Draft Detailed Project Report

New Technology Centre at
Sriperumbudur
(General and Precision Engineering)
June 2019

Technology Centre Systems Program

Report No: 2018-Delhi-0319

Submitted

To

The Office of Development Commissioner - MSME
Ministry of MSME, Govt. of India
Maulana Azad Road, New Delhi -110008

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21 June 2019

Director (Technology Centre Systems Program)

Office of Development Commissioner, MSME

Ministry of MSME

Nirman Bhawan, Maulana Azad Road,

New Delhi -110108

Dear Sir,

As part of our engagement to provide Consulting services for establishment of Program Management Unit (PMU) for designing the project, undertaking the pre-project activities and providing implementation support during the course of the Technology Centre Systems Program (TCSP), we hereby submit the Draft Detailed Project Report for setting up of Technology Centre at Sriperumbudur, Tamil Nadu for your kind perusal. The deliverable has been prepared in accordance with our engagement agreement dated 07 November 2013, and our procedures were limited to those described in that agreement.

This Detailed Project Report is based on inquiries of and discussions with:

- O/o DC MSME
- PSC
- Industry experts
- World Bank Mission
- Industries and Ancillary units
- Government Institutes and Industry association
- Secondary Research

We have not sought to confirm the accuracy of the data or the information and explanations provided by O/o DC MSME. Our work has been limited in scope and time and we stress that more detailed procedures may reveal other issues not captured here. The procedures summarized in our Draft Detailed Project Report do not constitute an audit, a review or other form of assurance in accordance with any generally accepted auditing, review or other assurance standards, and accordingly we do not express any form of assurance. This Draft Detailed Project Report is intended solely for the information and use of the Office of DC-MSME and is not intended to be and should not be used by anyone other than this specified party.

We appreciate the cooperation and assistance provided to us during the preparation of this report. If you have any questions, please contact the undersigned.

Very truly yours,

Amar Shankar, Partner – Advisory Services

Disclaimer

This Draft Detailed Project Report for development of Technology Centre at Sriperumbudur as part of consulting services to establish a Program Management Unit (PMU) for designing the project, undertaking the pre-project activities and providing implementation support during the course of the Technology Centre Systems Program (TCSP) has been prepared by Ernst & Young LLP (hereinafter referred to as 'EY' or 'Ernst & Young' or 'Us') and delivered to the 'Office of Development Commissioner - Ministry of Micro, Small & Medium Enterprise (O/o of DC-MSME)' (hereinafter referred to as 'the Client').

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Acknowledgement

We would like to express our sincere gratitude to MoMSME and its officials for their involvement and valuable inputs during the preparation of this DPR. We extend a special thanks to **Shri Ram Mohan Mishra, IAS, (AS&DC-MSME), Shri Sudhir Garg, (Joint Secretary-MSME), Shri Sanjeev Chawla (Director-TCSP, MoMSME) and Shri Virinder Sharma (Director, MoMSME)** for their proactive support and guidance during the entire process.

We would also like to thank the GMs of existing MSME TCs for their guidance and valuable inputs during preparation of the DPR.

We would like to convey our sincere thanks to officials of MSME Department, Government of Tamil Nadu, **SIPCOT**, Industries Associations and **MSME-DI Chennai** for their support during the on-site visit for the proposed Technology Centre at Sriperumbudur.

Also, we must extend our sincere thanks to all the stakeholders including, Large Enterprises, OEMs, Tier I and Tier II suppliers, industry associations like SIMA, CDISSIA, AIDAT, TIEMA, AIEMA, Government Institutes, MSMEs visited and other ancillary units who gave us their valuable time and insights with respect to various dimensions of the tooling industry and its support requirements. Without their help, capturing of the industry requirements would not have been possible.

Abbreviations

AICTE	All India Council for Technical Education
ACMA	Automotive Component Manufacturers Association of India
AIC	Atal Incubation Centre
AIDAT	Aerospace Industrial Development Association of Tamil Nadu
AIEMA	Ambattur Industrial Estate Manufacturers' Association
AR	Augmented Reality
ASEAN	Association of Southeast Asian Nations
ASMC	Automotive Suppliers' Manufacturing Centres
ATR	Academic, Technology support & Research
BEL	Bharat Electronics Limited
BEML	Bharat Earth Movers Limited
BHEL	Bharat Heavy Electricals Ltd.
BOD	Biological Oxygen Demand
BPL	Below Poverty Line
CAD	Computer-Aided Design
CAE	Computer-Aided Engineering
CAGR	Compounded Annual Growth Rate
CAM	Computer-Aided Manufacturing
CBIC	Chennai – Bengaluru Industrial Corridor
CDGI	Centre for Development of Glass Industries
CDISSA	Chennai District Small Scale Industries Association
CFTI	Central Footwear Training Institute
CIHT	Central Institute of Hand Tools
CII	Confederation of Indian Industry
CIM	Computer Integrated Manufacturing
CIPET	Central Institute of Plastics Engineering and Technology
CITD	Central Institute of Tool Design
CMC	Construction Management Consultant
CMM	Co-ordinate Measuring Machine
CMWSSB	Chennai Metropolitan Water Supply and Sewerage Board
CNC	Computerized Numerical Control
CSIR	Council of Scientific and Industrial Research
CTR	Commercial Tool Rooms
CTTC	Central Tool Room & Training Centre
DC	Development Commissioner

DeitY	Department of Electronics & Information Technology
DFC	Dedicated Freight Corridors
DIC	District Industries Centres
DPR	Detailed Project Report
DRDO	Defence Research and Development Organisation
DTCP	Department of Town and Country Planning
ECIL	Electronics Corporation of India Limited
EDM	Electrical discharge machining
EMF	Environmental Management Framework
EPC	Environmental Protection and Compliance
EPIP	Export Promotion Industrial Park
ERP	Enterprise Resource Planning
ESDM	Electronics System Design and Manufacturing
ESTC	Electronics Service & Training Centre
EY	Ernst and Young LLP
FDDI	Footwear Design and Development Institute
FDI	Foreign Direct Investment
FFDC	Fragrance & Flavour Development Centre
FMCG	Fast Moving Consumer Goods
FRP	Fibre Reinforced Plastic
FSSP	Full Social Screening Process
FY	Financial Year
GC	Governing Counsel
GDP	Gross Domestic Product
GE	General Electric
GESIP	Gender, Equity and Social Inclusion Plan
GIZ	Gesellschaft für Internationale Zusammenarbeit
GoI	Government of India
GSDP	Gross State Domestic Product
HAL	Hindustan Aeronautics limited
HIET	Hindustan Institute of Engineering Technology
HSC	Higher Secondary School Certificate
HT	Heat Treatment
IA	Industrial Area
ICICI	Industrial Credit and Investment Corporation of India
IDBI	Industrial Development Bank of India
IDEMI	Institute for Design of Electrical Measuring Instruments

IDFC	Infrastructure Development Finance Company
IDTR	Indo Danish Tool Room
IE	Industrial Estate
IEM	Industrial Entrepreneurs Memorandum
IEMA	Industrial Estate Manufacturers Association
IGTR	Indo German Tool Room
IISc	Indian Institute of Science
IIT	Indian Institute of Technology
IoT	Internet of Things
IP	Intellectual Property
IPSSP	Indigenous People's Social Screening Process
IRR	Internal Rate of Return
ISRO	Indian Space Research Organisation
IT/ITES	Information Technology/ Information Technology Enabled Services
ITI	Industrial Training Institute
ITSP	IT Service Provider
KPI	Key Performance Indicator
KVIC	Khadi and Village Industries Commission
LIE	Large Industrial Estate
LLP	Limited liability partnership
MoMSME	Ministry of Micro, Small & Medium Enterprises
MOU	Memorandum of Understanding
M-SIPS	Modified Special Incentive Package Scheme
MSME	Micro, Small & Medium Enterprises
MSME-DI	Micro Small & Medium Enterprise - Development Institute
NABARD	National Bank For Agriculture And Rural Development
NAL	National Aerospace Laboratories
NBFC	Non-Banking Financial Company
NCVT	National Council for Vocational Training
NGO	Non-Government Organisation
NH	National Highway
NIT	National Institute of Technology
NOC	No Objection Certificate
NSIC	National Small Industries Corporation
NSIC-TSC	NSIC-Technical Service Centre
NSSP	No Social Screening Process

NSTEDB	National Science and Technology Entrepreneurship Development Board
O/o of DC MSME	Office of Development Commissioner - Micro, Small & Medium Enterprise
OEM	Original Equipment Manufacturer
PCB	Printed Circuit Board
PDO	Program Development Objective
PHED	Public Health Engineering Department
PLC	Programmable Logic Control
PMC	Project Management Consultant
PMEGP	Prime Minister Employment Generation Programme
PMMY	Pradhan Mantri Mudra Yojana
PMU	Program Management Unit
PPDC	Process and Product Development Centre
PPP	Public Private Partnership
PSU	Public Sector Undertaking
QC	Quality Control
RFD	Result Framework Document
RFP	Resettlement Policy Framework
RPT	Rapid Prototyping
SCVT	State council for Vocational Training
SEZ	Special Economic Zone
SIATI	Society of Indian Aerospace Industries and Technologies and Industries
SIDBI	Small Industries Development Bank of India
SIDCO	Small Industries Development Corporation
SIMA	SIPCOT Irungattukottai Manufacturers Association
SIPCOT	State Industries Promotion Corporation of Tamil Nadu
SME	Small and Medium Enterprises
SSC	Senior Secondary School Certificate
TAFE	Tractors and Farm Equipment Limited
TAGMA	Tool & Gauge Manufacturers Association of India
TANSIDCO	Tamil Nadu Small Industries Development Corporation
TANSTIA	Tamil Nadu Small and Tiny Industries Association
TBI	Technology Business Incubator
TC	Technology Centre
TCM	Technology Cluster Manager

TCs	Technology Centres
TCSP	Technology Centre Systems Programme
TDC	Technology Development Centre
TIC	Technology Information Centre
TIEMA	Thirumudivakkam Industrial Estate Manufacturer Association
TIG	Tungsten Inert Gas
TIIC	Tamil Nadu Industrial Investment Corporation Ltd
TNEB	Tamil Nadu Electricity Board
TNPCB	Tamil Nadu Pollution Control Board
TR	Tool Room
TRTC	Tool Room & Training Centre
UAV	Unmanned Aerial Vehicle
UNIDO	United Nations Industrial Development Organization
UTI	Unit Trust of India
VCIC	Vizag-Chennai Industrial Corridor
VLSI	Very Large-Scale Integration
VOC	Volatile Organic Compounds
VR	Virtual Reality

Revision History

Serial No.	Revision	Amendment description	Prepared by	Reviewed by
1.0	First Draft DPR	Review of Draft DPR	Tashi Singh	Dr. Milind Mujumdar Dinesh Pradhan Samrendra Singh
1.1	Second Draft DPR	Incorporated changes as discussed with Dr. Milind, Dinesh Pradhan and Samrendra Singh	Tashi Singh	Dr. Milind Mujumdar Dinesh Pradhan Samrendra Singh
1.2	Third Draft DPR	Updated the machine list and incorporate changes suggested by Dr. Milind, Dinesh Pradhan and Samrendra Singh	Tashi Singh	Dr. Milind Mujumdar Dinesh Pradhan Samrendra Singh
1.3	Fourth Draft DPR	Updated machine list after second stakeholder discussion	Tashi Singh	Anil Bhandari Dr. Milind Mujumdar Dinesh Pradhan
1.4	Fifth Draft DPR	Included DART as per the suggestion of the Client	Tashi Singh	Anil Bhandari Dr. Milind Mujumdar Dinesh Pradhan
1.5	Sixth Draft DPR	Include changes suggested by the Client	Tashi Singh	Anil Bhandari Dr. Milind Mujumdar

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Executive Summary

Objective of DPR: Evaluate the feasibility of the proposed Sriperumbudur TC.

Key Components

- Opportunity and need assessment
- Social and Environmental assessment
- Technology & Skillset requirement
- Investment & Return

Opportunity and need assessment

Key clusters in Catchment Area

- Sriperumbudur – Orgadam Industrial Belt with major automobile players
- Maraimalai Nagar – Industrial hub, Ford, BMW etc. several global Tier 1 players – Bosch, TVS
- Sri city - Emerging auto hub, Isuzu and Honda facility, several Japanese tier 1&2 suppliers

Potential Market Opportunity

- Upcoming Defence Corridoe in Tamil Nadu – Chennai-Housur-Salem- Coimbatore-Tiruchirapalli
- Up-coming Aerospace Park at Orgadam

Stakeholder discussions

Key Stakeholders

- O/o DC-MSME
- Government of Tamil Nadu
- MSME-DI, Chennai
- Industry Association
- PSUs, Government Institutes
- OEMs, Tier I & Tier II suppliers
- MSMEs

Key Technology Requirement

- Precision and composites machining with CNC machines
- Testing & Validation lab
- 3D Printing, reverse engg.

Key Training Requirement

- Product Design – CAD/CAM/CAE
- 3D Printing & scanning
- Maintenance & Repair of CNC Machines

Financials

- Total Capital Expenditure: INR 197.26Cr
  - Production Machines: INR 85.92Cr
  - Training, DART, EDP and Incubation Centre Machines: INR 31.90 Cr
  - Building Infrastructure: INR 73.09 Cr
  - Other Infra. incl. Pre-Operative Expenses : INR 6.35 Cr

IRR: 11%
Positive income after depreciation is projected to be registered in 8th year

Location Overview

- Accessible by NH 16, NH 48
- Node to the Golden Quadrilateral Highway
- Upcoming Chennai-Bengaluru and Vizag-Chennai Industrial Corridor
- Connectivity with major cities like Bengaluru, Vizak, Mumbai etc.
- Connected to the North-South and South-West Dedicated Freight Corridor
- Access to major ports of Ennore, Chennai
- Proximity to Chennai International Airport

Automobile and Aerospace Industry in Tamil Nadu

20% of India's total installed capacity of Vehicle production

21% of India's automobile exports

Upcoming Defence Corridor in the state

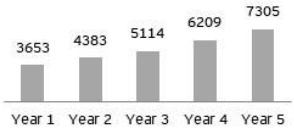
USD 3 billion investment planned for aerospace projects

Focus area of the Technology Centre

1 Production

- Composites Machining
- Advance CNC Machines
- Additive Manufacturing
- Testing and Validation facility
- Mold, Die & Tool making

Projected Number of Trained Students



2 Training

- Product Design – CAD/CAM/CAE
- Additive manufacturing
- Process automation, mechatronics
- AR, VR, IOT
- Courses on Rural Artisan, Craftsman & Technician Training

3 Consultancy

- Design Support
- Productivity improvement
- Support to training colleges

4 Additional Key Areas

- Rapid Prototyping Centre
- Incubation Centre & leveraging schemes like AIC etc.
- Technology Information Centre
- TCM support
- Department of Agricultural/Rural & Traditional Enterprises (DART)

Revenue (INR Cr)

Introduction

1 Introduction

1.1 Background and project rationale

India is one of the largest and dynamic emerging markets with vast economic potential. India's GDP in 2017 was USD 2,629 million ranking 6th amongst all countries[1]. In order to touch an overall growth rate to touch 8 per cent, India's manufacturing sector needs to grow at 12-14 per cent, as stated by NITI Aayog, Manufacturing has long been recognized as an essential driver of economic development for most countries, as it has an important economic and employment multiplier effect. The manufacturing sector has been identified as the key driver for growth which will have to play an important role to take Indian economy to a high growth rate trajectory and achieve the planned objectives. MSMEs play an essential role in the overall industrial economy of the country and account for over 45% of India's manufacturing output[2].

Despite strong potential, India's manufacturing performance has not been encouraging. The share of manufacturing in India's GDP has stagnated at around 16 percent[3], compared to more than 30 percent (and growing) in some of the other Asian countries. Many new initiatives have been taken by the Government to promote investment in manufacturing in the country. Under the Make in India initiative, the Government of India aims to increase the share of the manufacturing sector to the gross domestic product (GDP) to 25 per cent by 2022, from 16 per cent, and to create 100 million new jobs by 2022.[4] India's manufacturing sector has been facing challenges, such as low value addition, low productivity, and less-than-desirable up scaling. However, world-class production units that compete in the international market are observed in the automotive sector.

The major constraints in the growth and competitiveness of India's manufacturing sector are:

- Difficulties in accessing markets (including within India),
- Difficulties in accessing finance (especially for MSMEs),
- Infrastructure deficiencies and
- Difficulties for MSMEs to access technology and lack of skilled manpower.

These constraints impact the competitiveness of MSMEs operating in both upstream and downstream manufacturing industries.

Upstream industries, such as the tooling industry, which consists of developing and manufacturing of dies, moulds, castings, as well as testing and prototyping, serves as an interface between product

[1] World Bank Data
[2] http://www.dnb.co.in/Nashik2013/PDF/MSMEsInIndia.pdf
[3] The Manufacturing plan - Strategies for accelerating growth of manufacturing in India in the 12th Five Year Plan and beyond
[4] IBEF - https://www.ibef.org/industry/manufacturing-sector-india.aspx

design and product manufacturing. The right tools help increase throughputs, reduce material waste, improve product quality, time to market and thus improve competitiveness. The importance of the tooling industry increases with accelerating technological developments, product sophistication/ innovation/ customization and reducing time to market. Tooling is a specialized but local industry (more than 60 percent of tools in the world are locally produced and consumed – including in India) dominated by MSMEs (more than 80% of firms in India, Europe, US and Japan). As in other countries, the private tooling industry in India has grown hand in hand with the manufacturing industry. It is estimated that the total tooling market in India will reach to INR 20,000 Cr by FY 2020 with CAGR of 11% from current market of INR 14,640 Cr (FY 2016-17) over the next three years (TAGMA Report 2016-17). The constraints to the growth and competitiveness of the Indian tooling industry mirror the ones affecting manufacturing as a whole, as articulated above. The scarcity of skilled workers and problems related to their retention, as well as the lack of access to a high-quality design and prototyping facility has hurt growth.

In downstream industries such as automotive, electronics, fragrance and flavours, glass, leather, toys etc., there is shortage of skilled labour and limited access to advanced technologies. These industries include large numbers of MSMEs, often working as part of supplier networks of larger enterprises and subject to increase international competition.

1.1.1 Demographic overview and challenges

While India stands to benefit from an immense demographic dividend (with more than 62% of its population in the working age group of 15-59 years[5], it has an overall unemployment rate of 5 percent (under usual principal status approach) and an overall labour force participation rate of 50.3 percent[6] . For the country to gain from this demographic dividend, skilling and up-skilling its youth are key priorities for the Government of India (GoI).

India has a labour force of about 470 million, of which less than 10 percent has received skills training, either through formal or informal means[7]. About 26 million young people enter the labour force annually. Despite the huge expansion of skills training provision during the 11th Five-year plan, the country's skills development system requires massive up scaling. In its 11th and 12th Five-year plans, India recognized that skill development is critical to achieve faster, sustainable and inclusive growth on one hand, and to provide decent employment opportunities to the growing young population, on the other hand. According to the National Skill Development Policy 2015, there is an

[5] National Policy for Skill Development and Entrepreneurship 2015
[6] Report on the Fifth-Annual employment & unemployment survey (2015 – 2016) of the Ministry of Labor, Government of India.
[7] 11th and 12th Five Year Plan

additional net incremental requirement of 109.73 million skilled manpower by 2022. This will add another 104.62 million persons to be skilled to meet the target. [8]

Global experience shows that a workforce with higher education and skill levels leads to higher productivity and personal income. A 2011 study showed that students who attended three-year vocational training courses at ITIs earned 25 percent more than two-year course students, who earned 14 percent more than did one-year course students[9]. These results were also observed in a 2007 study showing that the returns on vocational training in India have been found to be 8 percent, almost equivalent to the 8.4 percent related to an additional year of education. The same study showed that increased educational attainment by one year is associated with 5.8 percent higher firm-level productivity in India[10].

Development of Indian manufacturing sector calls for deepening and recalibrating of economic reforms that would strengthen the sector and make it grow faster and become an engine of inclusive growth. To realize the potential of the manufacturing sector, Government of India had announced National Manufacturing Policy in 2011 with the objective of enhancing the share of manufacturing in GDP to 25% within a decade and creating 100 million jobs. It also seeks to empower rural youth by imparting necessary skill sets to make them employable. Sustainable development is integral to the spirit of the policy and technological value addition in manufacturing has received special focus.

The National Manufacturing Policy has six objectives:

- Improve manufacturing sector growth rate to 12-14% over the medium term to make it the engine of growth for the economy. The 2 to 4 % differential over the medium-term growth rate of the overall economy will enable manufacturing to contribute at least 25% of the National GDP by 2022.
- Increase the rate of job creation in manufacturing to create 100 million additional jobs by 2022.
- Creation of appropriate skill sets among the rural migrant and urban poor to make growth inclusive.
- Increase domestic value addition and technological depth in manufacturing.
- Enhance global competitiveness of Indian manufacturing through appropriate policy support.
- Ensure sustainability of growth, particularly with regard to the environment including energy efficiency, optimal utilization of natural resources and restoration of damaged/ degraded eco-systems.

[8] http://www.skilldevelopment.gov.in/assets/images/Skill%20India/policy%20booklet-%20Final.pdf
[9] Vocational Training in the Private Sector (Goyal 2011)
[10] The Knowledge Economy and Education and Training in South Asia (World Bank 2007)

1.1.2 Recommendations of 12th plan working group & Parliamentary Standing Committee

At present, the Office of Development Commissioner [O/o DC (MSME)], Ministry of Micro, Small and Medium Enterprises, operates 10 TRs and 8 TDCs (both hereinafter called as TCs) spread across the country. The TCs have been providing technical and vocational training programmes to more than 1, 00,000 trainees annually including AICTE and NCVT approved certification. They also provide design and manufacturing support to entrepreneurs alongside technical consultancies. The TCs' primary focus is to improve access to advanced technologies, provide technical advisory support to entrepreneurs and workers, and offer opportunities for technical skill development to the youth at varying levels. The variance in levels of training itself is demonstrative of a wide spectrum of technical sophistication in training inputs.

Considering the performance of existing TCs, the Department related Parliamentary Standing Committee on Industry, in its 235th report submitted to Rajya Sabha on 04th May 2012 have recommended as follows:

i) "The committee is impressed with the performance of the TRs established by the MSME Ministry. These enable the youth to improve their skills and get employment opportunities. The success of such TRs inspires confidence that establishment of more such institutions will equip the young people with necessary ability useful in the expanding market and manufacturing sector".

ii) "The Committee strongly recommends that more funds must be allocated for establishment of TRs across the country. It is understood that MSME Ministry is also approaching the concerned organizations within Government to get loan from International Financial Institutions. If Planning Commission and Finance Ministry cannot allocate more funds for this purpose, the necessary permission to MSME Ministry to get access to borrowings from international banks may be given without delay. However, it is strongly recommended that we must use our own resources for this cause, which is good for the youth of our country and MSME sector".

The evaluation of existing ten TRs was undertaken under GIZ–MSME Umbrella Programme during 2011. The experts have appreciated the performance of the existing TCs and have recommended expansion of skill development activities and introduction of newer technologies in the TCs.

Hon'ble Finance Minister on 28th Feb 2013, in his budget speech 2013-14 has made following announcement:

Para 75: "TRs and TDCs set up by the Ministry of MSME have done well in extending technology and design support to small businesses. I propose to provide with World Bank assistance, a sum of Rs.2200 crores during the 12th Five Year Plan period to set up 15 additional Centres".

In pursuance of (i) the Finance Minister's announcement through his Budget speech (2013-14), (ii) the recommendations of the Department Related Parliamentary Standing Committee on Industry in its 235th Report submitted to Parliament (Rajya Sabha) on 4th May 2012, and (iii) the recommendations of the experts after evaluating the performance of existing TCs, it was proposed to implement "Technology Centre Systems Programme (TCSP)" at an estimated project cost of Rs.2,200 crores including World Bank assistance of USD 200 million by setting up 15 new TCs and to modernize / upgrade existing TCs by introducing latest machinery / technologies.

1.1.3 Technology Center System Program

The Technology Center System Program, a national program, seeks to develop the technological and skill base of MSMEs in selected manufacturing industries, via upgraded and new TCs (currently called TRs and TDCs) has been envisaged. The TCs' mission would be to improve the competitiveness of MSMEs across India – with a strong emphasis on low income states.

This will be achieved by providing an integrated suite of services to MSMEs on a fee basis, ranging from providing them access to technology, access to skills and access to business advisory services. TCSP will reinforce the technical capability of the TCs as well as their performance, by further increasing the participation of the private sector in key decisions at both the national and local levels.

The TCs shall support industry clusters across manufacturing value chains, both upstream (tooling industry) and downstream (key industries exposed to global competition close to the technology frontier, such as the automotive and electronics sectors, as well as industries evolving through indigenous innovations, such as fragrance and flavour, glass, leather, toys etc.).

The PDO has been defined to enhance the competitiveness of MSMEs by improving their access to technology and business advisory services as well as skilled workers through systems of financially sustainable TCs. The program seeks to establish 15 new TCs and upgrade technological capabilities of the existing TCs and develop linkages between MSMEs, Indian and international research institutes and leading manufacturers. The program will connect leading practices that will contribute to advance technology, knowledge, skilling and innovation that can be transferred to MSMEs served by each TC.

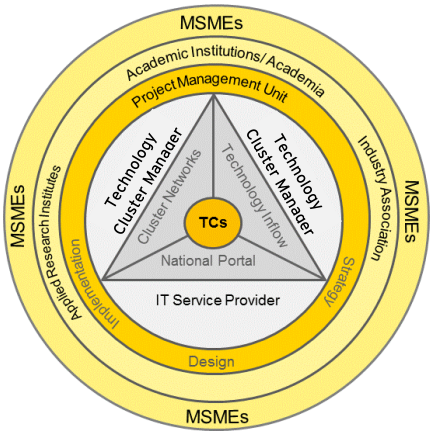
The competitiveness of MSMEs is impacted by various factors such as entrepreneurial drive of the leader, market and customer dynamics, their access to technology, finance & business advisory and availability of skill manpower. The TCs will shape the outcomes of the program by providing MSMEs access to technology, business advisory and skilled manpower. So it would be possible to measure

the success of this program by measuring the off-take of these paid services of the TCs by MSMEs. Therefore, the key indicators that will be measured are;

- Number of enterprises paying for the services of the TCs.
- Number of long term trainees employed by industry, including MSMEs, within six months after being trained at TCs.
- Profit of TCs before depreciation and land.

In addition, intermediate result indicators are designed to monitor critical progress towards achievement of the PDO with primary emphasis on market-tested outputs of the TCs supported by TCM. Examples of such indicators include capacity utilization of machines; trainees trained access to services by MSMEs, number of technology strategies / roadmaps developed by TCM and endorsed by industry associations and value of TCs' businesses generated with support of TCM.

Figure 1: TCSP eco-system



This program will help MSMEs in key industries to become more competitive by acquiring improved technology and employing better skilled workers. This will be done directly through the services provided to them by the TCs, as well as indirectly through their linkages with larger firms (e.g. as part of the supplier network of an OEM), which will have access to the services of the TCs under the condition that it benefits their suppliers. The TCs will contribute by providing inputs to MSMEs on manufacturing technology & business advisory and by improving the skills of workers/ skill seekers who can gain better employment opportunities. The program will therefore benefit the Indian MSMEs, students and workers and help establish systems of TCs in the country where each centre will gain from the specialization and experience of the other and improve the competiveness of MSMEs.

1.1.4 Key TCSP stakeholders

TCSP has multiple stakeholders who will need to work together to achieve the objective to enhance the competitiveness of MSMEs by improving their access to technology and business advisory services as well as skilled workers through systems of financially sustainable TCs. The key players who will participate in the program include:

- **Beneficiaries**

MSME units will be the prime beneficiaries of the program and the overall objective of the program centers around providing them with access to modern technology, business advisory services and skilled workforce. Workers, job and skill seekers will also gain from this program with access to short

term and long term training/ skill development courses which will help them in improving their career prospects and finding livelihood.

- **Office of Development Commissioner, Ministry of MSME (DC-MoMSME)**

The program would be designed and implemented under the aegis of the O/o Development Commissioner MSME, Government of India.

- **Technology Centres**

The TCs will act as the medium through which the services of the MSMEs - integrated suite of services on a fee basis, ranging from providing them access to technology, access to skills and access to business advisory services. The program will focus on up-gradation of select existing TCs and 15 new TCs that support or will support industry clusters across manufacturing value chains, both upstream (tooling industry) and downstream (key industries exposed to global competition close to technology frontier, such as automotive electronics, as well as industries evolving through indigenous innovations, such as fragrances and flavours, footwear, glassware, toys etc.).

- **Industry associations, academia, applied research institutes and others**

Strategic collaborations between TCs and various other organizations will be critical to foster research and development, idea incubation and strengthen the TCs with regard to manufacturing services, business advisory and training capabilities. These include:

- Regional / sectorial industry associations representing MSMEs.
- Regional / national level engineering/ academic / vocational training institutions.
- Applied research institutes.
- Local regional colleges.
- Autonomous institutes such as IISc, CSIR.
- Academia.

Leading practices from around the world for similar program suggest and underscore the importance of establishing such linkages. In the Indian context, there are many research oriented projects and concepts that can provide competitive advantage to Indian industry once the early state research emanating from applied research institutes and academia can be validated and implemented at the TC through such collaborations. The TCs will provide a unique environment of bringing the country's leading academics, engineering and industry professionals together to develop and demonstrate new

technologies on an industrial scale. This will allow the clients of TCs to develop new manufacturing processes in a safe, neutral setting, reducing the associated financial risks.

- **Program management unit (PMU)**

The PMU will assist the O/o DC MSME in designing and implementing this program. This will include developing framework for identifying sites/sectors for the new TCs, developing Detailed Project Report (DPR), support in procurement of services and Environmental Protection and Compliance (EPC) contracts; developing and implementing environment and social safeguards, monitoring and evaluation, manage the roll out of the IT Portal and ERP Implementation Partner, deployment of subject matter expertise and overall program management for TCSP over 6 years. EY LLP has been appointed as the PMU for the TCSP by the O/o DC MSME.

- **Technology Cluster Manager (TCM)**

Technology Cluster Manager (TCM) will help build capacity of the TCs to enhance economic development cooperation amongst key stakeholders to improve the competitiveness of the cluster. This will include strengthening market linkages of the TCs with the MSMEs in the cluster it serves, trade and industry associations, academia, educational institutions, applied research institutions, service providers, other government support institutions, workers and skill seekers.

TCM will enhance the competitiveness of the cluster business environment by establishing a network of service providers which will address the needs of the MSMEs not served by the TC e.g. access to a network of financial services. TCM will also facilitate closer cooperation between the TC and MSMEs with key innovation stakeholders such as applied research institutes, autonomous institutions such as IITs, IISc, CSIR, academia, skill seekers, and students etc. to enhance product and process innovation.

TCM will also help enhance the supply side of the TC by augmenting the technologies at the TCs, assist in their capacity building with respect to the identified technologies and clusters and provide greater support to the services being offered to the MSMEs by the TCs. These services include being exposed to the potential impact of new and relevant technologies, learning how to use new technologies/equipment, providing access to cutting-edge equipment, developing and testing new products, consultancy, training and deploying efficient techniques and practices that improve the competitiveness of the MSMEs being served.

- **IT Portal and ERP Implementation Partner**

TCSP will support an Online Portal for MSMEs and a common ERP for the TCs with the vision of "creating an interactive technology platform for the needs of Ministry of MSME, Technology Centres and MSMEs for collaboration and information dissemination". The portal will act as a common platform for information dissemination, services and support across many aspects of business that will be required by an MSME from the start of their business, to successful operations and growth e.g. access to Ministry's MSME schemes, TCs' services, MSME-relevant tenders published by Government departments and PSUs, central MSME databank etc. Through this portal, users will also be able to access (virtually) most of the technical information and training services provided by the TCs. A robust Monitoring & Evaluation mechanism will also be an integral part of the platform to help track the outputs and outcomes of the programs being run at level of TCs and under the ambit of TCSP.

Under the project, a fully integrated, robust & internationally recognized ERP solution is planned to be implemented for all the TCs encompassing functionalities such as Accounting and Finance, Purchase & Contract Management, Stores & Inventory Management, and HR and recruitment. The ERP would assist TCs carry out the essential functions in a standardized and efficient way. This ERP solution is also envisaged to help TCs collaborate among them on various business/non-business activities and thereby add greater value to the MSME value chain. Becoming centers of excellence on this product is also one of the long term objectives for some of the TCs, enabling them add additional source of revenue via imparting industry-accepted professional training courses & certifications on the ERP package to the MSME sector.

- **Construction Management Consultant (CMC)**

The Construction Management Consultant shall be responsible for design, supervision of work and final closure of construction works for the TCs. CMC will prepare concept plans and subproject appraisal reports, carry out contract planning and detailed engineering designs, prepare schedules of quantities and specifications. It will support the PMU in preparation of procurement packages, bid documents, invitation, receipt and evaluation of bids etc. CMC will supervise the construction, manage the contract, monitor construction activities and will certify contractor's progress claims, carry out quality control, testing, and prepare progress and monitoring reports, and certify bills. M/s Tata Consulting Engineers Ltd. has been selected as the CMC for the TCSP by the O/o DC MSME via competitive bidding as per World Bank guidelines.

1.1.5 RFD of TCSP

- TCSP's objective is to enhance the competitiveness of MSMEs by improving their access to technology, business advisory services as well as skilled workers through systems of financially sustainable TCs. For monitoring the program outcomes, RFD has been defined; which contains the results indicators at the PDO level and intermediate outcome level together with the baselines and targets over the life of the program. Intermediate results indicators are designed to monitor critical progress toward achievement of the PDO with primary emphasis on market-tested outputs of the TCs and other stakeholders of the TCSP (viz. TCM, IT Portal and ERP Implementation Partner).

Active participation of General Manager of TCs will be essential for steering the operationalization of TCSP in line with the envisioned mandate. The key success parameters of the General Manager include:

- Revenue earned by respective TC from,
  - Production
  - Training
  - Consultancy and other services
  - Business given to private tool rooms
  - Production/training/consultancy with the help of TCM (territory/sectors to be identified Jointly by TCM in advance)
- Recovery ratio--Revenue/ recurring expenditure (cash) in percentage
- Profit before depreciation
- Profit after depreciation
- No. of trainees trained in Long term & Short term training programme
- No. of courses identified which are suitable for women employment & courses designed and started (TCM to assist the identification and designing of courses)
- No. of units assisted , out of which how many are MSMEs
- Present technical papers showing successes delivered and how it has aided industry
- Technical incubation centre to be started and the long term trainees to be encouraged to register for starting enterprises

The table below depicts the snapshot of result indicators which form a part of the RFD.

Table 1: Result indicators of the RFD

Program development objective indicators		Number of enterprises paying for the services of TCs
		Number of long term trainees employed by industry, including MSMEs, six months after graduating from the TCs
		TCs' gross profit before depreciation (not including land)
Intermediary Results		
Component 1- Technical assistance to the existing and new TCs	Access to technology	Revenue of TCs from access to technology activities (production support and consultancy)
		Capacity utilization of machines in TCs
		No. of technology strategies/roadmaps developed by TCM and endorsed by industry associations and IC
	Access to skilled workforce	Number of trainees trained (direct program beneficiary)
		Number of skills development contents (e.g. curricula, standards, certifications) developed and adopted by industry associations, and/or certifying agencies
	Access to business advisory	Number of needs assessment and business plans developed by TCM and endorsed by Industry Assocs.
		Value of TCs' businesses generated with support of Technology Cluster Managers
		Number of users of IT Platform
Component 2-Investments to upgrade existing and develop new TCs		Number of new TCs built

1.2 Existing MSME TCs and feedback on other TRs

Out of the currently operational eighteen TCs & TRs, ten are for the tooling industry and eight are for other industries such as ESDM (electronics system design and manufacturing), glass, footwear, and fragrance and flavour industries etc. Half of these eighteen TCs are located in low income states (Uttar Pradesh, Madhya Pradesh, Odisha, Jharkhand and Assam). The TCs are self-sufficient institutions that provide training, manufacturing and consulting services to MSMEs and OEMs. They have created a niche in the market in various fields such as hand tools, plastics, automotive, lean production etc.

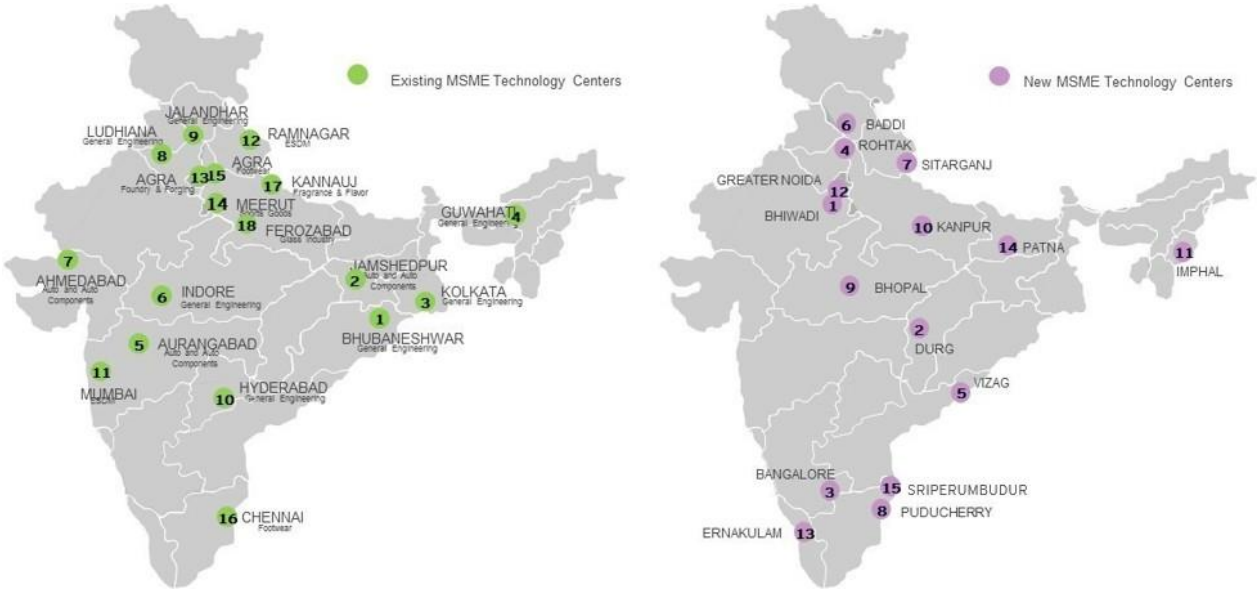
The list of the existing TCs & TRs along with their specializations is given below:

Table 2: Existing TCs & TRs along with their specializations

S. No.	Name	Specialization
1	Central Tool Room & Training Centre (CTTC), Bhubaneswar (Odisha)	Tooling, precision manufacturing and training
2	Indo Danish Tool Room (IDTR), Jamshedpur (Jharkhand)	Tooling (specialization in automotive) & training
3	Central Tool Room & Training Centre (CTTC), Kolkata (West Bengal)	Tooling & training
4	Tool Room & Training Centre (TRTC), Guwahati (Assam)	Tooling & training
5	Indo German Tool Room (IGTR), Aurangabad (Maharashtra)	Tooling (specialization in automotive) & training
6	Indo German Tool Room (IGTR), Indore (Madhya Pradesh)	Tooling (specialization in automotive and plastics, contributing to medical) & training
7	Indo German Tool Room (IGTR), Ahmedabad (Gujarat)	Tooling (specialization in plastics, contributing to automotive) & Training
8	Central Tool Room (CTR), Ludhiana (Punjab)	Tooling & training
9	Central Institute of Hand Tools (CIHT), Jalandhar (Punjab)	Tooling (specialization in hand tools)
10	Central Institute of Tool Design (CITD), Hyderabad, (Andhra Pradesh)	Tooling & training
11	Institute for Design of Electrical Measuring Instruments (IDEMI), Mumbai, (Maharashtra)	ESDM, tooling and training
12	Electronics Service & Training Centre (ESTC), Ramnagar (Uttarakhand)	ESDM and training
13	Process and Product Development Centre (PPDC), Agra (Uttar Pradesh)	Foundry & forging and training
14	Process cum Product Development Centre (PPDC), Meerut (Uttar Pradesh)	Sports goods and training
15	Central Footwear Training Institute (CFTI), Agra (Uttar Pradesh)	Leather footwear & training
16	Central Footwear Training Institute (CFTI), Chennai (Tamil Nadu)	Leather footwear & training

S. No.	Name	Specialization
17	Fragrance & Flavour Development Centre (FFDC), Kannauj (Uttar Pradesh)	Fragrance & flavours and training
18	Centre for Development of Glass Industries (CDGI), Firozabad (Uttar Pradesh)	Glass and training

Figure 2: Location of existing TCs and New TCs



Several of these were set up through support from German and Danish Governments and under bilateral agreements with the UNIDO. These TCs are largely self-sustaining entities that have been providing technical and vocational training programs to more than 1, 00,000 trainees annually. Some of these include certificate training programs certified by the AICTE and NCVT. They also provide design and manufacturing support to entrepreneurs alongside technical consultancies.

The existing TC's, were set up between 1967 and 1999, with primarily focus on improving access to technologies and providing technical advisory support for entrepreneurs in the given industry cluster they serve. These TCs also serve workers and youth by offering opportunities for hands-on technical training and skill development in varied trades with a view to improve employability and livelihood opportunities.

The key services offered by the TCs mainly include:

a) **Design & manufacturing**
   - Design & Manufacturing of Tools, dies, moulds and precision tools,
   - Process Development,
   - Product Development.

b) **Skill development**

- Long & short term training programs,
- Areas include Tool and die making, Computer Aided Design (CAD), Computer Aided Machining (CAM), CNC (**Computer Numerical Control**.) ,Robotics and machine shop automation, Rapid Prototyping (RPT), mechatronics, welding etc.,
- International, modular and customized programs,
- Varies from school drop outs, SSC / HSC / pass outs, ITI pass outs, diploma holders and graduate engineers.

c) **Consultancy**

- Inspection & calibration facilities,
- Turn-key assignments,
- Course curriculum developments for ITIs and other institutions

Over the last few years, financial performance of the TCs has markedly improved. Most of them have experienced strong revenue growth (mostly due to training activities) and have achieved financial sustainability (before depreciation and land costs).

Some of the preliminary findings from the analysis show:

a) **High profitability in recent years**: There has been an improvement in recovery ratio of these TCs, thus allowing them to progress towards their self-sustainability mandate. Each of these 8 MSME TRs has become profitable in the last two years. From our discussions, we understand that IGTR Indore and CTR Ludhiana were not profitable in recent years; however, these centres have also corrected their recovery rates in 2012-13. In addition to these institutes, some of the other institutes are yet to reach the recovery ratio of 100%.

b) **Skewed / Tilted towards training**: Training and skill developed services have been a key revenue source for the TCs. The scope of manufacturing needs to be up-scaled to achieve a balance in operations and revenues from each TC. Ideally, revenues should be balanced between the two main sources of income for the TCs. Only IGTR Aurangabad is found to be closely balanced. CITD Hyderabad and CTTC Kolkata, although profitable, need to perhaps enhance their production activities.

c) **Focus of production activities is more towards job work or component production**: It was found that the utilisation of machines in the production area was focused on component production and facilities for designing, die casting or tooling were not being fully utilized. CTTC Bhubaneswar and IDTR Jamshedpur focus on component production while CTR Ludhiana on job work and IGTR Indore and CTTC Kolkata on jigs and fixtures. Only IGTR

Aurangabad and CITD Hyderabad were found to focus on specialization in production, including designing, such as die casting and sheet metal or press tooling.

d) **Training capacity is well utilized**: As reflected in the sources of revenue generation, the scale of training activities has been growing. All TCs initially reviewed, demonstrated an increase in production numbers from 2016 to 2017, however training forms the majority share of the earnings. The staff at these TCs needs to further focus on production to maintain a balance between these two activities, while also up scaling other activities like consultancy and product testing. The centres should also seek avenues for taking advantage of government sponsored schemes and subsequently train more technicians in welding, machining and in automation.

1.3 Evaluation study of TCs and recommendations of the experts

A study of selected MSME TRs in India on '*Strategic Assessment and Recommendations*' has been submitted under the '*Micro, Small and Medium Enterprises Umbrella Programme*'. The purpose of the study was to make comparison of the TRs with international TR programmes. An integrated set of ten recommendations have been made to increase the impact of the TR programme - reducing constraints to manufacturing MSME growth which are as follows:

- **Scale up training to meet market demand** - TCs should contribute trainees in greater numbers. The gap in the supply of advanced manufacturing skills will systematically reduce.
- **Support private tooling sector to mature to excellence** - Besides 10 government TRs, hundreds of private TRs contribute to increased manufacturing MSME competitiveness by providing more complex tools at lower prices.
- **Speed up absorption of advanced manufacturing technology** - Increased numbers of MSMEs will be able to access advanced technologies which enables them to secure larger contracts at better margins.
- **Engage in strategic partnerships** - Partnerships with large manufacturers can help realise large scale opportunities for manufacturing MSME. TCs can benefit from large scale and long lasting demand for services and increased revenue.
- **Systematically build and leverage networks of capacities** - The TCs should build a network of collaborating stakeholders to support the TCs to unlock more opportunities. Sub-contractors can enable TRs to expand the scale and scope of their services.
- **Re-organise "business model" of government TRs**- the TCs should function as autonomous business units with increased powers and accountability, increase job enrichment and control over own wellbeing. These teams are likely to become more motivated, innovative, leaner and more responsive to customers.

- **Map out the TRs role in the local innovation system** - TCs can benefit from integration with the local innovation system. Increased opportunity will result from increased stakeholder awareness and support.
- **Move away from hierarchy to network governance** - TCs will benefit from more autonomy which enables them to respond better to opportunities.
- **Establish a strategic framework** - TCs should utilise a coherent strategic framework which clearly articulates programme goals, sound economic development principles and good practices. Revised KPIs should promote sound strategy that result in greater, sustained development impact.
- **Establish a strategic facilitation capacity** - TCs should learn faster to achieve greater development impact. TCs should be at an international level of competitiveness.

During our discussion with TCs, it was conveyed that several studies have been undertaken by O/o DC MSME to analyse the technology capabilities and governance framework established at the existing TCs. The key findings from these studies are summarized as follows;

A study was undertaken to analyse the technology, organization and training at select MSME TRs, including CTTC Bhubaneswar in November 2012. The key findings of the analysis for CTTC Bhubaneswar are as follows:

- **Technology**
  - The average milling machine age is a higher compared to the reference groups,
  - Multiple machine work is not accomplished limiting the potentials in productivity,
  - The number of unproductive machines is significantly lower compared to other MSME TRs,
  - The share of set-up times is conspicuously low and is therefore subject to review,
  - The technology relevance distribution is different to other TCs, as the turning technology is an important technology for the component production,
  - The grinding technology shows potential for higher performance particularly with regard of high precision machining for aeronautical components,
  - The technology analysis shows machinery characterized by a high machine performance

- **Organization**
  - Towards the customer this is compensated by a large portion of products being delivered early, – 4 out of 5 orders will reach the customer on time,
  - Late orders occur infrequently and are in line with the international competitive standard,
  - The experience, process quality, and customer focus is also represented by high customer satisfaction,
  - High manpower in the quality management department ensures the high quality of the products,

- Quality assurance is also exercised by the departments individually to operate with process orientation,
- The customer group can be considered focused by the standard of the other MSME TCs,
- A short average job tenure is an indicator for future sustainability and a stable process structure,
- CTTC Bhubaneswar successfully exploits the benefits of customer focus and product portfolio – The next step has to be undertaken by adding an electronic planning and control system

► **Training**

- The development of further courses on automation and systems should be continued,
- Even though an advanced process understanding is existent in manufacturing it is not sufficiently transferred to training,
- The analysed courses comprehensively attend to the necessary key know-how of machine operators, programmers, and designers in the mid-term format.

The key recommendations made in the report were as follows:

► **Technology**

- Holding the high machinery performance level with the help of machine investments – large size milling machines and grinding machines,
- Rationalization and standardization of all manufacturing processes,
- Reduction of in-machine set-up times using zero-point clamping systems and pallets,
- Efficiency improvements by reduction of electrode milling and sink-EDM machining time by shifting to graphite electrodes.

► **Organization**

- Definition of requirements to improve planning and control of the order fulfilment process by developing an electronic planning and control system.

► **Training**

- Development of a link between manufacturing competencies and course offerings by setting-up of course offerings addressing organizational capabilities and component manufacturing,
- Establishment of modular course structure for advanced training of industry professionals.

All of the above recommendations are valuable not only for the improvement of the existing TCs but also it serves as an important input for conceptualizing and planning for the new TCs.

DPR Objective and Approach

2 DPR objective and approach

2.1 Objective

Technology Centre in Sriperumbudur has been proposed with the underlying fact and review of the catchment area (Chennai, Ambattur, Padi, Maraimalai Nagar) which has some of the leading auto players, auto ancillary units, Aerospace and Precision manufacturing Units. Further the proposed Aerospace Park being developed will promote the establishment of MSMEs in this niche sector. The TC can provide training to up-skill the manpower and at the same time facilitate and support the MSME units which would come up across this region. The TC at Sriperumbudur will play an important role in enhancing the competitiveness of the MSME units in the area. TC will focus on providing skill up-gradation, improving access to technology, and offering advocacy support to the MSMEs with high growth potential. The long term vision is to ensure competitiveness of the MSMEs in the eco-system by strengthening their linkages to the mainstream manufacturing sector in the region.

The objective of this DPR is to evaluate feasibility of proposed MoMSME TC at Sriperumbudur. This include the assessment of the market needs in the region, technology and skillset requirement, amount of investment required, construction needed, its layout subsequent requirements for implementation of the greenfield TC at Sriperumbudur. This DPR is prepared in consultation with relevant stakeholders including O/o DC MSME, MSME Department, Government of Tamil Nadu, SIPCOT, World Bank, OEMs, Tier I & II suppliers, Industry Associations, Government Institutes and some ancillary units in the region. This DPR would facilitate the implementation plan of proposed TC at Sriperumbudur. Also, a stakeholder discussion at Chennai was organised on 25 April 2018, which was chaired by Secretary, MSME, Government of Tamil Nadu and in the discussion representatives from various industry associations, industries, MSMEs participated. Their suggestions and views were also taken into consideration during the preparation of DPR.

2.2 Approach

To start with, a comprehensive secondary research was carried out to understand the machining, tooling and technological requirements of Precision engineering and General Engineering in the catchment area around Sriperumbudur industrial area including Chennai region. To validate the facts, the team conducted a detailed primary research that included meetings with various key stakeholders including O/o DC-MSME, Industrial Associations and Precision engineering, General Engineering units in the catchment and others as explained below.

Discussions with various stakeholders were carried out to develop better understanding of the requirements and expectations from the proposed TC. Leading players were met in this region to discuss and understand the various insights with respect to the machining, tooling, Precision Engineering & other technological requirements during the preparation of the DPR. Telephonic discussions with Aerospace Industry Associations, some of the auto component manufacturers and

suppliers across various regions were carried out. The objective of this primary research was to understand their business requirements, issues, challenges, and future requirements to develop a deeper understanding of the requirements that can be served by the TCSP in future.

Based on the outcomes and the results of the discussions, market opportunity assessment was undertaken to understand the tooling & technology demand in automobile and precision engineering sector across various stages of manufacturing.

Way forward: Post completion of the DPR for the proposed TC at Sriperumbudur under TCSP, the on-boarding of 2 main partners would be very critical to achieve the envisaged outcome in the defined time frame.

- **Construction Management Consultant** - For the development of the new facility at Sriperumbudur, Tata Consulting Engineering Ltd. has been selected as the CMC for the TCSP.
- **Technology Cluster Manager** – Hiring of the TCM is under process for the TCSP project. The key purpose of TCM will be to assist in procurement of machines by providing inputs on technical specifications, adoption of new technologies available, designing technological roadmap etc. Also, TCM will assist TCs in marketing activities, provide linkages, cluster development etc.

Location/Cluster/ Industry Selection

3 Framework for Selection of Industry/ Clusters/ Systems/ Location for New TCs

3.1 Location selection framework

With the objective of establishing 15 new TC's to support industry clusters, there was a need to prioritize and identify high potential growth industries based upon certain selected parameters. Hence, one of the most challenging and critical aspect of the TCSP was selection of the Industry/Clusters/Systems/Locations. This required careful consideration of parameters and consultation with the stakeholders. Preliminary meetings with the O/o DC-MSME were held to discuss the concept and approach. Subsequently three distinct approaches were finalised to identify the locations:

a) **Manufacturing Competitiveness approach**: Key idea for this approach was to identify location for TC at a place where it can create the most impact on improving the manufacturing competitiveness. The steps involved were:

- Listing major manufacturing industries creating value across country
- Identifying the clusters which can be catalyst to the manufacturing competitiveness for respective industry

One key limitation of this approach is that it will select the clusters which are already established and are among the most competitive across the country. A TC at such location will further improve the competitiveness of this location.

b) **Inclusive Growth approach**: Approach is based on the assumption that the state which has higher Net State Domestic Product has significant growth and hence the states with lower per capita state domestic product should be supported. A TC in such states would become a catalyst to improve the manufacturing growth in the state. Following steps were followed:
   - Identification of bottom 15 Low Income states on the basis of per capita Net State Domestic Product[11]
   - Identification of major manufacturing Industries in the selected states
   - Identification of the major clusters for the identified major industries in the state

One of the key drawbacks of this approach is that clusters identified will not be the most competitive for the industry in the country. It is possible that by investing in a TC at such a location might improve the competitiveness of that cluster but this may not lead a world class centre TC.

[11] 2011-12 Current prices

c) **Alignment of Major Economic Projects:** Since a TC will create value for many years[12] and there are some mega projects in progress which will be completed in the next 10-15 years. This approach aims to incorporate the possible future growth areas on the basis of these mega projects. Considering that such economic growth is based on future development, these areas may not get covered in the above two approaches. The steps included are:

- Identification of major Economic projects & timelines (which have been ratified by the Government)
- Listing the States & Industries that are getting impacted
- Identifying the emerging clusters for the top industries

Above three approaches resulted in the first list of locations. It was important to create a common framework to choose the most appropriate location. In this context "systems approach" was applied. Systems approach takes in to account the presence of entire ecosystem for a TC in the catchment area[13] and a **Location Attractiveness (LA) Index** was created.

A Technology Centre will perform better in achieving its objectives if it is established at a location with better LA Index.

Construct of LA Index:

LA Index Score= Catchment Score * Presence of TC Score

Catchment Score = *f* x (MSME Unit Score * ITI/PT Score * Presence of Major Firms Score* Presence of Leading Technical Institute Score)

Presence of TC Score= Presence of state/private technology center in the catchment area

Following data prints were captured and analysed:

- Number of MSMEs, Number of ITIs /Polytechnics, Number of Major Firms, Leading Technology Institutes for R&D
- Existence of TCs in the Catchment area (inclusive of DC-MSME, State Government , and Private Tool Rooms)

MSME Units: This reflects the concentration of MSME and it is envisaged that larger the number of units more opportunity for TC to impact the competitiveness.

[12] Existing Technology Centers are more than 25 year old.
[13]Catchment Area = District of the location and all neighbouring districts (transcending state boundaries) it is assumed that maximum value creation will be in the immediate surroundings of the Technology Center.

Number of ITIs/Polytechnics: This reflects the availability of population seeking skill development courses. It has also been observed that students from ITI and polytechnic form a large group of students seeking vocational training at TCs due to lack of such facilities at their respective institutes.

Number of Major Firms: It has been observed that often larger firms take the initiatives to go for technology upgrades and performance improvements. This leads to cascading effect and firm's suppliers, competitors follow up these initiatives in order to stay competitive. If a TC has larger number of such major firms in the vicinity it will have more opportunity to do technology collaborations and thus impact the entire ecosystem.

Leading Technology Institutes: Each TC can play a vital role to establish an Industry- Academia partnership. It has been found that while there are researched ideas available at the academia but they have difficulty in commercializing same. On the other hand the industries are looking for the fresh ideas to improve upon their competitiveness in the market. Unfortunately this linkage does not happen as industry has the need for ideas where the proof of concept is ready but unfortunately academia does not go beyond research. TC can play a role of bridging this gap and create the platform to link industry and academia.

State/Private TC: TC can play a vital role in mentoring and improving the performance of the state government or private sector TCs (tool rooms). If there are such opportunities in the vicinity of the MoMSME TC it can further increase the reach of TC to improve the competitiveness of MSMEs.

The weightages assigned to each parameter were as below:

Figure 3: Weightage assignment

				Catchment Area Parameters				Major Firms		Tech Inst.		Presence of state/pvt TR	
			100		30		20		20		10		20
State	Industry	Location	Net Score	Units	Unit Score	ITI/PT	ITI/PT Score	Number	Score	Number	Score	TC of State Govt/ Pvt Tool Room	TC-State Govt/ Pvt Score

In order to further refine the list of locations arrived using the above approach, following additional criteria for shortlisting the industries were incorporated:

- **Prior experience**: These are the sectors where O/o DC-MSME has experience of operating TCs, such as General Engineering, Automotive, Electronics/ESDM, Leather & Footwear, Glassware, Sports Goods, and Fragrance & Flavours
- **Concentration of MSME's**: These are sectors where O/o DC-MSME has limited prior experience of operating TCs, however there exist a large number of MSMEs in these industries. Such as Food processing, Textiles (including Handlooms & Handicrafts), Pharmaceuticals, Wood/Paper/Pulp, and Rubber & Plastics.
- **Emerging Sectors**: These are upcoming sectors that may be at the forming stage, but will become major sectors in the near future, such as Bio-technology, Nano -technology, etc.

The sector in which DC-MSME has prior experience has been taken on priority. These sectors are: auto components, ESDM, general engineering, fragrance & flavour, leather & footwear, glass. Later the scope can be expanded to include other sectors pertaining to ministries other than MoMSME, if needed. Such sectors include food processing, pharmaceutical, packaging etc. where presence of MSMEs is considerable.

The list of locations arrived by the above was further refined and finalised with respect to the following additional considerations;

- State Classification: The states were classified into two categories as unserved states and served states. All states of the country were distributed between Un-served states where O/o DC-MSME did not have an operating TC and served states where an operating MoMSME TC existed.
- At first unserved states were considered for the new TC in order to spread the coverage of MoMSME TC which would help in supporting more MSMEs across the country. With the approval of locations for the unserved states, served states would also be considered for the technologies for which existing TC cannot support.
- On the basis of MSMEs concentration in prior experience sectors, leading clusters were identified in each unserved state. This resulted in identifying the industry wise potential locations in each of these states.
- Some of the unserved states took proactive approach and have allocated or identified land for the purpose of TC. These locations were mapped to the locations identified in the step above. Accordingly technology focus was selected for these locations.

3.2 Selection of Sriperumbudur location for setting up of new TC

Tamil Nadu state government has allocated 10 acres of land for setting up a TC at SIPCOT Industrial Park at Vallam-Vadagal. With the land availability, Office of DC – MSME advised EY to prepare a detailed project report for Sriperumbudur TC. The region has been found suitable from multiple perspectives:

- The State Government has identified Aerospace and Precision Engineering as a key focus area for Industrial growth of the state. An Aerospace Park of around 200 acres has been earmarked to come up just opposite the proposed TC site location. This serves as a great opportunity for the existing MSMEs and prospective units to venture into this thrust sector. The TC will play a crucial role by providing latest technological assistance required in this highly specialised engineering sector.
- Kancheepuram district, especially Sriperumbudur Industrial area Chennai houses a number of global automobile players having their manufacturing facilities and a huge supplier base supporting them in and around the region. Some of the major players are Hyundai, Nissan-Renault, Ford, Daimler, BMW, Ashok Leyland, Royal Enfield, Yamaha, TAFE etc.
- The catchment area has a number of Tier 1 and Tier 2 supplier, both domestic and global players like TVS Group, Bosch, Motherson, Sri Ram Pistons etc. These players are further supported by Tier 3 suppliers which are MSMEs servicing in the Automobile Sector. The TC will help improve the manufacturing competitiveness of these units and promote their growth and development.
- Good Connectivity and access from other location:
    - The TC site location is situated in the Industrial Area of Vallam-Vadagal, amidst the automobile cluster in Orgaddam and Peramabdur. It is in close proximity to the NH 5 connecting the Industrial cities of Hosur and Bengaluru
    - Easy access to major ports of the state i.e. Chennai and Ennore facilitating exports to international markets
    - Located near the Chennai International Airport
- The catchment area will be a part of two new Dedicated Freight Corridors planned by the Indian Railways. The first one, North South Corridor will connect Delhi and Chennai and the second one, South West Corridor will connect Chennai and Mumbai through Bengaluru.

Location Brief

4 Location brief

4.1 Regional overview

Tamil Nadu is the southernmost state of India. It is surrounded by Andhra Pradesh in the north, Karnataka towards the north-west and Kerala on the West. The eastern side of the state faces the Bay of Bengal and southern region, the Indian Ocean. The topography of Tamil Nadu broadly comprises of the coastal plains in the east, uplands and hills as we proceed to the westwards. The plains account for more than half of the area of the State.

The Technology Centre Site is located at Sriperumbudur in the district of Kancheepuram. The district is located on the northern East Coast of Tamil Nadu. It is surrounded by the Bay of Bengal on the east, Vellore and Thiruvannamalai district on the West, Thiruvallur district and Chennai district in the North and Villuppuram district in the south. The site is 40 km from the state capital, Chennai. The district covers a total area of 4393.37 Sq.Kms and lies between 11° 00′ to 12° 00′ North latitudes and 77° 28′ to 78° 50′ East longitudes. Kancheepuram district, known as a temple town, is known for its electronic and software industry and the IT corridor. Also, a number of global automobile manufacturers like Ford, Hyundai, BMW, Nissan etc. have their manufacturing units in the industrial estate at Sripreumbudur. Thera are several ancillary units including tier I and tier II suppliers located nearby to support the industry. It is a growing export hub for the global automobile players for the South Asian market.

Chennai is the nearest port from Sriperumbudur which is one of the 3 major ports in Tamil Nadu. It is the busiest port handling maximum cargo traffic of 47.59 million tonnes (2017-18). Sriperumbudur is primarily an industrial area which has a well-developed infrastructure with an excellent road network. National Highway 48 passes through the Industrial estate which connects Chennai to Bengaluru and further to Mumbai, Pune and Hubli. It is accessible through other 3 national highways through Chennai, connecting it to the major cities and industrial hubs. Chennai International airport is the closest airport located at the distance of 75 km. Other accessible international airports include Madurai, Coimbatore and Trichi.

Figure 4: Location of Sriperumbudur

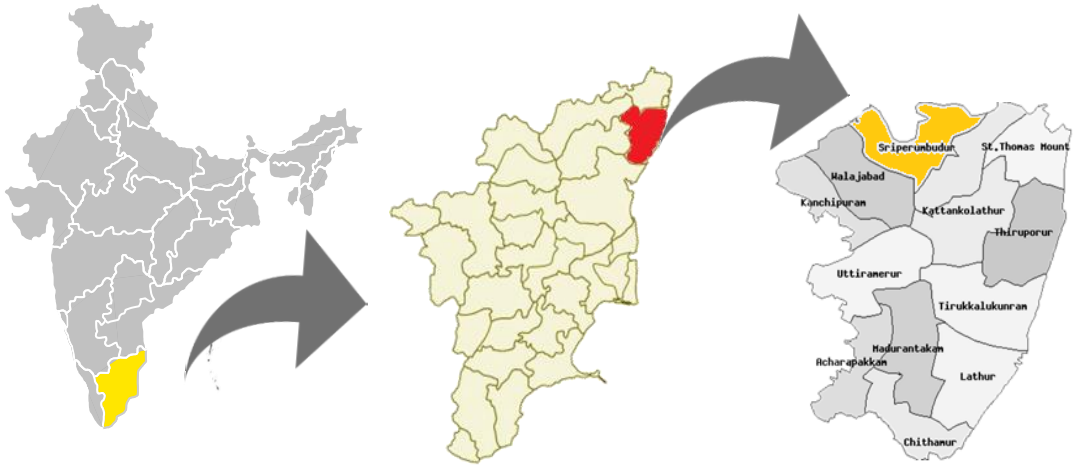


Table 3: Kancheepuram District snapshot[14]

Section	Quantity/Value
Area (geographical)	4393.37 sq. kms.
Administration	
Taluks	13
Revenue Villages	1,137
Population (2011 census)	
Total	39,98,252
Male	20,12,958
Female	19,85,294
Literacy Rate (2011 census)	
Total	85.29 %
Male	90.34 %
Female	80.17 %
Sex Ratio (2011 census)	986

Table 4: Tamil Nadu snapshot[15]

Section	Quantity/Value
Area (geographical)	1,30,058 sq. km
Administration	
Districts	32
Taluks	285
Revenue Villages	17,680
Population (2011 census)	
Total	7,21,38,958
Male	3,61,58,871
Female	3,59,80,087
Literacy Rate (2011 census)	
Total	80.33%
Male	86.81%
Female	73.86%
Sex Ratio (2011 census)	995
Infant Mortality Rate	20 per 1,000 live births less than one year

[14] https://kancheepuram.nic.in/about-district/ ; https://kancheepuram.nic.in/about-district/demography
[15] http://www.tn.gov.in/tamilnadustate ; National Family Health Survey – 4(2015-16), Tamil Nadu

Table 5: Status of Water, Electricity, Climate, Temperature in Kancheepuram District

Aspect	Status	Significance for TC
Water Availability	▶ Execution, operation and maintenance of water supply in Kancheepuram is looked after by Tamil Nadu Water Supply and Drainage Board ▶ Desalination and water recycling techniques of waste water are used.	▶ The city has 16 water distribution zones with 12 water distribution stations. ▶ Rain water harvesting system can help double the capacity available for consumption.
Electricity Availability	▶ Electricity is distributed and supplied by Tamil Nadu Electricity Board (TNEB)	▶ Power Backup to be designed keeping emergency and essential services/equipment in mind
Climate	▶ Northeast and Southwest monsoon are the major donors with 54% and 36% contribution each to the total annual rainfall. ▶ Wet season persists mainly during the north east monsoon period between October and December ▶ The average annual rainfall is about 1200 mm	▶ Good amount of rainfall signifies that there is a high capacity of rain water harvesting in the TC campus
Temperature	▶ Kancheepuram district has a Tropical Climate ▶ The hottest months are May-June with temperature reaching 37 °C and January being the coolest month with temperature ranging 18-29 °C.	▶ Due to high temperatures in summers and humid tropical climate, there is a high estimation of capacity of AC to be installed for adequate cooling, designing of building.

4.2 Demographic profile of the district

- The population Growth: The total population of Kancheepuram district is 39.98 Lakhs (census 2011). The growth of population in Kancheepuram district was 38.95% during the last decade (year 2001-11). Out of total population, 50.35% are men and 49.65% are women. Density of population is 892 persons per sq. km.

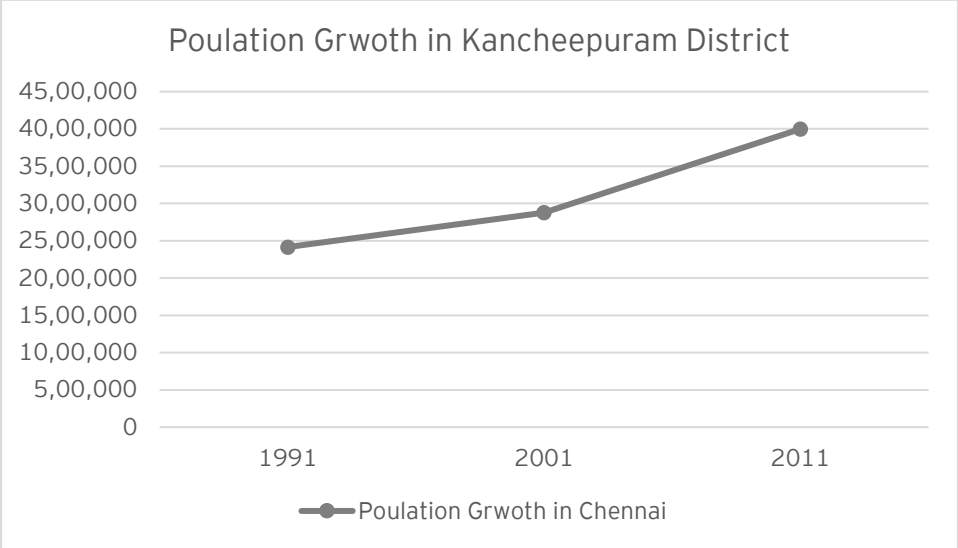


Figure 5: Growth of Population in Kancheepuram[16]

- The Literacy rate of Kancheepuram district is around 85.29%. Among male it is 90.34% and for females it is 80.17%.
- The sex ratio at the district level is 986 females per 1000 males (year 2011).
- Tamil is the official language however, other languages spoken including English and Hindi. English is widely understood though spoken by a few. Other languages spoken are Telegu, Malyalam and Urdu.

[16] Kancheepuram District Census Handbook - http://censusindia.gov.in/2011census/dchb/3303_PART_B_DCHB_KANCHEEPURAM.pdf

4.3 Regional Stakeholders

Regional industry associations, leading manufacturers, training institutes, applied research institutes, academia, thought leaders and above all MSMEs would play an important role in providing the guidance on key aspects including (but not limited) designing capabilities, technological requirements, skillset requirement and cluster development.

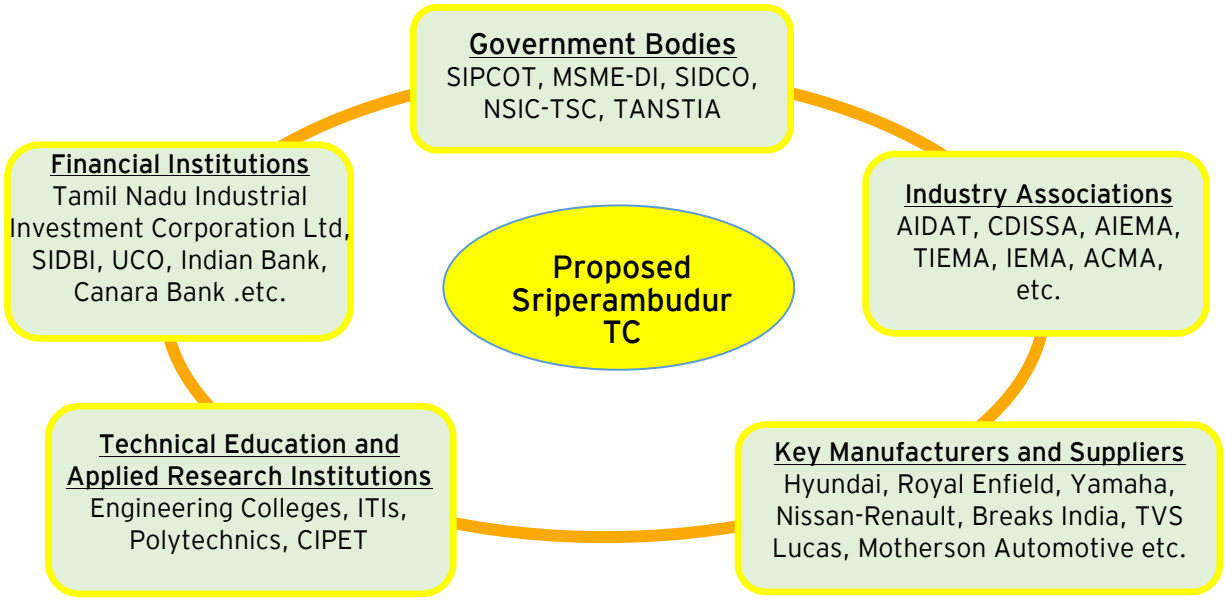


Figure 6: Stakeholders of Sriperambudur TC

4.3.1 Government Bodies

- **SIPCOT (State Industries Promotion Corporation of Tamil Nadu Ltd.)**

SPICOT was established in the year 1971 by Government of Tami Nadu to develop industrial growth in Tamil Nadu. In the last 44 years SIPCOT had established 11 Industrial Complexes, 3 Growth Centres, 5 Industrial Parks and 7 SEZs.

The Functions of State Industries Promotion Corporation of Tamil Nadu Limited (SIPCOT) are:

- Development of industrial complexes/parks/industrial estate and growth centres with basic infrastructure facilities
- Establishing sector-specific Special Economic Zones (SEZs);
- Implementation of Special infrastructure Projects
- On site office for complete assistance in interfacing with various government and non-government institutions
- Attractive fiscal incentives package depending on size of investments
- Common application form and single window facilitation to get all approvals

- Provision of external infrastructure including roads, power and water supply, public transportation, education, healthcare, housing and training facilities

► TANSTIA (Tamil Nadu Small and Tiny Industries Association) - The Apex Body of MSMES

TANSTIA is an apex body in the services of small & tiny industries as follows:

- Entrepreneur counselling service
- Sub-contracting Exchange
- Entrepreneur Development Programme
- Organizing Seminars, Workshops, Exhibitions and Trade visit foreign countries
- Liaison with Government
- Publication of Small Industry

Role of TANSTIA:

- It actively participates in the committees set up by state and Central Governments and promotes the interest of Small and Tiny industries.
- It sponsors Experts meet and Trade delegations to other countries.
- It offers valuable guidance to entrepreneurs.
- It publishes monthly magazine and newsletters for small industries.
- It organises Technical and Managerial training programmes to small industries.

TANSTIA - FNF Service Centre is a collaborative venture between Tamil Nadu Small and Tiny Industries Association, Chennai and Friedrich Naumann Foundation, Germany. It is intended for the following purposes:

- Creates an atmosphere for stimulating the growth of the state economy through the vibrant sector of small-scale industries
- Renders supporting services to small and tiny industries

► NSIC – TSC

The National Small Industries Corporation Ltd. was established in 1955 with a view to promote, aid and foster the growth of small industries in the country. It is a government of India Enterprise under the Ministry of Micro, Small and Medium Enterprises (MSME). The mission of the organisation is "to promote and support Micro, Small & Medium Enterprises (MSMEs) Sector" by providing integrated support services encompassing Marketing, Technology, Finance and other services. It provides Technology support through 8 Technology Service Centre (TSC) located across the country. It offers the following services through the TSCs:

- Technically trained manpower in traditional and advanced trades.
- Common facility support in machining, EDM, CNC, etc.

- Assistance in development of commercially viable prototypes.
- Material testing facilities through accredited laboratories
- Energy and environment services at selected centres
- Classroom and practical training for skill up-gradation

- **Tamil Nadu Small Industries Development Corporation Development (TANSIDCO)**

  Tamil Nadu Small Industries Development Corporation Limited (TANSIDCO) was incorporated in 1970 with the specific objective to play role of a catalyst in the growth and development of the Micro & Small Industries. It is wholly owned by the Government of Tamil Nadu. Micro, Small & Medium Enterprises Department, Government of Tamil Nadu, is the administrative department under the Ministry of Rural Industries, Government of Tamil Nadu.

  The prime function of SIDCO is the formation of potential growth centers in various parts of Tamil Nadu. The main objective of SIDCO is to stimulate development of industries in the small scale sector with the following promotional activities[17]:

  - **Creation of infrastructural facilities:** Development of industrial estates with infrastructure facilities and provision of work sheds & developed plots.
  - **Distribution/supply of raw materials:** Facilitate supply of Raw Materials to Micro & Small Industries through the wide network of Depots all over the State with assured quality at competitive price.
  - **Marketing Assistance Scheme:** Provides assistance to Micro & Small Industries to market their quality products to Government Departments / Government Undertakings at reasonable price.
  - **Bill discounting assistance:** The scheme has been initiated to mitigate the financial problems faced by SSI units due to delay in payments for their supply to government departments.
  - **Export Marketing Assistance**
  - **Captive Power plants:** Need assessment and feasibility reports are in progress for establishment of captive power plants in the Industrial estate
  - **Promotion of Skill development Centres in the Industrial Estate**
  - **Guidance to Entrepreneurs:** Provides guidance to aspiring entrepreneurs on information related to where and how to get project profiles, incentives available for the industry, packages of financial assistance, obtaining power connection and other facilities provided by central and State Government agencies

[17] http://www.investingintamilnadu.com/tamilnadu/institutional_support/SIDCO.php

- **District Industries Centre (DIC), Kancheepuram:**

District Industries Centres (DIC) are responsible for promoting enterprises, particularly medium, small and micro enterprises at the district level. The mission is to accelerate development in Tamil Nadu by maximising investment, output, growth, employment and manufacturing competitiveness through infrastructure and human resource development in the MSME sector. Some of the incentives provided include, schemes for technology development, infrastructure development, skill development and marketing support. It functions under the 'Department of Industries and Commerce'. The mission of the organisation is to accelerate development in Tamil Nadu by maximising investment, output growth, employment and manufacturing competitiveness through infrastructure and human resource development in MSME sector.

4.3.2 Industry Associations

- **Aerospace Industry Development Association of Tamil Nadu (AIDAT)**

The Aerospace Industry Development Association of Tamil Nadu is a new association formed in 2016 with the focus to engage multiple stakeholders in the community across the world for business opportunity in the field of aerospace and precision engineering. The objective is to make Tamil Nadu a premier destination for domestic and global manufacturing hub of Aerospace and Precision Manufacturing products.

The association also engages with the automotive manufacturers interested in expanding their business in the area of aerospace and become leaders.

AIDAT works to create an end to end ecosystem for aerospace sector covering design, engineering and manufacturing of aircrafts and other precision manufacturing related products. The vision and key objective of the association are:

- To position Tamil Nadu as an emerging hub for aerospace industry in India in the area of manufacturing, engineering design, maintenance support activities by harnessing its vast and growing industrial base and highly skilled capital base
- To spearhead and catalyse the aerospace and precision engineering industrial development in the State in line with the State Aerospace Policy
- To attract investments in Aerospace and precision manufacturing sector
- To generate employment opportunities to around 1 lakh people in 10 years
- To tap the existing strength of the State in Automotive sector in exploring opportunities in aerospace sector and create a global workforce for high-end manufacturing by establishing Centre of Excellence, R&D and skill development institutions
- To attract global OEMs and Tier 1 suppliers and Indian majors as anchor units in the state by providing required facilities and support at competitive rates.

- To create the comprehensive projects to be implemented in the state to achieve the objective of the Tamil Nadu State Vision 2023.

► Chennai District Small Scale Industries Association (CDISSIA)

CDISSIA was established in 1988 with the objective to serve the small-scale industries on not for profit basis. It a non-governmental organisation and is registered as a society under the Society's Act.

► Ambattur Industrial Estate Manufacturers Association (AIEMA)

AIEMA consists of more than 800 active members representing the small- scale industries of the Ambattur Estate. It was established in 1963, and has a good representation in the government organisations and media. The association liaises with Government, Statutory Bodies, Financial institutions and other similar associations to seek business opportunity and promote business interests. The Industrial Estate covers an area of around 473 hectares with more than 2000 active Tiny, Small and medium scale units. An estimated workforce of 2,00,000 contributes to a turnover of over INR 2,500 Crore.

AIEMA has its own Technology Centre, started in 1983 to facilitate technology up-gradation of its member units. It is a hub for all member activities and provides a range of training programs. The Centre is equipped with a CNC training facility, CAD/CAM, business centre, business library, conference hall etc. It has trained over 800 students through its training programs.

► Thirumudivakkam Industrial Estate Manufacturers Association (TIEMA)

TIEMA is an association of industrial units of SIDCO Industrial Estate, Thirumudivakkam established in the year 2001. It has around 350 members from Tiny, Small and Medium scale units in the 200 acre industrial estate. Majority of the units operate in the automotive sector- injection moulding, die making etc. and few in the pharmaceutical sector. The association continuously interacts with the State & Central Governments, financial institutions and other similar associations, thereby working for business promotion of its member firms. The units cater to a wide product range which replicates the all-inclusive scale of industries from automobile to software excellence guidelines.

The association conducts training programs as per the requirement of the members as well as the workers. TIEMA is dedicated to take care of Quality Guidance and encouragement allied services for its members.

4.3.3 Key Manufacturers and Suppliers

- **OEMs, Tier 1 Players**

Kancheepuram district houses a number of automobile manufacturers and the allied industry located in the region. Some of global automobile players in the catchment are Hyundai, Nissan- Renault, Daimler Trucks, Ashok Leyland, Royal Enfield, Yamaha, Ford, BMW, Mahindra & Mahindra TAFE etc. The leading Tier 1 players include Lucas TVS, Sundaram Fasteners, Bosch, Motherson Automotive, Brakes India, Wheels India, Caparo, WABCO etc.

All the established automobile players have their established supplier and ancillary units in the vicinity of their facility. The proposed TC would develop capabilities in manufacturing and design of automotive components required to support the large vendor base and ancillary units. It will help in growth and expansion of the existing MSMEs which are faced by several limitations in the current competitive environment. It would also play an important role in supply of skilled manpower to the industry.

- **MSME Units**

According to Udyog Aadhaar, Kancheepuram district has more than 57,782 MSME units registered out of which 17,442 units are in the manufacturing sector. Some of the significant industries in the district and its catchment are in automobile, auto components, electronics, IT systems and hardware, pharmaceuticals, ready-made garments and leather.

The auto components/engineering cluster in and around Kancheepuram district consists of more than 1,800 Micro, Small and medium units employing 5,000 people[18]. An overview of the spread of MSMEs in this region has been provided in the need assessment section.

4.3.4 Financial Institutions

- **Pradhan Mantri Mudra Yojana (PMMY)**

Under the Micro Units Development and Refinance Agency (MUDRA) Bank, comes a new institution which was set up by Government of India for development and refinancing activities relating to micro units. It was announced by the Finance Minister while presenting the Union Budget for FY 2016. The purpose of MUDRA is to provide funding to the non-corporate small business sector. Loans worth about Rs 1 lakh crore have been sanctioned to small entrepreneurs under the Pradhan Mantri MUDRA Yojana

- **Chennai** being a metropolitan city and the capital of Tamil Nadu, is infused with many private, public and cooperate banks. Some of the important financial institutes are:
  - Small Industries Development Bank of India (SIDBI)

[18] Brief Industrial Profile of Kancheepuram District, MSME-DI Chennai (2015-16)

- Tamil Nadu Industrial Investment Corporation Ltd (TIIC)
- Industrial Credit and Investment Corporation of India (ICICI)
- Industrial Development Bank of India (IDBI)
- Industrial Finance Corporation of India (IFCI)
- Industrial Investment Bank of India (IIBI)
- Infrastructure Development Finance Company (IDFC)
- National Small Industries Corporation (NSIC)
- Non-Banking Financial Company (NBFC)

4.3.5 Technical and Research Institutes

The details of technical and vocational training institutes supplying skilled man-power in the catchment have been given as follows:

► **Technical Education:**

Table 6: Intake capacity at technical institutions in Tamil Nadu[19]

Type of institute	No. of Institute	Intake Capacity (2015-16)
ITI	526	63,982
Polytechnic	511	1,12,717
Engineering	583	1,69,795
Total	1,620	3,46,494

The state of Tamil Nadu has more than 50 Universities. The technical education is well established in the state with over 500 engineering colleges including the prestigious Indian Institute of Technology, Madras. The renowned Anna University, situated in the southern part of Chennai City has 13 constituent colleges, 3 regional campuses and over 500 affiliated colleges. The university is an affiliated type which brings all the engineering colleges of the State under one umbrella, thereby ensuring uniform and quality engineering education. The state has a total of 583 engineering colleges with an intake capacity of around 3.5 lakh students annually. Kancheepuram district has a total of 52 engineering colleges and 4 Technical University[20]. There are several state and central government research institutes in various sectors. Government organisations like BHEL and ISRO have their independent research institutes pertaining to the welding and space research respectively.

► **Vocational Training:**

The State council for Vocational Training (SCVT) was formulated with the aim of streamlining the system of state run Vocational training in the state and also submit necessary proposals regarding

[19] Department of Technical Education, TN, http://www.tndte.gov.in/site/wp-content/uploads/2016/08/POLYTECHNIC-ADMISSION-ABSTRACT-COMMUNITY-WISE-2015-2016.pdf ; http://www.tndte.gov.in/site/wp-content/uploads/2016/08/ENGINEERING_ADMISSION_COMMUNITY_WISE_2015_16.pdf ; http://www.tndte.gov.in/site/wp-content/uploads/2016/08/District-Wise-No.-of-Institution-2015-16.pdf ; Directorate of Employment and Training- http://skilltraining.tn.gov.in/DET/coimbatore_reg.html

[20] Kancheepuram District Profile – MSME DI Chennai, 2015-16

State run vocational training to the Government of Tamil Nadu[21]. It is run by the Directorate of Employment and Training, which is affiliated to The National Council for Vocational Training.

The number of Government and private ITIs as reported are mentioned in the below table:

Type of institute	Govt. ITIs	Pvt ITIs	Total
Coimbatore Region	18	64	92
Madurai Region	15	55	76
Trichi Region	25	130	164
Tirunelveli Region	15	66	85

Various skill training programmes are being implemented through a vast network of Government ITIs and Private ITIs in the State. Systematic training offered in these institutes in different trades to ensure a steady flow of skilled manpower to the industries[22].

[21] Directorate of Employment and Training, Department of Labour and Employment, Government of Tamil Nadu http://skilltraining.tn.gov.in/DET/SCVT.html
[22] http://skilltraining.tn.gov.in/DET/objectives.html

Opportunity and Need Assessment

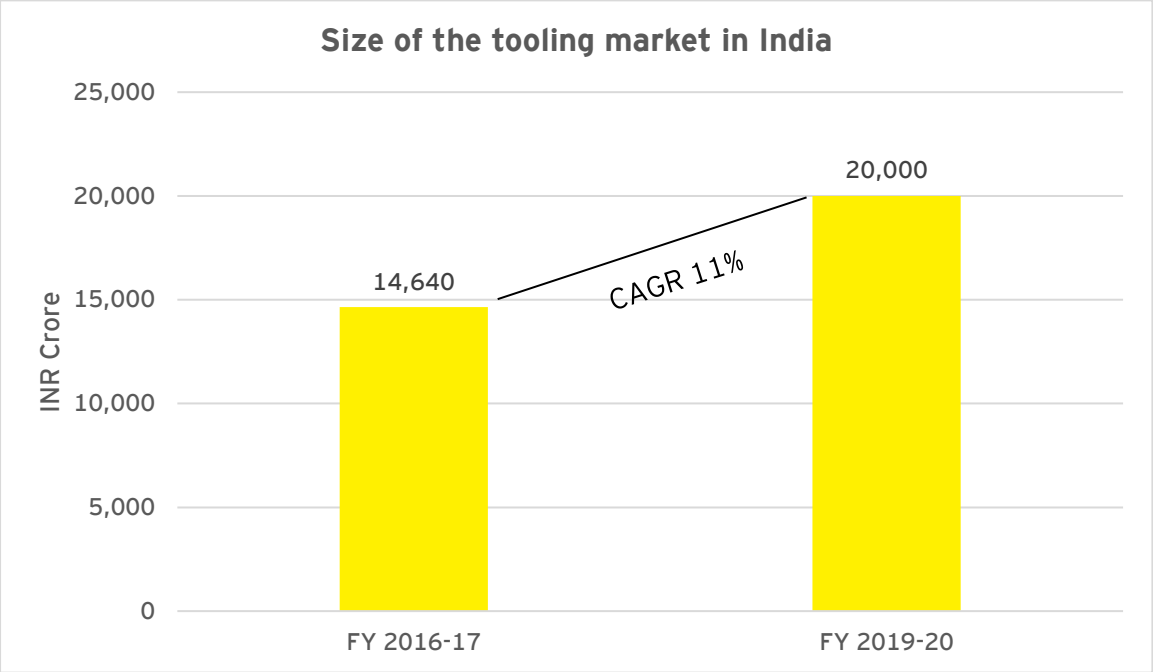
5 Opportunity and need assessment

5.1 Overall Market size of Tooling Industry

The tooling industry, that consists of developing and manufacturing dies, moulds, casts, as well as testing and prototyping serves as the interface between product design and product manufacturing. Growth of these manufacturing related industries, therefore, drives the growth in demand for tooling. The constraints to the growth and competitiveness of the Indian tooling industry mirror the ones affecting manufacturing as a whole. The scarcity of skilled workers and problems related to their retention, as well as the lack of access to a high-quality design and prototyping facility, has hurt growth.

It is estimated that the tooling market in India will reach to INR 20,000 crore by FY 2020 with a CAGR of 11% from the current market of 14,640 crore over the next three years (TAGMA 2016-17). The trend of growing demand for tooling market is illustrated in the figure below:

Figure 7: Size of the Tooling market in India



Source: Indian tool room industry report, TAGMA (2016-17)

Indian Tool Room industry size is estimated at ~INR 14,650 Cr. (2016-17)[23] which can be divided into two key segments - domestic (captive and commercial) and imports. Domestic Tool Rooms market is estimated at INR 12,020 Cr out of which INR 7,200 crores is generated from captive tool rooms and commercial tool rooms (CTRs) account for INR 4,820 crores. Imports are to the tune of

[23] TAGMA Report 2016-17

INR 2,700 Cr. In order to arrive at the addressable market for MSME TCs, a further analysis of the above three segments has been carried out.

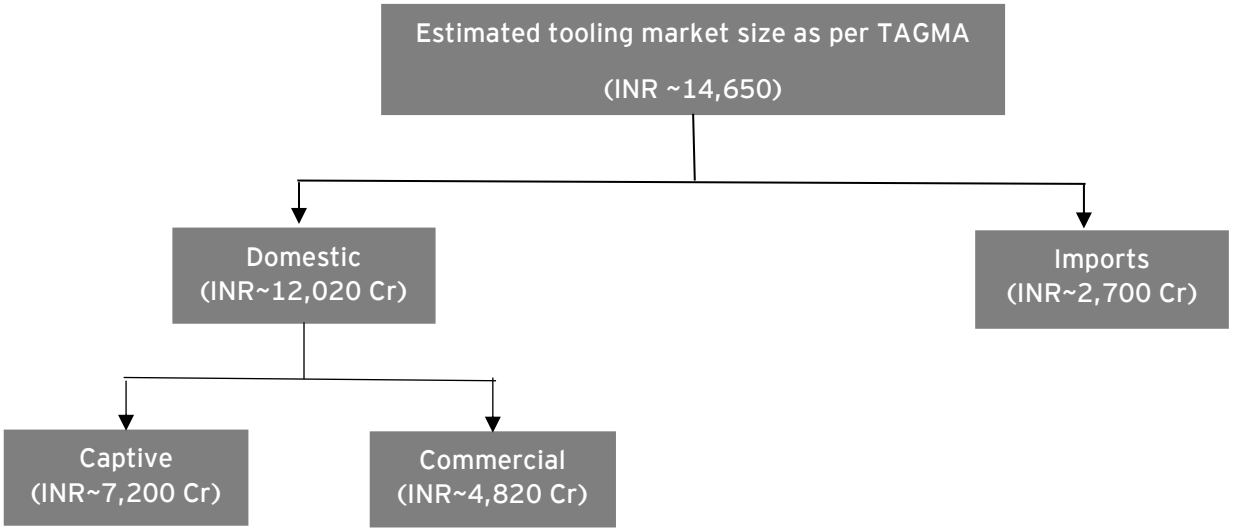
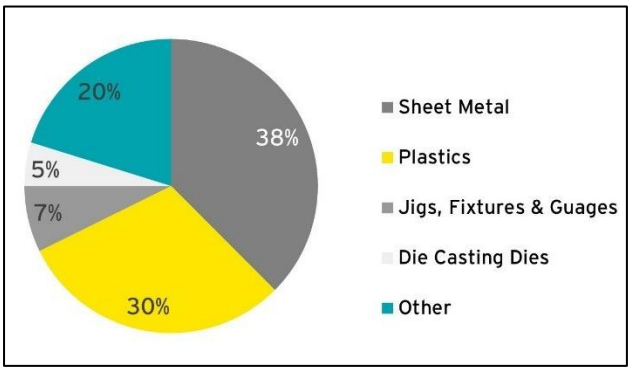


Figure 8: Structure of Tooling Market

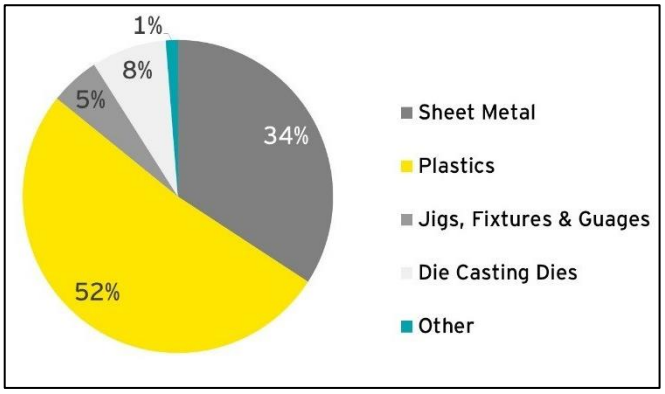
Figure 9: Composition of captive segment



In-house (Captive) Tool Rooms: Captive Tool Rooms mainly belong to the large and medium scale companies that develop tools for in house requirement, e.g. auto component, plastic, packaging etc. Such Tool Rooms have state of the art equipment to meet the internal requirements. Auto components and OEMs constitute around 60% of this segment. Quality tooling is critical to produce high quality finished components and such companies perceive that quality of the components can be maintained only by developing tools in house or through imports from their foreign counterparts which also ensures steady supply as per requirement. Another major reason for captive tool making is that these companies don't want to share their designs of tools to safeguard intellectual property of the company. Nearly 70% of auto and auto component companies except from Indian manufacturers, primarily import their tooling or have a captive Tool Room mainly due to lack of raw material quality and IP content. Indian Commercial Tool Rooms suffer from capacity constraint causing an increase in the lead time for manufacturing the tools to meet the demand of the end users. Thus, captive segment does not present a significant opportunity that can be targeted by MSME tool rooms.

Commercial Tool Rooms (CTRs): Commercial Tool Rooms account for ~ 49% of the total tooling market. Commercial Tool Rooms supply tooling on a commercial basis to a variety of industries and operate as independent companies. Besides manufacturing tooling, some Commercial Tool Rooms also undertake precision machining and component manufacturing. This segment with an estimated market size of the 7,200 crores (in year 2016-17) is the immediate low hanging fruit which can be addressed by MSME TCs by supporting Commercial Tool Rooms. It has been observed that Commercial Tool Rooms have insufficient capacity that leads to an increase in lead time for manufacturing of tools.

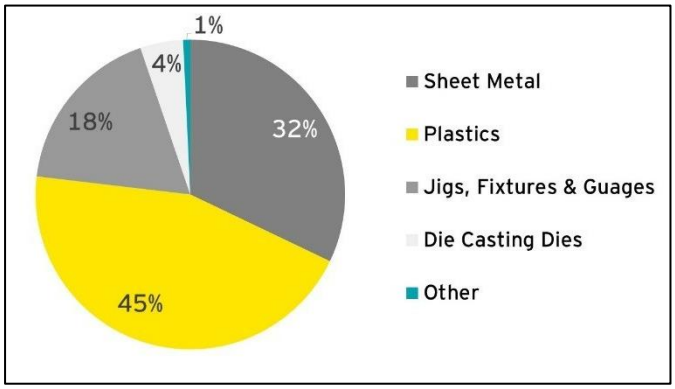
Figure 10: Composition of CTRs segment



Imports: Imports account for 18% of the total tooling market which is around INR 2,700 crores. There is a 20% decline in the market share of imports from INR 3400 Cr in FY 2012-13 to INR 2700 Cr in FY 2016-17. This indicates that end users are increasingly relying on domestic CTRs to meet their tooling need.

As per TAGMA report and our discussions with some of the Private Tool Rooms, key reasons for tooling imports are;

Figure 11: Composition of imports segment



- **Quality:** Better surface finish, lower turnaround time and higher degree of accuracy by ability to meet the tolerance range.
- **Complex Designs:** Lack of technical know-how, design and technical capability for critical and complex design with most of the CTRs
- **Capacity:** Insufficient capacity of Indian tool rooms to meet domestic demand and lack of infrastructure to make certain types of tools also results into imports.
- **Lead Time:** Higher lead time (12-16 weeks) offered by domestic CTRs whereas typical lead time offered by foreign CTRs are 8 -12 weeks.

- **Cost:** Higher price, non-availability of materials at par with the international standards, use of out dated technology due to absence of advance machinery compromises the quality of commercial tool rooms leading to demand for imports. In Countries like China and Taiwan, the tooling cost is lower than India.

- **Design:** International companies based in India prefer procurement of their tooling from their parent company to maintain design standards across the globe e.g. LG & Samsung import most of their tooling from Korea.

Import share are observed to be higher in segments like automotive, consumer durables and electronics[24].

Total addressable market for MSME Tool Rooms is about INR 9,900 crores (7,200 for Commercial Tool Rooms + 2,700 crores imports), especially those imports which take place as a result of insufficient capacity of domestic Commercial Tool Rooms.

To start with, the primary focus could be addressing the capacity constraint in the domestic tool room industry in the short run. However, a focused approach towards specialised tool production in the long run can help capture a part of imports which is being replaced by domestic supply from Commercial Tool Rooms. This would require additional support to Tool rooms just more than financial support and assistance. In the long run – MSME TCs can address rest of the market by,

- Increase in specialisation,
- Process standardisation,
- Safeguards to protect IP,
- Sharpen focus on quality and reduction in lead times

5.1.1 Primary Research

As a part of DPR preparation, discussions with some of the OEMs, auto component manufacturers, industry associations, and other stakeholders in the Chennai region were carried out. The objective of the primary research was to understand the business requirements, issues, challenges, and future requirements of the industry to develop a deeper appreciation of the requirements that the Technology Centre Systems Program of the O/o DC MSME can serve. The research also included the support requirements of these players with respect to designing, training, manufacturing and consultancy.

Stakeholder workshop was held at Chennai on 25 April 2018 with members of industry associations, officials of automobile players, BHEL, small auto component manufacturers and State Government.[25] Meetings and detailed discussions were held with small manufacturing units in the vicinity like Micro

[24] TAGMA Report 2016-17
[25] Details about stakeholders workshop in Annexure 18.2

Tech CNC Ltd, Shrivik Industries, MTAB Engineers India Pvt Ltd., Jayasuriya Enterprises, Chennai Forge, Kumar Industries etc. to understand their needs and potential areas of support.

Key inferences drawn from the primary research are as follows:

- The focus of the TC should be on providing manufacturing support through design, prototyping and testing services using state of the art technology in the automobile, aerospace and electronics sector.
- PSU representatives from BEL, HVF and Engine Factory requested for courses in PCB manufacturing, assembling soldering and wiring technologies. However, the suggestion was not to repeat the machinery in Puducherry TC.
- OEM representatives from Ashok Leyland and Nissan Renault emphasised on the introducing skill development courses on Mechatronics, Robotics, Artificial Intelligence, Industry 4.0 and IOT to produce industry ready workforce. They also suggested that the TC should undertake design and prototyping jobs in the automobile and electronic sector and not only provide machining support but to be a complete solution provider. It was recommended that the TC promote the culture of open innovation and consultancy, for instance provide electrical vehicle design assistance. This will help the supplier and the customer be at the same pace. The importance of linking academia and industry was also highlighted
- Request for an incubation centre was made which would provide assistance to start-ups by helping them in designing, prototyping and in technology transfer.
- The Aerospace Industry Development Association of Tamil Nadu recommended the following facilities to be a part of the proposed TC:
    - Tool Room
    - Precision Manufacturing Facility
    - Composite Manufacturing Facility
    - Design and Development Centre
    - Rapid Prototyping/3D Printing
    - Test and Validation
    - Skill Development
- Industry Associations and Industry representatives from TANSTIA, AIEMA, TAIMA, CDISSIA, Laghu Udyog Bharati gave suggestions for the machinery and facilities to be established in the TC. Some of the key prominent suggestions are:
- Tool and die facility requirements
    - CNC Machines – 5 axis, Vertical Machining Centres, EDM Machines etc.
    - Surface grinders,
    - Plasma cutters
    - TIG Welding machine
    - Die spotting machine
    - 3D Printing (metal and plastic)

- Plotters etc.

- Design Facility Requirement
  - Product Design Software like CATIA, NX
  - Mould Design Software CAD/CAM (NX with Mould Wizard, Solid Works
  - Mould Flow Analysis
  - Magma Simulation
  - Finite Element Analysis
  - 3D Scanning/laser scanning for Reverse Engineering etc.
- Testing Facility Requirement
  - NABL Certified lab
  - CMM machine (Carl Zeiss)
  - Gear testing
  - Chemical Testing
  - Mechanical Testing
  - Grinding burn detection
  - Laser Calibration Machine
  - Hardness, surface finish, eddy current tester
  - Corrosion resist testing
  - Radiography testing, Complete Spectro analyser
  - Facility to check Lub/engine oil purity
  - Hot chamber test
  - Destructive and non-destructive testing equipment
  - Endurance, spring testing etc.
- Training and Skill development:
  - Diploma courses in Tool and Die manufacturing, Mould Design & Mould Flow
  - Maintenance and repair of latest CNC machines
  - Refresher courses, part time/ short term for
  - Opportunity for trainees to handle live projects
  - Tie up with Industries for Industrial Training to be a part of the curriculum
  - Industry Experts to be part of the academic committee, etc.
- The TC should constantly interact with the Industry by updating its syllabus, according to the industry requirement, Guest lectures by Industry experts, students to be given exposure to the industry environment through Industrial Visits
- Requests for laser welding, spot welding, 3D robot welding, sheet metal cutting were also made
- It was also suggested that the TC collaborates with other institutes like CIPET, NTTF, GTTC etc. and have live interaction for technology exchange. Also provide exposure through industry associations like TAGMA. Foreign tie-ups with countries leading in manufacturing technologies like Japan, Germany and South Korea were also recommended.

- Recommendation for large sized CNC machines were made for the MSMEs to take up larger machining jobs as per the Client requirement. The unavailability of such huge machines serve as a major bottleneck for the growth and expansion which result in lost opportunities due to high investment.

Summary of challenges faced by players based on primary research:

a. **At the industry level**

- **Absence of or limited automation in the manufacturing process in India;**
  - Leads to low machine utilisation of around 50-55% on an average (best in India is around 70-75%) compared to 95-99% abroad in China where a single operator manages multiple machines
  - Main reason is lack of knowledge/ awareness of low cost automation technologies
- **Lack of standardisation**
  - Limited or very small number of standardised components for mould design in India cause delay in the production process. For every mould to be developed, designing is done from scratch to finish. In China & Malaysia the standardised component usage is very high and therefore concentration is more on core & cavity design of the mould resulting in better quality and faster production
  - Use of Standardised components helps to deliver moulds in 6 week in China compared to 16 weeks required in India
- **Lack of availability of skilled workers** & high attrition/ job hopping, shortage of trained manpower at machine operator level
- **Low capacity and lack of capability** to develop heavy and precision machines requiring a high proportion of the CNC machines to be imported (2/3rd of the total CNC machines) mainly because of the capital intensive nature of investment
- **Others**
  - **Limited/ slow adaptability of technology** by domestic TRs due to perception of quality about domestically developed products
  - **Dispersed/ unorganised industry structure**
  - **High cost of inputs** makes Indian machines costly to users as compared to those imported

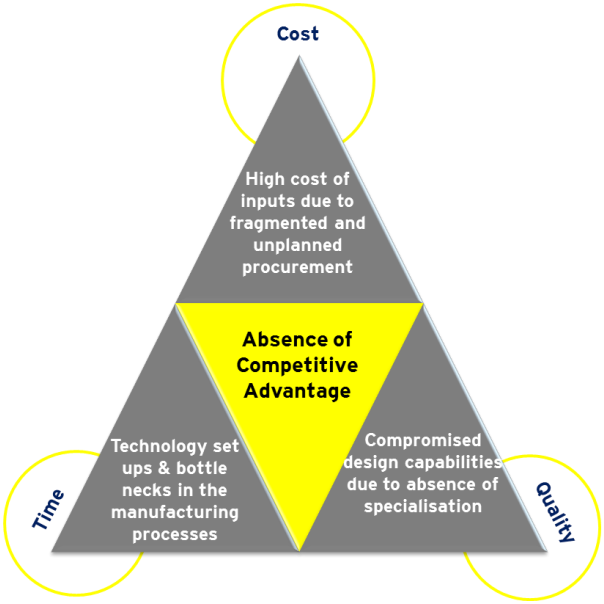
b. **Other macroeconomic factors**

- **High interest rates** of borrowing (~14%) which discourage investments by compromising viability
- Lower customs duty making imports more attractive and does not encourage domestic transfer of technology and local manufacturing and / or value addition
- Export efforts constrained by **high cost** of maintaining a presence in overseas markets

5.1.2 Challenges faced by MSME TRs

An analysis of the existing MSME TRs in India reveals that limited efficiency in production has caused loss of some of its clients to private Tool Rooms or cheaper options from other countries. One of the key reasons identified has been the generic nature of tool development by MSME Tool Rooms rather than catering to a specialised category.

Figure 12: Absence of competitive advantage



Generalised Tool Rooms are the norm in India due to;

- High capital investment requirement,
- To cater to a larger market,
- Low volumes in specific categories,
- Better risk management and
- Absence of specialisation

Whereas these Tool Rooms produce a variety of tools, they lack competitive advantage in any of the categories due to lower efficiencies mainly due to the technology used. Time taken for delivery of the product is longer due to;

- Technology set ups and bottle necks in the manufacturing processes,
- High cost of inputs due to fragmented and unplanned procurement,
- Lower design capabilities due to lack of specialisation

All these factors result in escalated costs and a further loss of competitive advantage. This reflects in the low volumes of tool production orders, which prevents the industry in tapping into the advantages of large scale production and economies of scale.

If MSME Tool Rooms specialise in a particular tool or tool production for a specialized sector, chances of developing competitive advantage become high. In Germany, a TR of **Zitzmann Inc**. specialises in particular type of mould development required for manufacturing glass bottles. It has got substantial competitive advantage in the production of such tools. Similarly, in China a TR of **China Taoshi Mould** has more than 120 machines ranging between 40,000 – 75,000 rpm that specialises in a particular type of moulds whereas for the Indian counterpart the machines range between 12,000 to 20,000 rpm. This results in on an average, procurement of a certain type of mould from China takes one third of the time it takes to be procured from within India. This is mainly due to low productivity and non-standardised use of tooling components in India.

Specialisation in the production process leads to some degree of standardisation enabling the Tool Room to maintain inventory levels which subsequently reduce the turnaround time for procurement. Absence of design facilities/ good designers in the MSME TRs is another important issue. Further,

non-alignment of the compensation structure for designers as per that of the market makes it difficult to retain the designers in the long term.

Case study 1: Specialised tool rooms in the world - Zitzmann GmbH & Co.KG, Germany

- Zitzmann glass mould is a large supplier of high quality moulds for the leading glass companies in Germany
- Specializes in manufacturing of moulds for complex container designs such as;
  - **High quality perfume flacons**
  - **Medicine bottles, tins, jars**
  - **Shaped bottles 3ml – 4250ml**
  - **Block moulds, solid blank mould**
- Its production portfolio includes complete mould sets, semi-finished parts, accessories in normal casting, special casting steel or bronze, vacuum full profile coating as well as flame spraying full profile coating
- It's in house facilities include latest technologies and production methods like;
  - **CAD/CAM design using Catia V5**
  - **The latest CNC machines in the turning and milling sector**
  - **Full profile welded moulds**
  - **Induction heat treatment and additional plasma welding**
- It has around 120 highly skilled technicians producing more than 30,000 moulds per year

Case study 2: Specialised tool rooms in the world - China Taoshi Mould, China

- A well-known and one of the biggest plastic mould designing and manufacturing enterprise
- Manufacturer of moulds, specializing in plastic moulds for automobiles, house electric equipment, electronic products, motorcycle, and other daily-used pieces etc.
- In house facilities include;
  - **Large-size CNC equipment including high speed CNC and EDM machines etc.**
  - **Advanced CAD/CAM/CAE system**
  - **Workstation and software of Pro-E, FFCAE, CIMATRON, etc.**
- It has more than 600 employees including middle/high administrators and around 180 technicians

5.2 Market opportunity

5.2.1 Aerospace and Precision Manufacturing

The global aerospace market valued at around US $ 500 Bn in 2013 and the Indian aerospace industry valued around USD 25 Bn in 2013. It is currently growing at an average rate of 12% which is about 2.5 times higher than the global average[26].

Propelled by an increased investment and a rapid growing commercial aviation market the Indian aerospace industry has become one of the fastest growing aerospace markets in the world. India is expected to become the 3rd largest aerospace industry by 2020[27]. An expenditure of INR 5,00,000 crore is planned over the next ten years by the government[28].

The aviation industry is also fast expanding with the advent of low-cost carriers (LCCs), modern airports, Foreign Direct Investment (FDI) in domestic airlines, advanced information technology (IT) interventions and growing emphasis on regional connectivity. Air traffic in India rose 15.80 per cent year-on-year to 280.24 million during April-February 2017-18. Witnessing a growth of 18.50 per cent over the previous year, total passenger traffic stood at a 264.97 million in FY17.[29]

The positive outlook of the industry has attracted major global aerospace companies to India and has incentivized domestic aerospace players to increase and deepen operations. Leading automotive Indian players like Ashok Leyland, Mahindra & Mahindra, Tata are establishing their aerospace engineering practice. Robust growth potential has attracted key OEMs in the aerospace sector to setup their manufacturing in India. This has led to a tremendous opportunity for the participation of Indian companies. Foreign aircraft players, Boeing and Airbus have already established their India operations and are planning to expand and explore further opportunities.

The Indian aerospace market is expected to reach USD40 billion by 2020. Some of the major growth drivers identified are:

- Potential of becoming international hub for commercial MRO needs due to low cost of technology at depot level and competitive labour costs
- Increase in air traffic especially in the Low Cost Carrier (LCC) category with low fares and regional connectivity.
- Infrastructure expansion identified for 20 locations for developing airports by 2020

[26] http://www.tidcoaeropark.com/aboutus1.php
[27] CII - http://www.cii.in/sectors.aspx?enc=prvePUj2bdMtgTmvPwvisYH+5EnGjyGXO9hLECvTuNtzD8aRMyMwXwlukeRiZBns
[28] http://apedb.gov.in/aerospace-defence-sector.html
[29] BEF – Aviation Sector Report April 2018

- A number of Government Policy issues pertaining to 100% FDI under automatic routes, tax exemptions/ tax holidays upto 100% for airport projects etc.

The Stat Government is poised at promoting aerospace in Tamil Nadu and has already earmarked its first Aerospace Park in Sriperumbudur covering an area of 200 acres. The state has already emerged as the hub for automobile and auto component manufacturer. Now taking a step further, it is set to establish itself as a centre for aerospace and precision engineering leveraging the already existing expertise in the auto manufacturing sector. Tamil Nadu has a strong ecosystem of IT, electronics systems which coupled with the auto component manufacturing will support and enhance the design and engineering capabilities required by the aerospace industry.

The Aerospace ecosystem is planned to be developed in phases at Hosur, Chennai, Salem, Coimbatore and Trichi[30]. The integrated ecosystem is estimated to create job opportunities for 100,000 highly skilled resources including both direct and indirect. The State has an investment planned of around USD 3 billion[31].

- Proposed 50 Acre land near Chennai airport to facilitate the MRO set up
- Proposed 250 Acre land in Sriperumbudur for aerospace components manufacturing park
- Proposed 3000 Acre land in Perambalur for setting up integrated Aerospace Park with an estimated 830 million investment.
- Proposed 5000 Acre land in Sriperumbudur for Greenfield airport to be built with an investment of USD 2.5 Billion.

5.2.2 Overview of Automotive Industry

Chennai (including its surrounding industrial estates in the Kancheepuram district) are a hub of automobile Industry in the country. Tamil Nadu has a manufacturing capacity of 3.55 million units. Major global players have established their facility in and around Chennai along with their ancillary units. Sriperumbudur Industrial area consists of leading automobile OEMs like Hyundai, Ford, BMW, Nissan-Renault, Yamaha, Ashok Leyland, Royal Enfield. Tier 1 suppliers like TVS, Motherson, Sundaram Clayton, Bosch have multiple facilities in the Industrial area, in and around Chennai and across the state. There are more than 600 auto components/engineering MSMEs in Chennai employing a workforce of 1,25,000 people[32]. Tamil Nadu is the major exporter of automobiles and auto components with 21% of India's automobile exports primarily to Europe. Chennai is fast emerging as one of the top 10 global automobile manufacturing centres.

In 2014, the state government announced to increase the vehicle production capacity to 5 million by 2020. The vision is to generate 5 lakh employment opportunity and bring Chennai to the list of

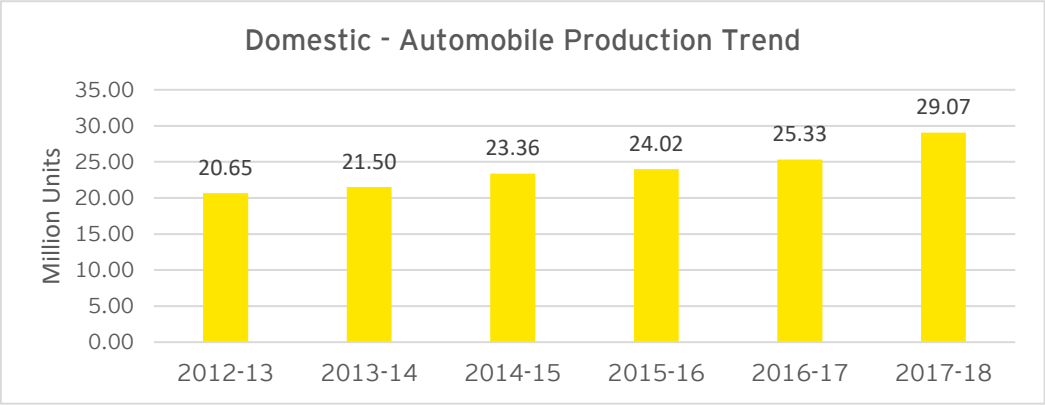
[30] These locations have been proposed by the Government and may change in future
[31] http://www.investingintamilnadu.com/doc/TN-GIM-Aerospace-Sector-profile.pdf
[32] DIP Chennai 2015-16, Ministry of MSME

World's top 5 global auto clusters. The state automobile policy envisages setting up of an exclusive auto city, India's first, to cater to the needs of both domestic and global auto manufacturers in component designing, prototyping and manufacturing[33]. The 2020 target calls for a skilled manpower and technically proactive efficient suppliers to cater to the domestic as well as international demand for vehicles.

The automotive manufacturing industry comprises of production of commercial vehicles, passenger cars, three and two wheelers. The Indian automotive industry (including component manufacturing is expected to reach INR 16.1 to 18.1 trillion by 2026[34]. According to Society of Indian Automobile Manufacturers (SIAM), in India, the total production volume grew at a CAGR of 5.86 % during FY2013-2018 and increased 14.8 % year-on-year in FY 2017-18. A total of 29 million units were produced in India during FY 2017-18[35]. Major players capturing the market share in each of the automotive categories are:

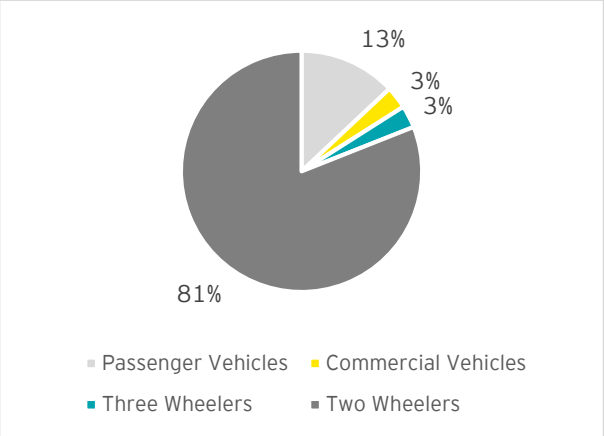
- **Passenger Vehicles:** Maruti, Hyundai, Mahindra, Honda, Nissan- Renault, TATA
- **Commercial Vehicles:** TATA, Mahindra & Mahindra, Ashok Leyland, Eicher
- **Three Wheelers:** Piaggio, Mahindra, Bajaj
- **Two Wheelers:** Bajaj, Hero, Honda, TVS, Royal Enfield

Figure 13: Domestic Automobile Production Trend

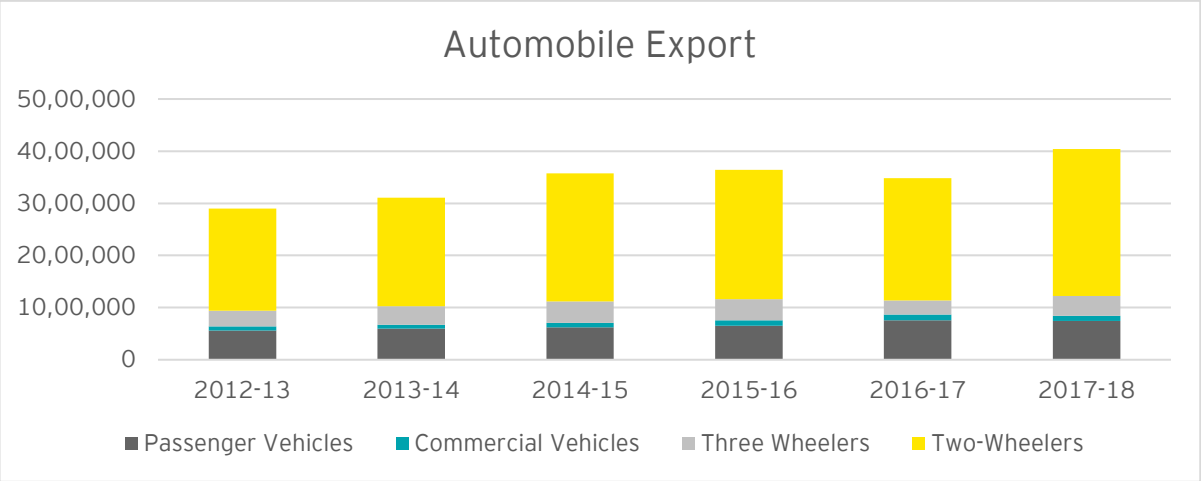


[33] IBEF Research; News Article- http://www.business-standard.com/article/economy-policy/tamil-nadu-to-step-up-vehicle-production-capacity-to-5-million-by-2020-114111401076_1.html
[34] IBEF- Automobiles Report - 2018
[35] SIAM - http://www.siamindia.com/statistics.aspx?mpgid=8&pgidtrail=13

The market is dominated by two- wheelers consisting of 81% of the total domestic market share followed by passenger vehicles at 13% during 2017-18. Together they account for 94% of the market share. Domestic passenger car market is mainly dominated by small and mid-sized cars. India maintains its second rank in global production of two wheelers after China. The Industry composition of each of the vehicle types is shown in the figure.



In April-March 2018, overall automobile exports increased by 16.12 percent. Two and Three Wheelers Segments registered a growth of 20.29 percent and 40.13 percent respectively, while Passenger Vehicles and Commercial Vehicles declined by 1.51 percent and 10.53 percent respectively in April-March 2018 over the same period last year[36]. Hyundai is the largest exporter of passenger cars from Chennai. As seen from the export trends shown by type of vehicles, the two-wheeler market dominates the exports.



The automobile Industry in Tamil Nadu began with the establishment of several auto component manufactures and OEMs like TVS, Standard Motors, Ashok Leyland, MRF in 1950s. The Centre and the state government played a crucial role by relaxing policy norms and promoting FDI. Today the state houses maximum number of global players established in the auto cluster across the country.

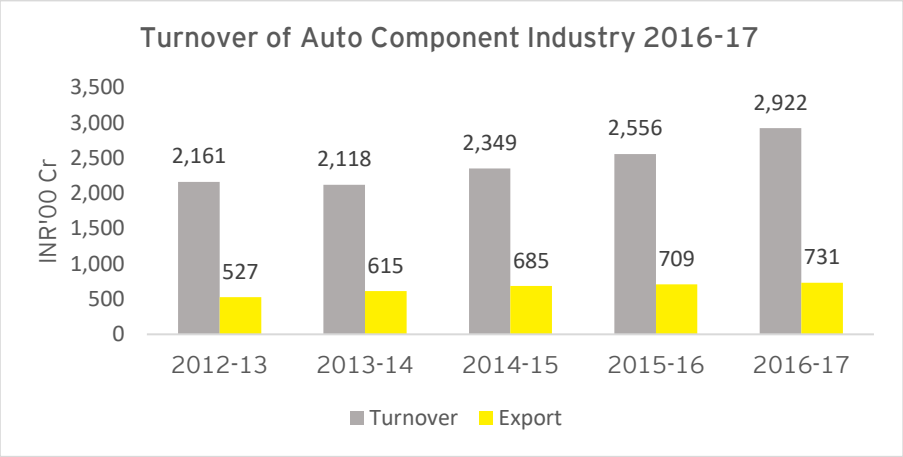
The Automobile sector contribution stands at 20% of the total Industrial output of Tamil Nadu (2011-12). The state has a total manufacturing capacity of 3.55 million units which is 20% of the total capacity installed in the country. It is the export hub for Passenger Vehicles accounting for 70% of India's overall exports. Over 3 million vehicles are rolled out of the state annually.

[36] SIAM (Society of Indian Automobile Manufacturers)

5.2.3 Overview of Auto Components Sector

The auto components industry has experienced a healthy growth over the years with revenues rising from 2,047 Cr in 2011-12 to 2,922 Cr during 2016-17[37]. The industry provides employment to 2 million people with 1.5 million direct and 1.5 million indirect employment opportunity. The contribution to GDP is around 2.3 % and 4% share in India's export market. Major export countries are USA- with 22 % of the total exports followed by Germany, Turkey, Italy and Thailand.

The auto component industry in India comprises of the organized and unorganized sector with 85% of the market share occupied by the organized sector. The organized sector caters primarily to the

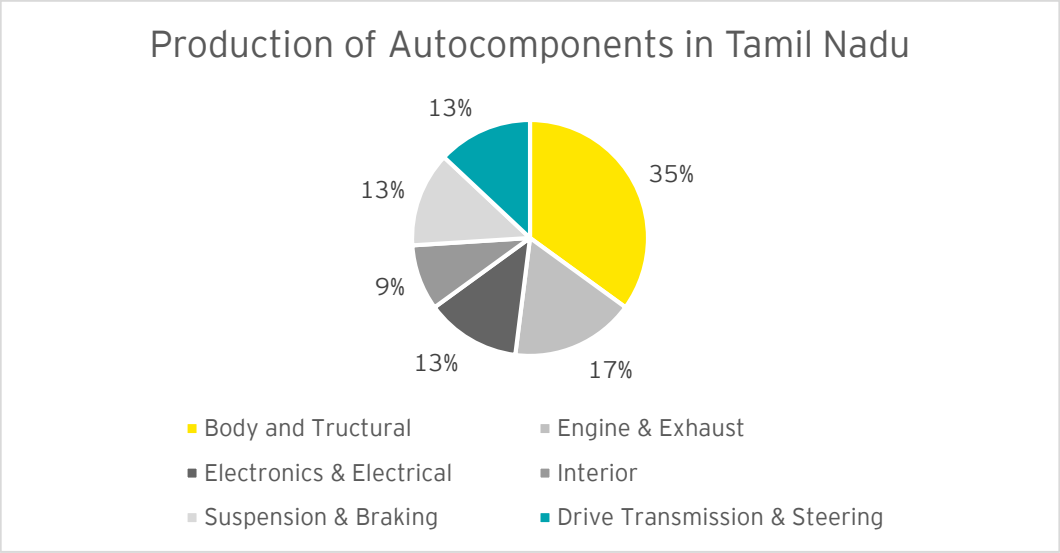


OEMs with high value precision instruments whereas the unorganized sector consists of low value products and mostly caters to the aftermarket category. The industry has achieved the capability to manufacture the entire range of auto components, such as engine components, drive and transmission components, suspension and braking components, electrical components, and body and chassis components. Engine components make up nearly a third of all exports of auto components from India.

According to the Automotive Component Manufacturers Association of India (ACMA), the Indian auto-components industry is expected to register a turnover of US$ 100 billion by 2020 backed by strong exports ranging between US$ 80- US$ 100 billion by 2026, from the current US$ 11.2 billion.

[37] ACMA Report: The Indian Auto Component Industry: Performance Review 2016-17

Tamil Nadu consists of over 80 automobile component manufacturers accounting for a turnover of over USD 1.3 billion in 2013-14. The state accounts for 35% of India's auto component production. The industry is highly concentrated in manufacturing of body and structural parts. The segment wise production of auto components in Tamil Nadu is shown in the figure below:



The state is the largest tyre manufacturer in India contributing 40% to the Country's total tyre manufacturing output. The presence of a robust domestic customer base with leading OEM players, the auto component industry is flourishing in the region.

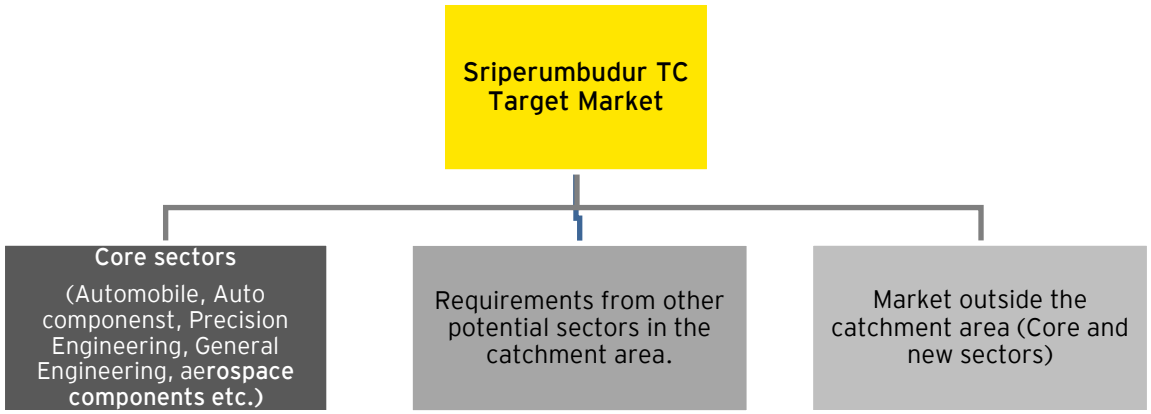


Figure 14: Target Market Structure of Sriperumbuduri TC

5.2.4 Market in core sectors in the catchment

Tamil Nadu has strong engineering base accounting for 35% of the automobile & auto components industry and 18% of the nation's electronics output. It is traditionally known for automobile manufacturing housing the complete ecosystem comprising of the OEMs, auto component and ancillary equipment manufacturers established in the region. The state has several global automobile players like Hyundai, Ford, Nissan-Renault, BMW, Daimler etc. Aerospace and precision engineering is a major thrust area in focus by the State Government to promote industrial growth in the state. The industry is forecasted to witness massive growth in capital investments due to existing strong electronics and IT/ITES industry. Key players like Ashok Leyland, Heavy Vehicle Factory have their precision engineering facilities in the State.

There are 3,36,849 micro, 40,633 small and 1,507 medium manufacturing units in the state of Tamil Nadu[38]. Totalling to 3,78,989 MSME units engaged in manufacturing in the state, out of these 17,440 MSME units are in Kancheepuram district. These units operate in the areas of Engineering, metal sheets fabrication, repairing and services, wood based furniture, readymade garments and embroidery etc.

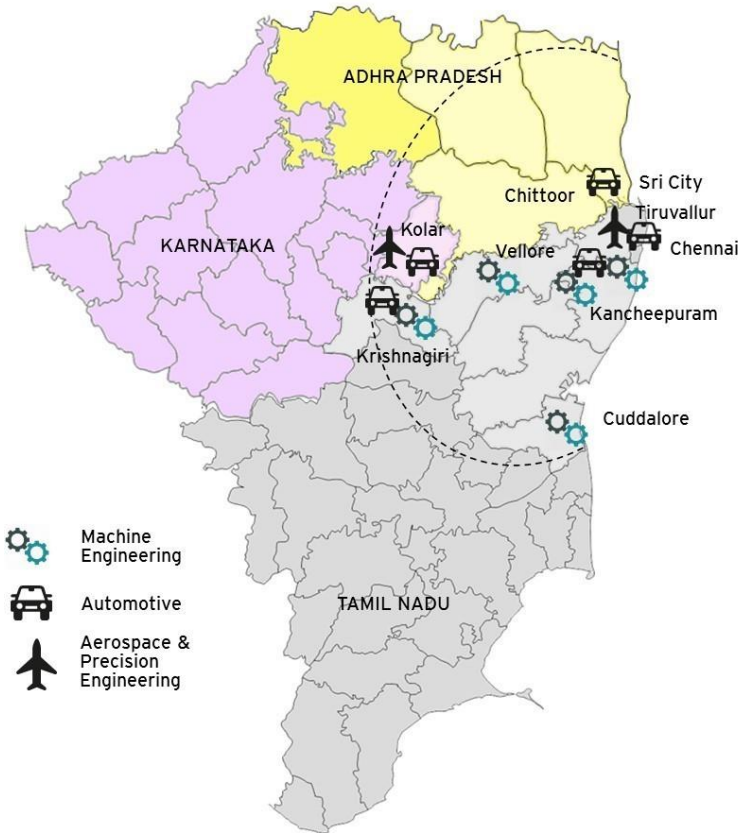


Figure 15: Core industrial District in the Catchment area

[38] https://udyogaadhaar.gov.in/UA/Reports/StateBasedReport_R2.aspx - Till 20 June 2019

There are several industrial areas in and around Sriperumbudur. These industrial areas cater to variety of sectors ranging from automobiles, IT/ITES, electronics, pharmaceuticals, etc.

Below is the list of existing industrial areas in the Kancheepuram District.

S. No	Industrial Estate	Type of Industry
1.	SIDCO Industrial Estate, Orikkai, Kancheepuram	Zari,Engineering Auto components
2.	SIDCO Industrial estate M.M.Nagar	Auto Components engines,Motors
3.	SIDCO Industrial Estate Alathur Pharmaceutical complex	Pharmaceuticals
4.	CMDA Industrial Estate Dev.Plots, M.M..Nagar	Engines,Motors
5.	Developed Plot Estate for Electrical & Electronic industries, Perungudi	Electronics, Software
6.	Dr.Vikram sarabai industrial estate, Tiruvanmiyur	Electronics, Software
7.	SIPCOT, Irungatukotai	Automobile Engineering
8.	SIPCOT, Sriperumbudur	Automobile, Electronics, Glass and other products
9.	The Chennai Export Processing Zone(CEPZ)	100% export units-Electronics, Rubber products & Garments
10	SIPCOT IT complex siruseri	IT Industries
11	SIPCOT, Oragadam	Engineering Industries Biotech, Electronics
12	Mahindra Industrial Park(SEZ)	Computer software
13	SIDCO Estate, Thirumudivakkam.	Engineering components

The Sriperumbudur-Oragadam industrial belt, towards the west of the city, is located on the National Highway 5 connecting Chennai to Bengaluru. It is the key automotive hub near Chennai comprising of the global automotive OEMs Hyundai, Nissan Renault, Daimler, Yamaha, Royal Enfield supported by the huge supplier base. The proposed Sriperumbudur TC site is located in this industrial area.

Located, 30 km south of Chennai city in Maraimalai Nagar, is Mahindra World City- an SEZ Industrial Park. Multinational Companies from diverse industries ranging from manufacturing, research and development, Information technology are present across an area of over 300 acres. It is accessible by NH 16 on Chennai-Kolkata Highway which is the part of Golden Quadrilateral. Ford India, BMW, Force Motors, TAFE, Mahindra & Mahindra (Research and Development Centre) are some of the leading OEMs in the automotive sector established in Maraimalai Nagar. Also global tier 1 and tier 2 suppliers like Motherson, Jhonson Controls, WABCO have their presence here.

Ennore, 20 km north of Chennai has become an industrial hub for chemical, fertiliser factories and power plants. The truck manufacturing giant Ashok Leyland has one of its manufacturing facility in Ennore.

Sri City situated in the Chittoor district of Andhra Pradesh is a key emerging auto hub in Southern India. It is located 55 km north of Chennai with access to the ports of Krishnapatanam, Vizag, Ennore and Chennai. It has attracted investments from Isuzu Motors and Hero MotoCorp as major OEMs in the region. The industrial park is set to attract investments from various Japanese auto component companies including Sumitomo and Kyokuto - major automotive component players in Japan.

Japanese crane manufacture Kobleco and Japanese auto coil spring maker NHK Springs have already set up a facility in Sri City.

The Kolar district in Karnataka has 5 Industrial Estates and 5 Industrial Areas with 10,340 registered MSMEs. Naraspura Industrial area is one of the largest industrial regions in the state. Automotive players Honda and Scania have their facilities established in the area. Several other automobile related units are under development to support the OEMs. The aerospace business of Mahindra Aerospace which will manufacture small aircrafts is planned in the region.

The following table enlists the prominent players in and around Sriperumbudur in automotive, Aerospace and precision engineering, Electronics Hardware and IT/ITES sector.

Table 7: Composition of major manufacturing players in the Sriperumbudur catchment

Type	Key players[39]
Automobile OEMs	▶ Hyundai Motor India Limited, Sriperumbudur ▶ Renault Nissan Automotive India Private Limited, Oragadam ▶ Royal Enfield, Oragadam ▶ India Yamaha Motors, Oragadam ▶ Ashok Leyland, Hosur, Ennore & Sriperumbudur ▶ BMW India, Maraimalai Nagar ▶ Daimler- Bharat Benz, Oragadam ▶ Mitsubishi, Thiruvallur ▶ TAFE Tractors, Maraimalai Nagar ▶ Ford India, Maraimalai Nagar ▶ Isuzu Motors India, Sri City, Andhra Pradesh ▶ Mahindra & Mahindra Research and Development Centre, Maraimalai Nagar ▶ Honda two Weeler, Kolar, Karnataka ▶ Scania Commercial Vehicles India Pvt Ltd., Kolar, Karnataka ▶ Force Motors, Maraimalai Nagar ▶ Omni Auto Limited, Sri City, Andhra Pradesh
Auto component – Tier I and Tier II Players	▶ Lucas TVS, Padi ▶ Brakes India ltd. ▶ Bosch, Sriperumbudur ▶ Wheels India Ltd, Padi ▶ Caparo, Sriperumbudur

[39] Source : Mahindra World City Website, Primary Research, SIPCOT Vellam Vadagal and Orgaddam industrial data shared data
Electronics: http://www.investingintamilnadu.com/tamilnadu/opportunities/electronic_hardware.php

Type	Key players[39]
	▶ Motherson Automotive Technologies and Engineering, Maraimalai Nagar ▶ Johnson Controls Automotive Ltd, Maraimalai Nagar ▶ JBM Auto System Pvt Ltd, Maraimalai Nagar ▶ WABCO India Ltd. ▶ TVS Sundaram Clayton, Padi & Maraimalai Nagar & Sri City ▶ Sundaram Fasteners ltd., Maraimalai Nagar ▶ India Pistons Limited, Maraimalai Nagar ▶ Flowserve India Controls Private Limited, Maraimalai Nagar ▶ Venture Automotive, Sri City, Andhra Pradesh
Aerospace & Precision Engineering	▶ Mahindra Aerospace. Kolar Karnataka ▶ Ashok Leyland ▶ Shri Jayasuriya Enterprise, Chennai ▶ Avian Aerospace ▶ Kerns Aero Products Private Limited ▶ J K Fenner ▶ Unicorn (Bangalore) Pvt Ltd
Electronics Hardware	▶ Samsung India Electronics Private Limited, Sriperumbudur ▶ Lenovo, Pondicherry ▶ Dell Computers, Sriperumbudur ▶ Motorola, Sriperumbudur ▶ Nokia Solutions & Networks India Pvt. Ltd., Orgaddam ▶ Moser Baer, Orgaddam ▶ TAPP Semiconductor, Sriperumbudur ▶ BYD China, Sriperumbudur & Irungattukottai ▶ TVS Electronics, Orgaddam ▶ Dixon Technologies, Orgaddam ▶ Flex Ltd, Sriperumbudur & Perungudi ▶ ZTT (China), Sri City ▶ Foxconn, Sriperumbudur and Sri City ▶ MTAB Engineers Pvt. Ltd. ▶ Bharat Heavy Electricals Limited, Chennai
IT/ITES	▶ Accenture, Chennai ▶ Capgemini, Chennai & Maraimalai Nagar ▶ Tata Consulting Services, Chennai ▶ Infosys, Maraimalai Nagar ▶ Cognizant Technology Solutions, Maraimalai Nagar

Type	Key players[39]
	▶ Wipro, Maraimalai Nagar ▶ Tech Mahindra, Maraimalai Nagar ▶ Computer Sciences Corporation(CSC) ▶ Hexaware Technologies ▶ Larsen & Toubro Infotech, Chennai ▶ Oracle Financial Services Software Ltd., Chennai

The demand for automobile and precision engineering in the key catchment districts around Sriperumbudur can be gauged from the below data on the manufacturing units:

Table 8: Sector wise table spread of MSMEs in key catchment area around Sriperumbudur

State	District	Distance from proposed TC (Kms)	Total no. of MSMEs	Manufacturing Units
Tamil Nadu	Tiruvallur	32	32,975	12,465
	Kancheepuram	32	41,347	12,234
	Vellore	97	15,355	9,626
	Tiruvannamalai	155	5,476	3,115
	Krishnagiri	220	12,053	6,587
	Villupuram	138	6,748	3,927
	Cuddalore	160	6,962	4,093
Puducherry	Puducherry	140	4,020	2,091
Karnataka	Kolar	230	1,164	820
Andhra Pradesh	Chittoor	118	8,181	1,928
	Nellore	213	46,548	2,968
	Cuddapah	260	31,854	2,664
	Total		2,12,683	62,518

Source: Udyog Aaddhar Data, Ministry of MSME

Core Industrial Districts in the catchment area of Kanchipuram district include, Chennai, Tiruvallur, in Tamil Nadu, Chittoor in Andhra Pradesh and Kolar in Karnataka which will be expecting to get most out of the new proposed TC in Sriperumbudur.

5.2.5 Market in other potential sectors in catchment area

The region has potential to tap the demand from several established and upcoming projects in other sectors in and across the neighbouring districts in the catchment area. Some of the sectors well established in the region include electronics hardware, food processing, textile and garments, leather and footwear etc.

Typical opportunities for TC within the catchment in existing and new sectors would be amplified due to existing and proposed major projects in the area like:

a) Electronics Hardware:

Chennai has emerged as the largest Electronic Hardware manufacturing and exporting hub in India. Some of the Fortune 500 companies which have set up manufacturing facilities in and around Chennai include: Nokia, Motorola, DELL Computers, Samsung, Foxconn, Sanmina-SCI, Flextronics, and Nokia-Siemens besides more than 30 components suppliers[40].

Under the Technology Centre Systems Program (TCSP), a Technology Centre with ESDM sector focus is planned and is under construction at Puducherry. Puducherry TC being in close proximity to Chennai, around 150 km away, will serve the electronics requirement in the catchment area. The greenfield TC in Puducherry is proposed to provide services across the value chain for ESDM sector for all sub-sectors with a focus on PCB manufacturing and design, with a key areas for specialization such as Industrial Electronics, Automotive Electronics, IT systems & hardware etc. The key services of the TC are divided into four independent profit centres. Below is the snapshot of the proposed services to be provided by Puducherry and Bengaluru TC:

Figure 16: Proposed Services to be provided by Puducherry TC

Innovation and Design Centre	Prototyping, Assessment, Testing and Calibration Centre	Manufacturing Incubation Centre	Technology Incubation Centre	Training & Placement Centre
Concept Creation support	Prototyping	Shell Infrastructure	Shell Infrastructure	Electronic Product Eng./ Embedded System
Product Design Centre	Electronic Assembly & Testing	Business Facilities Centre	Business Facilities Centre	PCB Assembly and Testing
Patent Registration and Harnessing	Product Assessment	Machinery and Equipment on rent	Machinery and Equipment on rent	Hardware Repair and Maintenance
Entrepreneurship Club	PCB Manufacturing	Software & Hardware on Rent	Software & Hardware on Rent	Placement Cell
Consultancy Services like legal advisory, financial advisory etc.				

[40] http://www.investingintamilnadu.com/tamilnadu/opportunities/electronic_hardware.php

5.2.6 Market outside catchment area

The region has potential to tap the demand from several established and upcoming projects in automobile and aerospace sector in and around the neighbouring districts in the catchment area. The adjoining states of Karnataka and Andhra Pradesh also pose a great opportunity with the existing automobile hubs and mega projects coming up in the aerospace industry.

Opportunities for TC within the state of Tamil Nadu around the area in the focus sector include:

a) **Aerospace and Precision Manufacturing Projects:** With an existing strong, well established ecosystem in the automobile sector, the state is set to emerge as a leader in aerospace in precision manufacturing. The Central Governments mandate to indigenise aerospace introduced conducive industrial policy and generous tax benefits. Apart from an up-coming aerospace park at Orgadam near Sriperumbudur, there is one at Selem. The Government has earmarked 5 cities namely Sriperumbudur, Hosur, Coimbatore, Salem and Trichi for an Aerospace and Precision Manufacturing Corridor in the State. It is expected to attract investment worth Rs 100 billion, creating opportunities for the local MSMEs to grow in this sector.

b) **Engineering and automotive sector:** Apart from Chennai, Hosur, Coimbatore, Trichi and Salem are important engineering hubs in the state of Tamil Nadu. A brief description about the industrial activities of these key industrial cities is as under.

   Hosur is an industrial city adjoin the state of Karnataka, 40 km from Bengaluru. It is one of the eminent industrial hubs housing several automobile and manufacturing industries. Hosur Industrial area consists of about 700 industries comprising of Large, Medium, Small and micro industrial units. Leading OEMs and auto component manufacturers like Ashok Leyland, TVS Motors, Sundaram Fasteners, Caterpillar India Pvt. Limited and Hindustan Motors are established in the city. Hosur has several existing precision engineering units for the watch making, medical instruments, special machine and auto component parts, aerospace etc.

   Coimbatore is the third largest city of the state and the fastest growing tier 2 cities in the country known for manufacturing, textile and healthcare. More than 50,000 engineering units function in and around Coimbatore city. Motor and Pumps, Auto Components, wet grinders, tooling, furniture are other key engineering products in the district. The auto component industry is a major source of livelihood in the city with the presence of major tier I, II and III players which catering to the needs of the entire gamut of the automobile industry ranging from 2 wheeler, 4 wheelers, commercial vehicles and tractors.

   Coimbatore is known as the pump city, catering to nearly two-third of country's pump and motor requirements[41]. The engineering industry, considered as one of the largest foundry clusters in

[41] http://www.coimbatore.tn.nic.in/industry.html

India contributes to high quality inputs such as castings and forgings and a wide variety of ancillary products.

Madurai is a popular industrial centre that houses a number of auto component manufacturing units. These units some of the large scale units operating in the auto parts manufacturing business are Sundaram Fasteners, Sri Chakkra tyres, TVS Automobiles service stations, Madras Suspension. The city is renowned for the supply of spare parts with more than 300 dealers. Some of the components manufactured by these units range from IC engine, springs, radiator, wheels, silences chasis, and forged press metal components. It also has a market for raw materials like paints, iron steel, tin sheets, rubber sheets. The auto hub is established in the industrial area at Kappalur.

Trichi is the hub of engineering equipment manufacturing comprising of rolling mill manufacturers, boiler plants, oil mill machinery manufacturer, etc. The manufacturing unit set up by Bharat Heavy Electricals (BHEL) was one of the key drivers for the industrial growth in and around the city. Apart from BHEL, other PSUs like Ordnance Factory Tiruchirappalli, Railway Factory at Ponmalai have led a string industrial growth with around 400 Small Scale units have been set up over the years. Trichi has a premier Welding Research Institute set up in association with BHEL. The institute utilises state of the art welding techniques which caters to the boiler parts manufacturing industry. For this reason the city is also known as a fabrication hub.
The government is planning to create auto clusters for OEMs in Trichi. SIPCOT is set to promote an Auto Industrial Park assuring power supply and other infrastructure. The city is well connectivity through the Trichi International airport and the Tuticorin sea port.

Namakkal is a known for truck and bus body building parts. Ashok Leyland has a Driving Training institute established, which was first of its kind to be established in the country. Recently, country's second largest car manufacturer, Hyundai Motor India ltd has tied up with Namakkal-based Excel Polytechnic College to set up Hyundai professional development centre (PDC). The engineering based manufacturing units located at Namakkal are into General Engineering, Welding, steel furniture, fabrication of steel structural.

Salem is the 5th largest city in Tamil Nadu. Being rich in minerals like bauxite and magnetite deposits, mining is a big business in the region. It has a huge steel plant operated by Steel Authority of India Ltd. One of the key industries of Salem is the textile industry followed by sago, automotive, poultry and steel industries. In the engineering sector, the city is known for sheet metal work.

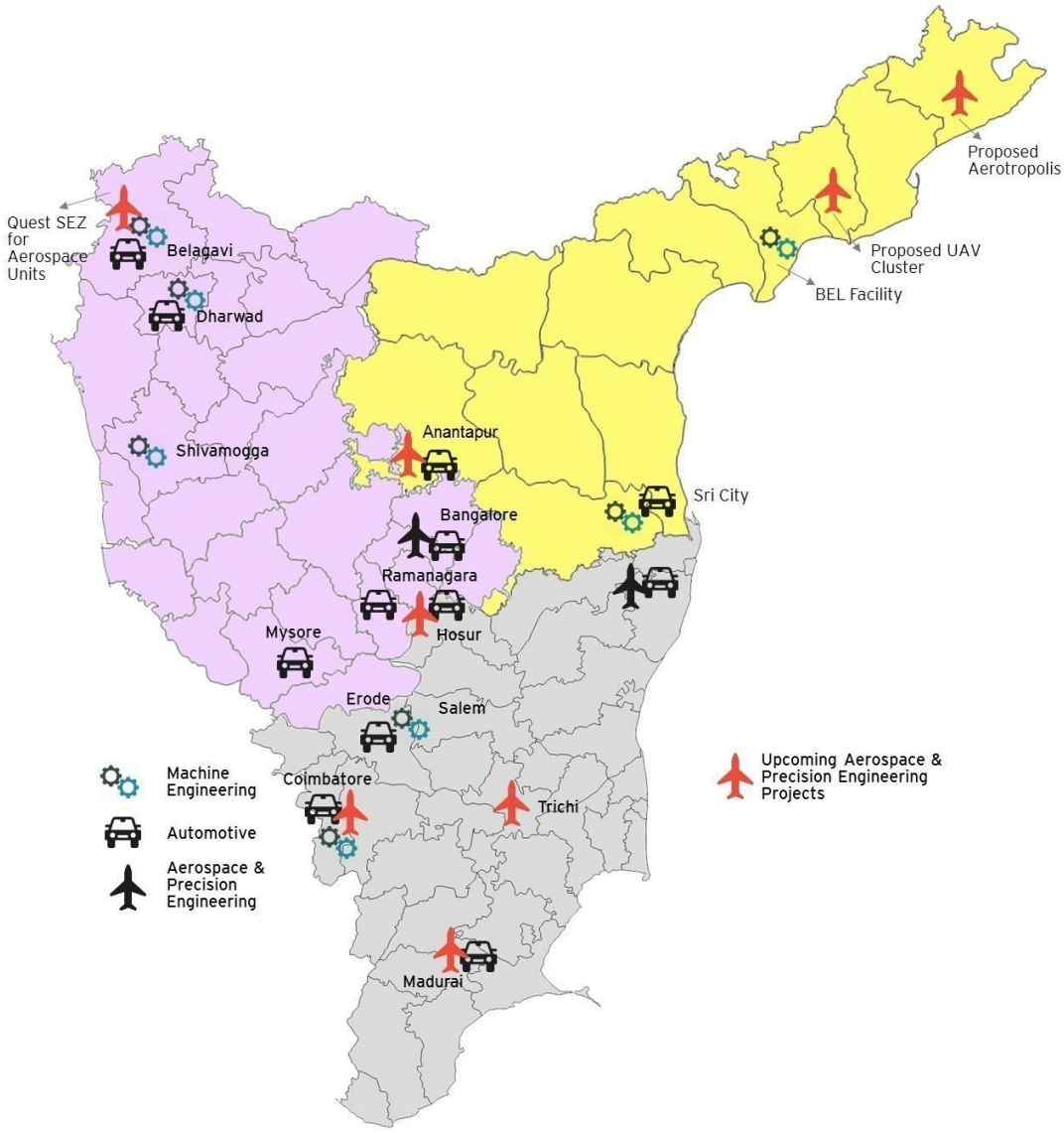


Figure 17: Market outside Catchment Area.

Opportunity in Karnataka:

a) **Aerospace and Precision Engineering Sector:** Karnataka is the pioneer of Aerospace industry since the establishment of Hindustan Aeronautics limited (HAL) in 1940. Over the years many aerospace and precision engineering R&D Centres and PSUs like BHEL, NAL, ISRO, DRDO, BEML etc. specialising in manufacturing, design and development have established themselves Bangalore, known as the Silicon Valley of India is the IT hub has global leaders servicing clients in the aviation and aerospace industry since many years. In addition, several scientific and technical colleges and ITIs serve as a rich knowledge pool and skill resource for R&D and simulation purposes for the aerospace majors.

The state offers strong and well established base of lower tier suppliers with more than 2000 MSMEs assisting the PSUs in various job works. The Society of Indian Aerospace Industries and Technologies and Industries (SIATI) has more than 300 members associated.

Recently international players like Boeing, Airbus, GE, Rolls-Royce have established their India operations in manufacturing in the state. Mahindra Aerospace is planning to manufacture small, business travel aircraft in the upcoming manufacturing facility in Narsapura Industrial Area, Kolar district.

The state attracts more 65% of the aerospace investment in the country and has a mission to attract investments of Rs. 60,000 crores over a period of 10 years[42]. In India's ambition to build capabilities and emerge as a preferred destination for aerospace manufacturing, Karnataka has taken the lead as aerospace hub. First to introduce a dedicated Aerospace Policy, the government has taken several initiatives to promote the sector growth. Some of the major projects and investments in line include:

- 1000 acre state of the art Aerospace Park with a 250 acre sector specified SEZ at Devanahalli near the Bengaluru International Airport.
- 610 Acre of land allotted to HAL in Tumakuru District for a light utility helicopter manufacturing facility
- Bangalore Aerospace Park at Devanahalli and MRO centres at BIAL and Mysore, and a precision manufacturing cluster at Managaluru have been planned
- Country's first Private Aerospace and Precision engineering SEZ is established by QuEST Global in Belgaum district

The above mentioned projects have been planned in view of 33 project proposals received amounting to INR 14,520 crore with the potential to generate over 10,000 jobs during 2017-18. These projects will attract new units as well as encourage the existing MSMEs to expand in this sector. The TCs can play an important role in assisting the new units establish their facility by providing designing and prototyping capabilities, market linkages, access to finance etc, considering the high investment and niche technological know-how required for this industry.

b) Automotive Sector: The automobile industry in Karnataka has doubled in the last 4 years with a growth of 30% (CAGR). The Industrial Policy for 2014-2019 has identified automotive as the focus sector. There are three auto clusters, one industrial valve cluster and two auto component clusters in the state.

- Auto clusters are located at Hoskote in Bengaluru Rural, Bidadi in Ramanagar and at Dharwad
- Industrial valve cluster is located at Hubballi – Dharwad
- Auto components clusters in Shivamogga and Belagavi

[42] http://kiadb.in/wp-content/uploads/2017/02/Aerospace.pdf

A wide ecosystem of OEMs, component manufacturers and R&D Centres support the whole value chain providing employment to 55,000 workers. Leading automobile players like Honda Motorcycles, Mahindra, Toyota, Scania and Tier 1 component suppliers like Bosch, Delphi, TVS have their presence in the State. Honda two-wheeler has its largest manufacturing unit in Kolar district. Bengaluru ranks second in the highest number of cars among all cities in India with more than 4.2 million registered cars. The industry caters to the local, national and international markets.

One of the key growth factors is due to availability of highly skilled workforce owing to more than 1400 ITIs. With more than 400 R&D centres and 206 engineering colleges the state has emerged as the centre of innovation.

SEZ Zones for automobile industry in Karnataka are Dharwad and Bangalore. Apart from the existing industrial clusters, there are upcoming manufacturing hubs in Vemagal and Narsapur Industrial Areas in the Kolar District.

Easy connectivity to the ports of Chennai and Mangalore have further increased the prospects of export market.

Considering the existing strength and investments in line, the automobile sector is set to reach new heights, thus providing the MSMEs a growth opportunity. The TC will play an important role in providing assistance to these MSMEs as well as supporting entrepreneurs to bring in innovation and new technology to the industry.

Opportunity in Andhra Pradesh:

a) Aerospace Sector:

The State Government has identified Aerospace manufacturing as a growth sector to promote industrial development in the state. The Aerospace Policy aims to attract investments of at least INR 20,000 Cr and generate employment for a highly skilled workforce for 5,000 in this sector by 2020. The development of this sector is poised to grow due to the presence of a robust infrastructure which include excellent ports, logistics, industrial corridors, power supply and ease of doing business. The strategic location of the state makes it a natural gateway to East and South East Asia for exports. The state is gradually emerging as a commercial aeronautical manufacturing hub with anchor investments by international player Titan Aviation, a subsidiary of Titan Metals and Minerals Ltd, which is set to invest INR 6000 Cr and indigenous players like Tata Advanced Systems.

The state has several projects in pipeline to promote aviation and aerospace manufacturing industry are:

- Currently there are three functional domestic and one international commercial airport; the state plans to have a total of 12 airports with 8 Greenfield airports.
- Aerospace and Precision manufacturing Park planned in Anantapur, 75 km from Bengaluru
- Greenfield aerotropolis to come up in over 7,500 acres in Visakhapatnam with a state-of-the-art MRO facility
- Proposed UAV Cluster at West Godavari

The above mentioned up-coming projects serve as a great opportunity for the MSMEs to explore this sector. The government's increased focus on indigenizing the aerospace and aviation industry serves as a great opportunity for the MSMEs to prosper in this niche sector. Thus, The TCs will play a crucial role in assisting and supporting them.

b) Automotive Sector: The Automobile and Auto component Policy aims to attract investment worth INR 2000 Cr and employment generation for at least 2 lakh people. The state government is set to build a strong presence of auto component manufacturers and a large pool of highly skilled workforce to set up dedicated Suppliers' Manufacturing Centers and Auto Clusters[43]. At present over 100 auto component manufacturers specialising in various auto components such as gears, pistons, and axles are well established. Over 50% of cylinder liners and clutch plates in India are being produced in Andhra Pradesh. A reliable port infrastructure provides a big opportunity for export to the South- East Asian countries.

Spread over 7,000 acres, Sri City Business Zone has emerged as the new automotive cluster attracting many international players like Isuzu and Honda. It is located 55 Km north of Chennai, well connected by National Highway - 5 with proximity to Chennai port, Ennore Port and Mattupalli Port. The State government is pursuing several Japanese auto component makers including big players like Sumitomo and Kyokuto to invest in Sri City.

Another auto cluster exists in the district of Anantapura, which houses the first plant of Kia Motors in India. The cluster is in close proximity to the auto hub in Kolar district of Karnataka. Anantapura is part of the proposed Bengaluru Kurnool Industrial corridor and Chennai – Bengaluru Industrial Corridor (CBIC).

Upcoming projects in Andhra Pradesh in the automotive sector:

- 2 auto clusters proposed by the government in Pottisriramulu Nellore and Chittoor districts to cater to the needs of the automotive companies
- Multiple world-class Automotive Suppliers' Manufacturing Centres (ASMCs) to be set up on PPP basis which will be dedicated industrial parks to the auto component manufacturers

[43] Andhra Pradesh - Automobile and Auto Components Policy 2015-2020

- Upcoming tyre manufacturing facility by Apollo Tyres
- Auto Components cluster in Vijayawada
- Investments over ₹ 1,500 crore, which will bring ancillary units of a minimum of INR 500 crore investment within 3 years are in pipeline

5.3 Opportunities associated with other proposed major projects in Tamil Nadu

Following are some additional upcoming major projects planned in the near future in and around Sriperumbudur and Chennai.

- **Aerospace Park:** A new aerospace park has been planned in SIPCOT Industrial Park at Sriperumbudur. The proposed site covers an area of 245 acres with an investment of around INR 200 Cr, and is in close proximity to the Technology Centre site. It is estimated that it will attract an investment of 1,000 Cr and create job opportunity for 30,000 people. In the initial phase around 50 companies are expected to have their operations at the park[44]. The TC will play an important role by providing assistance in the niche area of precision engineering related services crucial for the expansion of MSMEs in the aerospace sector.

- **New Port near Kanyakumari:** A 4th major port in Tamil Nadu is proposed to be constructed near Keelamanakudi and Kovalam villages near Kanniyakumari. The site will be well connected to the roadways as well as the rail network. A 3.6 km flyover is planned to connect to NH 7 directly and a railway line will be constructed underneath[45]. The transhipment terminal will greatly reduce the cost for imports as well as exports in southern part of the country, who depend on transhipment in other ports like Colombo thereby incurring additional port handling charges.

- **Dedicated Freight Corridor:** The up-coming Indian Railway project- Golden Quadrilateral Freight Corridor has 6 Dedicated Freight Corridors (DFC), out of which 2 are under implementation and the remaining 4 have been approved. The DFC passing through Chennai are:

    - North-South Dedicated Freight Corridor which is 2,173 km long, connecting Delhi to Chennai
    - South-West Dedicated Freight Corridor, is 890 km-long planned from Chennai to Goa, while passing through Bangalore-Chennai Industrial Corridor

  The industries will greatly benefit from this line as it will enhance the transportation facility, reduce time by providing quick and easy access to and from the Port of Chennai and industrial hubs like Bangalore, Coimbatore. It will ease and increase the prospects of domestic and international export from the state as well.

[44] https://www.thehindubusinessline.com/news/national/tamil-nadu-cm-lays-foundation-stone-for-rs-198-cr-aerospace-park/article9923222.ece
[45] http://www.newindianexpress.com/states/tamil-nadu/2017/dec/22/enayam-project-out-port-to-come-up-in-new-kumari-location-1734137.html

- **State Industrial Parks and Corridors:** SIPCOT and TIDCO have earmarked land for various Industrial Parks and Industrial Corridors in the State. Some of them include[46]:
    - Thervoy Kandigai Industrial Complex
    - Mappedu Industrial Complex
    - Tuticorin Industrial Park
    - Madurai Tuticorin Industrial Corridor
    - Coimbatore Salem Industrial Corridor
    - Chennai Ranipet Hosur Industrial Corridor
    - Perambalur SEZ Project

- **Chennai-Bengaluru Industrial Corridor (CBIC):** The corridor emphasises on the infrastructure development in the region between Chennai Chennai-Bengaluru-Chitradurga which is around 560 Km. It will have an influence area spread across the States of Karnataka, Andhra Pradesh and Tamil Nadu. It has been strategically selected for its many advantages, including proximity to the port; the coastal town is only 80 kms from the proposed SEZ at Naidupeta, 130 km from Sri City, 40 km from Nellore city and 90 km from Tirupati airport. It will not only facilitate development of a well-planned and efficient industrial base by providing smooth access to the industrial production units but also decrease the transportation and logistics costs along with an improved delivery time and reduction in inventory cost. It will lead to increased private investments in manufacturing and industrial activity in the three states.

- **Vizag-Chennai Industrial Corridor (VCIC):** Visakhapatnam–Chennai Industrial Corridor (VCIC), is a key part of the East Coast Economic Corridor (ECEC) being India's first coastal corridor. It is aligned to the Golden quadrilateral from Kolkata (in West Bengal) to Kanyakumari (in Tamil Nadu). The government has strategized to develop the industrial corridor of international standards for expanding its manufacturing and services sectors, and creating modern urban centers connected by state-of-the-art infrastructure. The 800 km long corridor is an important link connecting the country with the ASEAN market and other East Asian economies.

- **TAPP Semicon Park:** A 53 acre industrial estate in Sriperumbudur, is coming up. It will house facilities of leading electronics and telecommunication companies in the vicinity of the local vendors and service providers. It will be located near NH 4 on the Bangalore Highway road.

- **ITC facility at Pudukottai:** The FMCG giant has planned to invest INR 2,500 Cr in the State. An Integrated Consumer Goods Manufacturing and Logistics Facility will be constructed in an area of 55 acres in two phases. ITC will manufacture food products in this plant with an investment of

[46] Investing in Tamil Nadu:
http://www.investingintamilnadu.com/tamilnadu/infrastructure/new_industrial_park.php

INR 1,000 Cr. The TC can provide trained manpower in Industrial automation and assist in reverse engineering related services.

- **Peugot Investment:** The European automobile player, PSA Peugot is to sign a Memorandum of Understanding (MoU) with the State Government to invest INR 7,000 Cr into a car manufacturing facility and Research and Development Centre. It has planned to launch 17 vehicles by 2021. The Group will start its operations in India in collaboration with the CK Birla Group. The TC will play an important role in providing trained manpower, production and design capabilities to the new establishment especially in its initial phase.
- **CEAT Tyres:** RPG Group's company Ceat is setting up a tyre manufacturing unit near Sunkuvarchatram, located 49km from Chennai, covering an area of 163 acres at an investment of around INR 5,000 crore. The tyre manufacturing companies are located near the automobile hub of Chennai to cut logistics costs.

Social and Environmental Safeguards

6. Social and Environmental Safeguards.

6.1 Socio-economic profile of district

- **Composition of workforce:** Kancheepuram is a major manufacturing hub in the state of Tamil Nadu. Agriculture is the main occupation of the people with 47% of the population engaged in primary activities. According to the Census 2011, the total main workers of the District was 16,73,814 persons forming 41.9% of total population; of this, 11,81,308 were male workers and 4,92,506 were female workers. Around 6.7 lakh were from rural and 10 lakh were from Urban parts of the district. The total number of cultivators stood at 89,343, 2,72,514 agricultural labourers and 2,72,514 workers were involved in of Household industries.[47]

- **Sector composition:** The Gross District Domestic Product (GDDP) of Kancheepuram was estimated at INR 26,59,745 lakh (at 2004-05 prices) in 2010-2011[48]. It stands second in the state after Chennai. The share of tertiary sector was highest in Kancheepuram district at 59.18 per cent and lowest in the primary sector at 5.98%. The sectorial composition of the GDP is shown in figure below.

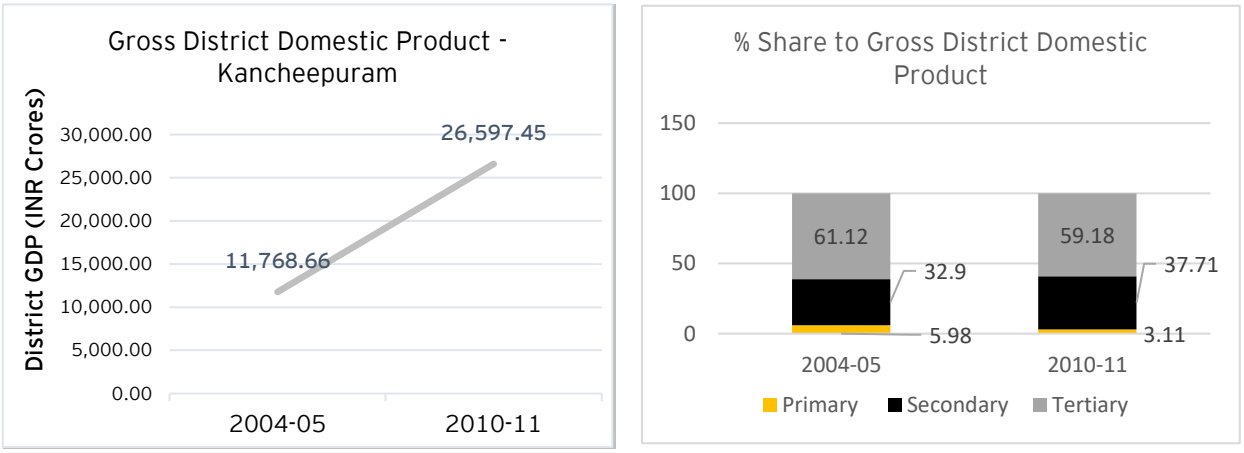


Figure 18: Growth of District GDP of Kancheepuram[49]

Primary Sector: The contribution of primary sector in the district GDP stood at only 5.98% during 2004-05 and declined to 3.11% in 2010-11. Agriculture is the main occupation of the people with 47% of the population engaged in primary activities. Paddy is the major crop cultivated in this district. Groundnuts, sugarcane, cereals and millets and pulses are the other major crops. Kancheepuram district is known for cultivation paddy and pulses. The District leads in the production of fruits, vegetables and flowers in the State. The major horticultural crops are mango, cashew and banana.

[47] Kancheepuram District Website: https://kancheepuram.nic.in/about-district/
[48] Statistical Hand Book 2016- http://www.tn.gov.in/dear/State%20Income.pdf
[49] Statistical Hand Book 2016- http://www.tn.gov.in/dear/State%20Income.pdf

Out of total land cover of 4393.37 sq. kms., the net sown is area stretches across 1364.89 sq. kms and the net irrigated area stands at 1236.28 sq. kms[50]. Cattle rearing, milk production and fisheries are other important activities in the primary sector in the district.

Secondary Sector:

Kancheepuram has become a manufacturing hub in various sectors like automobile and auto components, electronics, ready-made garments, leather, plastics, chemicals etc. It has emerged as a leader in the automobile and auto components sector with the presence of domestic and global leaders established in and around the district. It is the leading exporter of vehicles (passenger, utility, 2 wheelers and other multipurpose vehicles) to various markets in the Middle-East, Africa, ASEAN, Europe etc. Tamil Nadu has also planned to promote the state as an aerospace and precision engineering hub and has come up with aerospace manufacturing policy. A 250 acre Aerospace Park is planned with an estimate cost of INR 200 Cr in SIPCOT Industrial Park at Vallam-Vadagal Industrial Park, Sriperumbudur. Also, the traditional silk weaving, handloom and rice milling clusters are important industries in the district.

- There are total of 57,782 Udyog Aadhaar registered units in the district with 50,799 micro, 6,766 small and 217 medium units.
- A total of 17,442 MSMEs are into manufacturing
- Other major exportable items include: electronic components, software products, ready-made garments, leather products, silk sarees, jewellery and frozen sea food like fish, shrimps.

Tertiary Sector: The tertiary activities has the maximum contribution, around 59.18% in the district GDP. There are 40,340 MSME units engaged in Services sector. There are a number of existing and new IT Parks and SEZs coming up in and around the city dedicated to the IT/ITES sector. The electronics and software industry is one of the fastest growing industries in the district. It has a thriving tourism sector & service industries include trade, hotels, restaurants, hospitals, repair and servicing, consultancy and transportation.

- **Education:** Kancheepuram literacy rate stands at 85.29%. The district consists of 2 engineering colleges and 4 technical universities. There are over 50 universities in the state with world class education in engineering, medical sciences. The state has institutes of national importance such as Indian Institute of Technology, National Institute of Technology & many research institutes in the field of electronics, engineering, agriculture, leather, marine etc. The prestigious Anna University in the heart of the Chennai city has over 400 colleges affiliated to it. The following table gives information regarding the number of educational institutions present in Chennai district.

[50] https://kancheepuram.nic.in/about-district/

Table 9: Educational Institutions in the District[51]

Education	Number
Primary schools	68
Middle Schools	390
Secondary & Senior Secondary Schools	638
Engineering Colleges	52
Technical University	4

- **Health:** The status of health delivery system in Kancheepuram has been widely appreciated. The following table gives an overview of health infrastructure in the district during 2015-16:

Table 10: Health Infrastructure in Sriperumbudur[52]

SN	Type	Numbers
1.	Allopathic hospitals	10
2.	Total number of beds hospitals	4,191
3.	Ayurvedic Hospitals	2
4.	Beds in Ayurvedic Hospitals	160
5.	Primary health Centres	57
6.	Health Sub -Centres	364

[51] Brief Industrial Profile – Kancheepuram 2015-16: http://dcmsme.gov.in/dips/2016-17/DIP.KANCHEEPURAM.2015.16.pdf
[52] Brief Industrial Profile – Kancheepuram 2015-16: - http://dcmsme.gov.in/dips/2016-17/DIP.KANCHEEPURAM.2015.16.pdf

6.2 Social and environmental screening

Environmental and social screening enables the envisaged risks to be addressed at the very beginning of designing and conceptualizing the implementation of the expansion or the green-field development. The two main objectives of environmental and social screening are to:

- Enhance the environmental and social sustainability of a proposed project. This aspect of screening focuses on the environmental and social benefits of a project.
- Identify and manage environmental and social risks that could be associated with a proposed project. This aspect of screening focuses on the possible environmental and social costs of an intervention and may point to the need for environmental and social review and management.

6.2.1 Social screening

As per World Bank guidelines TCSP has a two-tier approach[53] to Social Screening Process (SSP) as defined by World Bank which is as follows;

- **No Social Screening Process (NSSP)** is applicable if,
  - Expansion/modernization of an existing TC takes place within its existing complex/campus and/or within an established and operational sites such industrial estates, industrial parks, export promotion zones etc.
  - New TC is to be established within established and operational sites such as industrial estates, industrial parks, export promotion zones etc.
- **Full Social Screening Process (FSSP)** is applicable if a new TC is to be established on land acquired from private title holders and/or on Government land under different tenure systems provided by the Government to establish a new Centre
- **Indigenous People's Social Screening Process (IPSSP)** will be undertaken
  - If a new TC is to be established in an area with high indigenous population comprising tribal populace and
  - If the area is covered by Govt. Policies and Plans such as Tribal Sub Plans and Panchayati Raj Extension to Scheduled Areas

Further, Resettlement Policy Framework (RPF) applies to all components of Technology Centre Systems Program that requires acquisition of private land and transfer of Government/public land and that are likely to have adverse social impact including involuntary resettlement.

[53] As per TCSP Environmental management framework - Draft (9 December 2013), MoMSME

In context of Sriperumbudur **TC;**

- Site description of the identified site for the proposed TC at Sriperumbudur;
  - The 10 acres of land is located at within SIPCOT Industrial Park, Vallam, Vadagal.
  - The land has been allocated by SIPCOT to O/o DC MSME on 19th March 2018 for the establishment of a TC by MSME.
  - Possession and Demarcation are yet to be undertaken.
- The site visits and social screening was carried out by the PMU team (including social safeguard specialist). The PMU and WB Environmental Specialists were also present during the screening undertaken on 14th May, 2018, it was observed that the site was free from any kind of encumbrances. Clearances for this will be sent along with the SS certificate 3B.
- The allocated site for the proposed new TC at Sriperumbudur is in an established Industrial Park consisting of Automobile Industries and Aerospace Park. The site is surrounded by a road and automobile industries.
- FSSP would not be applicable as 'the land for the establishment of the TC is not acquired from any private title holders and/or on Government land under different tenure systems'.
- Hence, in this case NSSP will be applicable since the new TC is to be established within an Industrial Site. The Social Screening certificate 3B has been shared and discussed with the concerned authorities during the World Bank and PMU joint site visit on 14 May 2018.

  Also, the proposed location of the TC is not established in an area with high indigenous population comprising tribal populace and the area is not covered by any Govt. Policies and Plans such as Tribal Sub Plans and Panchayati Raj Extension to Scheduled Areas. Hence, this rules out the undertaking of IPSSP.

The responsibilities related to social management will ultimately reside with the respective TC. The PMU will facilitate, support the implementation of the Social Management Plans and prepare a six-monthly report on all aspects of Resettlement Policy Framework and Process.

6.2.2 Environmental screening

Environmental safeguards are an integral component of the TCSP project. TCs are like mini industries; hence planning, development and management of the TCs involve several critical environmental, health and safety obligations. Incorporation of best environmental practices and processes are an integral part of any expansion or development of any green-field TC. The Environmental Management Framework ("EMF") of the project outlines and details of the environmental aspects to be considered in each phase of the project.

The foremost and most essential stage of environment management is to conduct an environmental screening. The primary objective of the environmental screening is to identify the environmental issues, concerns and environmental risks associated with the use(s) of the Site. Environmental screening enables the envisaged risks to be addressed at the very beginning of designing and conceptualizing the implementation of the expansion or the green-field development. Further, the screening analyses the environmental setting, surrounding land use, historical land use and related issues concerning the respective environmental context. As a consequence, the outcome of the screening process will be categorization of the project into one or more of the following categories:

- No further action is needed, either because no significant environmental impact and risks were identified, or because sufficient environmental review has already been conducted and environmental management recommendations have been incorporated into the project;
- Environmental sustainability elements need to be integrated into project design because there are possible environmental and social benefits, impact, and/or risks associated with the project (or a project component) but these are limited in nature, predominantly indirect or very long-term and so extremely difficult or impossible to directly identify and assess; and
- Further environmental and social review and management is needed because potential environmental and social impact or risks are associated with the project (or a project component) and it is possible to identify these with a reasonable degree of certainty. In some cases, determining the significance of these impact or risks will require environmental and social assessment which, in turn, will lead to the identification of specific environmental and social management measures that need to be incorporated into the project.

As a requirement Initial Environment Screening is conducted at all these sites to ascertain the potential environment impact of these developments, if any. Based on the observations, appropriate measures shall be planned in the Environment Management Plan (EMP) of the proposed Site.

The methodology for environment screening includes desk study, site visit, interview with relevant stakeholders and study of available literature and analysis of data/information.

- Desk study involves collection and review of the secondary data available in the public domain. This may involve analysing the geo-physical location and seismic activity of the site historical aerial photographs (Google Earth), soil type, land use pattern and readily available historical information; and
- Site visit/s is/are conducted to collect first hand data/information about the new/existing site. Physical assessment and verification of the site features, topography, existing structures etc. and other major environmental observation to evaluate any possible environmental impact. Interviews are conducted with relevant stakeholders including the site officials for understanding site specific information. The field visit helps to confirm the observations made through secondary data review and identification of additional environmental concerns (if any). Following aspects are analysed and assessed during environmental assessment:

    - Associated change in land use pattern
    - Level of land clearance associated with the development
    - Protected area/ Biodiversity sensitive area in the vicinity
    - Cultural heritage in the vicinity of the site
    - Indigenous people in and around the site
    - Effect on surrounding features due to construction/operations
    - Water source available at site for operations and envisaging the additional pressure on water sources
    - Sources of air/ noise emissions on the site and associated concerns
    - Concerns associated with use of chemicals, handling, storage and disposal of hazardous waste on site
    - Risk of natural calamities on site

To assess the potential environment impact of TCSP, the sites were visited and stakeholders were consulted to gather the relevant information. Stakeholders including MSME officials, representatives of industrial development and other Government officials were consulted during the site visit. Based on this preliminary review, the potential environment impacts of envisaged expansion/new TRTCs were gauged as per the current scenario and anticipated activities during construction and operation phase of the TRTCs.

Site description and environmental setting

The Site is located within SIPCOT Industrial Park, Vallam, Vadagal. The Site has a flat terrain .No structures were observed on the Site during the visit. Site is surrounded by road and has two

automobile industries in east side of the plot. As per the discussion with the Site Representatives, the Site was historically an unused land and has remained vacant throughout. The Site is within the SIPCOT Industrial Park, Vallam, Vadagal. The SIPCOT Industrial Park has Automobile Industries and Aerospace Park. The project does not involve land acquisition from private players. The Site is owned by SIPCOT and has been allocated to MSME- DI Chennai.

As per the Site representatives, ground water will not be used for the operations within the industrial area. Source of water for SIPCOT Industrial Area is Chembarambakkam Lake. No sources of air emissions, noise were identified on the site. However site has automobile industry in east side of plot. So it is recommended to collect baseline environment data for Air, Water and Noise. The site did not involve handling hazardous waste or chemicals. No biological sensitive area, cultural heritage structure was observed in the vicinity of the Site. There are no records of natural calamity in the region. Construction and operation of the Tool room is not envisaged to have any impact of the surrounding area.

The initial environmental screening was conducted to identify the environmental issues, concerns and environmental risks associated with the use(s) of the Site. Further, the screening analyses the environmental setting, surrounding land use, historical land use and related issues concerning the respective environmental context. The EY team conducted a site visit during the study phase and held discussions with Site Representatives. Based on the discussion, the checklist used to conduct environment screening at the selected site is given below:

Table 11: Checklist for environmental screening

SN	Issues	Yes/No	Remarks
1	Will the expansion or new tool room affect the land use pattern?	No	The allotted land is in a designated industrial area earmarked for industrial operations
2	Will the development include significant land disturbance or site clearance?	No	The land has Kikar (Acacia karoo) the small thorny tree. It grows to the height of 7 – 12 meter.
3	Will the project involve acquisition of land from private players?	No	The land has been allotted to MSME and is an earmarked industrial zone. Therefore, does not involve acquisition of land from private players.
4	The selected site is defined as industrial / commercial / residential?	Yes	Industrial zone
5	Is there any protected area or biodiversity sensitive area	No	No biodiversity sensitive areas are present near the site.

	in the vicinity which is likely to be affected by the operations of the tool room?		
6	Is there any archaeological or cultural/heritage structure in the vicinity of the site?	No	There is no archaeological or cultural/heritage structure in the vicinity of the site.
7	Is there any group of indigenous people in and around the selected site?	No	There are no indigenous people in and around the selected site.
8	Will the construction activity affect the surrounding around the tool room?	No	The construction and operation of the Tool room is not envisaged to have any impact of the surrounding area.
9	What is the source of water available at the site (Ground water, surface water, municipal supply, etc.)? Is the water requirement envisaged to put additional pressure on the water sources?	No	As per the Site representatives, ground water will be not be used for the operations within the industrial area. Source of water for SIPCOT Industrial Area is Chembarambakkam Lake. As water requirement for TC is only domestic purpose which is marginal. Hence no additional pressure on the water source envisaged.
10	Were any sources of air emissions observed on the Site?	No	No sources of air emission were observed on the site during the site visit. However the site has automobile industry in east side. So it is recommended to collect baseline ambient air quality surrounding the site.
11	Were any sources of noise identified on the Site?	No	No sources of noise were observed on the site. However the site has automobile industry in east side. So it is recommended to collect baseline noise quality surrounding the site.
12	Were any chemicals used on or in the vicinity of the Site?	No	No chemicals were being used on the Site during the Site visit.
13	Does the Site involve handling, storage and disposal of hazardous waste? If yes, what are the	No	As the Site did not involve any operations, no chemicals were handled on the Site.

	different types of waste envisaged from the TC?		
14	Is the project located in the area of seismic faults? In case yes, in which seismic does the location lie?	Yes	The TC location falls in the Seismic zone -III and these may be designed to be capable of handling an earthquake in case there is one in the future.
15	Is there any record of natural calamity in the area in the past? If yes, what is the probability of the same effecting the operations of TC in the future?	No	There is no record of natural calamity in the region.

6.3 Gender equity and social inclusion strategy

Gender, Equity and Social Inclusion Plan (GESIP) is an important aspect of the social management framework. TCSP also aims to create more choices for young people entering labour force (including women and those who belong to vulnerable sections of society) in terms of providing opportunities for hands-on-technical skills development at varying levels and types through TCs. This is in accordance with Government of India's focus on inclusive growth focusing on poverty reduction and group equality and also with World Bank's Country Partnership Strategy with emphasis on engagement, transformation and inclusion.

GESIP will be formulated for the proposed Sriperumbudur TC, during its operational phase which would not only be an outcome of the participatory process but also be rooted in the national and state policies for gender and social inclusion. Areas to be considered while preparing GESIP will also be in line with the RFD of the programme and would comprise the following (but not limited to):

- Criteria for admission into vocational education and training for skills development
- Increased opportunities for employment to women trainees
- Timings of training
- Ease of Location of TC
- User friendly campus infrastructure esp. for differently abled sections
- No. of women rest rooms
- Training Aids and infrastructure
- Any other component

The PMU will prepare and monitor the strategy to help with the preparation and implementation of a GESIP with particular emphasis on inclusion of young women as well as those who belong to weaker and underprivileged sections of society. For example, those who belong to SC/STs, backward castes, minorities and those who are differently abled. Good practices coming out of the GESIP will be documented and replicated/scaled up further in new TCs.

GESIP Strategy roadmap (Suggestive)

- Develop a module/ guidance notes for preparing TC specific GESIPs covering the following aspects:
  - Gender gaps
  - Importance of gender
  - Identification of gender specific issues and constraints that hinder the implementation of GESIP (human capital, access to information, access to finance, institutional factors, socio-cultural norms, structural factors, political/ legal)

- Use of gender-disaggregated data to analyse the business environment
- Identify communication channels to reach intended program beneficiaries
- Useful links and tools
- Case studies/ best practices
- Core questions and indicators

- Capacity building of TC focal points identified to work on GESIP. Analysis of existing pool of potential trainees and their eligibility in terms of gender and social inclusion and in terms of eligibility criteria as set out in national and State policies

- Hand holding support for planning and implementing GESIP

- Setting up institutional arrangements at TC level for transparent and accountable implementation and monitoring of GESIP based, among others, on specific and measurable indicators. Develop reporting and monitoring formats to assess progress every 6 months

- Organize and facilitate monthly meetings (for 6 months) for GESIP coordinators to identify issues and best practices and synthesize learning's' within and across sectors

6.4 Sample monitoring and reporting template

The monitoring of environmental parameters would be undertaken on quarterly basis. The responsibility of the same would lie with the concerned TC and a copy of the consolidated performance will be sent to the O/o DC MSME for their records and recommendations. The suggestive template for monitoring and reporting for the same to be adopted by the TC's is given below. Further, during operation and maintenance of the TC, a number of potential EHS impact may be expected based on the kind of activities undertaken. These possible aspects are delineated in the EHS section of this DPR.

Table 12: Sample monitoring and reporting template

SN	Parameter	Frequency of monitoring and reporting
1	Water consumption	Quarterly
2	Water Cess Report	Quarterly
3	Energy consumption	Quarterly
4	Waste generation and disposal - Municipal Solid Waste - Hazardous waste - Non-hazardous waste - Other categories	Quarterly
5	Safety records Near Misses First Aid cases	Quarterly
6	Training No of students and other trained	Quarterly
7	Air pollution and Noise pollution	6-monthly
8	Internal audit report	Quarterly
9	Update of legal register	6-monthly

Regulatory Approvals required

7. Clearances required and respective authorities

The proposed TC at Sriperumbudur is one of the Greenfield projects proposed under TCSP. This would include development of physical infrastructure including facilities like production, training, administration, hostel, canteen, utilities etc. keeping in view the long-term sustainability. The same would require clearances at different levels during construction such as approval of layout plan, environmental clearance, electricity and water supply connection, health and safety clearance and other associated clearances. Obtaining these clearances would be crucial for timely completion of the project and therefore needs to be planned well in advance. The following table gives indicative details of the various clearances along with the respective approving authorities and the tentative time required. However, considering that land has already been allotted to O/o DC-MSME for development of TC, some of these regulations may not be applicable.

Table 13: Clearances required and respective authorities

S. No	Required clearance/ approvals[54]	Department /agency	Tentative time limit for approval (days)
1.	Incorporation of Companies	Registrar of Companies	Single-window clearance, clears investment proposals in 30 days on an average
2.	Registration, Industrial Entrepreneurs Memorandum (IEM),	District Industry Centre	Single-window clearance, clears investment proposals in 30 days on an average.
3.	Tax Clearance Certificate	Commercial Taxes Department	1 day in case of non-default of tax payment
4.	Land conversion - Conversion of land use	Town and Country Planning/ Local Authority/ Kancheepuram Composite Local Planning Authority	90 days (If the requisite amount is deposited with application) 165 days (if additional amount needs to be deposited over

[54] Indicative list of clearances/ approvals

S. No	Required clearance/ approvals[54]	Department /agency	Tentative time limit for approval (days)
			and above the amount deposited with application)
5.	Land Allotment	State Industries Promotion Corporation of Tamilnadu Ltd (SIPCOT)	30 days if allotment is to be made at the District Level 60 days in case Government's approval is required
6.	Allotment of plots in Industrial Areas	Tamil Nadu Department of Industries/State Industrial Development Corporation/Infrastructure Corporation) / State Industries Promotion Corporation of Tamil Nadu Ltd (SIPCOT) /State department	60 days
7.	Issue of NOC to the authority concerned regarding conversion of land use	Various State department depending upon the classification of land	30 days
8.	Environmental Clearance (Consent of Air and Water Pollution)	Tamil Nadu Pollution Control Board (TNPCB) and Union Ministry of Environment and Forests	Site/environment clearance: 90 days, NOC to establish: 45 days, NOC to operate: 30 days, Renewal of consent: 30 days
9.	Electricity Connection	Tamil Nadu Electricity Board (TNEB)	Loads up to 60 HP: 66 days, Loads above 60 HP and up to 300 KW: 90 days, Loads above 300 HP and up to 3000 KW: 180 days,

S. No	Required clearance/ approvals[54]	Department /agency	Tentative time limit for approval (days)
			Load above 3000 KW and up to 33KV: 375 days
10.	Water connection	State Department/ Central Ground Water Board / Tamil Nadu Water Supply and Drainage Board	Up to 30 days
11.	Fire safety	Tamil Nadu Fire & Rescue Services Department /State Department	Up to 30 days
12.	Approval of place and for permission to construct building under the Factories Act	Department of Town and Country Planning (DTCP)	15 days
13.	Approval of factory layout plan under factories Act, 1948	Department of Town and Country Planning (DTCP)	30 days
14.	License for running the factory	Department Inspectorate of Factories - Government of Tamil Nadu	45 days
15.	Registration of shops and commercial establishments	Labour Department – Government of Tamil Nadu	10 days
16.	Permission to establishments having more than 50 labourers under	Department Inspectorate of Factories - Government of Tamil Nadu/ Labour Department	45 days

S. No	Required clearance/ approvals[54]	Department /agency	Tentative time limit for approval (days)
	Industrial Employment		
17.	Lift	Electrical Inspector, Government of Tamil Nadu	NA
18.	Borewell	Central Ground Water Authority	NA
19.	Society registration	Registration Department, Government of Tamil Nadu	7 Working Days

Manpower and Human Resource requirement

8. Manpower and Human Resource development

The success of an institute or an organization majorly depends upon the skill set and experienced human resource available with them. Hence, it's planning, recruitment and development is one of the most important aspects while designing a new Technology Centre. As a part of the study we have analysed organizational structures of some of the existing Technology Centres to understand the major functional areas, number and level of employees, contractual staff and other related aspects. In continuation, we have also discussed the same with O/o DC-MSME and some of the heads/GMs of the existing TRs.

As per the existing structure, there are following functional areas/streams in a TR:

- Production
- Design
- Training
- Consultancy and Marketing
- Administration and Accounting

The level of employee heading a particular Functional area/stream/department varies in some of the TCs. In an Indo German TC Administration and Accounting is headed by a Manager while in Indo Danish TCs this is being headed by a Senior Manager. Sanctioned employee strength in these existing TCs typically varies from 110-120.

Proposed organization structure

While analysing the existing organizational structures and designing the new one, we have taken some considerations into account which have been discussed and validated with the O/o DC-MSME. Some of the key considerations are as below:

- As per the decision taken in the Empowered Finance Committee, the total sanctioned strength for any new TC would be 60 in contrary to the existing ones which have total sanctioned strength of 110-120.
- In the proposed organizational structure for Sriperumbudur TC, the main revenue streams are Training, Production and Design & consultancy. These departments will be headed by Senior Managers who would directly report to GM/DGM.
- In contrary to the existing structures and target of sanctioned employee strength of not more than 60, we have proposed only 7 levels as compares to the existing structures which have 9 levels in the hierarchy. Below these levels, the resources will be hired as contractual employees on need basis.
- In the existing structure consultancy and marketing department were clubbed into one, but in the proposed structure for Sriperumbudur TC it has been proposed to have marketing as a separate department and consultancy be clubbed with the design department. This has been done after having discussions with some heads/GMs of the existing MSME TCs and understanding the

customer requirements to meet the technical experts while pitching for any consulting assignment. Moreover, production projects' catering to component manufacturing or tool designing requires consulting. Most of these projects are mutually exclusive with less replicability across designs.

- The other two departments namely, Marketing and Administration and Accounting are proposed to be headed by Manager level position and they will directly report to GM/DGM. This has been done as the administration and accounts department is lean and a manager level employee would be able to manage the same. Also, as stated above, the total sanctioned strength cannot exceed 60.
- Consistent efforts will have to be made to optimize the revenue from training, production and business advisory. With this is in mind, the design and consulting department have been strengthened with a sanctioned strength of 7 experts which will mainly work in the areas of Design support, Quality systems support, Product development and engineering solutions, Project consultancy in setting up of TR, training centre and others. These experts will be supported by internal production team and external experts on need basis.
- In contrary to the sanctioned strength (4-5 employees) in marketing department of many existing TCs, the sanctioned employee strength in the proposed structure has been reduced to 2 only (1 Manager and 1 officer sales). This has been proposed keeping in mind that the GM or Deputy General Manager will devote his/her significant time in marketing and sales. Also, the respective departmental heads (Senior Managers) will be responsible for the sales and marketing efforts of their departments. Moreover, above all TCSP aims to hire Technology Cluster Manager to facilitate all the market linkages for the proposed TC. The role of TCM for marketing would be very crucial and it will act as an additional arm of the marketing wing of the proposed TC. Considering all the above factors into account, a lean marketing department has been proposed for the proposed Sriperumbudur TC.
- The maintenance manager though will be a part of the production department but will have an added responsibility to support the maintenance of machines in the training department as well. He/she will be supported by 1 Senior Engineer and 2 Senior Technicians.
- Based on our discussions with the O/o DC-MSME and heads of the existing MSME TCs, there was a need for dedicated manager for the short term trainings. In the structure for Sriperumbudur TC, we have proposed separate manager for mechanical, electronics and short term trainings. Keeping in mind the scale and the number of trainees in the short term courses (both mechanical and electronics), the manager short term would mainly be responsible for administration, planning, quality control, issue of certificate to trainees, fee collection and others. Even one of the managers (from mechanical and electronics) would be additionally responsible for placement of students which will include industry interaction, managing training and placement, delivering presentations etc.
- While estimating the numbers we have considered the following considerations:

- The final semester trainees of Tool Design and Manufacturing course would also work with the design and consultancy department. This will help them in getting the hands-on experience and will also provide support the department
- In continuation to the above, even the final semester trainees of Diploma in Tool & Die making, Post Diploma in Tool Design, Post diploma in Tool Manufacturing and CNC Machinist would work in the production department depending upon the skill set and interest area.
- In addition to the regular employees, the training department will have the maximum number of contractual faculty in the form of guest faculty and full time contractual faculty. The figure for number of contractual faculty have been arrived at by taking various factors into account namely – existing employees in training and production, the number of courses vis-à-vis the number of trainees, trainee to teacher ratio, projected revenue numbers over the years, number of shifts in production vis-à-vis the utilization and others. The TC will sub-contract the assistants in the administration, accounts and stores department for providing the support to the departmental team on day to day basis.
- The requirement of staff for the house-keeping and security will be outsourced to a third party agency on yearly contract basis

Based on the considerations stated above, the organisational chart in figure 19 demonstrates the target organizational structure to be achieved in 5 years (by 2022-23) from inception. Though, we have provided the figures till 2027-28 since we are estimating the revenue and expenditures for next 10 years.

As highlighted above, the proposed Technology Centre at Sriperumbudur will be divided into five functional areas/departments. These are:

- Production
- Training
- Design and consultancy
- Marketing
- Admin and Accounting

It is recommended that the GM and the DGM divide these five areas/departments between them, depending on competency, work-load and previous experience. Overall GM would be responsible for the management and financial health of the TC.

The chart consists of 5 levels in addition to the General Manager (GM) and the Deputy General Manager (DGM).

- The third level consists of Senior Managers as the departmental heads of design and consulting, production and training. They will report directly to either the GM or the DGM, depending upon the division of departments within them.

- The fourth level will consist of Managers who will be supporting Senior Managers in their respective domains. But for marketing and admin and accounting department, as explained above manager will head this department and directly reporting to GM or DGM.
- The fifth level consists of senior engineers (Sr. Engg.) and Sr. Officers. Level six consists of engineers (Engg.) and officer / foreman.
- The final level consists of senior technicians with requisite operational level expertise.

The responsibilities of each position and qualifications required to fulfil roles are covered in the following section. Hence, the recommended final organisational structure for the proposed TC is based on experience from established MSME Technology Centres, discussions with O/o DC-MSME and heads of some of the existing TCs, expert opinion and knowledge and experience with organisational planning.

Table 14: Sanctioned strength of key resources

S. No.	Designation	Proposed Sanctioned Strength
1.	General Manager	1
2.	Deputy General Manager	1
Department		
3.	Administration and accounting	7
4.	Design and consultancy	7
5.	Production	18
6.	Training	22
7.	Incubation Centre	2
8.	Marketing	2
	Total	**60**[55]

In addition to the above sanctioned strength, we have recommended additional employees as contractual employees. Based on the requirement, we have estimated around 140 contractual employees (128 in training & 12 in production) by end of FY 2030. The figure for number of contractual employees have been arrived at by taking various factors into account namely – existing employees in training and production, the number of courses vis-à-vis the number of trainees, trainee to teacher ratio, projected revenue numbers over the years, number of shifts in production vis-à-vis the utilization and others.

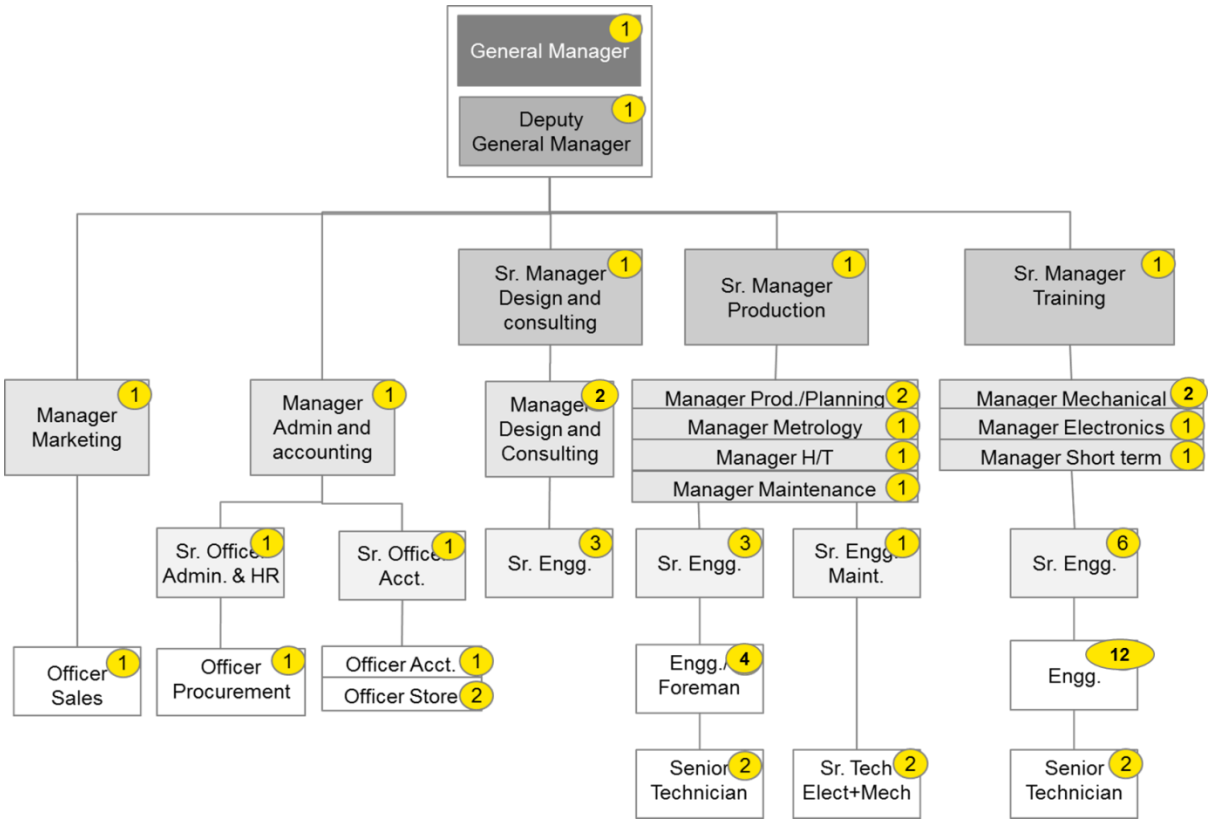
[55] The details and basis of number of employees is provided in the next section

While considering the ratio for trainee to teacher, we have used the following assumptions after discussion with existing GMs and O/o DC-MSME.

- Trainee to teacher ratio for theory classes – 60:1; with theory classes conducted for 20% of time
- Trainee to teacher ratio for practical classes – 20:1; with practical classes conducted for 80% of time

After calculating the weighted average of the above ratios we got the overall trainee to teacher ratio of 28:1. Post discussions, we have considered trainee to teacher ratio of 25:1 for calculating the number of employees in the training department (regular and contractual faculty) keeping in mind the employees who will be on leave at any given point of time.

Figure 19: Proposed organisation structure



8.2 Phase wise induction of human resources

As discussed in the above sections, the proposed TC will have 60 employee as sanctioned strength and the target structure will be achieved within 5 years from 2021-22. Therefore due care has been taken during the study to phase the recruitment of employees. On the same lines, initially some positions have been proposed to be vacant when establishing the organizational structure of the TC. This has been proposed keeping in mind the time it will take to be fully operational. Vacant positions will also create incentives for high performers to obtain higher positions when the time comes for fulfilling these.

The phase wise estimated staffing over next few years as part of human resource planning has been done through the identification and analysis of the various types of activities and skill sets required for smooth and efficient functioning of the proposed TC. Multiple rounds of discussions with industry experts, World Bank, O/o DC-MSME and heads of some of the existing MSME TCs have been undertaken to arrive at the requirement of human resources needed to meet the business objectives in the short and long term of the proposed TC.

The following provides the details of recruitment in various phases over next few years. This phasing is suggestive and can be modified based on the need and revenue generating capabilities of the TC during operations. Some of the considerations which have been taken into account while recommending the phasing of employees are as below:

- **Year 2021-22: 2 staff members**
  - GM will be involved in project implementation and work out the strategy for marketing, training, production and consultancy with the help of TCM. GM will also monitor the progress of construction and procurement of machines etc. GM will also be responsible for planning of recruitment of required manpower.
  - Manager – Administration & Accounts will be responsible to get statutory registrations like sales tax and PF, opening of TC's bank account, getting power and water connection etc. Manger will also support GM in recruitment of people in the coming years.

- **Year 2022-23: 20 staff-members**
  - Three senior managers will be recruited to further recruit staffs in respective departments. These would also be responsible for orientation and training of respective staff members.
  - Senior officer - administration & HR will be recruited to support the GM and manager - administration and accounts for further recruitment of staff and forming of systems to conduct day to day administrative activities
  - The first long term training programme will commence this year and one senior engineer, one engineer and one senior technician will be recruited for installation of machines and conducting theory and practical training
  - By second half of this year, production and design staff will be recruited. The respective senior managers would be responsible for orientation and training of these staff members. These staff will undergo training (preferably at another Tool room at Aurangabad and/or Ahmedabad) for a period of 3-6 months to make them fully trained before start of the operations of the proposed TC
  - Manager - maintenance and senior technicians will be recruited to install and commission machines for production and training. They will also be responsible for installing the power supply system
  - Stores and accounts officers will be recruited to maintain statutory records and support the operations

- **Year 2023-24: 42 staff- member**
  - Production will commence during this phase and hence more engineers and senior engineers will be recruited. The number of staff has been decided based on estimated number of machines commissioned during this phase and number of shifts in production
  - This year some short term training courses will commence along with the starting of the second year of the long term course.
  - Officer sales will be recruited to support manager marketing for preparation of detailed marketing plan of the TC. The staff would be engaged in various marketing activities for wider reach of the proposed TC across the region. This would be crucial for promotion of the TC and would help departments increase their revenue
  - The Design and Consultancy department has been planned to commence its commercial services during this year and hence manager and senior engineers will be recruited to meet the requirement.

- **Year 2024-25: 52 staff members**

The proposed TC would be fully operational by this period with activities in production, training, design and consultancy etc. Additional staff will be recruited for smooth undertaking of the gradual increase in the activities across all the departments.

It is recommended to leave the position of the DGM vacant initially. The position of the DGM can be filled by a high performing senior manager within design and consulting, production or training depending upon the requirement, skill set and experience.

Rest of the positions will be filled gradually as TC activity escalates and the manpower requirements increase. The tables below summarize the phasing of the organizational completion within each area; Administration and Accounting, Design and Consulting, Production, Training and Sales and Marketing, in addition to the positions of the GM and DGM. The numbers represent the numbers of employees within the specific position at a given point in time. The timeline spans from 2017 to 2026.

Table 15: Summary of phase wise induction of resources

Year	21-22	22-23	23-24	24-25	25-26	26-27	26-27	27-28	28-29	29-30	30-31
Full time employees											
Total	2	20	42	52	57	60	60	60	60	60	60
Contractual employees											
Total	-	3	25	44	65	78	97	112	126	140	140

Below tables depicts the hiring of number resources in every department every year starting from 2021-22 to 2030-31. In the year 2030-31, the TC is recommended to hire the complete sanctioned strength of 60 employees.

Table 16: Department wise induction of fulltime resources

General Manager							
Year	21-22	22-23	23-24	24-25	29-30	30-31	31-32
General Manager	1	1	1	1	1	1	1
Total	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Deputy General Manager							
Year	20-21	21-22	22-23	23-24	24-25	29-30	30-31
Deputy GM	-	-	-	-	-	1	1
Total	**0**	**0**	**0**	**0**	**0**	**1**	**1**
Administration and Accounting							
Year	20-21	21-22	22-23	23-24	24-25	29-30	30-31
Manager Admin. and Accounting	1	1	1	1	1	1	1
Sr. Officer HR	-	-	-	-	-	1	1
Sr. Officer Accounting	-	1	1	1	1	1	1
Officer Procurement	-	-	1	1	1	1	1
Officer Store	-	1	1	2	2	2	2
Officer Admin	-	1	1	1	1	1	1
Total	**1**	**4**	**5**	**6**	**6**	**7**	**7**
Design and Consulting							
Year	20-21	21-22	22-23	23-24	24-25	29-30	30-31
Senior manager		1	1	1	1	1	1
Manager *			2	2	3	3	3
Sr. Engg. *			2	3	3	3	3
Total	**0**	**1**	**5**	**6**	**7**	**7**	**7**
Production							
Year	20-21	21-22	22-23	23-24	24-25	29-30	30-31
Senior Manager	-	1	1	1	1	1	1
Manager Prod/ Planning	-	-	1	2	2	2	2
Manager Metrology	-	-	1	1	1	1	1

Manager Maintenance	-	1	1	1	1	1	1
Sr. Engg. Maintenance	-	-	-	1	1	1	1
Sr. Engg. Prodn*	-	3	3	3	3	3	3
Engg. / Foreman	-	2	5	5	5	5	5
Senior Technician	-	1	2	2	2	2	2
Senior Technician Maintenance (Mech + Elect)	-	1	1	2	2	2	2
Total	**0**	**9**	**15**	**18**	**18**	**18**	**18**
Training							
Year	20-21	21-22	22-23	23-24	24-25	29-30	30-31
Senior Manager	-	1	1	1	1	1	1
Manager Mechanical	-	-	1	1	1	1	1
Manager Electronics	-	-	1	1	1	1	1
Manager Short term	-	-	-	-	-	1	1
Sr. Engg.	-	1	5	6	6	6	6
Engg.	-	1	4	8	10	10	10
Senior Technician	-	1	2	2	2	2	2
Total	**0**	**4**	**14**	**19**	**21**	**22**	**22**
Incubation Centre							
Year	20-21	21-22	22-23	23-24	24-25	29-30	30-31
Manager	-	1	1	1	1	1	1
Officer	-	-	1	1	1	1	1
Total	**0**	**1**	**2**	**2**	**2**	**2**	**2**
Sales and Marketing							
Year	20-21	21-22	22-23	23-24	24-25	29-30	30-31
Manager Marketing	-	1	1	1	1	1	1
Officer Sales	-	-	1	1	1	1	1
Total	**0**	**1**	**2**	**2**	**2**	**2**	**2**

*One of the Post will be filled with an electronics background

8.3 Roles and responsibilities

While conducting the study, we had series of discussions with the O/o DC-MSME and some heads/GMs of existing MSME TRs on the prospective roles and responsibilities of the employees for the Sriperumbudur TC. Below is summary of the suggestive roles and responsibilities (including the minimum qualification levels) of the individual employees which can be referred to while recruiting.

Table 17: Roles and responsibilities of proposed positions

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
General Manager	B.Tech (Mechanical) with MBA or M.Tech	15 Years with 8 years in similar role	▶ Tool Manufacturing/Design/ Product development/ Training. ▶ Experience in Project Implementation will be preferred	▶ Over all responsible for the administration and financial health of the TC ▶ Key responsibility areas include (but not limited to); Marketing, Administration, HR, Accounts, Production, Design & consultancy etc. ▶ Responsibility for achieving the target KPIs set by the GC
Deputy General Manager	B.Tech (Mechanical) with MBA or M.Tech	12 Years with 5 years in similar role	▶ Tool Manufacturing/Design/ Product development/Training. ▶ Experience in Project Implementation will be preferred	Head of Production, Design, Consultancy and Training
Manager - Admin. and Accounting	CA/ICWA or MBA with bachelor's	8 Years with 3 years in similar role	▶ Experience in the area of Administration, HR and Accounting	Head of Accounts, Administration and HR: ▶ General housekeeping of TC

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
	degree in Commerce/ Accounting / Finance		▶ The Manager must also have basic knowledge of government laws, regulations and state specific compliances ▶ Familiarity with ERP/accounting software	▶ Bookkeeping, accounting and finance including financial analysis ▶ TC security ▶ Payroll ▶ Procurement management and store keeping
Sr. Officer - Admin. & HR	MBA or Equivalent	5 Years	▶ Experience in the area of HR and Administration ▶ Familiarity with Industrial laws and compliances	▶ Housekeeping of TC ▶ Security systems operation ▶ Transport System and management ▶ Payroll
Sr. Officer - Accounting	Bachelor's degree in commerce/Accounting / Finance with M.Com. or MBA	5 Years	▶ Experience in accounting and Tax ▶ Should be familiar with latest accounting software	▶ Bookkeeping and accounting ▶ Financial analysis
Officer - Accounting	M. Com. or MBA or Equivalent in Accounting	3 Years	▶ Experience in accounting and Tax. ▶ Should be familiar with latest accounting software	▶ Bookkeeping and accounting ▶ Handling of Cash, Banking etc.
Officer Store	Diploma in Mechanical or Equivalent	3 Years	▶ Experience in Store keeping, including inventory management	▶ Managing store ▶ Issue of consumable and non-consumable stores and keeping records

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			▶ Experience in Computer systems / software for store keeping operation	
Officer Procurement	M. Com. or MBA or Equivalent	3 Years	▶ Experience in Procurement processes ▶ Knowledge of Govt. Procurement rules and processes will be desirable	▶ Procurement ▶ Vendor Development
Senior manager - Design & Consultancy	M.Tech in Mechanical engineering.	10 Years with 5 years in similar role	▶ Experience in product modelling, design, tool design ▶ Proficiency in one of the areas in Tool Design, either Sheet metal press tool or Plastic mould ▶ Practical Experience in use of CAD/CAM/CAE in product and tool design ▶ Experience of Tool trial ▶ Experience of assembly and inspection of Jigs and Fixtures ▶ Knowledge of Quality systems ▶ Experience in technical consultancy will be preferred	Responsible for designing tools, moulds and die casting w.r.t. ▶ New product development planning and its execution ▶ Quality systems ▶ Value engineering ▶ Tool try outs and proving ▶ Consultancy to MSMEs In charge of Incubation centre ▶ Helping members of Incubation centre in getting orders and execution of the same
Manager- Design & Consultancy	B. Tech in Mechanical engineering.	8 years with 3 years in a similar role	▶ Experience in product modelling, design, tool design	▶ Designing tools, moulds and die casting ▶ Product development ▶ Quality systems ▶ Value engineering

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			▶ Proficiency in one of the areas in Tool Design, either Sheet metal press tool or Plastic mould ▶ Practical Experience in use of CAD/CAM/CAE in product and tool design ▶ Knowledge of Tool trial ▶ Experience of Jigs and Fixtures ▶ Knowledge of Quality systems ▶ Experience in technical consultancy will be preferred	▶ Tool try outs and proving ▶ Consultancy to MSMEs: Deliver functional consulting on assigned areas to ensure MSMEs are able to successfully use the solutions
Sr. Engineer-Design & Consultancy	B. Tech in Mechanical engineering	5 Years	▶ Experience with designing sheet metal tools, plastic moulds or die casting ▶ Knowledge of high end CAD software, analysis software and metrological instruments ▶ Experience of consultancy in the areas of product development, quality systems and value engineering	▶ Designing tools, moulds and die casting ▶ Product development ▶ Quality systems ▶ Value engineering ▶ Tool try outs and proving ▶ Consultancy to MSME
Sr. Manager Production	M. Tech. in Mechanical Engineering	10 Years with 5 years in similar role	▶ Experience with tooling or manufacturing and at least 3 years of leadership experience	▶ Overall responsible for Production, production planning and control, including quality assurance of Tools and components, Tool trials etc.

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			▶ The Sr. Manager should have experience in metal or plastic mould and/or die casting ▶ The Sr. Manager should also have hands on experience with CAD and CEM software, and programming of CNC machines ▶ Experience to debug tool, analyse problems, root causes & take corrective improvement actions when tool is not able to produce as per part specifications	▶ Overall responsible for relevant software CAD/CAM/CNC ▶ Overall responsible for machine maintenance and upkeep ▶ Ensuring on-time deliveries ▶ Deliver budgeted quantities as per required quality standards ▶ Manpower deployment and controlling manpower costs as per target
Manager-Production	B. Tech in Mechanical Engineering	8 Years with 3 years in a similar role	▶ Experience with tooling or manufacturing ▶ Knowledge of metal or plastic mould and/or die casting ▶ Hands on experience with CAD and CAM software, and programming of CNC machines ▶ Experience to debug tool, analyse problems, root causes & take corrective improvement actions when tool is not able to produce as per part specifications	▶ Production ▶ CAD/CAM/CNC programming and operation ▶ Responsible for timely delivery of tools and components ▶ Responsible for Tool Trial ▶ Responsible for Consultancy to MSMEs ▶ Should have good knowledge of Quality and inspection

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Manager- Production planning	B. Tech in Mechanical Engineering	8 Years with 3 years in a similar role	▶ Experience in tooling or manufacturing ▶ Experience in metal or plastic mould and/or die casting. ▶ Experience in CAD and CAM software, and programming of CNC machines ▶ Knowledge of ERP software	▶ Preparation of stage wise / machine wise scheduling in co-ordination with head of production team ▶ Production Planning and Control, and further dispatching of jobs ▶ Estimate & manage to get raw materials and component requirements ▶ Responsible from issue of raw materials to dispatch of final product to customers including routing
Manager- Metrology	B. Tech in Mechanical Engineering	8 Years with 3 years in a similar role	▶ Practical knowledge and experience of handling CMM and measuring Instruments ▶ Knowledge of Quality assurance and systems	Head of QC and metrology section with in production
Manager- Heat treatment (HT)	B. Tech in Metallurgy/Mechanical Engineering	8 Years with 3 years in a similar role	Practical Experience in heat treatment of engineering products including tool steel	Head of heat treatment section and responsible for heat treatment operation
Manager- Maintenance	B. Tech in Mechanical/ Electrical/	8 Years with 3 years in a similar role	▶ Knowledge of Installation and commissioning of machines and equipment	▶ Head of Machinery maintenance including preventive maintenance, repair etc. of machines and equipment

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
	Electronic Engineering		▶ Practical experience in preventive and repair maintenance of machines and equipment ▶ Practical experience of maintaining utility equipment like sub-station, UPS, water treatment plant, DG set etc.	▶ Responsible for Power supply, energy conservation water system in the campus
Senior Engineer-Production	B. Tech in Mechanical Engineering	5 Years	▶ Knowledge and experience in tool manufacturing, metal cutting through CNC programming and operation ▶ Experience of precision components ▶ Tool assembly ▶ Tool trial	▶ CNC machine programming and supervision of machining and assembly of tools ▶ Machinery maintenance ▶ Quality assurance ▶ Team work
Engineer-Production	Diploma in Tool & Die Making or Equivalent	3 years	▶ Knowledge and experience in tool manufacturing, metal cutting through CNC programming and operation ▶ Tool assembly ▶ Tool trial	▶ CNC machine programming and operation ▶ Assembly and trial of Tools
Foreman	Promotion from Senior Technician	3 years as Sr. Technician	▶ Knowledge and experience in tool manufacturing, metal cutting through CNC programming and operation ▶ Tool assembly ▶ Tool trial	▶ CNC machine programming and operation ▶ Assembly and trial of Tools

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Senior Technician (Electrical maintenance / Mechanical maintenance/ tool assembly & manufacturing)	Diploma/ ITI in respective areas	1 year after Diploma or 5 Years after ITI in respective areas	Experience in Maintenance of machines and equipment (electronics or mechanical)/ Experience in CNC machine programming and operation/ Experience in Tool assembly and trial	▶ CNC machine programming and operation ▶ Assembly and trial of Tools ▶ Also work as Maintenance Technician in Mechanical/ Electronics
Senior Manager-Training	M. Tech. in Mechanical engineering	10 Years with 5 years in a similar role	▶ Experience with tooling / manufacturing and training in metal cutting / tool engineering / industrial automation systems ▶ Experience with designing curriculum and preparing lecture plans and course material for long term and short term training and teaching	▶ Overall responsible for planning and executing training activities ▶ Overall responsible for designing curriculum and preparing lecture plans and course material ▶ Responsible for Quality and Certification in training
Manager Training-mechanical/ Electronics	B. Tech. in Mechanical or Electronics or Electrical Engineering	8 years with 3 years in a similar role	▶ Experience with tooling / manufacturing and training in metal cutting / tool engineering / industrial automation systems ▶ Experience with designing of curriculum and preparing lecture plans and	▶ Planning and implementing of training activities in manufacturing and tooling, Mechatronics, IT etc. including market assessment to discover training demand ▶ Evaluation of training activities and identify improvements

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			development of course material for long term and short term training and teaching	▶ Curriculum design ▶ Lecture plans and course material
Senior Engineer-Training	B. Tech. Mechanical or Electronics/ Electrical	5 Year	▶ Experience with tooling / manufacturing and training in metal cutting / tool engineering / industrial automation systems ▶ Experience with designing curriculum and preparing lecture plans and development of course material for long term and short term training and teaching experience ▶ Knowledge of CAD/CAM/CNC	▶ Undertake training courses in manufacturing/ tooling and related courses
Engineer-Training	Diploma in Tool & Die Making/Electronics	3 Years	▶ Experience in tooling / manufacturing and training in metal cutting / tool engineering / industrial automation systems and teaching	▶ Undertake training courses ▶ Demonstrate practical skills to trainees ▶ Deliver theory lectures
Manager – Incubation Centre	M. Com. Or MBA or Equivalent	8 Years	▶ Experience in management, administration, and marketing in the sector ▶ Familiarity with regulations and compliances	▶ Helping members of Incubation centre in getting orders and execution of the same

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Officer – Incubation Centre	M. Com. or MBA or Equivalent	3 Years	▶ Experience in the area of Administration and Marketing ▶ Familiarity with Industrial laws and compliances ▶ Prior experience of marketing and promoting in the sector	▶ Administration and Promotion
Manager- Sales & Marketing	M. Tech. in Mechanical Engineering preferably with MBA	10 years with 5 years in similar role	▶ Marketing of TC product range ▶ Supporting Sr. Managers of respective departments to acquire orders ▶ Follow up with prospective and existing customers	▶ Plan and evaluate marketing activities towards all stakeholders ▶ Stakeholder analysis ▶ Sales according to targets
Sales Officer	BE/B. Tech Mech. with MBA or Equivalent	3 years	▶ Marketing of TC Products ▶ Customer Follow-up & Complaints ▶ Should be familiar with Computerised accounting procedures ▶ Feed Back, Dues Collection	▶ Execute marketing and sales activities ▶ Sales invoicing, taxes etc.

8.4 Governance structure

8.4.1 Governance Model for the new TCs

All the existing 18 TCs have been set up under the Societies Registration Act, 1860. The management of affairs mainly rest with the Governing Council constituted by MoMSME, Government of India with the Additional Secretary and Development Commissioner of Ministry of Micro, Small and Medium scale Enterprises (DC-MSME) acting as the President of the Society and Chairman of the Governing Council (GC).

This arrangement has proved effective as most TCs have supported local MSMEs well and have performed financially. Each TC has a separate society and has very decentralized authority and governance structure. DC, MSME being chairman and other two members Director –Tool Room and representative of IF-wing of MoMSME are common members in all 18 GCs.

The Sriperumbudur TC will also be set up under the Societies Registration Act, 1860 and will function as the current TCs are functioning.

The benefits of registering under the Societies Registration Act, 1860 are listed in the table below:

Table 18: Comparison of Society Registration Act and Companies Act

Features	Registered Society
Setting up and running cost	Nominal
Formation	Simple
Jurisdiction	Registrar of society
Meetings	Annual Meeting As per Law. Governing Body meeting as per the rules of Society.
Governance	Vests with governing body as per the rules framed by them. Law specifies no rules & regulation
Membership transfer	Impossible
Statutory Regulations	Limited
Transparency	Transparent (As society act is not so exhaustive requiring statutory compliance for each and every step of business operation)
Perception commercial lenders	Less comfortable

Features	Registered Society
Interest of commercial lenders	Less secured, as Act doesn't provide any rules regarding how the interest of lenders can be settled in the case of bankruptcy
Accountability	More (Can be established, if the rules, regulation and by-laws of the Society are framed in manner to fix accountabilities)
Financial Management & Disclosures	Best practices can be adopted through framing regulations. However, Act doesn't provide anything specific on this
Modification of Objects	Easy Legal Procedure
Penalties	Lesser
External audits	Subject to lesser audit requirement. As Act doesn't provide for various kind of audits of the Society. However, generally the society provide for audit regulations and compliance to audit observations as part of their bye-laws and rules and regulations
Basic Document	Memorandum of Association Articles of Association with rules & regulations

The Table above outlines the benefits of registering under the Societies Registration Act, 1860.

8.4.2 Composition of the Governing Council

As mentioned above, the proposed TC will be set up under the Societies Registration Act, 1860. The management of affairs primarily rest with the Governing Council constituted by MoMSME, Government of India with the Additional Secretary and Development Commissioner, Ministry of Micro, Small and Medium Enterprises (DC-MSME) acting as the President of the Society and Chairman of the Governing Council of each TC.

The Governing Council of TC will comprise four types of members as explained below:

Table 19: Governing Council of Sriperumbudur TC

Representation in the Governing Council	Suggestive recommendations
(i) Ex-officio members	
Representative from Government of India ▶ Development Commissioner, Ministry of MSME as Chairman,	▶ Secretary, Industries ▶ Commissioner/Director, Technical Education & Training

Representation in the Governing Council	Suggestive recommendations
▶ Industrial Advisor or Director of TR or Program Coordinator, ▶ Director DI-MSME of the respective States, ▶ Representative from Integrated Finance Wing of the Ministry of MSME. **Representative from State Government** ▶ Official from concerned industry department, ▶ Official from concerned department of technical education/training.	
(ii) Institutional members	
▶ Representative of state level industrial promotion body ▶ Representative of association of small scale industries ▶ Representative of the local chambers of commerce and industries/ Industry Promotion Institution/NSIC.	▶ District MSME association ▶ Madras Chamber of Commerce and Industries/ Department of Industries
(iii) Professional and other members	
▶ One expert representing the fields of finance & accounts/ law/management, ▶ One representative of small scale tool producers, ▶ One representative of OEM, ▶ One representative of major manufacturers in the region ▶ Representative of Technical University of the state which governs engineering colleges	▶ To be nominated by O/o DC-MSME ▶ To be decided by O/o DC-MSME
(iv) MD/Executive Director/GM/PD of the Society	
On his appointment, the Executive Director or General Manager of the Society shall automatically become ex-officio member of the Governing Council during the tenure of his office, as *Member Secretary*.	

▶ **Role of the governing council**

The Governing Council will discharge such duties and responsibilities, exercise such powers and undertake and carry out such activities as considers essential with a view to attain the aims and objectives as per the Memorandum of Association of the Society, with particular reference to the following;

- To prepare and execute plans and programmes for the establishment of the TC based on the plan of operation and to carry on its administration and management after such establishment.
- To prepare, consider and approve the policies and strategies of the Society and to reconsider and amend the said policies and strategies whenever appropriate.
- To receive grants and contributions and to have custody of the funds of the society.
- To prepare, consider and approve the budget estimates of the society every year.
- To prepare and maintain accounts and other relevant records and annual statement of accounts including the balance sheet of the society.
- To open, conduct and prescribe courses of study, training and research in tool management and allied subjects.
- To fix and receive such fees and other charges from persons undergoing training as may be necessary.
- To prescribe rules and regulation for the admission of candidates to the various courses of training.
- To lay down standards of proficiency to be demonstrated before the award of diplomas, certificates and other distinctions to the trainees.
- To institute and award scholarships, prizes and medals.
- To provide for and supervise the residence, health, discipline and the well-being of the trainees in the Society.
- To create subject to the provisions of Rule 68 supra technical, training, research, administrative, ministerial and other posts under the Society and to make appointments thereto on such terms and conditions as deemed appropriate.
- To co-operate with any other organisation in the matters of education, training, management and allied subjects.
- To enter into arrangements for and on behalf of the society.
- To sue and defend all legal proceedings on behalf of the Society.
- To appoint committee or committees for the disposal of any business of the Society or for advice in any matter pertaining to the Society.
- To delegate to such extent it may deem necessary any of its power to any officer or committee of the Governing Council.
- To consider and pass such resolution on the Annual Report, the annual accounts and the financial estimates of the Society as it thinks fit.
- To make, inform, adopt, amend, vary or rescind from time to time rules and by-laws for the regulation of and for any purpose connected with the management and administration of affairs of the Society and for the furtherance of its aims and objectives.
- To make, adopt, amend, vary or rescind from time to time rules and by-laws for
    - For the conduct of the business of the Governing Council and the committee(s) to be appointed by it,

  - For delegation of its powers,
  - For fixing quorum.
- To sell, lease, mortgage or exchange and otherwise transfer all or any portion of the properties of the Society.
- To establish a provident fund for the benefit of the employees of the Society.
- To perform such additional functions and to carry out such duties as may from time to time be assigned to it by the Society.
- To establish procedure in respect of services and technical advice to be rendered to the industry by the Society and the levy and collection of charges for the same.
- To delegate its powers as may be deemed fit and appropriate but not the powers for:
  - Altering, extending or abridging the purposes of the TC within the meaning of the Societies Registration Act, 1860.
  - Amalgamating the TC either wholly or partially with any other TC having similar aims and objectives.
  - Altering, extending or abridging the Rules and Regulations of the TC within the meaning of the Societies Registration Act, 1860.
  - Shifting the existing location or altering the capacity of the TC.
  - Making capital investment exceeding the approved budget.
  - Borrowing money except for working capital exceeding the approved budget.
  - Transferring by way of mortgage, pledge, hypothecation or otherwise any assets, moveable or immovable, except as security for working capital.
  - Appointing bankers and auditors.
  - Generally anything extraordinary and of major importance.

▶ **Roles and responsibilities of the member secretary (GM/PD/MD)**

- Plan, direct, co-ordinate, organize and supervise day-to-day work of the society.
- Implement policies, strategies and such programs of the society and attend to all statutory requirements imposed thereon.
- Prescribe the functions, duties and responsibilities for all officers and staff of the society, give them appropriate instructions and exercise such supervision and disciplinary control as may be necessary.

▶ **Roles and responsibilities of the O/o DC-MSME in management of the TCs**

- Support DC-MSME in executing the responsibilities as the Chairman of the Governing Council of all TCs.
- Support in implementation of strategic projects and policies from the central to the TC levels.
- Act as the nodal point of coordination between the TCs and the DC-MSME.

Marketing Plan

9. Marketing plan of Sriperumbudur TC

The marketing plan of Sriperumbudur TC would require specific actions to engage with potential customers and clients in the catchment area. A series of activities is therefore required to be planned for effective marketing of Sriperumbudur TC to promote its business, product or services. A broad suggestive framework for marketing of Sriperumbudur TC would include the following;

Figure 20: Suggestive framework for marketing of TC

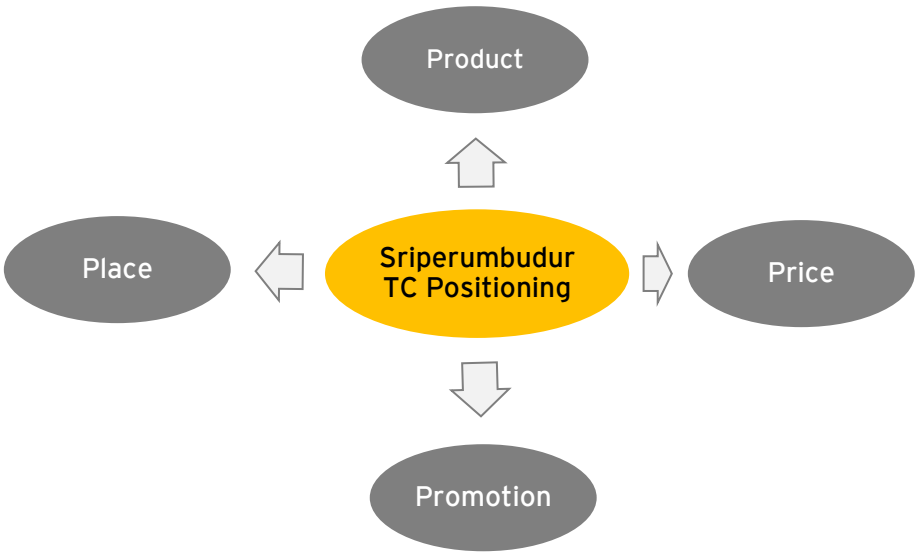
In line with the above suggestive framework, a detailed Go to Market plan of the proposed TC will be prepared subsequently by the Technology Cluster Manager (TCM) along with the GM and marketing team of the TC. The role of TCM for marketing would be very crucial and will act as an additional arm of the marketing wing of the proposed TC. It will further strengthen its market linkages with the MSMEs in the cluster it serves. TCM will also market the TC within the trade and industry associations, academia, educational institutions, applied research institutions, service providers, other government support institutions, workers and skill seekers.

As part of the marketing initiative, TCM would work closely with MSME clusters in the region to understand their needs and requirements and involve OEMs/ large players in the region. Based on the observations, the marketing strategy of the TC would be customized targeting various focus groups including technical and training institutes. Further, the TCM would be part of the consolidation of the results and recommendations of the diagnostic into a strategic plan for cluster development. The TCM would also represent the TC in various industry oriented outreach programs and workshops. This would help in two ways; promoting the TC and understanding industry perspective and future areas of focus. The same will help to identify key areas of focus for the TC and align the future marketing strategies accordingly.

Hence, the TCM would promote the TCs in among the newly developed partnerships for mutual benefit around identified programs / initiatives.

The plan should clearly position the proposed TC's marketing mix with respect to its four Ps - product, price, place and promotion. The suggestive points which needs to be taken care while designing the Go to Market Plan for the Sriperumbudur TC has been highlighted below:

Figure 21: Positioning of marketing mix for proposed TC



Product
A General Engineering TC with focus on Precision Engineering is proposed to be developed at Sriperumbudur based on the fact that the capital city is among the top ten global automobile hubs in the world with presence of large number of international automobile players supported by the whole ecosystem comprising of tier 1, tier 2 suppliers, ancillary units in the region. The state has identified Aerospace and Precision Engineering as a key thrust area for industrial growth in the State and earmarked a 250 acre of land for an Aerospace Park near Sriperumbudur-Oragadam Industrial belt, 30 km away from Chennai. The product and service offering of the proposed TC therefore has been carefully derived keeping in view the existing gaps to address specific requirements of this sector in the catchment area. Further the shortlisted specializations and respective courses to be offered by the proposed TC have been done keeping in view the shortage in the availability of required skill sets in the labour force across the industry. The summary is provided below: The key offerings of the proposed TC will be; manufacturing of tools, testing facility, training for skill development with respect to various specialisations, consultancy services in automotive and precision engineering. Focus areas would include:

- Manufacturing of moulds, jigs and fixtures, tooling etc. for general engineering with a focus on automotive and precision engineering
- Testing facility, NABL Certified
- Long and short term training programmes in CNC/ CAD/CAM/CAE, IoT, Industry 4,0, AR/VR, industrial and process automation etc.
- Consultancy services in the field of product and tool design, manufacturing etc. for improved quality and productivity.

Price

As per the study and discussions with GMs of some of the existing TCs, the proposed TC should adopt the cost plus pricing approach for its products and services during its initial years of operation and thus ensuring operating profit for sustainability. Most of the existing MSME TCs follow the cost plus pricing approach only for all of their products and services

As a differentiator from the existing MSME TCs, it is proposed that once the TC strengthens its brand and credibility in the market it should gradually move towards market-based pricing with defined margin levels (margin based costing). Then, the TC will have to work towards optimisation of its processes and operations to sustain its margins in the competitive environment.

The above mentioned pricing models are suggestive and will depend on the detailed analysis while preparing the Go To Market Plan with the support of the TCM.

Promotion

Promotion of TCs products and services is one of the most important components of the Go To Market Plan for a new set-up. Hence, below are some of the suggestive points which might be considered while making the final Go To Market Plan for the proposed Sriperumbudur TC.

- **Increasing visibility to external audience**
  - Encourage and execute early communication and promotion of activities by TC which are relevant to key external audiences including industry, media, technical media etc.
  - Producing a steady, reliable stream of quality outbound communications that highlights;
    - Research innovations and technology evaluations coming from the TC and its partnerships.
    - Special events and conferences hosted or supported by TC.
  - Working with industry partners to identify projects for joint publicity.
  - Develop Facebook/ LinkedIn/ Twitter/ YouTube presence to connect to students.
  - Ensure current marketing message is being maintained with all social media platforms administered by these TC.
- **Engaging internal stakeholders**

- Conduct media and website training on a regular basis for all interested faculty and staff.
- Leverage active partnerships with the industry and community, inviting departmental and staff participation.
- Ensure department faculty and staff are informed of the progress of the TC with respect to each goal.

- **Other Activities**
  - **Website:** Develop a website showcasing all highlights of the TC.
  - **TC fast facts:** Fast fact can be a two-page information sheets describing the highlights of TC. It can be made available online and increase the visibility to external audiences.
  - **TC online email newsletters:** Preparation and delivery of high-quality email newsletters from TC to industrial units, associations and other partners with the latest research announcements, news and more of engaging and interesting information to these external audiences.
  - **High quality print promotions:** High quality print promotions coordinated by TC communications, which maintains the Sriperumbudur TC as a brand to be utilised in outreach efforts.
  - **Industry tie-ups:** Partner with Industries and other technical education institutes to increase the visibility of TC. Explore opportunities to participate in publications and other co-branding opportunities with these partners from time to time.
  - **Maintain consistent social media presence:** Ensuring consistent, exciting messaging is posted on active social media platforms including the TCs Facebook page, Twitter account, YouTube channel and others. Promote the presence of TC on these platforms to students, alumni and supporters while acting as a social media hub for internal departments

Place

Sriperumbudur is the automobile hub in southern part of the country with major global OEMs like Hyundai, Ford, Nissan-Renault, Yamaha etc. established in the Industrial Area in and around the City. The up-coming business centre at Sri City, which houses manufacturing facilities of Isuzu, Honda is just 55 km away from Chennai. Being a port city located on the eastern coast has significant advantage of exporting to Eastern and South Eastern Asian Countries. It is well connected to Industrial Cities of Hosur and Bengaluru, major engineering hubs in Southern India through National Highway-5. The Further two Dedicated Freight Corridors are planned by Indian Railways with Chennai as a node connecting it to Delhi in the north and Mumbai in the West. Additionally, Vizag-Chennai Industrial Corridor (VCIC) and Chennai-Bengaluru Industrial Corridor (CBIC) are planned to ease the transportation and logistics in the region.

All these location advantages will be leveraged while preparing the detailed marketing plan to establish the proposed TC as one of the prominent TCs catering to the Auto Sector.

As a part of developing the go to market plan GM would work with the TCM, during the final stages of the construction, to prepare a detailed marketing plan keeping in view the focus areas of the TC. This team, with support from TCM, would be responsible to conduct the suggestive activities as mentioned in the promotion component and lead the marketing initiative for the TC.

In view of the above broad framework the following would be undertaken for marketing of the TC during its inception to start with. It is proposed to keep aside an initial one time marketing budget for completing most of the below mentioned activities through third party vendors:

Table 20: Suggestive marketing activities, ownership and timeline

Phases	Activity	Ownership	Timeline
Preparation of promotional materials	• Designing brochure of TC (through outsourcing) • Short video film of TC infrastructure and facilities available (through outsourcing- post completion of the infrastructure/construction) • Development of TC website (through outsourcing)	Marketing team, GM and TCM	Construction and Post construction phase
Pre marketing activities	• Preparing list of industrial association bodies in the Sriperumbudur catchment, district and state. • Preparing list of industries in consultation with DIC. • Shortlisting of perspective players' with respect to product range and process. • Design a brief questionnaire. • Preparing list of engineering colleges, ITIs, polytechnics, in the catchment area.	TCM and GM	Construction phase
Targeting the manufacturing units	• Send the brochure along with cover letter and short questionnaire to the shortlisted industries. • Seek time from large industries and industry body associations to give presentation on the capability statement of Sriperumbudur TC with respect to manufacturing of tools etc. • Send representatives to get the filled questionnaire or fill the questionnaire circulated earlier.	GM, Manager Marketing and TCM	During installation and commissioning of machines for manufacturing

Phases	Activity	Ownership	Timeline
	• Analyse the questionnaires received with respect to production, consultancy, training requirements of industries. • Meeting the key industrial units identified in the analysis to further understand their needs with respect to tool manufacturing, production support, training of employees etc. • Organise as well as participate in industry oriented outreach programmes/ seminars/ workshops/ boot camps etc.		
Targeting OEMS	OEMs are important because they involve many industries including MSMEs in the manufacturing of a product. The TC will plan for targeting the same through the following; • Take appointment and meet the OEMs in the region to understand their specific needs with respect to support required in tool manufacturing and training of employees etc. • Presentation on the capability statement of the TC with respect to manufacturing of tools, training etc. • Get their vendor details and understand their portfolio of product requirement at various levels • Plan to Increase product portfolio to cater to the OEMs and their vendors	GM, Manager Marketing and TCM	During installation and commissioning
Targeting technical and vocational training institutes and high schools	• Meet the principle/ HoD of the institutes and present on the capability statement of Sriperumbudur TC with respect to training infrastructure, faculty, real time learning with on job learning etc. • Seeking permission and presenting the same to final and pre final year students • Getting permission to display the brochure of TC on the notice board of these institutes.	Marketing team (GM) and TCM	During installation and commissioning of machines for training

Phases	Activity	Ownership	Timeline
	• Organise as well as participate in industry oriented outreach programmes/ seminars/ workshops/ boot camps etc.		

Focus Area for Sriperumbudur TC

10. Focus area for Sriperumbudur TC

Based on the research done, data available, up-coming aerospace sector and presence of large auto focused units, discussions with O/o DC-MSME and major firms in the region and domain experts, a General Engineering TC with focus on aerospace, precision engineering and auto sector is proposed at Sriperumbudur. The TC will focus on providing manufacturing assistance followed by testing facility, Incubation Centre and Advisory Services. Skilling/training courses will also be provided in tool and die making, CAD/CAM/CAE software and other relevant courses as identified during the stakeholder discussions. We have also included electro-mechanical machinery to support the requirements raised by Bharat Electronics Limited (BEL) during the stakeholder discussions. We have also proposed facility to machine composite materials like – CFRP CFRP/Metals, titanium and titanium fiber materials to cater to the aerospace sector. The details of these facilities are explained below.

10.1 Production

On the basis of focus sector for the proposed TC, following are the machines identified for production/ manufacturing activities at the proposed TC. The list will be further validated by Technology Cluster Manager for finalisation and to initiate procurement. The TC will provide various machining support to MSMEs in the catchment area. The machines in the production area would be the latest in its class and will have accuracies in the range of 10 microns or less on a case to case basis. The growing concerns related to climate change, energy security, scarcity of natural resources and increasing environmental regulations is putting more emphasis on sustainable production activities in manufacturing process. Due care therefore has been taken during the identification of machines for production systems and associated services, processes, plants and equipment in the TC. This will make the TC environmental friendly and energy efficient and would be better equipped to manufacture more products with less material, energy and waste.

Table 21: Proposed list of machines for production/ manufacturing activities

S.N.	Machine	Size	Number	Value (lacs)	Total Cost
1	5 Axis CNC Milling	800*650*550 (axes traverse)	1	250	250
2	5 Axis CNC Milling - Double Column with Universal Head	2000*1800 * 1200 (axes traverse)	1	600	600
3	3 Axis CNC Milling - Double Column	3000 *2000* 1500 (axes traverse)	1	250	250
4	CNC VMC - 3 axis	1250*650*600 (axes traverse)	1	150	150

S.N.	Machine	Size	Number	Value (lacs)	Total Cost
5	CNC VMC -3 axis (High speed – at least 40,000 RPM)	450*550*400 (axes traverse)	1	350	350
6	CNC HMC	2000*1600*1500 (axes traverse)	1	375	375
7	CNC EDM Wire Cut	600*400*350	1	400	400
8	CNC EDM Die Sinking	600*400*400	1	200	200
9	CNC EDM Die Sinking	2000*1250*1500	1	400	400
10	Machining Centre for Composite Materials	1100*900*600	1	550	550
11	Plasma Cutting Machine	3000*2000	1	350	350
12	Consumables & Tooling Systems (@ 10% of machine value)				387.50
13	Surface Grinding	1000*500	1	50	50
14	Surface Grinding	450*200	1	25	25
15	Cylindrical Grinding	250*1000	1	50	50
16	Conventional Vertical Milling	1200*300*400	2	25	50
17	Conventional Lathe	400*1200	2	20	40
18	Radial drill machine	63mm	1	10	10
19	Precision 3D scanner (White Light)	To be decided after thorough study of cluster industries	1	150	150
20	Hand Held Portable Laser Scanner	To be decided after thorough study of cluster industries	1	20	20
21	Additive Manufacturing Metal Laser	300*300*300 (Build Volume)	1	550	550
22	Consumables & Tooling Systems (@ 5% of machine value)				47.25
23	Hydraulic press	63 Tonne	1	15	15
24	Mechanical press	100 Tonne	1	30	30
25	Injection Moulding Machine	500 Tonne	1	150	150
26	Die Spotting Machine	100 Tonne	1	250	250
27	Vacuum Heat Treatment Facility	900*900*1200	1	300	300
28	Metrology Lab		1	100	100
29	CNC 3D Coordinate Measuring Machine	1000*1600*900	1	250	250

S.N.	Machine	Size	Number	Value (lacs)	Total Cost
30	Industrial Boroscope		1	20	20
31	EMI/EMC Chamber	3m	1	210	210
32	ESS Chamber	750*500*850	1	105	105
33	Water Chiller – 60 TR		1	20	20
34	ESD Assembly Work Station	1500* 800*1500	1	0.25	0.25
35	Clean Room of appropriate class	To be decided after thorough consultation with cluster and OEM	1	50	50
36	Work Benches with Bench Vices & Hand tools		10	1	10
37	Auxilliary Equipts (Drill m/c, pedestrial grinder, trollies etc.)	1 Lot	1	10	10
38	Material Handling Equipment - Trolley (2 no.), Jib Crane (2 T, 1 no.) and EoT (20 T and 7.5 Ton)		1	50	50
39	Compressor (approx. 125 CFM) Including piping and accessories	125 CFM	1	5	5
40	CAD/CAM Software	1 Lot	1	100	100
41	CAE & Simulation Software		1	100	100
42	Scanning/Drafting/Printing		1	5	5
43	CAD-CAM Workstations		15	2	30
	Contingency		5%		353.25
	Total Production Machines & Equipt.				**7,418.25**

10.2 Testing Facility

During the stakeholder discussion with various Industry Associations, leading automobile and precision engineering players it was learnt that there is a requirement for a testing facility. Thus, the TC at Sriperumbudur is proposed to have a NABL accredited Testing Facility. The facility will be equipped with latest machinery and equipment to cater to the requirements of the MSMEs involved in auto and precision engineering sector. This will strengthen the product quality as per the industry standards and norms enabling the MSMEs to stay competitive in both domestic and international markets meeting the client's standards and requirement. Below is the list of machinery and equipment proposed for Sriperumbudur TC.

Table 22: Proposed list of machines and equipment for Testing Facility

S.N.	Testing Facility Machines & Equipment	Size	Number	Value (lacs)	Total Cost
1	Universal Testing Machine		1	35	35
2	Digital Impact Testing Machine		1	15	15
3	Micro Hardness Tester		1	2	2
4	Universal Hardness Tester		1	11	11
5	Optical Emission Spectrometer		1	45	45
6	Metallurgical Sample Preparation Facilities		1	5	5
7	Optical Microscope		1	20	20
8	Stereo Zoom Microscope		1	6	6
9	Portable Ultrasonic Flaw Detector		1	8	8
10	Energy Dispersive X-Ray Fluorescence Spectrometer (EDX)		1	45	45
11	Metro-tomography (NDT & Dimensional Metrology)		1	350	350
12	Shock & Vibration Test Facility		1	166	166
13	Bump Test Facility		1	10	10
14	Fatigue Testing and Fracture Toughness testing with high temp test accessories and testing software		1	400	400
	Contingency		5%		55.90
	Total				**1,173.90**

Justification and utilisation of the major machines proposed is attached as Annexure – II

10.3 Skill Development

The TC at Sriperumbudur will provide professional training in various courses with focus on automotive and precision engineering. The TC will be able to produce highly skilled technical workforce, with greater career prospects in the engineering industry. The duration of courses will be both short and long term, ranging from 1 month to 48 months in various specializations like; Tool Room & CNC Manufacturing, CAD/ CAM, Electronics and IT, Industrial and process Automation, etc. The batch size; number of batches per annum and respective fee have been decided on the basis of capacity of existing TCs and NCVT norms. A soft skill lab for training in English language and communication facilities will also be established in the TC. Soft skill module will be an integral part of all the medium to short term courses. The TC will start training activity from the first year of its operation across all specializations. The detail of courses in various specializations is given below:

Table 23: Details of specialization, courses, duration and capacity intake

No.	Specialization	Course name	Duration (months)	Batch size	No. of Batch/ year	Annual intake
1	Tool Room	Advanced Diploma in Tool & Die making	48	60	1	60
		Machinist Course	24	30	1	30
		Post Diploma in Tool Design	12	30	1	30
		Post Diploma in Tool Manufacturing	12	30	1	30
		Post Diploma in CNC-Prog & Op	12	30	1	30
		Adv. Certificate Course in Tool Design & CAD/CAM	12	30	1	30
		Adv. Certificate Course Tool & Die Manufacturing	12	30	1	30
		Master Certificate Course in Tool Design	6	30	1	30
		Certificate Course in CNC Machine Operation	12	30	1	30
		Advanced course in Metrology and QC	4	30	1	30
		Certificate Course in Inspection & Quality Control	6	30	1	30
		Additive Manufacturing	2	20	1	20
					Sub Total	**380**
2	CNC Manufacturin, CAD/CAM	Diploma in Precision Manufacturing	36	60	1	60
		Post Diploma in Precision Manufacturing	12	30	1	30
		CNC lathe programming and operation (Part Time)	4	30	3	90
		CNC Milling Prog and Operation (Part Time)	4	30	3	90
		Master of CAD/CAM/CNC	6	30	2	60

No.	Specialization	Course name	Duration (months)	Batch size	No. of Batch/ year	Annual intake
		CAD/CAM/CNC Engineer (Full Time)	4	30	3	90
		CAD/CAM/CNC Engineer (Part Time)	6	30	2	60
		Auto CAD	1	30	6	180
		ANSYS	1	30	6	180
		Hyperworks Suite (Hyper Mesh, Hyper Form, RADIOS)	1	30	6	180
		CAD Modelling with UNIGRAPHICS	1	30	6	180
		CAD Modelling with CREO Parametric	1	30	6	180
		CAD Modelling with CATIA	1	30	6	180
		CAD/CAM Solidworks	1	30	6	180
		STAAD. Pro	1	30	6	180
		Computer Integrated Manufacturing (CIM)	1	15	6	90
					Sub Total	**2010**
3	Electronics and IT	Basic computer and Hardware (Part Time - 4 hrs)	2	30	12	360
		Advanced Hardware & Networking (Part Time - 4 hrs)	4	30	6	180
		VLSI Design	4	30	4	120
		Embedded System Design	4	30	4	120
		Electronics Maintenance (Part Time)	4	30	4	120
		Power Electronics and Industrial Drives	4	30	6	180
		Solar Energy System Technician	3	30	4	120
					Sub Total	**1200**
4	Industrial and process	Industrial Hydraulics	1	20	6	120
		Industrial Pneumatics	1	20	6	120

No.	Specialization	Course name	Duration (months)	Batch size	No. of Batch/ year	Annual intake
	Automation and Others	PLC Programming	1	20	6	120
		Industrial Automation Technician	4	20	3	60
		Industrial Automation Design	4	20	3	60
		Certificate course in Industrial Automation with PLC, AC Drive and CNC Maintenance	6	20	2	40
		Diploma in Mechatronics	36	60	1	60
		Introduction to IOT, Industry 4.0, AR/VR	2	15	6	90
					Sub Total	**670**
5	Training on Testing	Mechanical: Physical Properties of metal and Non Metal product/material	2	15	3	45
					Sub Total	**45**
6	Rural Artisan, Technician and Skill Training	Courses on Rural Artisan, Craftsman & Technician Training	3	3000	1	3000
					Sub Total	**3000**
		Grand Total				7,305

The TC will have adequate installed infrastructure like machines, software, computers etc. required to provide training to the proposed number of students under various specializations. The following table provides the details of the same;

Table 24: Proposed list of machines for training

S.No.	Training Machines	Nos.	Value (lakhs)	Total
Advanced Machines				
1.	CNC-Milling Machine	10	20	**200**
2.	CNC Vertical Machining Centre	1	30	**30**

S.No.	Training Machines	Nos.	Value (lakhs)	Total
3.	CNC -Turnmill Centre	1	35	**35**
4.	CNC Lathe	10	20	**200**
5.	CNC EDM Wire Cut	1	50	**50**
6.	CNC EDM Die Sinking	1	50	**50**
7.	CNC Milling & Lathe Simulation Modules with multiple Controller	30	2.5	**75**
8.	Tooling for machine tools @ 5% of Machine Cost	1		**32**
Conventional Machines				
9.	Conventional Milling-V-H-U	10	15	150
10.	Conventional Lathe	10	6	60
11.	Surface Grinding	5	5	25
12.	Cylindrical Grinding	4	10	40
13.	Tool & Cutter Grinder	1	20	20
14.	Work benches with Tool Assembly Kit	20	2	40
15.	Pillar Drilling Machine (25 mm)	1	2	2
16.	Radial Drilling Machine (50mm)	1	5	5
Department of Agri/Rural & Traditional Enterprises and EDP Cell				
17.	Rural Artisan, Craftsman & Technician Training Machinery & Equipment	1	300	300
18.	Farm Machinery Repair & Maintenance Training Machinery & Equipment	1	100	100
19.	Solar & Biomass/Bio Gas Plant Lab Machinery & Equipment	1	100	100
20.	Construction Skill Lab with Models Machinery & Equipment	1	150	150
21.	2/3/4 Wheeler Repair, Maintenance & Servicing Machinery & Equipment	1	100	100
22.	Entrepreneurship development & Incubation Centre	1	300	300

S.No.	Training Machines	Nos.	Value (lakhs)	Total
Labs and Supporting machines				
23.	Material Handling equipment Trolley (2 No.), Jib Crane 1 Ton (1 No.)	1	5	5
24.	Electronics Lab	1	40	40
25.	Solar Energy Lab	1	30	30
26.	Computers for CAD/CAM/CAE Labs	300	0.75	225
27.	Automation & Robotics Lab	1	250	250
28.	IT, IoT Industry 4.0 Lab AR/VR Lab	1	100	100
29.	Additive Manufacturing Lab	1	15	15
30.	Material & Metallurgical Test Lab	1	20	20
Training Infrastructure				
31.	Teaching aids (Audio Visual)	30	1	30
32.	Teaching aids (Smart Board)	10	1	10
33.	CAD/CAM Software License	250	0.3	75
34.	Furniture for labs	60	0.25	15
35.	Classroom Furniture @ 60 seats	8	3	24
36.	Contingency @5%			145.15
	Total			**3,048.15**

10.4 Consultancy

MSMEs are plagued with bottlenecks and inefficiencies that compromise their competitiveness and presence in the market. Handholding is required to enable MSMEs to develop competencies in the areas of product & process development, operation improvement, streamlining and standardisation of processes through adoption of international norms, new technologies and capacity enhancement. Quality and technical relevance of products need to be maintained by supporting product development, component manufacturing, precision engineering, process automation and adherence to quality norms.

Therefore, Sriperumbudur TC would have a dedicated professional wing to assist MSMEs by providing consultancy services in the field of Design Support (incl. Product Design), Engineering Solutions

(Development of Jigs & Fixtures for Machining, Welding etc., Quality System Support, Project Consultancy (curriculum development, community colleges, trainers etc.), Low cost Automation Solution support, Productivity Improvement. The support of TCM will be taken wherever required. Consultancy will be provided in the following areas:

- Product development and engineering solutions
- Project consultancy in setting up of private TRs, training centre etc.
- Design support
- Quality systems support
- Productivity improvement through cluster approach
- Curriculum development, Course material development for ITIs, Polytechnic etc.
- Trainers training to ITI, Polytechnic and Community Colleges
- Lean manufacturing
- Business incubation services
- Other consulting projects
- Vendor development for MSMEs

Since providing consulting services requires the expertise in specific domain, the TC would hire the required resources to increase the in-house capability. Illustrative phasing of the areas/domains where the TC can provide consulting services has been suggested below. This has been designed keeping in mind the resource planning and future revenue projections as well.

The designing and consulting department will be equipped with high-end workstations, CAD/ CAM software, and analysis software. The design and consulting department is recommended to have 7 experts. The consulting team will also be supported by the production and training departments on need basis. In addition to the above, 30 trainees of final semester tool design course will also work with design department in shifts on daily basis. It is also proposed to have tie-ups/ collaborations with other MSME TCs in specialised areas of project consultancy as and when needed. The table below represents the projected revenue estimates for 10 years, keeping in mind the impetus on the consulting services for the proposed TC. The revenue estimation has been done using the average machine hour rate.

Table 25: Areas of consulting and estimated revenue

S. No	Consulting Areas	Suggestive Rev Year 1	Suggestive Rev Year 2	Suggestive Rev Year 3	Suggestive Rev Year 4	Suggestive Rev Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
						15%	15%	15%	15%	15%	15%
1.	Design Support	-	25,00,000	31,25,000	37,50,000	43,12,500	49,59,375	57,03,281	65,58,773	75,42,589	86,73,978
2.	Product Design Support	-	20,00,000	25,00,000	30,00,000	34,50,000	39,67,500	45,62,625	52,47,019	60,34,072	69,39,182
3.	Engineering Solutions (Development of Jigs & Fixtures for Machining, etc.)	-	15,00,000	18,75,000	22,50,000	25,87,500	29,75,625	34,21,969	39,35,264	45,25,554	52,04,387

4.	Quality System Support	-	10,00,000	12,50,000	15,00,000	17,25,000	19,83,750	22,81,313	26,23,509	30,17,036	34,69,591
5.	Project Consultancy (curriculum development, community colleges, trainers, etc.)	-	2,00,000	2,50,000	3,00,000	3,45,000	3,96,750	4,56,263	5,24,702	6,03,407	6,93,918
Total			72,00,000	90,00,000	1,08,00,000	1,24,20,000	1,42,83,000	1,64,25,450	1,88,89,268	2,17,22,658	2,49,81,056

*The suggestive revenue from design support during second year after start of operations has been estimated on the basis of usage of CAD Software like CATIA, UG or other analysis software etc. The TC is provisioned to have 10 numbers of such software packages which with an average estimated rate/hour of INR 200. So with installed capacity @ 70%, the revenue from this stream during one shift of operation is estimated to be around 10*8*70%*200 = INR 11,200. Assuming 75% capacity utilisation for 300 days during 2nd year, the total estimated revenue from CAD Software like CATIA, UG packages is INR 25 lakhs. Hence, the total estimated revenue from design support is around INR 25 lakhs for Year 2.

Table 26: Proposed areas of consulting

Consulting Stream	Focus Area (Recommended)
Design Support	▶ Tool design in the field of sheet metal, press tool and plastic moulds.
Product Design	▶ Support MSMEs in designing products to be supplied to OEMs. This will require 3D modelling and may include reverse engineering etc.
Engineering Solutions (Development of Jigs & Fixtures for Machining, Welding etc.	▶ Designing the machining processes involving jigs and fixtures design, cutting tool selection, machine selection, cycle time and tack time selection and achieving the final shape and quality
Quality System Support	▶ Supporting MSMEs in establishing quality systems, quality improvement and acquiring necessary certifications
Project Consultancy (curriculum develop, community colleges, trainers etc.)	▶ Supporting training institutes in curriculum develop, community colleges, trainers etc. ▶ This may also involve setting up of Tool Rooms and vocational training centres on turnkey basis for various companies under CSR initiatives and for Government

Based on the focus areas recommended above, revenue estimation has been done for the identified consulting streams. These estimations are purely based on the historical data, prevailing market rates and discussions with the existing TRs.

Table 27: Estimated revenue from consulting

Consulting Stream	Approximated Revenue Estimation
Design Support	▶ Revenue estimation from CAD Software like CATIA, UG etc. – 10 Nos. and hourly rate of Rs 200. This is initially estimated to run in 1 shift (8 hrs.) at 75% capacity. The installed capacity assumed to be 75% running for 300 days a year. Therefore the calculation would be, 75%*[(10*200*8*300)*70%] ~ INR 25,20,000 per year
Product Design	▶ Revenue from other Engg. Analysis software like ANSYS, mould flow, auto-form etc. for product design is estimated to be INR 50,000 per job. Considering 36 jobs in the first year (average of 3

Consulting Stream	Approximated Revenue Estimation
	jobs in a month) , the revenue would be 50,000*36~18,00,000 per year.
Engineering Solutions	Rate of INR 400/hr with an estimation of minimum requirement 100 hours per product. We have estimated initially at least 35 products in first year. Therefore, 35*400*100 ~ INR 15,00,000/year
Quality System Support	Estimated rate of INR 1,00,000 per unit. We have estimated serving at least 10 units in the initial year. Therefore, 1,00,000*10 = INR 10,00,000/year
Project Consultancy (curriculum develop, community colleges, trainers etc.)	Revenues from these assignments vary significantly depending upon the nature of the assignment. We have estimated a range of INR 1-4 lacs per assignment with 1-2 assignment per year

10.5 Centre of excellence for manufacturing and skill development

Tamil Nadu represents a key industrial hub of the country with presence of more than 7 major automobile OEMs and upcoming investment in aerospace and precision manufacturing. In order to supply skilled manpower to the up-coming manufacturing industries, the TC is going to play a vital role. It shall work as a nodal skill development centre. It shall not only provide advanced training in manufacturing technology but also work as a key facilitator for existing ITIs and polytechnic institutions in the catchment area. The following services shall be provided by the TC in order to increase competitiveness of ITIs and Polytechnic institutions.

- **Curriculum Development Support:** The TC shall assess curriculum of these institutions and provide support in developing modular training program which are latest and high on demand by the local industry. Based on the assessment of utilization of the existing infrastructure, the TC shall advise new courses for the institute.
- **Mentorship for new institution:** The TC shall work as a mentor and provide support in setting up new ITI and small skill development sector in manufacturing field.
- **Testing and certification of the skill:** The TC will work as a nodal organization to provide common platform to test and certify the skill level of the trainees.
- **Training of Trainers:** The TC shall provide access to new and advanced technology for the trainers of these institutions and shall provide necessary training to upgrade their skill set.

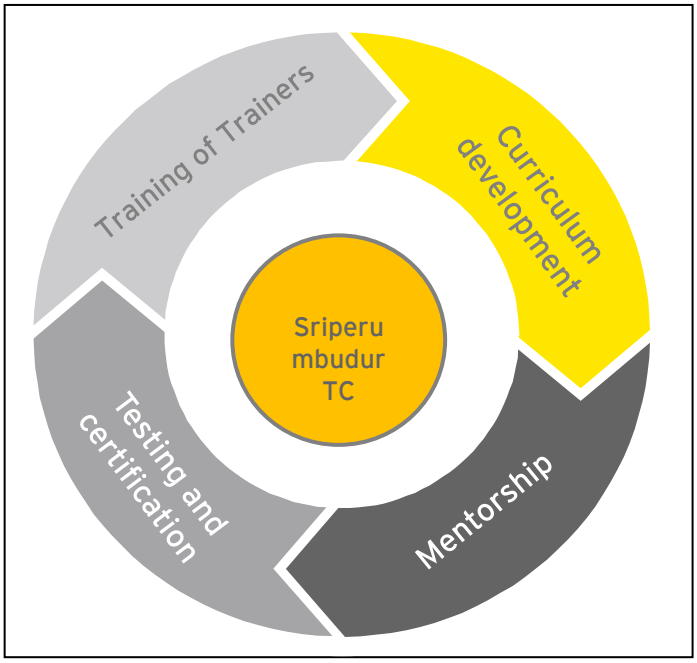


Figure 22: Support for other training institutions

To update the industry with the latest cutting-edge technologies prevalent in the industry, the TC will act as a demonstrator to facilitate access to such upcoming technologies. The TC is planned to be equipped with an additive manufacturing facility, AR/VR, IoT and Industry 4.0 lab to start with.

- **Additive Manufacturing Facility**

The Sriperumbudur Technology Centre is planned to have an additive manufacturing facility for both training purposes and to give MSMEs access to prototyping services at reasonable costs. The centre will have 3D printing capability which will be able to produce functional prototypes, presentation models, casting patterns and production parts in a variety of plastic materials. The centre will also have the capability to digitize physical objects through 3D scanning processes and thus will be able to help the MSMEs in reverse engineering of vital components. The centre will conduct training programmes for personnel from academia and industry.

- **Industry 4.0, AR, VR Labs**

With the innovations in technology the tides of industrial revolution had started flowing from harnessing power from natural resources to electricity mass production followed by IT and automate production and now it's shifting into technology that is blurring the lines between the physical and virtual spheres i.e. Industry 4.0.

With the imminent developments in this field, countries which used to set up their establishments in other developing countries, due to availability of cheap and skilled labour, no longer need to do so as Industry 4.0 does not rely on manual labour force. With the manufacturing sector shifting onto the virtual platform, countries no longer need to set up their businesses in other nations, vast research

and development in this field no longer require widespread and complex networks. Although it proves to be cost efficient it will also cause the displacement of workers by machines thereby exacerbating the gap between returns to capital and labour.

As we see today, the future is Industry 4.0.

However in India the, MSMEs are not ready to adopt this technology immediately. Nevertheless, keeping up with these technological advancements has become essential in the ever competitive world. Therefore, we aspire to promote the adoption of industry 4.0 by the industry today in India.

To support this, we have planned an Industry 4.0, AR, VR etc. lab with the primary aim to provide exposure to the students and MSMEs by allowing them to have a first-hand experience with the widespread technology advancements. The labs will contain virtual as well as physical machineries and equipment which will provide a better platform for understanding and development.

- **Composites Manufacturing**

Composite materials consist of two or more chemically distinct materials combined to have improved properties. These materials are bonded together to form complex structural sub-assemblies that must be either assembled together or attached to other structural components, such as aluminum or titanium. This presents a unique set of challenges that requires radical new technologies. It is possible to achieve combinations of properties not attainable with metals, ceramics, or polymers alone with composites. These materials provide strength, are good damage tolerance and corrosion resistant and light weight at the same time. Due to these properties, the aerospace sector is one of the largest and most important sector to the composites industry. For instance, one of the most recent materials developed using carbon fiber and resins is called CFRP (Carbon-Fiber Reinforced Polymer). Due to attractive properties, such as weight-to-strength ratio, durability, and extreme corrosion resistance, CFRP is used mostly in primary structure applications like aircraft hull and wings. This technology is growing fast and today commercial aircrafts, helicopters, business jets, general aviation aircraft and space craft make substantial use of composites, both inside and outside.

10.6 Proposed support system to enable private TRs tap the market

A collaborative approach with private TRs can help to augment capacity to support MSME.

- **Productivity and Quality club**: To form a productivity and Quality Club where engineering units in a cluster under MSME may join the club on a reasonable annual fee. The value to the MSMEs would be as follows; MSME TC needs to earmark one expert (with support from TCM if required) for the cluster for a period of 12 months with minimum 12 assured visits. The expert would mentor the MSME units individually towards improvement of their system and process to increase the productivity of the unit and quality of its product. These members may also enjoy preferential treatment in other services of the Tool Room e.g. designing and testing, CAD/ CAM etc. The club will facilitate for;

- **Partnerships and collaborations:**
  - Develop better partnerships with corporations located in the state and in the catchment.
  - Collaborations with academic and applied research institutes to commercialise new technology/ innovations.
- **Facility Sharing:** Sharing the Tool Room facility like high end design, analysis, intricate machining etc.
- **New Market:** Jointly exploring potential new markets/ programs and execution the same.
- **Innovation:** Promote emerging technological and knowledge-based innovative through seminars and clinics.

- **Partnering with small tool rooms and MSMEs to make them competitive:** The objective of the same is to carry out activities with potential to develop competitive advantage over time. Rather than two or more Tool Rooms in the catchment producing similar kind of products, a group of Tool Rooms can specialise in selected jobs which would further improve the focus on factors such as quality, costs and time.

- **Case Study – Consortium with MSMEs - CTTC Bhubaneswar**

In 2013, CTTC Bhubaneswar has formed a consortium with 15 MSMEs from different industries in Odisha.

Objective

To obtain jobs/ work orders from customers for the consortium. These jobs, once received will be executed by different members of the consortium according to their capabilities and capacity. The majority of the work will be performed by the consortium members. In the initial period, CTTC will support the MSMEs to undertake final machining and inspection for the products.

Over the period, as MSMEs equip themselves and develop in-house capabilities to independently execute the jobs, CTTC's support will reduce. Further, the number of MSMEs in the consortium is expected to increase, which would in turn strengthen the existing consortium and its capability to pitch for more specialised jobs.

CTTC has jointly pitched for jobs for consortium with its clients like

- Ordnance factory, Balangir
- HAL Koraput

Key Benefits

- As part of the consortium, the MSMEs can pitch for bigger and long term jobs and plan their investments in a better way. This will in turn encourage formation of new MSMEs and strengthening of existing MSMEs in Odisha
- Currently for some of the jobs, CTTC has to reach out to MSMEs outside Odisha. Over the period as MSMEs in Odisha get better equipped, these jobs can be performed by them.
- Gradually CTTC will move up the technology curve and would provide support mainly for higher end technologies and so on.

10.7 Technology collaboration

The TC at Sriperumbudur will venture into multiple new areas and to facilitate technology transfer and improve market linkages, role of TCM has been planned under TCSP.

- The TCM will help identify and define globally competitive technological capabilities required in the cluster and assist proposed TC in building this capability through planning and handholding. The Technology Cluster Manager (TCM) is required to enhance the capability and service offerings of TCs such that they transform to become models of manufacturing excellence for MSME. They need to become a trusted partner for MSMEs to learn how to attain manufacturing excellence and attain associated excellence in skills development. The services of the TCs include being exposed to the potential impact of new and relevant technologies, trainings on use of technologies/equipment, providing access to cutting-edge equipment, developing and testing new products and patenting. The key objectives of the TCM in terms of assistance in technology transfer include:

    - In conjunction with all stakeholders of the TCSP identify and define the globally competitive technological capability required by TCs, assist in their execution and provide handholding during their roll out.
    - Supporting the up gradation of the existing TCs and establishment of new TCs for the manufacturing sector
    - Augment services being offered by the TCs with respect to identified technologies and clusters with respect to training, production assistance (including optimization of equipment utilization) and technical advisory, resulting in increase in revenues of TCs focused at the manufacturing sector
    - Support TCs to increase productivity and competitiveness of general engineering focused MSMEs by
        - Exposing them to existing and expected future technologies
        - Develop skills of the workers and students in the identified technologies and clusters
        - Offering advice/recommendations to MSMEs (clients) who directly or indirectly supply to large players or component manufacturers.

All investment decisions (technological & other) and work prioritization in TCs must be intrinsically connected with the market place and efficiently translate market needs to products and services that (satisfy these needs), & will be enabled by technology and enriched by global knowledge & expertise of the various stakeholders including the TCM, empowered by global networks and people.

- TCM will also facilitate cluster and market development to realise improved competitiveness. The TCM will work closely with the MSME clusters to understand their needs and requirements and get OEMs/ buyers involved in the program. TCM will strengthen market linkages of TC with the MSMEs in the cluster it serves, trade and industry associations, academia, educational institutions, applied research institutions, service providers, other government support institutions, workers and skill seekers. Existing research institutions which could be potential collaborators for specific technologies etc. TCM would work towards the following key objectives:

    - Increase of business opportunity for MSMEs through new market linkages.
    - Increase competitiveness of supply chains of large firms by enhancing the quality, reliability and productivity of MSME suppliers.
    - Increase the number of MSMEs utilizing the services of TCs resulting in increase in revenues of TCs
    - Enhance competitiveness of the cluster business environment:
        - Increase access by MSMEs to a network of business development services (BDS) which address needs not in the domain of TC expertise
        - Increase access by MSMEs to network of financial service providers
        - Increase awareness of opportunities in the public sector to contribute to a more competitive business environment.
    - Establish closer cooperation of key innovation stakeholders to enhance product and process innovation. This would include linking the research agendas of applied research and education institutes/organizations to industry and market requirements and promoting joint research and development projects.
    - Facilitate closer cooperation amongst skills development and labour market stakeholders to increase the number of workers/ trainees from TCs finding long term employment to improve their livelihood.
    - Establish a business model which ensures financial self-sustainability of the TCM as before the end of the TCSP funding window.

    All investment decisions (technological and other) and work prioritization in TCs must be intrinsically connected with the market place and efficiently translate market needs to products and services that (satisfy these needs), and will be enabled by technology and enriched by global

knowledge and expertise of the various stakeholders including the TCM, empowered by global networks and people.

10.8 Department of Agricultural/Rural & Traditional Enterprises (DART) & Plug and Play

One of the key objectives of the business plan is to extend the services of the TC to the majority of micro entrepreneurs. The TC needs to take various initiatives to reach out to the entrepreneurs residing at the bottom of the pyramid essentially agricultural, rural and traditional strata of the society as they represent the maximum concentration of the micro entrepreneurs.

Following key initiatives have been identified by the TC in this area.

- Training of agricultural rural and traditional entrepreneur under Recognition of Prior Learning (RPL) in the areas of repair & maintenance of agricultural equipment, Home appliances repairing, Solar and Bio Gas plant maintenance etc.
- Support budding entrepreneur to add value to farm entrepreneur through development of new technology e.g. the TC can help start-ups in development of small size rice milling machine for which can be used by farmers or micro entrepreneurs to mill small quantity of rice at farm level.
- Digitization of drawing of farm equipment and low-cost automation wherever possible is another service which can be provided.

The TC is planning to develop a specialized course in the service area such as agriculture and farm machinery equipment, home appliances repairing, Mobile repairing, Motor cycle repairing etc. which can be conducted in the rural and semi urban area through mobile van. Below is the snapshot of courses and facilities which will be provided as part of this centre.

Rural Artisan, Craftsmen & Technician Training

- House-wiring Training
- Electrical Household Equipment like fan, mixers, gysers, etc.
- Refrigerator freeze repair
- Pumps & Motor
- Welding Fabrication

Farm Machinery Repair & Maintenance Training

- Repair & Maintenance & Servicing like Tractor trolleys, Tillers etc.
- Welding, bearing replacement kit, material lifting, hydraulic & pneumatic repairing kit
- Agriculture tractors, water pumps and farm implements

Solar & Biomass/Bio Gas Plant

- Basic Solar Lab - for 20 trainees
- Basic Electrical Lab will be shared
- Biomass Plant
- Biogas Plant
- Training yard for biogas plant with gas pipeline

Construction Skill

- Construction yard for mason, scaffolding, tiling, plumbing, etc.
- Lab with Models - 400 sq. mtrs.

2/3/4 Wheeler Repair, Maintenance & Servicing

- Diagnostic Lab
- Battery Management Unit
- Electrical/Electronic Kit
- Three Wheeler Diagnostic
- Auto Lifting Device
- Washing/ Servicing Station

Entrepreneurship development & Incubation Centre

- Incubation Support
- Plug & Play Centre

Plug and Play Facility (PPF)

A pilot scheme for green-field Flatted Factory based Plug and Play Facility (PPF) in industrial clusters is proposed to be launched to enhance competitiveness of industry by providing quality infrastructure in selected industrial clusters. This is particularly to assist start-ups, expanding and diversifying units who suffer from access to industrial infrastructure and space and high Capital Cost. This will ensure optimisation of space and costs in many relevant sectors. Such quality infrastructure may be visualised as including both technical infrastructure (common facilities) as well as physical infrastructure (buildings with plug and play work sheds and supporting utilities). Such facilities may be utilised by start-ups as well as expanding and diversifying units as "incubation infrastructure" for a period of 3-5 years, after which they are expected to graduate to next level and move to own premises elsewhere.

A PPF will provide complete end to end manufacturing facilities under single platform. An entrepreneur, who wants to start a new business or expand the existing business, may approach to these PPFs and may start manufacturing with minimal investment on land, plant & machinery and other facilities which are considered as one of the biggest hindrance in starting/expanding a business.

Plug and Play Facilities will target start-ups, expanding and diversifying units who suffer from access to industrial infrastructure and space. Plug and Play Facilities will considerably reduce the start-up investment costs, procedural obstacles and risks for SMEs at a phase in their development where the bank loans are major stumbling block in realising their business plans.

Some of the expected outcomes which can be envisaged at this stage are as follows:

- Innovating product, process, technology, energy efficiency etc.
- Reducing start up investment costs and risks for MSMEs at a phase in their development where they are still too risky for bank loans.
- Establishing safety, health and environmentally strong practices in these clusters to encourage MSMEs at large
- Facilitating development of industrial clusters allowing for economies of scale
- Encouraging setup of a manufacturing facility (Handholding support for manufacturing Space, Registrations etc).
- Supporting in improving access to markets, skills, finance and technology
- Mentoring Start-up/ MSMEs by engaging with academia and industry
- Reducing inefficiency in provision of public goods and market information

This will result in enterprise development at an accelerated pace allowing tremendous economies of scale.

10.9 Incubation and Entrepreneurship Development Cell

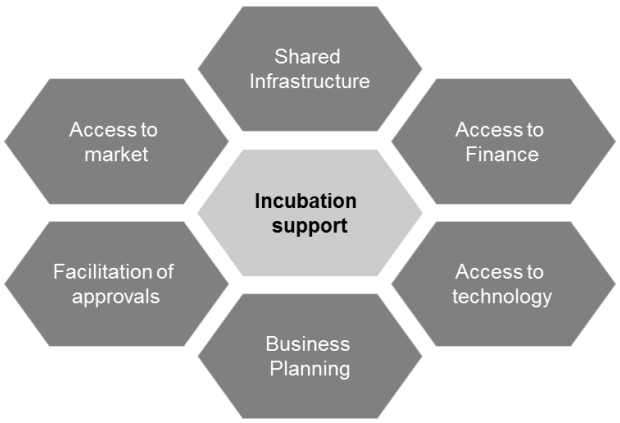
10.9.1 Incubation Centre

Promoting emerging technological and knowledge-based innovative ventures that seek to nurture ideas from professionals is important for development MSMEs. Such entrepreneurial ideas need to be fostered and developed in a supportive environment before they become financially sustainable or attractive enough for venture capital. Hence need arises for incubation centres to promote budding individual innovators and to assist them to become technology based entrepreneurs. Typical areas of Incubation support include

- Idea conceptualisation & business planning - Technology commercialization,
- Access to infrastructure – networking, office space
- Access to finance - bank loans, loan funds, guarantee programs, investors
- Access to technology – access to machines, designing support
- Access to market – Introduction to strategic partners
- Facilitation of approvals - regulatory compliances, clearances

The incubation centre may also provide support to promote networking and forging of linkages with other constituents of the innovation chain for commercialization of their developments.

Figure 26: Key areas of incubation support



Typically the incubation support initiatives provide support to new businesses for an initial period of 2-4 years.

Business incubators differ from traditional research and technology parks in terms of scale and assistance. Research and technology parks are typically large-scale projects that house corporates, government companies or university labs to very small companies. Typically research and technology parks do not provide business assistance services, which are the hallmark of business incubators. However, research and technology parks may house incubation programs.

Several initiatives in this direction of incubation have been taken by various departments of Central Government. Some of them include

- **Incubators scheme for MSMEs- A component of National Manufacturing Competitiveness programme to improve competitiveness of MSMEs (MoMSME)**

  The term 'innovation' covers a very wide domain. According to MoMSME, innovation signifies any activity and new/ ingenious procedure or product that is likely to be of use to society and marketable in the long run. The scheme seeks to provide small dose of assistance, to students/ ex-students of science and technology and entrepreneurs to try out their innovative ideas (new processes/ products) at the laboratory or workshop stage and beyond (to the extent possible) with an objective to carry the idea from concept stage to 'know-how' stage and then to 'do how' stage.

- **Technology Business Incubator (TBI), Department of Science & technology, (DoST)**

  TBI is a flagship programme of National Science and Technology Entrepreneurship Development Board (NSTEDB) and focuses on incubation of potential ideas and innovations through a well-defined venture/ enterprise creation process and by effectively utilizing the requisite expertise, facilities and other infrastructure available within the host institution and the adjoining region. The incubation period is expected to be 2-3 years. Key areas of assistance in the TBI scheme include:

  - Market survey/ marketing,
  - Business planning and training,
  - Organising management/ technical assistance,
  - Obtaining statutory approvals,
  - Information dissemination on product ideas/technologies,
  - Syndicating finances,
  - Arranging legal and IPR services,
  - Provision of work space, shared service facilities

The proposed MSME Technology Centre at Sriperumbudur will house incubation facilities to promote new entrepreneurs and MSMEs in the catchment area.

10.9.2 Incubation Centre at Sriperumbudur TC

Sriperumbudur TC will provide space for new age entrepreneurs and young minds to transform their innovative ideas into viable business propositions. The major role of TC will be to facilitate a platform for a budding entrepreneur to start a business venture with minimum risks. Sriperumbudur TC will ensure that incubates have access to technological assistance which will be generated through mentors with multidisciplinary expertise. Young enthusiasts with creative pursuits with an inherent zeal to be entrepreneurs will be encouraged to take advantage of this initiative. Sriperumbudur TC will facilitate interdisciplinary research with special emphasis on development and innovation of high-growth- knowledge-based-business and nurtures the indigenous products. Technical support,

business mentoring, space availability and soft loan facility subject to availability will be the key services of the TC.

The Incubation Centre proposed at the Sriperumbudur TC will offer the basic shell infrastructure with area ranging from 100-150 square-meter and latest technologies, world class manufacturing plant and machinery on rental basis for a 2-year period. This Incubation Centre is expected to fuel the growth of enterprise which has successfully crossed the stage of pilot order and ready to execute larger orders. The Incubation Centre would support entrepreneurs to develop end products for commercialization. The Incubation Centre would comprise of the following facilities:

a) Shell infrastructure for setting up an manufacturing facility with space between 20-40 square meter

b) Support Business facilities like office space, conference rooms, reception area etc.

c) Business Support: Provides assistance in company formation, provides assistance for Regulatory Clearances, Vetting Business Plans, etc.

d) Technical Support: The incubatee companies are provided with support of machineries, testing and calibration equipment, product assessment facilities and mentors for technical support.

e) Financial Support: The MIC will provide financial support to the Incubatee Companies in the form of Soft Loan with minimum simple interest, from the funding agencies.

f) Legal Support: The Incubatee Companies would also be assisted in filling patent, patent harnessing as and when required on chargeable basis.

g) Networking: The MIC will provide Networking with Domains Experts, Consultants, Venture Capitalist and other funding agencies.

h) IT Support services like internet, video conferencing, Wifi etc.

i) Electricity and power connection with sub-meters

j) Registrations and Clearances for setting of a manufacturing unit such as environmental clearances, fire safety, license for running a factory, registration for commercial establishment etc.

Incubation centre can take support from TC more than mentoring whereas order sharing can happen on need basis. Moreover, TCM will also support members of incubation centre on need basis in order to help them expanding the business as well as in collaborating with industry and academia.

The Incubation Centre would not only provide space, latest technologies but also help in connecting with suppliers and skilled workers. One of the key points this Incubation Centre aims to achieve is to ensure focus on quality control from the get-go. Members of the Incubation Centre would be encouraged to start work in a setup concentrated on following environment, protocols and ethics from day one. It is therefore expected that when these enterprises come out of the Incubation Centre they could be examples of world class manufacturing practices.

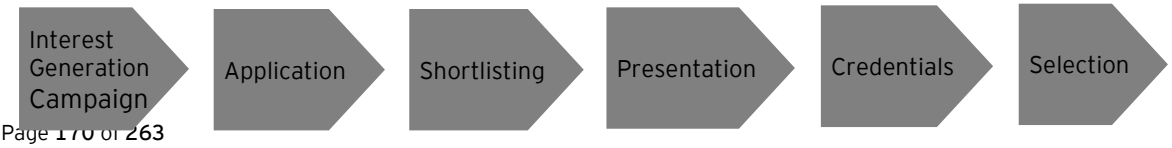
Following is the list of machines identified for the incubation centre of the new TC at Sriperumbudur. The budgetary cost (landing cost) of these machines is given in the table below:

Table 28: Proposed list of machines and equipment for Incubation Centre

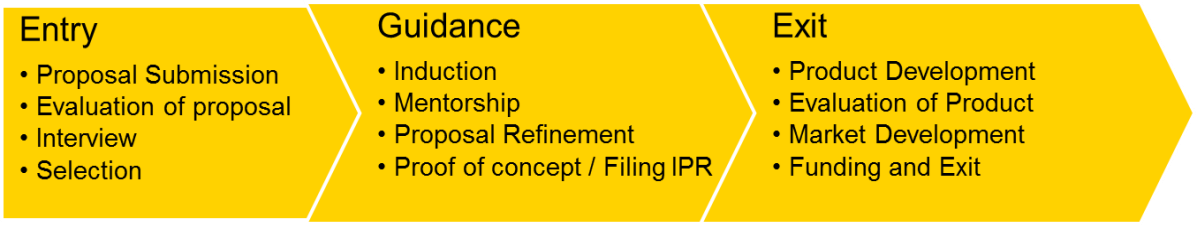
S.N.	Testing Facility Machines & Equipment	Number	Value (lacs)	Total Cost
1	CNC Milling Machine	1	25	25
2	CNC Lathe Machine	1	20	20
3	Injection Moulding Machine (50 Ton)	1	15	15
4	Mechanical Press (10 Ton)	1	5	5
5	Additive Manufacturing	1	10	10
6	Hand held Scanner	1	15	15
7	Assembly Benches with Tool Assembly Kit	2	2	4
8	Metrology Equipment	1	10	10
9	Other Supporting Machines (Bench Drill, Pedestal Grinder etc.)	1	2	2
10	Workstation	5	1	5
11	CAD/CAM/CAE Software			10
12	Surface Grinding	1	4	4
13	Cyl-grinding	1	10	10
	Contingency	5%		6.75
	Total			141.75

10.9.3 Proposals & Selection

The success of an Incubation Centre depends on the ideas it gets for ripening. To get an 'out of the box' ideas an interest generation campaign shall be in operation throughout the year. The campaign can have conferences, seminars, road shows etc. The other processes which can be a part of robust selection process are listed below;



The incubation centre will have robust processes for entry and a systematic strategy for the exit of incubates. The entry process will involve stages like proposal submission, interview etc. A model which will be followed for the development of processes is given below;



The key parameter for the exit of incubates can be:

- Completion of incubation period
- Raising substantial investment from VC/angel investor/ Govt. etc.
- When the number of employees of the company exceeds 10/15 or so
- When annual revenue of the company exceeds substantial amount.

10.9.4 Investments/ Sustainability of incubation centre

There are various government schemes which can be availed to set up an Incubation Centre. Few of the Govt. Schemes and other ideas which can be used for investments generation and sustainability of Incubation Centre are listed below:

a) Modified Special Incentive Package Scheme (M-SIPS) - The scheme is promoted by Department of Electronics & Information Technology (DeitY), Govt. of India. Under this scheme subsidy is provided for investments in capital expenditure, 20% for investments in SEZs and 25% in non SEZs. There are other incentives as well which can be availed by state govt. for setting up Incubation Centre.

b) Atal Incubation Centre (AIC) – The Govt. of India under AIM, intends to establish 'new' incubation centres across India by providing them financial support. Under the scheme, the incubation centre will provide necessary and adequate infrastructure along with high quality assistance services to start-ups in their early stages of growth. The government will also provide a financial assistance of INR 10 Crore under the scheme if the area provided by the institution is more than 10,000 square feet. Accordingly the area proposed in Incubation Centre is 950 square meter which is in line with the requirement. The AIC scheme can be used by TC to set up Incubation Centre.

c) Incubation Centre should have facilities which can provide pay per use support to existing and upcoming manufacturing facilities that are keen to be competitive in the ESDM sector.

d) Few of the facilities within the Incubation Centre can be set up on PPP model in collaboration with existing reputed companies present in state such as Volvo, BHEL etc.

e) An international investment promotion cell can be set up to encourage foreign investments and form alliances with trade bodies from Japan, Taiwan, US and other countries to facilitate technology transfer.

10.9.5 Entrepreneur Development Cell

Promoting emerging technological and knowledge-based innovative ventures that seek to nurture ideas from entrepreneurs is important for development MSMEs. Such entrepreneurial ideas not only provide a career option for students but also have a multiplier effect on employment generation. In order to encourage more and more students to become entrepreneurs, it is necessary to create awareness, motivate, educate and support the students. The development of an entrepreneur includes inculcating the entrepreneurial skills into a common person, providing the needed knowledge, developing the technical, financial, marketing and managerial skills, and building the entrepreneurial attitude among the applicants.

The Objective of EDC is to

- Act as an institutional mechanism for providing various services including information on all aspect of enterprise building to budding MSME entrepreneurs
- Create Entrepreneurial culture in the Institution and other institutions in the region and to promote entrepreneurship programmes related to women and weaker sections of the society
- Train the entrepreneurs in management of manpower, machine, material, taxes, legal aspects, finances and cash flow of a MSME
- Foster better linkages between the Parent Institution, Industries and R&D institutions in the region and other related organisations engaged in promoting Small & Medium Enterprises
- SMEs and Non-Government Organisations (NGOs).
- Catalyse and promote development of enterprises and promote employment opportunities in the innovative areas
- Respond effectively to the emerging challenges and opportunities both at national and international level relating to SMEs and micro enterprises

10.9.6 Entrepreneur Development Cell at Sriperumbudur TC

Entrepreneur cell at the TC shall consist of student and faculty (in house and visiting), adapt a systematic approach to guide students to become a leader to take global challenges and opt for self-employment.

Following activities shall be taken up by the entrepreneur cell to accomplish its vision.

- Sensitize students on entrepreneurship at induction stage & orientation to the students.
- Conduct awareness programmes in house
- Enhancing industry institute interaction through guest lectures and industry visits
- Conduct programmes on idea generation & business plan preparation
- Conduct training programmes In the field of entrepreneurial skill development
- Market assessment for the entrepreneur opportunities
- Provide guidance and facilities to first time entrepreneurs particularly in raising funds and firm registration
- Support for entrepreneurship in curricula at diploma and degree levels

Collaborate with various institutes such as Entrepreneur Development Institute of India, Ahmedabad, and Entrepreneur Development Institutions (National Institute for MSME Hyderabad, Indian Institute for Entrepreneur (IIE) Guwahati, and National Institute for Entrepreneurship and Small Business Development, and society like Society for Innovation and Entrepreneurship hosted by IIT Bombay. A close link will be made with leading bank and DIC/industry department to support the ecosystem.

Quality System

11. Quality system

The new TC would further aim to obtain various process certificates to enhance its competitiveness like:

Table 29: Indicative certifications of quality systems

Name of certification	Area	Details
ISO 9001	Quality Management System	▶ This would help to monitor, control, and improve quality of products and services offered by the TC ▶ It is a series of standards that define, establish, and maintain a quality assurance system for manufacturing and service industries ▶ ISO 9001 deals with the requirements that organizations wishing to meet the standard must fulfil
ISO 14000	Environmental Management System	▶ Will help to address various aspects of environmental management of the TC ▶ It provides practical tools to identify and control environmental impact and constantly improve their environmental performance ▶ These standards call for analysis of the entire life cycle of a product, from raw material to eventual disposal and focus on awareness of the processes and procedures that can affect the environment
ISO 29990	Learning services for non-formal education and training	▶ For quality professional practice, performance and enhance transparency ▶ Allows for comparison on a worldwide basis of learning services, and management standards in the field of non-formal learning
ISO 50001	Energy management systems	▶ Gives requirement for energy management systems ▶ Establishes framework for industrial plants; commercial, institutional and government facilities and entire organisations to manage energy usage
OHSAS 18001	Occupational Health and Safety standard	▶ Is an internationally-applied British Standard for occupational health and safety management systems ▶ It provides for the elements of an effective safety management system which can be integrated with other management

Name of certification	Area	Details
		systems and help organizations achieve better occupational health and safety performance and economic objectives

- The TC will essentially adopt the 5S technique for process improvement to clean and organise its workspace to improve the workflow. Further trainees will be trained and exposed to 5S process improvement technique. This would require the TC to do the following;

  - **Sort:** To de-clutter the workspace and prioritise tools and materials used frequently, the TC will sort everything in the work area so that unnecessary items (tools, parts, equipment, storage bins, etc.) can be removed and either discarded or stored elsewhere.

  - **Straighten:** This will involve creating storage solutions that would facilitate orderly work flow of everything in the TC by placing more frequently used items for quick and easy access.

  - **Shine:** This will require efforts in the initial phase involving painting and installing better lighting to make the workspace clean and tidy. Further during ongoing activities at the TC, the work space and equipment will be cleaned and restored to their proper place at the end of each shift. Basic preventative maintenance tasks like tightening, oiling, restocking will also be part of this. The workstation would then be ready for the next user (or the next day) and the order created in the first two steps will be preserved.

  - **Standardize:** The objective of the same would be to make everyone in the TC familiar about the current steps in order to follow and establish expectations. TC would conduct training, create documented procedures, work instructions, use visual guides, checklists, and/or photos for easy understanding of any changes made. Standardised ways will increase efficiency and be user friendly for TC employees and others.

  - **Sustain:** Sustaining the processes would be important to ensure that focus doesn't drift away from 5S. TC would adopt strategies like daily meetings, mini-audit and ongoing continuous improvement efforts to sustain the 5s.

Infrastructure and Facilities

12. Infrastructure and facilities

The infrastructure of the proposed TC at Sriperumbudur has been developed based on the requirements, recommended norms, capacity data of the existing TCs capacity, discussions with key stakeholders and the experience of the team in providing professional advice on similar projects. The team has studied the applicable AICTE/ NCVT norms for development of infrastructure facilities for engineering and technology institutes and detailing out the infrastructure provisions for the proposed TC in view of the same. Also, leading practices form international training institutes have also been considered. The TC will be built on area of around 10 acres and the layout will have following blocks with required infrastructure.

- **Production Block:** The highest priority has been given to the allocation of space for installation of machines for training and production activities. Depending on the space required by the machines, the area for manufacturing and training should be demarcated which would also include other facilities like toilets, washrooms and change rooms, adequate space for their mobility, clean drinking water in their vicinity etc. This block will also have metrology section and rapid prototyping centre which can be accessed by industry directly.
- **Training Block:** This area will have classrooms, labs, conference hall, faculty rooms, technical information centre and facilities for training / seminars/ workshops etc.
- **Administrative Block:** This block will have GM and DGMs Office and secretariat. It will also house office and desk space of all management, professional staff, administrative and support staff, library and other amenities such as conference room with video conferencing facility, meeting rooms etc.
- **Agriculture/Rural & Traditional Enterprises and EDP Cell:** This area will have classrooms, labs and small workshops for specialized course in the service area such as home appliances repairing, mobile repairing, motor cycle repairing, solar and biomass plant and general engineering workshop for agricultural equipment etc. targeted for rural/agriculture artisans entrepreneurship promotion and skilling.
- **Utilities Block:** The utilities block comprises of areas that will house main electrical meter, VCBs, HT panel, distribution panel and power back up DG plant. The utilities block will also house water pumps, purification plant and chilling plant, water treatment plant etc. The open areas around the building will also have some utilities provision such as rain water harvesting pits and panels for the operation of external lighting. Utility will also include sewage treatment plant at an appropriate location.
- **Hostel and staff accommodation:** The hostel blocks will comprise of accommodation for the students (separate for males and females). A few staff quarters (for driver, security officer, wardens – boys and girls hostel, Maintenance staff etc.) will also be constructed to house some of the emergency staff or on need basis.

- **Open Areas:** The open areas comprise of drive way, rain water harvesting pit and landscaped areas including the facade and main entry of the TC. The size of the open area will depend on the design strategy adopted by the CMC.
- **Others**: This will include canteen, parking, security room etc.
- **Basic amenities:** Apart from the above facilities the campus will have basic amenities with provision for;
  - Drinking water
  - Toilets
  - Dining room as a hygienic area and place away from the work environment for rest breaks and the consumption of food
  - Change rooms to enable employees to change (e.g. uniforms or dirty work clothing) with privacy and security. Such facility helps to reduces employee exposure to and potential spread of contaminating substances used in work processes
  - Personal storage for the secure and clean storage of personal belongings or clothing, lockable where necessary
  - Immediate availability of doctors, health supervisors and ambulance and sufficient first aid kits
  - Fire safety with smoke alarms to protect people against death and injury from fires. Providing fire safety awareness to employees and conduct fire drill from time to time
  - Fire assembly area in case of fire or natural calamity
  - Dustbins with proper colour coding in green for organic, yellow for glass, white for paper, grey for metal, blue for plastic, red for hazardous products

Table 30: Details of proposed infrastructure

Details	Nos.	Total Area (Sq. mt.)
Production Block		**5,560**
Workshop	1	5000
Office Area	1	560
DART, EDP & Plug and Play		**1,500**
DART Centre	1	700
EDP & Plug and Play Facility	1	800
Training Block		**4,812.50**
Sn. Manager/HoD Room	1	30
Training Office and Faculty	1	50
Manager Room	1	25
Reception	1	30
Placement Cell/Counselling Room	1	25
Library	1	240
Multi-purpose hall for examination/drawing/reading room	1	100
Classrooms	8	600

Details	Nos.	Total Area (Sq. mt.)
Labs	16	1200
Language Lab	1	75
Record Keeping Room	1	30
Conference Room	1	50
Electrical Panel, Server Room etc.		25
House Keeping		10
Corridor, Stairs and others		622.5
Toilet		100
Workshop shed	1	1600
Admin Block		**500**
Director office with secretary and Meeting Hall	1	50
Conference Hall	1	60
Pantry	1	10
Marketing	1	50
Admin including Reception, Purchase, Accounts, HR etc.	1	150
Toilet (Male and Female)	1	50
UPS/Electrical, IT Server Room	1	10
Housekeeping	1	20
Circulation and wall		100
Canteen		**400**
Others		**225**
Utilities Room - DG Set, Transformer, UPS		200
Security Room (incl toilet)		25
Total		**12,997.5**

- **Hostel and staff accommodation:** The hostel block will comprise of accommodation for students enrolled under fulltime courses along with the hostel warden. It is proposed to develop the hostel capacity for around 225 trainees and out of which around 75 will be reserved for female trainees. The hostel building has been planned to be G + 3 structures with provision for further vertical expansion depending on future requirements. Part of the ground floor of the hostel building will be reserved for use as hostel office, other common facilities etc. The space on rest of the floors will be developed as rooms for accommodation of students. The details of proposed hostel infrastructure have been given in the following table. Additionally, eight emergency staff quarters will also be constructed to house some of the key management officials as per requirement. Initially the staff quarters block will be a G+1 structure with a provision of further expanding it vertically depending on future requirements.

Table 31: Details of proposed infrastructure for hostel and staff quarters

Hostel	Category	Floors	Trainees per Room	Number of trainees	Area per trainees (sq. mt.)	Total Area (sq. mt.)

Hostel No.1	Boys	G+3	4	150	12	1800
Hostel No.2	Girls	G+3	4	75	16	1200
Sub-Total						**3,000**

		Number	Area (sq mtrs)
Staff Qtrs	**G+2 (72sqmt/quarter)**		
Sub-Total	72	8	576
Total			**3,576**

Note: All viable options will be studied to decide on the design of the proposed block for hostel and staff quarters. The number of floors for these facility buildings and all other associated details can be further finalised with the CMC during the design stage for development of the campus for TC.

As per the details of proposed infrastructure given in above two tables, the construction of the new Sriperumbudur TC will include development of 16,573.5 {12,997.5 + 3,576 (staff Quarters and hostel)} square meter of built up area in total and per square meter cost of construction has been estimated to be INR 42,000. This estimated cost includes construction of boundary wall, landscaping, water, sanitation, internal roads, grey water training treatment plant, lighting etc.

The details of the cost for development of total campus infrastructures is as follows:

Table 32: Cost for development of campus infrastructures

SN	Building Infrastructure	Cost (in INR lakh)
1.	Cost of development of build-up area @ 42,000 per sq. mt. for 16,573.50 sq. mt.	6,961
2.	Contingency @ 5%	348
	Grand total	**7,309**

Further provisioning towards establishment of other associated infrastructure will be done for the planned capacity and is listed in the following table:

Table 33: Details of other infrastructure

SN	Other Infrastructure	Nos.	Budgeted Cost (INR lakhs)	Total Cost (INR lakhs)
1	Office & Storage Furniture	60	0.5	30
2	Hostel Furniture	160	0.25	40
3	Canteen and Hostel Dining hall furniture	20	0.6	12
4	Kitchen equipment	1	20	20
5	Other Office equipment	50	1	50

SN	Other Infrastructure	Nos.	Budgeted Cost (INR lakhs)	Total Cost (INR lakhs)
6	Laptop	20	0.6	12
7	Desktop	40	0.5	20
8	Photocopier cum printer	4	2	8
9	Vehicle	2	12.5	25
10	Solar System 100 KW (may vary according to roof area)	1	80	80
11	Pre-Operative Expenses		258	258
12	Others (Miscellaneous)	1	50	50
12	Sub Total			605
13	Contingency 5%			30.25
	Total			**635.25**

Above all, the development of campus infrastructure will be done keeping the following guidelines in mind;

- **Campus Layout/ Plan:** Campus layout is crucial for successful performance of the TC. At least 30% green area will be maintained and landscaping will be done to improve aesthetics of the surrounding while maintaining habitats conductive to natural fauna. Also, efforts will be made to conserve existing vegetation and other rich biodiversity in the premises as well as vicinity. Apart from this, there will be the following considerations while planning the campus layout:

  - **Site drainage:** Existing drainage pattern of the available site will be studied and the drainage system required for the TC will be constructed in line with the drainage pattern. Storm water drain will be constructed separately so as avoid mixing of the fresh and the waste water.
  - **Heat island effect:** Site will be planned properly to mitigate the heat island effect (Thermal gradient difference between developed and undeveloped areas) by following measures:
    - At least 40% of the non-roof impervious surfaces on the site (including parking lots and walkways) will be shaded
    - Pavements and walkways should be painted in light colour (solar reflectance index > 0.5)
  - **Boundary:** The campus will be provided with boundary wall in all the directions to avoid encroachment, theft and safety.
  - Trees will be planted in large numbers to provide natural shade in the open areas. This helps to reduce the temperature on campus in comparison to the vicinity
  - Efforts will be made to utilize natural light to the maximum possible extent and provision should be made for natural ventilation

- Green building codes will be adopted while designing the building layout so as to ensure following environmental safeguards;
  - Renewable energy in terms of solar water heater, solar panels, solar street light may be used
  - LED/CFL lights will be used within the premises to reduce the energy consumption
  - Provisioning of water treatment and recycling facility to reduce water consumption
  - Water harvesting arrangement to recharge the ground water and/or reduce dependency on ground water
  - Provisioning of waste management including practices to minimize waste generation, etc.
- Criteria mentioned in the National building code will be followed so as to ensure that all the safety precaution like escape routes/emergency exits, setting of machinery providing appropriate working space, etc. is maintained
- Hazardous material like asbestos sheets should be avoided in any part of the structure
- Substitutes to natural resources will be encouraged in appropriate ratio so as to decrease natural resource consumption while maintaining the required strength (example: Fly ash may be used in small percentage instead of cement for construction, composite material may be used construction of doors instead of wood, etc.
- Provision of toilets for both men and women will be made in appropriate number so as to ensure comfortable and hygienic working conditions
- Energy efficient products like 5 star rated air conditioner, refrigerator, energy efficient motors, etc. will be used in the TC's

- **Detailed building plan preparation:** The building design is crucial for sustainable performance of the TCs. A number of factors including energy efficiency, materials of construction, natural light and ventilation, insulating, etc. must be kept in mind in order to maintain eco-friendly operations. Also, adherence to aspects related to safety like, resistant to earthquakes, proper evacuations, etc. will ensure successful operations of the TC.
- **Construction management:** Construction at the site involves a number of activities. These activities may lead to certain EHS impact on the existing natural settings and therefore, appropriate mitigation measures will be required to be put in place so as to minimize or avoid this impact. A snapshot of the issues with the basic principles to be kept in mind during construction is given in the EHS section of this DPR.

Expenditure pattern

13. Expenditure pattern

13.1 Capital expenditure

Summary of the Capital Expenditure is provided as below:

Table 34: Capital expenditure

Capex (Inc. Contingency @5%)	Cost (INR Lakhs)
Production Machinery and equipment	8,592
Training machines and equipment	3,048
Incubation Centre machines and equipment	142
Other infrastructure including pre-operative expenses	635
Building and construction	7,309
Total Capex including contingency	**19,726**

13.1.1 Plant and machinery

Total expenditure on machines envisaged for the setting up of new TC at Sriperumbudur is as under:

Table 35: Plant & Machinery[56]

Capex	INR Lakhs
Production Machinery and equipment	8,183
Training machines and equipment	2,903
Incubation Centre machines and equipment	135
Contingency @ 5%	561
Total for Plant and Machinery	**11,782**

The investment which has been proposed in the electronic testing such as EMI/EMC, ESS Chamber etc. have also been proposed in Puducherry and Bengaluru TC. For Sriperumbudur TC, we would first explore the opportunity of getting these testing services done from these two TCs i.e. Puducherry and Bengaluru. The Sriperumbudur TC will act as a nodal agency and assist in getting jobs done through these TCs. And when the demand increases, the investment will be made subsequently for these equipment at Sriperumbudur TC. Also, investment in Composite Machining and Metro-

[56] Details about plant machinery are in Chapter 10, section 10.1 and 10.2

tomography (NDT & Dimensional Metrology) will be made once the tool room is functional and sufficient demand is felt.

The capital cost estimate for the proposed project has been prepared jointly by O/o DC-MSME and EY team based on inputs from the following:

- Market opportunity assessment by EY team
- Stakeholders discussion in Chennai
- Inputs from existing technology centres
- Validation of technology needs by detailed discussions and site visits to key manufacturing organisations
- Site visits and discussions with local industry and industry associations.
- Inputs from Office of DC MSME
- Inputs as per the World Bank Environment and Safety requirements

13.1.2 Building cost

Sriperumbudur has around 10 acres of land available for setting up of the facility of the new TC[57].

Table 36: Building cost[58]

SN	Building Infrastructure	Cost (in INR lakhs)
1.	Cost of development of build-up area @ 42,000 per sq. mt. for 16,573.50 sq. mt.	6,961
2.	Contingency @ 5%	348
	Grand total	**7,309**

13.2 Operating expenditure

The operating expenditure for the TC has been classified into variable operating expenditure and fixed operating expenditure.

13.2.1 Variable operating expenditure

Variable operating expenditure has four key heads. Expenditure under each head has been identified for the key income streams:

a) Raw materials

[57] SIPCOT, Govt. of Tamil Nadu
[58] Details about infrastructure and other areas are in Chapter 11

- Raw materials for finished goods
- Raw materials for training

b) **Consumable tools**

- Consumable tools for finished goods
- Consumable tools for training

c) **Consumable stores**

- Consumable stores for finished goods
- Consumable stores for training

d) **Utilities (electricity and water)**

- Utilities for finished goods
- Utilities for training

Table 37: variable cost assumptions

Description	Unit	Norms
Variable operating cost		
Raw material		
RM for Finished goods	% of FG	20.6%
RM for Training	% of Trg	1.0%
Consumable tools – FG	% of FG	2.5%
Consumable tools – Trg	% of Trg	1.0%
Consumable stores – FG	% of FG	2.0%
Consumable stores – Trg	% of Trg	0.6%
Utilities		
Electricity & water		
FG	% of FG	6.5%
JW	% of JW	6.5%
Training	% of Trg	4.9%

13.2.2 Fixed Operating expenditure

Fixed operating expenditure has four key heads. Expenditure under each head has been identified for the key income streams:

a) **Salary and wages/ establishment expenses**

The salary expenses include salary for employees of proposed TC at Sriperumbudur. There will be 60 employees on regular contract and ~ 140 will be on temporary contract/honorarium visiting.

b) Repairs and maintenance (R&M)

Cost of repair and maintenance has been calculated for

- **Plant and machinery installed**

  R&M for plant and machinery has been taken as a percentage of the gross block in an operating year.

- **Buildings**

  R&M for plant and machinery has been taken as a percentage of the gross block in an operating year,

c) Training expenses

Training expenses primarily comprise of expenses incurred for external faculty visiting to the TC from time to time as part of Short term and Long term trainings. These expenses typically include faculty fees, hotel and transportation.

d) Other production and administration expenses

These include expenditure on heads like transportation/entry tax/ freight, Vehicle expenses, Printing and stationery, traveling and conveyance, audit, consultancy, advertisement, publicity, marketing, telephone, internet, bank charges, miscellaneous expenses. Expenditure under each head has been identified for the key income streams- Finished goods and Training

e) Insurance of new plant and machinery

Insurance expense for new plant and machinery includes the insurance cost for the new machinery to be installed. The same has been calculated as a percentage of the gross block of new machines.

Table 38: Fixed Operating Cost assumptions

Description	Unit	Norms
Fixed Operating Cost		
Salaries & Wages	Detailed assumptions given in a separate table	
R&M (Plant & Mach)	% of Plant	1.0%
R&M (Building)	% of Building	1.7%
Training Expenses		10%
Other Production & Admin. Expenses	%of income	8%
Insurance cost (New P&M)	% of P&M	0.5%
Marketing expenses (1st year)	INR Lakhs p.a	25
Marketing expenses (2 year onward)	INR Lakhs p.a	15

- **Manpower and salary cost**

Manpower numbers have been designed in line with the expansion plan of the TC and ramp up of the production, training and consultancy. Manpower salary numbers are in line with the salary structure of existing TCs

Table 39: Manpower and salary assumptions

Top Management	Designation	Monthly salary (INR)	Nos.											
	GM	1,53,861	1	1	1	1	1	1	1	1	1	1	1	1
	DGM	1,29,327						1	1	1	1	1	1	1
Sub Total			1	1	1	1	1	2	2	2	2	2	2	2
Management and Support staff														
Administration and accounting	Manager Admin. and Accounting	69,204	1	1	1	1	1	1	1	1	1	1	1	1
	Sr. Officer HR	62,371						1	1	1	1	1	1	1
	Officer Procurement	35,744			1	1	1	1	1	1	1	1	1	1
	Officer Store	35,744		1	1	2	2	2	2	2	2	2	2	2
	Officer Admin	35,744		1	1	1	1	1	1	1	1	1	1	1
Design and consultancy	Senior manager	86,857		1	1	1	1	1	1	1	1	1	1	1
	Manager	82,777			2	2	3	3	3	3	3	3	3	3
	Sr. Engg.	64,806			2	3	3	3	3	3	3	3	3	3
Production	Senior Manager	86,857		1	1	1	1	1	1	1	1	1	1	1

Top Management	Designation	Monthly salary (INR)	Nos.											
	Manager Prod./Planning	82,777			1	1	2	2	2	2	2	2	2	2
	Manager Metrology	82,777			1	1	1	1	1	1	1	1	1	1
	Manager H/T	82,777			1	1	1	1	1	1	1	1	1	1
	Manager Maintenance	82,777		1	1	1	1	1	1	1	1	1	1	1
	Sr. engg. Maintenance	64,806					1	1	1	1	1	1	1	1
	Sr. Engg. Production	64,806		3	3	3	3	3	3	3	3	3	3	3
	Engg. / Foreman	34,240		2	4	6	6	6	6	6	6	6	6	6
	Senior Technician	29,512		1	2	2	2	2	2	2	2	2	2	2
	Senior Technician Maintenance (Mech + Elect)	29,512		1	1	2	2	2	2	2	2	2	2	2
Training	Senior Manager	86,857		1	1	1	1	1	1	1	1	1	1	1
	Manager Mechanical	82,777			1	1	1	1	1	1	1	1	1	1
	Manager Electronics	82,777			1	1	1	1	1	1	1	1	1	1

Top Management	Designation	Monthly salary (INR)	Nos.											
	Manager Short term	82,777						1	1	1	1	1	1	1
	Sr. Engg.	64,806		1	5	6	6	6	6	6	6	6	6	6
	Engg.	34,240		1	4	8	10	10	10	10	10	10	10	10
	Senior Technician	29,512		1	2	2	2	2	2	2	2	2	2	2
Sales and marketing	Manager Marketing	82,777	1	1	1	1	1	1	1	1	1	1	1	1
	Officer Sales	35,744			1	1	1	1	1	1	1	1	1	1
Incubation Centre	Manager IC	82,777		1	1	1	1	1	1	1	1	1	1	1
	Officer IC	35,744			1	1	1	1	1	1	1	1	1	1
Total (Mgt & Support staff)			**2**	**19**	**42**	**50**	**56**	**58**	**58**	**58**	**58**	**58**	**58**	**58**
Number of Employees on Temporary Contract														
	Training	15,000	-	3	21	34	55	68	85	100	114	128	128	128
	Contractual Employees (Production)	10,000			4	10	10	10	12	12	12	12	12	12
Employees on Temporary Contract				3	25	44	65	78	97	112	126	140	140	140

Financial Analysis

14. Financial analysis

14.1 Key assumptions

Project construction and commencement of operations

The project construction is expected to start in the financial year 2019-20. It is assumed that, the construction period and installation of machines shall be completed in 15 months. Full-scale operations will commence at the end of the construction period of 15 months.

Table 40: Key assumptions

Start of Project	1-Mar-19
Construction period (Months)	15
Commencement of operation, date	1-June-21
Number of years, useful life of machines and equipment (as per depreciation rules)	10
Maximum days of operation in a year	300

14.1.1 Income assumptions

- **Production**

Table 41: Production machine revenue assumptions

S.N.	Machine	Estimated Machine Rate/Hour	Shift	Hours
1	5 AXIS CNC Milling - 800*650*550 (axes traverse)	2000	2	16
2	5 Axis CNC Milling - Double Column With Universal Head - 2000*1800 * 1200 (axes traverse)	4000	1	8
3	3 Axis CNC Milling - Double Column - 3000 *2000* 1500 (axes traverse)	2000	2	16
4	CNC VMC - 3 axis - 1250*650*600 (axes traverse)	1000	2	16
5	CNC VMC -3 axis (High speed - 40,000 RPM)	2500	2	16
6	CNC HMC - 2000*1600*1500 (axes traverse)	2500	1	8
7	CNC EDM Wire Cut (600*400*350)	2500	2	16

S.N.	Machine	Estimated Machine Rate/Hour	Shift	Hours
8	CNC EDM Die Sinking (600*400*400)	2000	2	16
9	CNC EDM Die Sinking (2000*1250*1500)	3000	2	16
10	Machining Centre for Composite Materials	4000	1	8
11	Plasma Cutting Machine	1000	1	8
12	Surface Grinding (1000*500)	500	2	16
13	Surface Grinding (450*200)	250	2	16
14	Cylindrical Grinding (250*1000)	500	2	16
15	Conventional Vertical Milling (1200*300*400)	250	2	16
16	Conventional Lathe (400*1200)	200	2	16
17	Radial drill machine (63mm)	100	2	16
18	Precision 3D scanner (White Light)	1000	1	8
19	Hand Held Portable Laser Scanner	500	2	16
20	Additive Manufacturing Metal Laser (300*300 Build Volume)	4000	1	8
21	Hydraulic press 63 T	150	1	8
22	Mechanical press 100 T	300	1	8
23	Injection Moulding Machine 500 T	1000	2	16
24	Die Spotting Machine 100 T	2000	0.5	4
25	Vacuum Heat Treatment Facility	2000	2	16
26	CNC 3D Coordinate Measuring Machine	1000	1	8
27	Industrial Boroscope	200	0.5	4
28	EMI/EMC Chamber	2000	1	8
29	ESS Chamber with Water Chiller	1500	1	8
30	CAD/CAM Software	500	0.5	4
31	CAE & Simulation Software	2000	0.5	4

Table 42: Testing facility machine revenue assumptions

S.N.	Machine	Estimated Machine Rate/Hour	Shift	Hours
1	Universal Testing Machine	350	1	8
2	Digital Impact Testing Machine	200	1	8

S.N.	Machine	Estimated Machine Rate/Hour	Shift	Hours
3	Micro Hardness Tester	200	1	8
4	Universal Hardness Tester	200	1	8
5	Optical Emission Spectrometer	450	1	8
6	Metallurgical Sample Preparation Facilities	200	1	8
7	Optical Microscope	200	1	8
8	Stereo Zoom Microscope	200	1	8
9	Portable Ultrasonic Flaw Detector	200	1	8
10	Energy Dispersive X-Ray Fluorescence Spectrometer (EDX)	450	1	8
11	Metro-tomography (NDT & Dimensional Metrology)	3500	0.5	4
12	Shock & Vibration Test Facility	200	0.5	4
13	Bump Test Facility	100	0.5	4
14	Fatigue Testing and Fracture Toughness testing	2500	0.5	4

Table 43: Incubation Centre machine revenue assumptions

S.N.	Machine	Estimated Machine Rate/Hour	Shift	Hours
1	CNC Milling Machine	400	1	8
2	Conventional Lathe Machine	300	1	8
3	Injection Moulding Machine (50 Ton)	200	1	8
4	Mechanical Press (10 Ton)	100	1	8
5	Additive Manufacturing	200	1	8
6	Hand held Scanner	100	1	8
7	Metrology Equipment	150	1	8
8	CAD/CAM/CAE Software	100	1	8
9	Surface Griner	100	1	8
10	Cylindrical Grinder	150	1	8

- **Training revenue assumptions**

Table 44: Training revenue assumptions

No.	Specialization	Course name	Fees in '000	Duration (months)	Batch size	No. of Batch/ year	Annual intake
1	Tool Room	Advanced Diploma in Tool & Die making	150	48	60	1	60
		Machinist Course	50	24	30	1	30
		Post Diploma in Tool Design	60	12	30	1	30
		Post Diploma in Tool Manufacturing	60	12	30	1	30
		Post Diploma in CNC-Prog & Op	60	12	30	1	30
		Adv. Certificate Course in Tool Design & CAD/CAM	60	12	30	1	30
		Adv. Certificate Course Tool & Die Manufacturing	60	12	30	1	30
		Master Certificate Course in Tool Design	40	6	30	1	30
		Certificate Course in CNC Machine Operation	60	12	30	1	30
		Advanced course in Metrology and QC	40	4	30	1	30
		Certificate Course in Inspection & Quality Control	30	6	30	1	30
		Additive Manufacturing	20	2	20	1	30
2	CNC Manufacturing, CAD/CAM	Diploma in Precision Manufacturing	120	36	60	1	60
		Post Diploma in Precision Manufacturing	60	12	30	1	30

No.	Specialization	Course name	Fees in '000	Duration (months)	Batch size	No. of Batch/ year	Annual intake
		CNC lathe programming and operation (Part Time)	12	4	30	3	90
		CNC Milling Prog and Operation (Part Time)	12	4	30	3	90
		Master of CAD/CAM/CNC	30	6	30	2	60
		CAD/CAM/CNC Engineer (Full Time)	20	4	30	3	90
		CAD/CAM/CNC Engineer (Part Time)	20	6	30	2	60
		Auto CAD	10	1	30	6	180
		ANSYS	15	1	30	6	180
		Hyperworks Suite (Hyper Mesh, Hyper Form, RADIOS)	15	1	30	6	180
		CAD Modelling with UNIGRAPHICS	12	1	30	6	180
		CAD Modelling with CREO Parametric	12	1	30	6	180
		CAD Modelling with CATIA	12	1	30	6	180
		CAD/CAM Solidworks	12	1	30	6	180
		STAAD. Pro	12	1	30	6	180
		Computer Integrated Manufacturing (CIM)	15	1	15	6	90
3	Electronics and IT	Basic computer and Hardware (Part Time - 4 hrs)	10	2	30	12	360

No.	Specialization	Course name	Fees in '000	Duration (months)	Batch size	No. of Batch/ year	Annual intake
		Advanced Hardware & Networking (Part Time - 4 hrs)	15	4	30	6	180
		VLSI Design	20	4	30	4	120
		Embedded System Design	20	4	30	4	120
		Electronics Maintenance	15	4	30	4	120
		Power Electronics and Industrial Drives	12	4	30	6	180
		Solar Energy System Technician	8	3	30	4	120
4	Industrial and process Automation and Others	Industrial Hydraulics	10	1	20	6	120
		Industrial Pneumatics	10	1	20	6	120
		PLC Programming	10	1	20	6	120
		Industrial Automation Technician	15	4	20	3	60
		Industrial Automation Design	25	4	20	3	60
		Certificate course in Industrial Automation with PLC, AC Drive and CNC Maintenance	34	6	20	2	40
		Diploma in Mechatronics	120	36	60	1	60
		Introduction to IOT, Industry 4.0, AR/VR	24	2	15	6	90
5	Training on Testing	Mechanical: Physical Properties of metal and	15	2	15	3	45

No.	Specialization	Course name	Fees in '000	Duration (months)	Batch size	No. of Batch/ year	Annual intake
		Non-Metal product/material					
6	Rural Artisan and Skill Training	Courses on Rural Artisan, Craftsman & Technician Training	16	3	1	3000	3000

Machine utilization	Year	
2nd year of production	2023-24	25%
3rd year of production	2024-25	40%
4th year of production	2025-26	50%
5th year of production	2026-27	60%
6th year of production	2027-28	70%
year on year increase in machine utilization and machine hour rate 7th year onwards	2028-29	10%

- **Consultancy revenue assumptions**

Revenue from consultancy is expected to start from 2nd year of operation, however full-fledged revenue will start from the 4th year when the TC is fully operational and all infrastructures are in place.

Table 45: Consultancy revenue assumptions

S. No	Consulting Areas	Suggestive Rev Year 1 (INR lacs)	Suggestive Rev Year 2 (INR lacs)	Suggestive Rev Year 3 (INR lacs)	Suggestive Rev Year 4 (INR lacs)	Suggestive Rev Year 5 (INR lacs)	Suggestive Rev Year 6 (INR lacs)	Suggestive Rev Year 7 (INR lacs)	Suggestive Rev Year 8 (INR lacs)	Suggestive Rev Year 9 (INR lacs)	Suggestive Rev Year 10 (INR lacs)
1.	Design Support (incl. Product Design)	-	25,00,000	31,25,000	37,50,000	43,12,500	49,59,375	57,03,281	65,58,773	75,42,589	86,73,978
2.	Product Design Support	-	20,00,000	25,00,000	30,00,000	34,50,000	39,67,500	45,62,625	52,47,019	60,34,072	69,39,182
3.	Engineering Solutions (Development of Jigs & Fixtures for Machining, Welding, etc.)	-	15,00,000	18,75,000	22,50,000	25,87,500	29,75,625	34,21,969	39,35,264	45,25,554	52,04,387
4.	Quality System Support	-	10,00,000	12,50,000	15,00,000	17,25,000	19,83,750	22,81,313	26,23,509	30,17,036	34,69,591
5.	Project Consultancy	-	2,00,000	2,50,000	3,00,000	3,45,000	3,96,750	4,56,263	5,24,702	6,03,407	6,93,918

	(curriculum development, community colleges, trainers, etc.)										
6.	Productivity Improvement	-	-		-	-	-	-	-	-	-
7.	Other Consulting assignments	-	-	-	-	-	-	-	-	-	-
Total			72,00,000	90,00,000	1,08,00,000	1,24,20,000	1,42,83,000	1,64,25,450	1,88,89,268	2,17,22,658	2,49,81,056

14.1.2 Project cost and financing

The expected completion period of the project is 15 months. The Workshop for training and production activities is planned to be completed in 12 months. The procurements of machines will be planned according to the scheduled completion of the workshop.

Table 46: Project cost and financing

Project cost	In lakhs
Plant & Machinery	11,221.00
Infrastructure (including other infrastructure and pre-operative expenses)	7,565.87
Contingency @ 5%	939.35
Total	**19,726.21**

14.1.3 Other financial assumptions

Terminal value assumptions:	
Discount rate	9.25%
Growth rate in perpetuity	5.0%
Cost of equity	9.25%

Repair & maintenance (of P&M)	1.0%
Repair & maintenance (of Building)	1.7%
Post commissioning Insurance cost of new P&M (of P&M & building)	0.5%

Working Capital Assumptions		
Cash in Hand	Days	60
Accounts Receivables	Days	90
Suppliers Credit (A/P)	Days	30
Finished goods Storage	Days	30
Inventories (RM, Consumables)		
Finished goods	Days	90
Training	Days	90

Inflation (Salary etc.)	10%

Depreciation Rates			
Asset Class		WDV	Max Depreciation
Tangible Assets			
	Plant and machinery	13.91%	95.00%
	Buildings	10.00%	95.00%

Working capital and cash flow statement

Overall net working capital requirement for the TC and cash flow closing balance is depicted in the graphs below:

Figure 23: Net working capital requirement

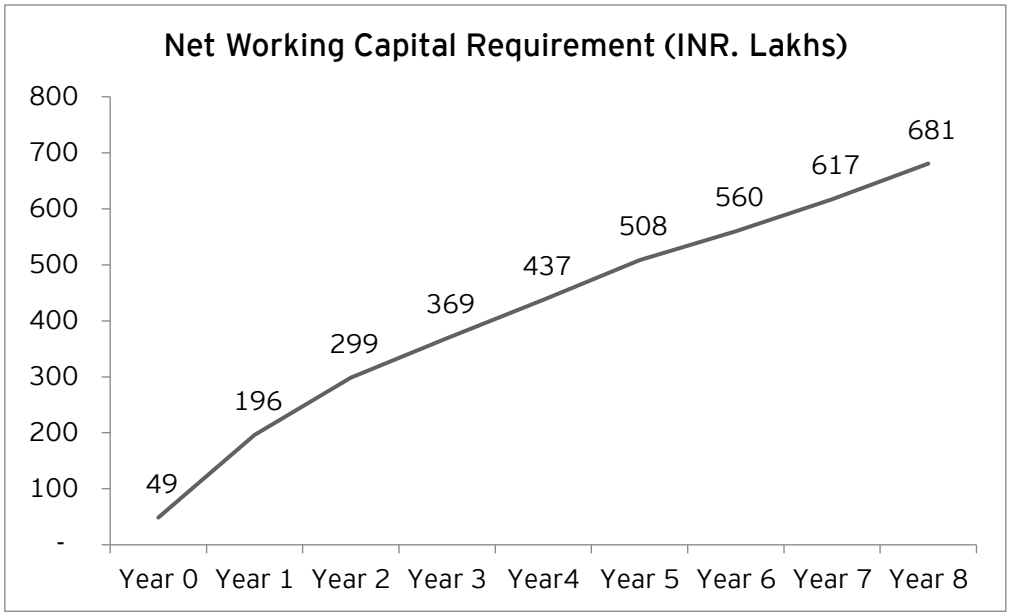


Figure 24: Cash flow closing balance

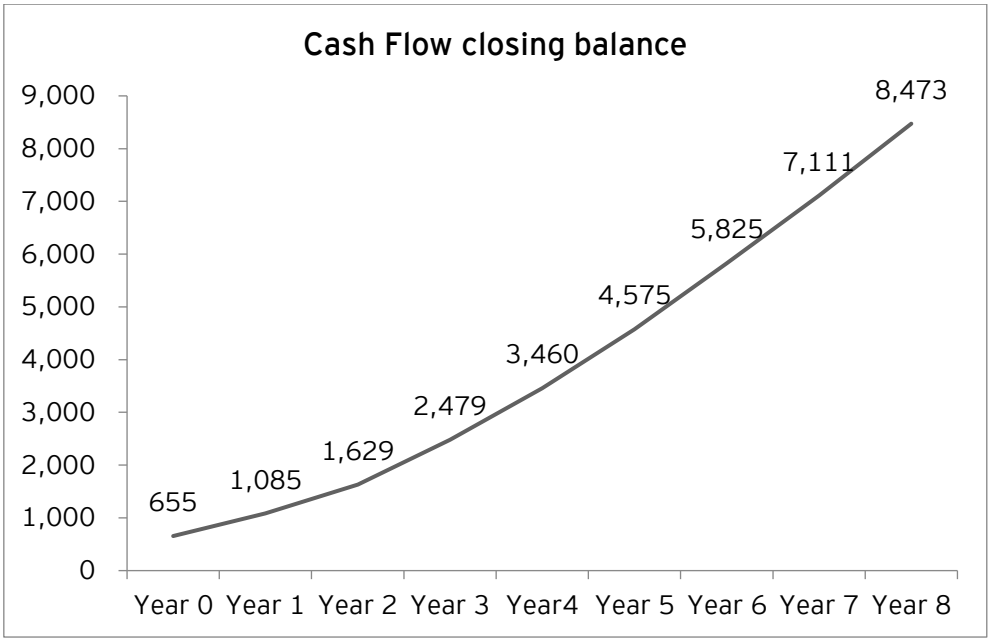


Table 47: Working capital schedule

Working Capital Schedule - With TCSP											
Years	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
											INR Lakhs
Raw Material Storages											
Finished goods	-	5	22	35	43	52	60	66	73	80	88
Training	1.21	2	3	4	5	6	6	7	7	7	8
Consumable tools											
Finished goods	-	1	3	4	5	6	7	8	9	10	11
Training	1.21	2	3	4	5	6	6	7	7	7	8
Consumable stores											
Finished goods	-	1	2	3	4	5	6	6	7	8	9
Training	0.69	1	2	2	3	3	4	4	4	4	5
Finished Product Storages											
Finished goods	-	9	35	56	70	84	98	107	118	130	143
Accounts Receivables	1.09	28	131	202	251	298	347	384	425	470	519
Gross Working Capital	4.19	50	200	310	387	459	534	590	650	717	790
Suppliers Credit	1.04	1	4	11	17	22	26	30	33	36	39
Net Working Capital Requirement	3.14	49	196	299	369	437	508	560	617	681	751

Table 48: Cash flow statement

Cash Flow

Years	Construction Period	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
											INR Lakhs
Income post Depreciation	-27	197	44	-1,648	-1,109	-623	-311	-11	247	413	605	789
Add: Depreciation				1,995	1,755	1,544	1,359	1,197	1,055	930	821	724
Inflow from capital fund	1,986	15,026										
Capital fund to balance -ve cash flows, if any	30	160	300	230								
Total Cash Inflow	1,989	15,383	344	578	646	921	1,049	1,186	1,302	1,343	1,426	1,513
Investment in Assets	1,986	15,026										
Net Change in WC		3	46	148	102	71	68	71	52	57	64	70
Total Cash Outflow	1,986	15,029	46	148	102	71	68	71	52	57	64	70
Opening Balance		3	357	655	1,085	1,629	2,479	3,460	4,575	5,825	7,111	8,473
Surplus/Deficit	3	354	298	430	543	851	980	1,115	1,250	1,286	1,362	1,443
Closing Balance	3	357	655	1,085	1,629	2,479	3,460	4,575	5,825	7,111	8,473	9,916

14.2 Income & expenditure statement

The income to the proposed center from training will start accruing from second year of construction period with completion of phase 1 (basic training infrastructure and procurement of basic machines) and start of basic courses.

Table 49: Income and expenditure

Income and Expenditure											
Year	Construction Period	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
INR Lakhs											
Income											
Training Income		394	812	999	1,295	1,669	1,836	2,020	2,222	2,333	2,449	2,572
Sale of Finished goods			85	349	559	699	836	976	1,073	1,181	1,299	1,429
Sale of Scrap		3.6	9	16	23	30	34	39	43	46	49	53
Consultancy Income		-	-	72	90	108	124	143	164	189	217	250
Total Income		398	907	1,437	1,968	2,506	2,831	3,177	3,502	3,748	4,014	4,303
Expenditure											
Variable Operating expenditure											
Raw materials		**4**	**26**	**82**	**128**	**161**	**191**	**222**	**244**	**267**	**293**	**321**
Finished goods			18	72	115	144	172	201	221	243	268	294
Training		4	8	10	13	17	19	21	23	24	25	26
Consumable tools		**4**	**11**	**19**	**28**	**35**	**40**	**46**	**50**	**54**	**58**	**63**
Finished goods			2	9	14	17	21	24	27	30	32	36

Income and Expenditure												
Year	Construction Period		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Training		4	9	10	14	17	19	21	23	24	26	27
Consumable stores		**2**	**6**	**13**	**19**	**24**	**27**	**31**	**34**	**37**	**40**	**44**
Finished goods			2	7	11	14	17	20	21	24	26	29
Training		2	5	6	8	10	11	12	13	14	14	15
Utilities (Electricity & water)		**19**	**45**	**72**	**100**	**128**	**145**	**163**	**179**	**191**	**205**	**219**
Finished goods			6	23	36	45	54	63	70	77	84	93
Training		19	40	49	64	82	90	99	109	115	120	126
Variable Operating expenditure		**30**	**88**	**186**	**275**	**347**	**403**	**461**	**507**	**550**	**596**	**646**
Fixed Operating Expenditure												
Salary & Wages/ Establishment expenses	27	146	336	414	488	599	698	804	921	1,054	1,160	1,276
Repairs and Maintenance			**219**	**219**	**219**	**219**	**219**	**219**	**219**	**219**	**219**	**219**
P&M			91	91	91	91	91	91	91	91	91	91
Buildings			129	129	129	129	129	129	129	129	129	129
Training Expenses			81	100	130	167	184	202	222	233	245	257
Other Production. & Admin. Expenditure			70	111	152	194	219	246	271	290	311	333
Marketing expenses		25	25	15	15	15	15	15	15	15	15	15
Insurance of new machines			43	43	43	43	43	43	43	43	43	43

Income and Expenditure												
Year	Construction Period		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fixed Operating Expenditure	27	171	774	903	1,047	1,237	1,379	1,530	1,692	1,855	1,993	2,144
Total Expenditure	27	201	863	1,089	1,322	1,584	1,782	1,991	2,200	2,405	2,589	2,790
Income (Gross income)	(27)	197	44	348	646	921	1,049	1,186	1,302	1,343	1,426	1,513
Depreciation	-	-	-	1,995	1,755	1,544	1,359	1,197	1,055	930	821	724
Income post Depreciation	(27)	197	44	1,648)	(1,109)	(623)	(311)	(11)	247	413	605	789

13.3 Balance sheet

Table 50: Balance sheet

Balance Sheet												
Years	Construction Period		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
INR Lakhs												
Liabilities												
Capital fund	1,986	17,012	17,012	17,012	17,012	17,012	17,012	17,012	17,012	17,012	17,012	17,012
Capital for -ve cashflows	30	190	490	720	720	720	720	720	720	720	720	720
Reserves & Surplus	(27)	170	214	(1,434)	(2,543)	(3,166)	(3,477)	(3,488)	(3,242)	(2,829)	(2,224)	(1,435)
Total	1,989	17,372	17,716	16,298	15,189	14,566	14,255	14,244	14,491	14,903	15,508	16,298
Assets												
Fixed Assets	1,986	17,012	17,012	17,012	17,012	17,012	17,012	17,012	17,012	17,012	17,012	17,012
Net Block	1,986	17,012	17,012	15,017	13,262	11,718	10,358	9,161	8,106	7,175	6,355	5,630
Cash	3	357	655	1,085	1,629	2,479	3,460	4,575	5,825	7,111	8,473	9,916
Current Assets	-	3.1	49	196	299	369	437	508	560	617	681	751
Total	1,989	17,372	17,716	16,298	15,189	14,566	14,255	14,244	14,491	14,903	15,508	16,298

13.4 Profitability

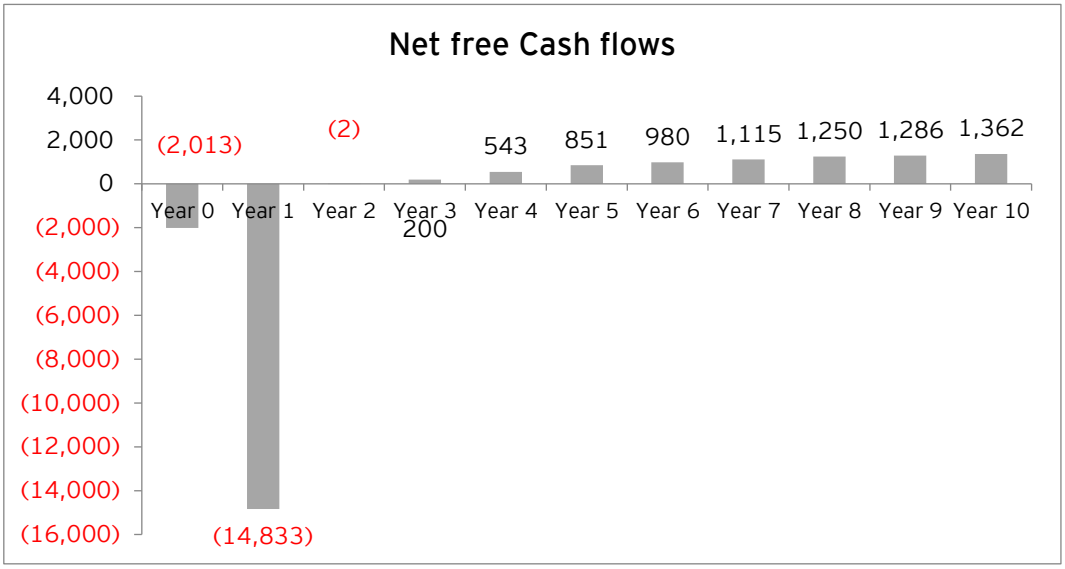
Overall project profitability has been estimated considering phased investment in plant & machinery and infrastructure. The full-fledged operations are expected to start from the year 2021-22. Hence the project IRR for a period of 12 years till 2033-34 is 11.0%.

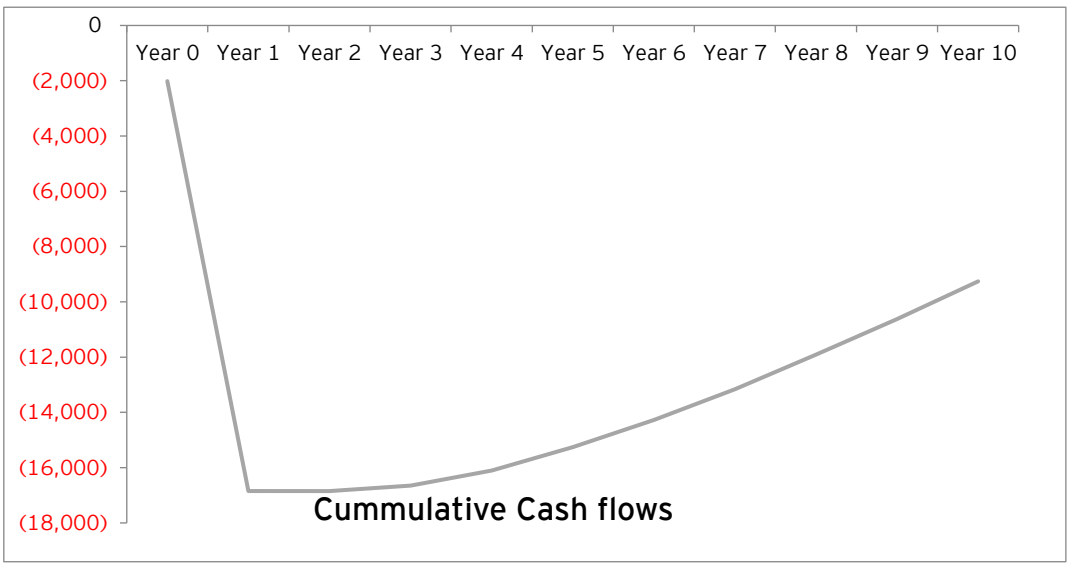
Table 51: Profitability with investment plant & machinery

Project IRR	11.0 %
Payback period	>11 years

The project is expected to generate positive net free cash flows starting 2nd year.

Figure 25: Net free Cash flows and Cumulative Cash flows





13.5 Sensitivity analysis

Sensitivity analysis of Project IRR has been carried out with respect to the key project parameters.

- Project cost
- Revenue from Production
- Revenue from Training
- Revenue from Consultancy

The project IRR is most sensitive to changes in training revenue, followed by changes in project cost, production revenue and consultancy revenue.

Production and training form majority of revenue for the TC followed by consultancy.

5 percent increase/decrease in production revenue increases / decreases the project IRR by about 0.34%.

5 percent increase/decrease in training revenue increases / decreases the project IRR by about 0.77%.

5 percent increase/decrease in project cost decreases/ increases the project IRR by about 0.59%

Consultancy being the lowest contributor to revenue has the lowest impact on project sensitivity. 5 percent increase/decrease in consultancy revenue increases / decreases the project IRR by about 0.09%.

Table 52: Sensitivity of IRR

		Construction period (15 Months)
Increase in Project cost	-5%	11.6%
	0%	11.0%
	5%	10.4%
	10%	9.8%

		Construction period (15 Months)
Increase in Consultancy revenue	-5%	10.9%
	0%	11.0%
	5%	11.1%
	10%	11.2%

Increase in Training revenue	-7.5%	9.6%
	-5%	10.1%
	0%	11.0%
	5%	11.9%
	10%	12.7%

Increase in Production revenue	-10%	10.3%
	-5%	10.6%
	0%	11.0%
	5%	11.3%
	10%	11.7%

Environment, Health and Safety

15. Environment, health and safety

Effective management of environmental, health, and safety (EHS) issues entails the inclusion of EHS considerations at various levels during project implementation. It is proposed that World Bank EHS guidelines will be followed to adhere to the desirable performance levels and measures while developing the TC.

15.1. Environment

15.1.1. Air emissions

The expected manufacturing processes in the proposed TC with air emissions would be sintering, metal cutting, grinding and / or forming (including forging, wire drawing, pressing, stamping, among others), quenching, annealing and other general treatments, abrasive treatments, solvent degreasing and emulsion, alkaline, and acid cleaning, welding, anodizing, chemical conversion coating, electroplating, painting and other metal finishing techniques (Including polishing, hot dip coating). To counter the problems, the following techniques will be used:

- **Volatile Organic Compounds (VOC)** emissions management strategies will be used which include:
  - Installation of refrigerator coils (or additional coils) above the degreaser vapour zone
  - Application of an air flow over the top of the degreaser that should not typically exceed 40 m / minute
  - Rotation of parts before removal from the vapour degreaser, including:
    - Installation of thermostatic heating controls on solvent reservoirs and tanks
    - Installation of in-line filters to prevent particulate build- up
    - Use of solvent recovery to reduce emissions of VOC from curing ovens
    - Use of activated carbons to recover solvent vapours
  - In order to reduce emissions during welding and coating, metal surfaces would be carefully cleaned
  - Coatings would be removed from the base metal before welding preferably using mechanical cleaning (for example blasting with CO2-pellets) instead of solvents.
- **Dust:** Dust emissions management strategies will be used which include:
  - Installation of in-line aspirators with filters or scrubbers. Electrostatic precipitators (ESP) will also be employed
  - Where possible, maintaining wetness on the metal surface in order to prevent or minimize dust production
- **Acid / Metals Content in Mists and Fumes:** Management strategies for acid / metal content in mist and fume emissions will be used which include:
  - Use of fume suppressants as additives to electroplating baths to reduce air emissions of

electroplated metals (e.g. chromium)

- Installation of in-line aspirators with filters to eliminate acid compounds
- For metals or metal oxides abatement, installation of filters capable of handling complex metals
- Welding fumes (a mixture of metals, oxides, and smoke from burning off oil) would be controlled by removing coatings from base metals

15.1.2. Wastewater and liquid wastes

Typical sources of wastewater discharged from product manufacturing process in the proposed TC would include water-based cleaning and rinsing streams, cooling water, alternative cleaners, wastewater generated from cutting, blasting, deburring and mass finishing activities and water-based metalworking fluid operations. To counter the problems, the following techniques will be used:

- **Oil-based Effluents**
  - Effluent separation from wastewater, and special disposal will be done if recycling is not possible
  - Standardization of use of oil types, and efficient scheduling of processes that require use of varying oil types
  - Extension of the life of cooling liquid through use of centrifuges, introduction of periodical analyses, use of biocides and ultrafiltration, and removal of oils by disk or belt skimmers.
  - Appropriate housekeeping techniques to prevent cutting oils from being contaminated with solvents will be used
  - Oil quench baths would be recycled by filtering out metals
  - Metal-working fluids would be recovered using collection (or drip) pans under functional machinery;
  - In cold forming or other processes where oil is used, automatic oilers would be used to reduce grease accumulation. A stamping lubricant suitable for conditions leading up to thermal treatment processes would be taken into consideration.
- **Solvent and Water-based Effluents**
  - Solvents would be carefully managed to prevent spills and fugitive emissions
  - Less hazardous degreasing agents (e.g. petroleum solvents, vegetable cleaning agents, VCA, supercritical CO2 or alkali washes) would be considered, in addition to the use of counter current solvent cleaning (two-stage: first cleaning with dirty solvent, followed by fresh solvent); Aqueous non-VOC-containing alkali washes would be used for metal cleaning whenever possible. Some of these can be regenerated by microfiltration
  - Spent-degreasing solvents would be recycled on site, reusing batch stills and waste solvents
  - Cold cleaning with recycled mineral spirits would be implemented before final vapour degreasing

- Acids in wastewaters would be recovered through evaporation;
- Rinse contamination would be reduced via drag-out by optimization of part operation, using surfactants and other wetting agents;
- Mechanical cleaning techniques would be used instead of chemicals where possible (e.g. a vibrating abrasion apparatus for brass rather than acid pickling; mechanical scraping instead of acid solution to remove oxides of titanium; and rotating brush machines with pumice to clean copper sheets);
- Concentrations of dissolved metal ions would be controlled and reduced (e.g. molybdenum concentration reduction through reverse osmosis / precipitation systems; use of non-chromate solutions for alkaline etch cleaning of wrought aluminum; use of sulfuric acid / hydrogen peroxide dip instead of cyanide and chromic acid dip for copper- bright dipping process)
- Acid or alkaline pickling solutions would be replaced, if possible, with alternative cleaning agents (e.g. use of caustic wire cleaner with biodegradable detergent and use of linear alcohols instead of sulfuric acid to pickle copper wire, provided that adequate safety and fire prevention is implemented)
- Flow restrictors / control meters would be installed and a foot pump (or photo sensor for automatic lines) would be used to activate rinse
- Process wastewaters would be treated and recycled, using ion exchange, reverse osmosis, electrolysis, and electro dialysis with ion exchange.

▶ **Surface Treatment / Finishing Wastewater:**

- Strong agents and toxic surfactants would be substituted by less hazardous alternatives;
- Anodizing and alkaline silking baths would be regenerated by recuperation of metallic (e.g. aluminum) salts through use of hydrolysis of sodium aluminate;
- Stocks of finishing material would be limited with short shelf lives;
- Painting jobs (light to dark) and the selection of spraying techniques would minimize wastewater production (e.g. use of a spray gun for particular applications, use of an electrostatic finishing system instead of conventional air spray);
- The use of chlorinated solvents would be avoided and substituted (including carbon tetrachloride, methylene chloride, 1,1,1- trichloroethane, and perchloroethylene) with non-toxic or less toxic solvents as cleaning agents;
- Chromic acid and trisodium phosphate would be substituted by less toxic and non-fuming cleaners (e.g. sulfuric acid and hydrogen peroxide), and cyanide cleaners would be substituted by ammonia;
- Less toxic bath components would be used (e.g. zinc in place of cadmium in alkaline / saline solutions; nitric or hydrochloric acids in place of cyanide in certain plating baths; zinc chloride in place of zinc cyanide);

- Drain boards, drip guards, drip bars, and dedicated drag out tanks would be installed, after process baths.

- **Metals in Wastewater:**
  - The management of water consumption is crucial, as it also reduces the usage of raw materials and their loss to the environment. Good process control and drag-out reduction are key factors to reduce the consumption of hazardous raw materials;
  - Wastewaters with recoverable metals would be separated from other wastewater streams. Metals would be recovered from solution (e.g. using electrolytic cells or hydroxide precipitation);
  - Used metal pickling baths would be sent to a continuous electrolysis process for regeneration and metal recovery;
  - Metals from bright dipping solutions would be recovered using suitable processes (e.g. ion exchange system for copper, or segregating phosphates from treatment of aluminum based alloys);
  - Solutions containing cyanide salts (e.g. for hardening processes) would be replaced with solutions using a fluidized bath of nitrogen and corundum;
  - Hexavalent chromium would be substituted for plating. If this is not possible closed loops and covered vats would serve to minimize emissions.
- **Process Wastewater Treatment:** Since general manufacturing operations, including metals, plastics and rubber products use a myriad of raw materials, chemicals and processes, wastewater treatment will require the use of unit operations specific to the manufacturing process in use. Techniques for treating industrial process wastewater in this sector include source segregation and pre-treatment of concentrated wastewater streams. Typical wastewater treatment steps include:
  - Greasing of traps, skimmers, dissolved air floatation or oil water separators for separation of oils and floatable solids
  - Filtration for separation of filterable solids
  - Flow and load equalization
  - Sedimentation for suspended solids reduction using clarifiers
  - Biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD)
  - Biological nutrient removal for reduction in nitrogen and phosphorus
  - Chlorination of effluent when disinfection is required
  - Dewatering and disposal of residuals in designated hazardous waste landfills.

15.1.3. Waste water management

Wastewater management would include water conservation, wastewater treatment, storm water management, and wastewater and water quality monitoring.

- **Industrial Wastewater:** Industrial wastewater generated from industrial operations includes process wastewater, wastewater from utility operations, runoff from process and materials staging areas, and miscellaneous activities including wastewater from laboratories, equipment maintenance shops, etc.

  Process Wastewater: Adequate treatment technology will be used to achieve the desired discharge quality and to maintain consistent compliance with regulatory requirements. The design and operation of the selected wastewater treatment technologies will be done to avoid uncontrolled air emissions of volatile chemicals from wastewaters. Residuals from industrial wastewater treatment operations will be disposed in compliance with local regulatory requirements or will be consistent with protection of public health and safety, and conservation and long term sustainability of water and land resources.
- **Wastewater from Utilities Operations:** Utility operations such as cooling towers and demineralization systems in the TC may result in high rates of water consumption, as well as the potential release of high temperature water containing high dissolved solids, residues of biocides, residues of other cooling system anti-fouling agents, etc. Water management strategies for utility operations will be used which include:
  - Adoption of water conservation opportunities for facility cooling systems
  - Use of heat recovery methods (also energy efficiency improvements) or other cooling methods to reduce the temperature of heated water prior to discharge to ensure the discharge water temperature does not result in an increase greater than 3°C of ambient temperature at the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity among other considerations;
  - Minimize use of antifouling and corrosion inhibiting chemicals to ensure appropriate depth of water intake and use of screens. Least hazardous alternatives would be used with regards to toxicity, biodegradability, bioavailability, and bioaccumulation potential. Dose applied would accord with local regulatory requirements and manufacturer recommendations;
  - Testing for residual biocides and other pollutants of concern would be conducted to determine the need for dose adjustments or treatment of cooling water prior to discharge.
- **Storm Water Management:** Storm water includes any surface runoff and flows resulting from precipitation, drainage or other sources. Typically, storm water runoff contains suspended sediments, metals, petroleum hydrocarbons, Polycyclic Aromatic Hydrocarbons (PAHs), coliform, etc. Rapid runoff, even of uncontaminated storm water, also degrades the quality of the receiving water by eroding streambeds and banks. In order to reduce the need for storm

water treatment, the following principles would be applied:

- Storm water would be separated from process and sanitary wastewater streams in order to reduce the volume of wastewater to be treated prior to discharge
- Surface runoff from process areas or potential sources of contamination would be prevented
- Where this approach is not practical, runoff from process and storage areas would be segregated from potentially less contaminated runoff
- Runoff from areas without potential sources of contamination would be minimized (e.g. by minimizing the area of impermeable surfaces) and the peak discharge rate would be reduced (e.g. by using vegetated swales and retention ponds)
- Where storm water treatment is deemed necessary to protect the quality of receiving water bodies, priority would be given to manage and treat the first flush of storm water runoff where the majority of potential contaminants tend to be present;
- When water quality criteria allows, storm water would be managed as a resource, either for groundwater recharge or for meeting water needs at the facility;
- Oil water separators and grease traps would be installed and maintained as appropriate at refueling facilities, workshops, parking areas, fuel storage and containment areas.
- Sludge from storm water catchments or collection and treatment systems will contain elevated levels of pollutants and would be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety , and conservation and long term sustainability of water and land resources.

► **Sanitary Wastewater:** Sanitary wastewater from industrial facilities includes effluents from domestic sewage, food service, and laundry facilities serving site employees. Miscellaneous wastewater from laboratories, medical infirmaries, and water softening etc. can also be discharged to the sanitary wastewater treatment system. Sanitary wastewater management strategies will be used which include:

- Segregation of wastewater streams to ensure compatibility with selected treatment option (e.g. septic system which can only accept domestic sewage)
- Segregation and pre-treatment of oil and grease containing effluents (e.g. use of a grease trap) prior to discharge into sewer systems
- If sewage from the industrial facility is to be discharged to surface water, treatment to meet national or local standards for sanitary wastewater discharges or, in their absence, the indicative guideline values applicable to sanitary wastewater would be met
- If sewage from the industrial facility is to be discharged to either a septic system, or where land is used as part of the treatment system, treatment to meet applicable national or local standards for sanitary wastewater discharges will be done.
- Sludge from sanitary wastewater treatment systems would be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety , and conservation and long term sustainability of water

and land resources.

15.1.4. Solid waste management

The TC will establish waste management priorities at the outset of activities based on the understanding of potential Environmental, Health, and Safety (EHS) risks and impact and considering waste generation and its consequences. The TC will do the following with respect to the same;

- Establish a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes.
- Avoid or minimize the generation of waste materials, as far as practicable
- Minimize, recover and reuse waste where waste generation cannot be avoided
- Treat, destroy and dispose waste in an environmentally sound manner where waste cannot be recovered or reused

The manufacturing and related operations (e.g. wastewater treatments or fume reduction) will generate solid waste at the TC. Its management measures will include:

- Separating metal dust or scrap by type to promote recovery and recycling
- Reducing and treating slags from welding, forging, machining, and mechanical finishing, which may contain metal ions
- Proper management of metals removed from wastewaters for recovery or disposal; disposal of sludge from surface finishing processes (e.g. galvanizing, painting, hot dip)
- If reuse or recycling is not possible, the waste would be disposed of according to industrial waste management recommendations in the General EHS Guidelines

15.2. Occupational health and safety

The TC is proposed to implement all reasonable precautions to protect the health and safety of employees and students as per the World Bank norms. Although the focus will be placed during the operation of TC, much of the occupational health and safety guidance will also be followed during the construction and decommissioning activities. Preventive and protective measures will be introduced according to the following order of priority:

- Eliminating the hazard by removing the activity from the work process e.g. substitution with less hazardous chemicals, using different manufacturing processes, etc.
- Controlling the hazard at its source through use of engineering controls e.g. local exhaust ventilation, isolation rooms, machine guarding, acoustic insulating, etc.
- Minimizing the hazard through design of safe work systems and administrative or institutional control measures e.g. job rotation, training safe work procedures, lock-out and tag-out, workplace monitoring, limiting exposure or work duration, etc.
- Providing appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE.

The application of prevention and control measures to occupational hazards will be done based on comprehensive job safety or job hazard analyses. The results of these analyses should be prioritized as part of an action plan based on the likelihood and severity of the consequence of exposure to the identified hazards. The general EHS guidelines: occupational health and safety will be followed with respect to the following;

- **General facility design and operation**
  - Integrity of workplace structures
  - Severe weather and facility shutdown
  - Workspace and exit
  - Fire precautions
  - Lavatories and showers
  - Potable water supply
  - Clean eating area
  - Lighting
  - Safe access
  - First aid
  - Air supply
  - Work environment temperature
- **Communication and training**
  - OHS Training
  - Visitor Orientation
  - New Task Employee and Contractor Training

- Labelling of Equipment
- Area Signage
- Communicate Hazard Codes

- **Physical Hazards**
  - Rotating and Moving Equipment
  - Noise
  - Vibration
  - Electrical
  - Eye Hazards
  - Welding / Hot Work
  - Industrial Vehicle Driving and Site Traffic
  - Working Environment Temperature
  - Ergonomics, Repetitive Motion, Manual Handling
  - Working at Heights
- **Chemical Hazards**
  - Air quality
  - Fire and explosions
  - Corrosive, oxidizing, and reactive chemicals
  - Asbestos Containing Materials (ACM)
- **Biological and radiological hazards:** Biological agents represent potential for illness or injury due to single acute exposure or chronic repetitive exposure. Radiation exposure can lead to potential discomfort, injury or serious illness to workers. Appropriate strategies as per the guideline will be taken for Prevention and control of such hazards.

- **Personal protective equipment (PPE)** to provide additional protection to workers exposed to workplace hazards in conjunction with other facility controls and safety systems.

15.2.1. Monitoring

Occupational health and safety monitoring programs would be undertaken to verify the effectiveness of prevention and control strategies. The selected indicators should be representative of the most significant occupational, health, and safety hazards, and the implementation of prevention and control strategies. The monitoring program would include;

- Safety inspection, testing and calibration
- Surveillance of the working environment
- Surveillance of workers health
- Training

15.2.2. Monitoring accidents and diseases monitoring

The TC will,

- Establish procedures and systems for reporting and recording
  - Occupational accidents and diseases
  - Dangerous occurrences and incidents
- Enable and encourage employees to report management all
  - Occupational injuries and near misses
  - Suspected cases of occupational disease
  - Dangerous occurrences and incidents
- Investigate of all reported incidences with the assistance of a person knowledgeable/ competent in occupational safety.

15.3. Addressing potential EHS issues

The key possible issues with respect to Environment, Health and Safety (EHS) for establishment of the new TC at Sriperumbudur during the construction phase, operation and maintenance phase and tool manufacturing are as follows;

15.3.1. Construction phase

The activities and anticipated EHS issues during the construction phase are highlighted in the following sections:

Table 53: Activities and anticipated EHS issues during construction phase

Activity	Associated impact	Recommendation for mitigation
Clearing of land (before initiating the construction work, clearing of the shrubs and bushes shall be carried out)	Soil erosion	▶ It would be ensured that the construction activity immediately follows the clearing of land to avoid soil erosion.
Excavation, drilling and levelling for the construction of foundation and base of building and roads	Air pollution	▶ Water sprinkling at regular intervals during excavation and drilling activities would be practiced to avoid generation of dust. ▶ The excavated soil would not be stored in the direction of the wind and covers to be provided for loose construction material. ▶ Activities like digging and filling will be avoided in conditions of very high wind. ▶ Construction machinery will be properly maintained to minimize exhaust emissions of CO. SPM and Hydrocarbons.
	Soil erosion/ Loss of Top soil	▶ Effort would be made to use the overburden within premises for landscaping. ▶ During levelling, gradation across the land (If any) would be reduced to the extent possible.
	Noise pollution	▶ Regular maintenance of plant equipment will be carried out.

Activity	Associated impact	Recommendation for mitigation
		▶ Noise prone activities will be undertaken during day time and shall be avoided, to the extent possible, during night time. ▶ Personal protective equipment will be provided for workers performing drilling at site.
	Occupational health hazards	▶ Provision of adequate personal protective equipment like safety helmets, face masks, safety shoes, safety goggles etc. for the safety of workers. ▶ The excavated area would be provided with a visible boundary (Usually created using a tape and sticks) to ensure safety at site. ▶ Training will be imparted to workers on occupational safety and technical aspects of job undertaken by them.
	Disposal of debris and other wastes	▶ The waste and debris would be disposed of at an identified place preferably wasteland and appropriate approval should be taken for the same from land owner or revenue authorities. ▶ The disposal site would be at least 1000 meters away from the areas including notified forest land, water bodies and productive lands.
Establishing labour camp (Provision of civic amenities for construction labour and movement of truck drivers for transporting construction material shall be provided at the site. The labour camps at the project site will be temporary in nature)	Health Risks	▶ Provision of separate mobile toilet facilities for men and women will be made. ▶ The domestic effluent will be properly disposed of in soak pits. ▶ Contractor will provide garbage bins to all workers' accommodation for dumping wastes regularly in a hygienic manner in the area. ▶ First aid box would be provided at every construction campsite and under the charge of a qualified person to provide first aid. Availability of such person should be ensured at all time. The first aid box would contain the following in case of less than 50 workers at the site; i) Twelve small sterilized dressings. ii) Six medium size sterilized dressings.

Activity	Associated impact	Recommendation for mitigation
		iii) Six large size sterilized dressings. iv) Six large size sterilized burn dressings. v) Six (1/2 oz.) packets sterilized cotton wool. vi) One (2 oz.) bottle containing a 2 per cent alcoholic solution of iodine. vii) One (2 oz.) bottle containing sal-volatile having the dose and mode of administration indicated on the label. viii) One roll of adhesive plaster. ix) One snake-bite lancet. x) One (1 oz) bottle of potassium permanganate crystals. xi) One pair of scissors. xii) One copy of the first-aid leaflet approved by the Chief Inspector of Factories.
	Chances of spread of sexually transmittable diseases like AIDS	▶ Awareness programmes will be conducted regularly for workers on AIDS, and other health related issues. ▶ Health check-up facilities for employees and contract workers.
	Water pollution	▶ Separate mobile toilet facilities will be made available for male and female workers. The domestic effluent will be properly disposed of in soak pits. ▶ Adequate drinking water facilities, sanitary facilities and drainage in the temporary sheds of the construction workers would be provided to avoid the surface water pollution.
	Land contamination	▶ Basic sanitary facilities will be provided for the workers staying at the labour camp and at the project site. ▶ Dustbins will be provided at the camp by the contractor.
Movement of vehicles (Vehicle movement shall	Air pollution	▶ All the vehicles entering the site will be asked to have updated PUC (Pollution under control) certificate. ▶ Vehicle speed will be restricted to 15km/hour at site.

Activity	Associated impact	Recommendation for mitigation
prevail at the site to transfer the material and workers at site. Apart from this, third party vehicles delivering the material and equipment shall also be there.)		▶ Trucks/dumpers will be covered by tarpaulin sheets during off site transportation of friable construction materials and spoil. ▶ Maintenance of vehicles will be carried out regularly. ▶ Sprinkling of water will be practiced at the site.
	Soil contamination	▶ Proper maintenance of vehicle will be carried out to avoid any leakage of oil or grease.
	Water contamination	▶ Proper maintenance of vehicle will be carried out to avoid any leakage of oil or grease.
	Safety risks	▶ Vehicle speed will be restricted to 15km/hour at site. ▶ Necessary safety trainings will be provided to the drivers of construction vehicles for speed restrictions and dos' and don'ts will be followed during movement of construction vehicles.
Use of D.G set (D.G sets shall be used at site to provide electricity to labour camps in the night time. Also, in case of non-availability of power from grid, D.G sets shall be used to provide electricity at the site for construction activity)	Air pollution	▶ D.G will be optimally used with proper orientation and adequate stack height. ▶ Stack monitoring will be carried out on regular basis. ▶ Proper maintenance of the DG will be carried out on regular basis.
	Noise pollution	▶ Acoustic enclosures will be provided with the D.G sets to minimize the noise levels.
Storage of diesel (Diesel shall be stored on-site so as to ensure availability for D.G sets)	Soil contamination	▶ A covered area will be defined for storage of HSD with concrete flooring
	Safety risks	▶ The diesel storage area will not be in proximity of the labour camps. ▶ Inflammable substance will not be allowed at the project site.

Activity	Associated impact	Recommendation for mitigation
Handling of waste (During construction phase there may be generation of both hazardous and non-hazardous waste which needs to be carefully handled to ensure environment safeguard)	Land contamination and Water contamination	▶ Waste will be stored at designated place after segregation on the basis of category (hazardous and non-hazardous). ▶ Hazardous waste will be disposed of to the authorized vendors only. ▶ A waste management plan will be chalked out to properly dispose the debris generated from the site.
	Safety risks	▶ Adequate PPE's will be identified and provided to the workers at site.
Installation and operation of concrete mix plants and batching plants (In case, these are installed on temporary basis at the project site)	Noise pollution	▶ Noise shielding will be used where practicable and fixed noise sources will be acoustically treated for example with silencers, acoustic louvers and enclosures. ▶ Provision of make shift noise barriers near high noise generating equipment will be made to minimize horizontal propagation of noise in case of residential area in the vicinity.
Construction labour management	Child labour and forced labour	▶ Provision of clause in contractor's agreement will be made that bans child labour and forced labour at project site. ▶ Adequate procedures to avoid or prevent hiring/entry of child labour at the project site will be undertaken; ▶ Random check will be undertaken at the site.
	Health and safety risks for children of workers	▶ Temporary crèche facility will be provided in case of migrant labourers children residing in the camps to ensure safety.
	Water wastage	▶ Emphasis will be given on optimization of water usage and supply of potable drinking water for labour camps.

Activity	Associated impact	Recommendation for mitigation
	Pressure on forest produce	▶ Fuel will be made available to construction workers so as to reduce pressure on forest produce or local fuel wood resources.

15.3.2. Operation and maintenance

There are a number of environment aspects and health and safety hazards which may arise during operations and due to negligence towards appropriate maintenance work in a TC. A snapshot of potential aspects and hazards are as follows:

Table 54: Potential hazards during O & M phase

Potential impact	Recommendation for mitigation
Deterioration of the structure over the period of time	▶ Maintenance and repair work would be carried out on regular basis to slow down/mitigate the deterioration of the structure. ▶ A structural stability certificate would be taken from a chartered engineer every 5 years. ▶ Any change in the layout of the equipment, bringing heavier machinery in place of a small one or putting more number of machinery in a particular place, would be approved by the chartered engineer to ensure that the modification in layout is not going to impact the stability of the structure.
Water contamination	▶ Cleaning of the terrace of the building would be practiced so as to ensure that the rain water collected through water harvesting is not contaminated. Alternatively, first rain harvest would be washed through the storm water drain in case of rain abundant area.
Fire risk	▶ Fire extinguishers will be checked for pressure on annual basis. ▶ Fire hydrant system would be checked once in six months to ensure it is operational. ▶ Electrical wiring in the premises would be regularly checked and repair should be undertaken wherever required.

15.3.3. Manufacturing

Table 55: Potential hazards during manufacturing phase

Activity	Associated impact	Recommendation for mitigation
Hand tool manufacturing		
Hammering during forging process	Noise pollution and hear loss over longer period of time	▶ Ear plugs/muffs would be provided to the employees and students working in the hammering process. ▶ Level of noise would be monitored on regular basis so as to ensure that the noise level is within specified limits. ▶ Hammering would not be carried out during night time. ▶ Regular audiometric test of employees would be carried out in order to understand if any person is susceptible to hearing loss and in case such situation is encountered the person would be shifted to other department and provided with medical facility.
	High vibrations	▶ Monitoring of the vibration will be conducted on regular basis.
Heat treatment	Air pollution	▶ Ventilation would be provided in work shop to avoid concentration of the fumes.
	Burn injury	▶ Employees would be provided with Apron while working in the workshop. ▶ Workplace safety training will be provided on regular basis. ▶ Eye wash and shower facility would be provided in the facility. ▶ Appropriate PPE including, gloves, safety shoes, goggles, etc. would be provided to employees and the students.
	Heat stress	▶ Heat stress monitoring of the employees will be conducted once a year to ensure safe and appropriate working conditions.
Non-maintenance of clean premises	Injury due to trips	▶ Cleaning schedule will be developed for the site. ▶ Proper demarcation of the storage area for waste material will be done according to the different type of waste material.

Activity	Associated impact	Recommendation for mitigation
Handling of waste (Hazardous and non-hazardous waste generated during day to day operations to be carefully handled to ensure environment safeguard)	Land contamination and Water contamination	▶ Waste will be stored at designated place after segregation on the basis of category (hazardous and non-hazardous). ▶ Hazardous waste will be disposed of to the authorized vendors only. ▶ A waste management plan will be chalked out to properly dispose the debris generated from the site.
	Safety risks	▶ Adequate PPE's will be identified and provided to the workers at site.
Use of D.G set (D.G sets shall be used at site to provide electricity in case of power failure)	Air pollution	▶ D.G set will be optimally used with proper orientation and adequate stack height. ▶ Stack monitoring to be carried out on regular basis. ▶ Proper maintenance of the D.G set to be carried out on regular basis.
	Noise pollution	▶ Acoustic enclosures will be provided with the D.G sets to minimize the noise levels.
Storage of diesel (Diesel shall be stored on-site so as to ensure availability for D.G sets)	Soil contamination	▶ A covered area will be defined for storage of HSD with concrete flooring.
	Safety risks	▶ Inflammable substance will not be allowed in the premises.
Specialised Tool manufacturing		
Designing of components	Depletion of natural resource (paper)	▶ Paper would be recycled for rough work.
Machining activities	Land contamination due to waste	▶ SOP would be formulated for handling and storage of waste oil and coolant.

Activity	Associated impact	Recommendation for mitigation
	oil and waste coolant	▶ A designated area would be identified to store these wastes under the shed. ▶ The hazardous waste will be disposed of to an authorised recycler and shall not be used internally for any purpose until prior permission is sought from SPCB.
	Water contamination due to waste oil and waste coolant	
	Noise pollution due to pressing and shearing activities	▶ Ear muffs / Ear plugs will be provided to officials working on these activities.
	Land contamination due to metal scrap	▶ The metal scrap would be collected appropriately and stored in a designated area before being disposed of/sold to a third party.
	Cut/injury due to metal scrap lying unmanaged	
Use of D.G sets	Noise pollution	▶ Acoustic enclosures would be provided to avoid noise pollution.
	Land contamination	▶ Diesel would be poured in D.G set using funnel. ▶ Concrete flooring would be made near the D.G set.
	Air pollution	▶ Chimney with appropriate height would be provided to minimize air pollution and compliance with the legislation.
Storage of hazardous waste like empty printer cartage, waste coolant, oil soaked cotton waste, etc.	Land and water contamination due to leakage and/or spill over	▶ The storage area of the hazardous waste will be cemented in order to avoid land contamination. ▶ Proper demarcation of storage area for hazardous waste will be done to avoid chances of spill over during handling. ▶ All the waste will be stored under a shed so as to avoid contamination and washing away of waste in nearby water stream or ground water in case of rain

Activity	Associated impact	Recommendation for mitigation
	Water contamination due to leakage and/or spill over	▶ All the waste will be stored under a shed so as to avoid contamination and washing away of waste in nearby water stream or ground water in case of rain.

The protection of public health, safety and general welfare will also be ensured through adherence to the building codes since these are related to the construction and occupancy of buildings and structures.

15.4. Provisioning of site services

The following section outlines the details of the essential measures to be designed as per regulatory requirements relating to maintenance such as;

- Fire alarm and firefighting system,
- Rain water harvesting,
- Water treatment and sewage treatment,
- Ventilation system.

15.4.1. Fire alarm and firefighting system

a) Fire alarm system

- Automatic Fire alarm system will be provided in all buildings of the campus excluding student hostels and emergency staff quarters.
- The system will have appropriate provisioning of smoke detectors and beam detectors with respect to the sensitivity and probability of fire.
- Fire alarm panels will be provided at appropriate locations with easy and convenient accessibility for manual activation of alarm in case failure of automatic system.
- A control panel will be provided at control station with a repeater panel in security cabin to activate, deactivate and reset the fire alarm system.
- The instrumentation, panels, sensors and equipment used will be of certified make confirming to relevant standards.
- Smoke detectors and beam detectors will be installed above and below false ceiling as applicable.

b) Firefighting system – overview

- Firefighting system comprising of sprinklers, yard hydrants and pumping station will be provided.
- Sprinklers system will be provided in the production area (above and below the false ceiling), training block, administrative building (all floors) and other buildings etc.
- Yard/ field hydrant system will be provided throughout campus with hydrant posts at appropriate locations having operating valve and hose reel provided in hose reel boxes as per standards.
- Staircases in all buildings will be provided with wet risers.
- The piping network will have suitable size/ diameter MS pipes welded at joints or connected with socket and threaded joints as per the regulations.
- All pipes will be painted in red colour as per the standards.
- The hydrant and sprinkler system will be connected to piping network and will be continuously charged with water at appropriate pressure as per applicable standards.
- All equipment and items used in firefighting system will conform to relevant codes of practice, standards, rules and regulations applicable.
- Fire water tank of minimum 2000 cum capacity/ one hour supply will be provided.
- The tank will be placed overhead/ above ground so that the pumps operate in negative suction and with required level of water even when they are off.

c) Pump room

- The pumping station will be located near the fire water tank to store adequate volume of water for firefighting as per rules and regulations set by local fire authority and guidelines by NBC.
- Both the sprinkler system and hydrant system will be fed with common electrically driven pump, backed with a diesel engine driven pump of adequate capacity to maintain required pressure in the pipe line.
- Electrically driven jockey pump of adequate capacity will be provided in the pumping station, which will be positioned and programmed in such a way that jokey pump starts first in case there is any loss of pressure in the fire pipe line.
- The pumps will be automatically operated and control panels with required switchgear, logic will be provided to control the pumps.
- Necessary arrangements for power supply will be done for the fire pumps.
- The power and control cables used for fire pumps will be fire rated and conforming to relevant applicable standards.

- The pumps will be placed on adequate foundations/ pedestals with adequate support to the piping.
- The pump room will be covered with canopy roof in steel structure and pre-coated sheets.
- All electrical fittings and accessories in pump room will be of weatherproof category IP55.

d) Sprinkler system

- The sprinkler pendants/ heads provided will be of appropriate category as per the hazard category and water required to extinguish fire. This will be governed by appropriate design standards and regulations of local fire authority.
- At least one test sprinkler will be provided in each area for periodic testing of the system.
- The density of sprinklers will be as per applicable regulations.

e) Hydrant system

- The hydrant system will comprise of ring main and other circuits around all buildings in the campus, thus making it possible to reach to any corner in case of fire.
- Hydrant system will have hydrant posts at appropriate locations.
- The hydrant post will have hose reel box with hose reel of appropriate length with nozzle as per applicable regulations.
- The hydrant posts and the hose reels will be easily accessible.
- Appropriate valves will be provided on the hydrant posts to operate the hydrant and connect hose reel whenever required.
- Sufficient valves will be provided in each loop of the hydrant system to enable maintenance of any portion of line without draining the firefighting system and releasing pressure in remaining portion.
- 4 way valves will be provided at appropriate places allowing connection with external fire tenders mounted on truck.
- Wet risers will be provided in every staircase of each building with suitable reel drum having rubber hose of adequate length fit with suitable nozzles.
- The hydrant network pipes will be placed above ground and only the crossings will be underground wherever required.

f) Fire water tank

- Water tank with adequate capacity will be provided to store water for firefighting purpose.
- Arrangement will be done in such a way that the water sourced will first be filled in the primary fire water tank and the excess overflow from this tank will be put in to domestic and other water tanks.
- The tank will be site assembled with FRP or other panels using appropriate technology and will be placed above ground.

15.4.2. Rain water harvesting

- The campus will be divided in to 4 or 5 areas and the storm water from the roof top of each building in each area will be collected in the specified area.
- The storm water outlets on building roofs will be checked for adequacy with respect to size considering maximum rainfall intensity in past 100 years.
- Additional outlets will be provided to the building roof, in case the existing outlets are found to be insufficient.
- The outlets will be provided with vertical down take pipes, which will be connected to the existing underground storm water lines through nearby chambers.
- Suitable locations for ground water recharge pit will be identified in each area as mentioned above.
- Considering geology, ground water tables, applicable rules and regulations and available space, ground water recharge pits with bore holes and pipes will be designed with adequate capacity.
- The ground water recharge pits will be connected to the storm water line through nearest chamber to fetch storm water (collected on roof) to the pit.
- Overflow will be provided to the ground water recharge pit at suitable level, to take off excess water back to the storm water network and discharge off.
- The ground water recharge pits will be protected with fence around to prevent ingress of people, animals etc.
- Suitable provision will be made to cut off and on the flow to the ground water recharge pits.

15.4.3. Water treatment plant

- Water treatment plant with 2 types of treatment will be provided on campus;
  - Water softening (1, 50,000 litres/Day).
  - Water purification with suitable RO and UV (25,000 Litres/Day).
- The water treated with softening plant will be used for general domestic purpose except for drinking.
- The drinking water will be treated using water purification plant with RO and UV technology.
- Adequate piping network conforming to applicable rules, regulations and standards will be provided for supply of drinking water at various locations within the facility.
- The softened water will be supplied through existing water supply network to various locations in the premises.
- The existing water supply network will be inspected for leakages, damages for appropriate repairing.
- The equipment provided for water treatment will be standard and approved/ certified by appropriate government bodies certifying such equipment.

- Arrangements for power connection including laying cables and necessary switch gears at both ends at main supply point and machine point will be provided.
- Adequate drainage will be provided for regeneration of both treatment plants, while connecting the same to primary and secondary effluent treatment.

15.4.4. Sewage treatment plant

- Sewage Treatment plant with integral effluent treatment will be provided for primary and secondary treatment with capacity of 60 cum/day.
- The primary treatment will be through the use of septic tanks of adequate capacity, located at various places near the toilet blocks on campus.
- The septic tanks will have adequate manholes for cleaning and maintenance purpose and will also have gas vents rising above the highest level of the buildings to avoid foul smell.
- Overflow outlets of the septic tanks will be connected to secondary treatment achieved through properly designed constructed wet land system with sub-surface flow.
- The constructed wetland will consist of locally available species of wetland trees, bushes and shrubs.
- Collection tank of adequate capacity will be provided on the upstream of the constructed wetland to take care of incidental heavy flows.
- The constructed wetland will be located suitably in the premises allowing adequate sunlight for growth of plants throughout the day.
- Provision will be made to allow rejection and regeneration discharge from water treatment plant by dissolving high TDS water suitably.
- Necessary de-odour and chemical dosing will be provided at the end of wetland before the water obtained is reused.
- All equipment used and the design, arrangement will be in compliance with applicable rules and regulations as laid down by town planning authority, central pollution control board and other local authorities.

15.4.5. Ventilation system

a) Internal buildings

- The TC premises will have provision for sufficient ventilation. This will be done keeping in view the amount of space in the TC, number of people expected to occupy the space, type and amount of machines/equipment, and overall size of the space. The designing will be done keeping in view proper distribution of air for ventilation throughout all occupied spaces across the TC.
- Natural ventilation - The premises will have adequate openings, such as doors, windows and/or vent opening to clean environment. Roof vents would be placed wherever applicable

to reduce the reliance on air conditioning systems and also reduce CO2 emission in the building.

- Mechanical ventilation – Mechanical parts would be installed to provide air to building occupants at a comfortable temperature and humidity that would be free of harmful concentrations of air pollutants.
- Provision for adequate supply of outdoor air in the indoor environment will be provided to dilute pollutants released by equipment, building materials, furnishings, products, and people. The building's ventilation system will be properly installed with filters to trap such particles.
- Air input, smoke exhaust will also be installed and maintained for proper ventilation.
- Hybrid ventilation systems are popular in industrial buildings which predominantly use natural ventilation along with mechanically driven fans to improve predictability of performance over a wider range of weather conditions. Provisioning of the same will be taken into account wherever applicable during designing the ventilation system.

b) Manufacturing/ Production area

- Precision machining and QC areas will be provided with central air conditioning.
- Air quality in production area will be checked for vital parameters such as concentration of CO2, CO and other relevant gases during operations.
- In case the parameters above are not acceptable as per relevant standards, adequate capacity fresh air system will be designed and provided for production area to improve quality of air.
- The fresh air supply system will consist of an external air handling unit of adequate capacity with suitable grade filters on inlet side.
- The outlet of the air handling unit will be connected with duct system supplying air inside the production area at various places.
- The fresh air will be discharged in the production area by providing suitable diffusers.

c) UPS room

- Appropriately designed ventilation system will be provided to the UPS room.
- The ventilation system will mainly comprise of air conditioning units providing cold air at lower temperature and exhaust system taking out hot air coming out of the UPS.
- The system will be designed to maintain adequate temperature around the UPS equipment as per manufacturer's requirements/ specifications.
- Humidity will be controlled to the desired level as directed by the UPS manufacturer by controlling inflow of fresh air.
- Proper ventilation will be provided to battery racks with adequate number of air changes as per applicable rules and regulations.

Key risks and mitigation

16. Key risks and mitigation

The key risks associated with implementation of the project along with possible mitigation measures are summarized in this section. It must be noted that risks universe is dynamic and is likely to change periodically. It is recommended that frequent analysis is carried out and mitigation plans are drawn. Below are risks that may impact this project;

Table 56: Risks & mitigation

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
Project Planning	Risk of inadequate planning of time, effort and resources required to complete the project	▶ Adequate time and cost buffer to be kept to deal with contingencies. ▶ Appointment of CMC for detail design and project management during construction of the TC	✓	✓	✓
Approvals and Clearances	Risk of delay in clearances from local authorities like ▶ Plan Sanction – Town Planning Authority/ Local Body ▶ Commencement Certificate – Town Planning Authority/ Local Body ▶ Fire NOC – Provisional and Occupancy – Local Fire Authority ▶ Plinth Checking Certificate – Town Planning Authority/ Local Body	▶ Appointment of PMC firm. ▶ Timely application of approvals for relevant authorities by CMC ▶ Monitoring of status of Approvals.		✓	

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	▶ Building Completion Certificate – Town Planning Authority/ Local Body ▶ Consent to Establish and Operate – Pollution Control Board ▶ MAP Approval and Factory License – Directorate of Industrial Health and Safety ▶ Labour License – Labour Commissioner ▶ Fuel Storage – Chief Controller of Explosives ▶ Tools, Tackles, Pressure Vessels, Hoists – Competent Engineer ▶ Electrical Systems – Electrical Inspector				
Environmental risk	Loss of top soil	▶ Top soil excavated from the site should be carefully handled. It should be collected separately and stored as a heap which is appropriately covered. The heap should not be put in the direction of wind to avoid dust generation ▶ Maximum effort should be made to utilize the top soil for landscaping within the site	✓		✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	Air pollution due to digging and levelling activities	▶ Water sprinkling shall be practiced ▶ Construction machinery shall be properly maintained to minimize exhaust emissions of CO, SPM and Hydrocarbons ▶ These activities shall be avoided in very high wind and cover should be provided for loose construction material	✓		✓
	Water contamination and health risks associated with setting labour camp for construction	▶ Toilet shall be earmarked for both men and women contractual workers ▶ Adequate drinking facilities shall be provided at the construction site; ▶ Temporary crèche facility may be provided in case of migrant labourers children residing in the camps to ensure safety	✓		✓
	Land and water contamination due to waste generated at site	▶ Waste shall be stored at designated place after segregation on the basis of category (hazardous and non-hazardous) ▶ Hazardous waste shall be disposed of to the authorized vendors only	✓		✓
	Air pollution due to use of D.G set.	▶ D.G set to be optimally used with proper orientation and adequate stack height ▶ Stack monitoring carried out on regular basis	✓		

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
		▶ Proper maintenance of the DG Set should be carried out on regular basis ▶ Acoustic enclosures are to be provided with the D.G sets to minimize the noise levels			
Construction	Delay in construction due to cost overrun, management of building contractors.	▶ Appoint a PMC for a design and build contract for managing construction. ▶ Strict timeline will be made and agreed with PMC. ▶ Regular M&E, Built in mechanism for penalty for delays and incentive for timely completion, ensuring timely payment based on milestones.	✓	✓	
Deviation in project scope	Change in project scope ▶ initiated by MoMSME, ▶ Machinery supplier constraints ▶ Product discontinuation	▶ Clear buy in on project plan and execution planning. ▶ Identification of Machinery suppliers based on the top current suppliers and technology available.	✓	✓	✓
Maintaining World Class Construction quality	Construction quality may not be up to the mark.	▶ Appointment of third party Government quality assurance agency.	✓		✓
On-boarding of Key players	Delay in on boarding of key project stakeholders • Technology Cluster Manager	▶ Clearly defined scope and incentives for stakeholders.		✓	✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	• Construction Management Consultant Quality Assurance	▶ Timely contracts with the project stakeholders.			
Procurement of machinery	Delay in procurement of machines and goods due to high Lead time and time taken for clearances	▶ Machines and equipment chosen should be standard and popular models available in market. Early release of order confirmation and advance if any. ▶ Appointment of efficient and pre-approved Clearing & Handling Agency (CHA) to ensure timely clearances and transportation of machines.		✓	
	Variation in Equipment required and finally procured. Too stringent specs may lead to high price and low competition, loose specs may lead to low price but low quality	▶ Neutral specifications to be drafted based on thorough research on TC requirements and current models available.	✓	✓	
Trained resource availability	Availability of trained manpower for operation of new machines	▶ Machine specific training programmes to be conducted for training of key personnel and knowledge sharing.			✓
Market	▶ Change in product mix ▶ Change in customer mix ▶ Change in technology ▶ Change in product pricing ▶ Competition from Govt./Public tool rooms	▶ Expansion of product base. ▶ Increase in customer base. ▶ Develop a backup plan for retiring of obsolete machines.	✓		✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	▶ Lack of cluster development in the target region				
Policy	Change in Government Policy/ Schemes for ▶ Training ▶ key sectors E.g. Change in Government space programme, increase in imports may affect orders from major clients	▶ Increase existing customer base. ▶ Diversify into new sectors.	✓		✓
Taxation	Change in service tax policy on training may adversely affect training revenue	▶ Institute should keep abreast with policy changes and the same should be considered while designing the course and fee structure.	✓		
Human resource	▶ Labour availability ▶ Retention of key employees (Flight of key talented people can make it difficult to achieve centre's growth plans)	▶ Planning for holidays and lean periods. ▶ Good incentive scheme and career development plans.	✓		✓
Management risk	Lack of capable management to run the TC	▶ Leadership training. ▶ Succession planning.			✓
Maintenance risk/ spares - Availability of spares & services	Delay in availability of spares and service support at a reasonable cost	▶ Procure models that are likely to continue for at least next 5 yrs. to ensure better availability of spares and services.	✓		

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
Performance of key stakeholders	Poor performance of Outsourced agencies like TCM and PMC	▶ Establishment of KPIs ▶ Periodic review of performance. Suitable penalty clauses to be added in the ToRs.			✓
Weather	Delay in construction due to monsoon season	▶ Planning for lean periods and periods of low construction activity.	✓	✓	

Conclusion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17. Conclusion

The proposed TC at Sriperumbudur will be a General Engineering TC with primary focus on Aerospace, Precision manufacturing and Automotive sector. The proposed TC will aim to support and strengthen MSMEs and help them improve competitiveness through production, testing facility, training support and advocacy. Tool manufacturing, Testing and consultancy streams would be the prominent activities to be undertaken by the TC. Besides providing training to students, the TC will also provide support to other training institutions. The TC will also have a documentation centre which consist of latest publication standards, engineering standards and other technical books.

TC shall also support MSME clusters in technology and engineering solutions and for improvement of their quality systems and productivity. The TC will make a concerted effort in reaching out to MSMEs for these works. For improvement in productivity, TC would initiate design clinics, training in lean manufacturing and project based consultancy. TC would further put greater emphasis to equip itself to provide consultancy services to MSMEs in the field of product design and development, tool design, manufacturing and innovations in process and productivity.

TC will contribute towards skilling youth to make them employable in industry by designing courses relevant to them. The focus areas for the proposed TC are in line with objectives of the program. This will be further be complemented by the proposed initiatives like:

- Visit to MSMEs during the primary research, it was observed that the tool and die industry in the automotive sector is on the upswing. Moreover the aerospace sector is identified as one of the thrust sectors in the state and investments are being made by the government, like development of dedicated aerospace parks. There is requirement for sophisticated machinery and state of the art technology to help them grow further and stay competitive in the global market catering to the industry demand. The proposed machine list has been suggested keeping in mind the above fact and requirements raised during the stakeholder discussion.

- The TC aims to introduce a testing lab which will be equipped with latest technology testing equipment in use by the industry. This facility will enable the MSMEs in the catchment area to perform testing and validation for the requisite jobs as per the requisite norms and standards. It will play a critical role especially in the aerospace and precision engineering jobs where parameters like quality, accuracy, precision composition of the material etc. is of utmost important. It will help the units remain competitive in the market by maintaining the Industry quality and standard norms and at the same time increase export prospects.

- Incubation Centre: The Incubation Centre is proposed at Sriperumbudur TC with the basic shell infrastructure and world class manufacturing plant and machinery on rental basis for a 2 year period (as part of Phase 2). This Incubation Centre is expected to fuel the growth of enterprises

which have successfully crossed the stage of pilot order and are ready to execute larger orders. The Incubation Centre would provide shell infrastructure, latest technologies, support business facilities, provide IT support, provide electricity and power connection, and assist with registration and clearances for setting up a manufacturing unit. In addition to this, the Incubation Centre would help entrepreneurs to connect with suppliers and skilled workers.

- TC shall work as a key skill development centre. It shall not only provide advanced training in manufacturing technology but also work as a key facilitator for existing ITIs and polytechnic institutions in the catchment area. It will provide curriculum development support, training for trainers, mentoring to new institutions, and testing and certification services to increase competitiveness of ITIs and Polytechnic institutions in line with the industry trend and requirement.

- The new TC will take steps to form consortium with MSMEs including other TCs to jointly cater to the focus sectors. Once formed, the TC would further formalise and institutionalise the consortium. The TC should provide handholding/ support and special machining & testing facility to members of this consortium and prepare a road map for the next 3-5 years to ensure that these MSME can develop the required expertise and become more competitive.

- The TC will form Productivity and Quality club for cluster of engineering industry and support them for a period of 12 months in which each cluster club of about 10 MSMEs will be assigned a mentor (Sr. Engineer Production/ Design/ Training and above). The mentor will make periodic visits to the MSMEs. He will plan and handhold in the execution of the plan at the MSMEs so as to have a visible improvement at the end of 12 months period. Membership can be for a nominal fee. Quality club and Productivity club may be formed separate and the KPI of mentors will be decided based on the results achieved by MSME units.

All these initiatives of the TC would not only strengthen the expertise of MSMEs in manufacturing but also help to develop a sustainable ecosystem for MSMEs in the region in the long run. On the same line, even investments have been proposed keeping the focus area and adherence to EHS guidelines in mind.

Above all, TCSP program will enable TC to showcase the best practices not only in the adoption of new technologies and skilling the youth but also managing all the associated environmental and social aspects.

Annexure

18. Annexure

18.1. Minute of stakeholder's meetings at Chennai

Date	25 April 2018	
Time	1500 - 1700 hrs	
Location	Conference Room – MSME Development Institute, Chennai	
	Name	**Designation/Organization**
Chaired By	Shri. Dharmendra Pratap Yadav, IAS	Secretary to Government of Tamil Nadu, MSME Department
MoMSME	S. Sivagnanam	Additional Industrial Adviser, MSME-DI Chennai
	V. Ramakrishnan	Dy. Director, MSME DI Chennai
	Kiran Dev Satuluri	Asst. Director, MSME DI Chennai
	K. Thiruppathi	Asst. Director, MSME DI Chennai
	K. Dayalan	Asst. Director, MSME DI Chennai
Others	R. Srinivasan	General Manager, Bharat Electronics Limited
	D. Gunalan	Deputy General Manager, Bharat Electronics Limited
	D.Sundar	Heavy Vehicles Factory, Avadi
	P. Satish Kumar	Heavy Vehicles Factory, Avadi
	Dr. M.K. Padmanabhan	ViriniaTech, Cengtre for Advanced Research and Education
	S. M. Kanakaraj	Honorary Treasurer, Aerospace Industrial Development Association of Tamil Nadu (AIDAT)
	N. Shekar	President, Aerospace Industrial Development Association of Tamil Nadu (AIDAT)
	Prasad M P	Renault-Nissan

	S. Sakthivel	DIC, Kancheepuram
	T. V. Hariharan	President, Chennai District Small Scale Industries Association (CDISSIA)
	K. Balasubramanian	General Secretary, Chennai District Small Scale Industries Association (CDISSIA)
	K. Sundavarjan	Hindustan Institute of Engineering Technology, (HIET), Chennai
	A.K. Sabapathy	Sasco Engg(I) Pvt. Ltd.
	V. Jayakumar	Laghu Udyog Bharati
	Joseph	Ambattur Industrial Estate Manufacturers' Association – AIEMA
	C. Raju	Ambattur Industrial Estate Manufacturers' Association – AIEMA
	Madhurmathi Kumar	General Manager, SIPCOT (State Industries Promotion Corporation of Tamil Nadu)
	P. Krishnan	Plant Head- Operations, Micro-Tech CNC Pvt Ltd.
	C. Sivakumar	Frontier
	J. Sridhar	Chief Executive Officer, Magal Tech
	G. Ravkumar Solomon	Hindustan University
	P. Vijayababu	Hindustan University
	P. Devarajan	Madras Radiator & Pressing Ltd.
	CH. Soma Sekhar	Madras Radiator & Pressing Ltd.
	K. Jagadarsan	Electronics Corporation of India Limited (ECIL)
	V.Umashankar	Small Industries Development Corporation Limited (SIDCO)

	M. Srinivasan	Small Industries Development Corporation Limited (SIDCO)
	N. K. Subramani	NSIC-Technical Service Centre
	R. Selvam	Thirumudivakkam Industrial Estate Manufacturer Association - TIEMA
	S. Vadivel	Thirumudivakkam Industrial Estate Manufacturer Association - TIEMA
	C. K. Mohan	President, Tamil Nadu Small and Tiny Industries Association - TANSTIA
	A Velladurai	CIPET Chennai
	V. Kumar	CIPET Chennai
	M. Komagan	Ashok Leyland
EY Personnel	Dinesh Pradhan	Sr. Advisor
	Dr. Milind Mujumdar	Team Leader
	Samrendra Singh	Senior Consultant
	Tashi Singh	Consultant
Agenda	**Stakeholder workshop in Chennai** ▶ Overview of MSME Sector in Chennai region ▶ Challenges faced by MSMEs ▶ Potential for a TC at Sriperumbudur ▶ Emerging business opportunities for Indian MSME ▶ Overview of ecosystem and the need of MSME players in the region ▶ Up-coming projects and investment related to general engineering in the region	
Key Points Discussed	Meeting was chaired by Shri. Dharmendra Pratap Yadav, Secretary MSME, Government of Tamil Nadu. Following inputs were given by the members participating in the stakeholder discussion:	

	▶ The focus of the TC should be on providing manufacturing support through design, prototyping and testing services using state of the art technology in the automobile, aerospace and electronics sector. ▶ PSU representatives from BEL, HVF and Engine Factory requested for courses in PCB manufacturing, assembling soldering and wiring technologies. However, the suggestion was not to repeat the machinery in Puducherry TC. The requirement for following facility/machines were raised by BEL: o EMI/EMC Chamber o Water Chiller o ESD Assembly workstation o Clean Room Facility o Vibrating machine with shock facility etc. ▶ HVF suggested for establishing testing facilities for extreme climatic conditions, up to -18°C ▶ HAL raised a requirement for testing facility, imported and indigenous machines, skilled manpower in mechatronics and maintenance ▶ OEM representatives from Ashok Leyland and Nissan Renault emphasised on the introducing skill development courses on Mechatronics, Robotics, Artificial Intelligence, Industry 4.0 and IOT to produce industry ready workforce. They also suggested that the TC should undertake design and prototyping jobs in the automobile and electronic sector and not only provide machining support but to be a complete solution provider. It was recommended that the TC promote the culture of open innovation and consultancy, for instance provide electrical vehicle design assistance. This will help the supplier and the customer be at the same pace. The importance of linking academia and industry was also highlighted ▶ Ashok Leyland also proposed to have a new product development facility to assist its vendors. Due to lack of such a facility, the tier 1 and tier 2 vendors give a delayed reply resulting in increased lead time and missed market opportunities for the OEM. ▶ Requests for an incubation centre was made which would provide assistance to start-ups by helping them in designing, prototyping and in technology transfer. ▶ The Aerospace Industry Development Association of Tamil Nadu recommended the following facilities to be a part of the proposed TC: o Tool Room

	○ Precision Manufacturing Facility ○ Composite Manufacturing Facility ○ Design and Development Centre ○ Rapid Prototyping/3D Printing ○ Test and Validation ○ Skill Development ▶ Industry Associations and Industry representatives from TANSTIA, AIEMA, TAIMA, CDISSIA, Laghu Udyog Bharati gave suggestions for the machinery and facilities to be established in the TC. Some of the key prominent suggestions are: ▶ Tool and die facility requirements ○ CNC Machines – 5 axis, Vertical Machining Centres, EDM Machines etc. ○ Surface grinders, ○ Plasma cutters ○ TIG Welding machine ○ Die spotting machine ○ 3D Printing (metal and plastic) ○ Plotters etc. ▶ Design Facility Requirement ○ Product Design Software like CATIA, NX ○ Mould Design Software CAD/CAM (NX with Mould Wizard, Solid Works ○ Mould Flow Analysis ○ Magma Simulation ○ Finite Element Analysis ○ 3D Scanning/laser scanning for Reverse Engineering etc. ▶ Testing Facility Requirement ○ NABL Certified lab ○ CMM machine (Carl Zeiss) ○ Gear testing ○ Chemical Testing ○ Mechanical Testing ○ Grinding burn detection ○ Laser Calibration Machine ○ Hardness, surface finish, eddy current tester ○ Corrosion resist testing ○ Radiography testing, Complete Spectro analyser

	○ Facility to check Lub/engine oil purity ○ Hot chamber test ○ Destructive and non-destructive testing equipment ○ Endurance, spring testing etc. ▶ Training and Skill development: ○ Diploma courses in Tool and Die manufacturing, Mould Design & Mould Flow ○ Maintenance and repair of latest CNC machines ○ Refresher courses, part time/ short term for ○ Opportunity for trainees to handle live projects ○ Tie up with Industries for Industrial Training to be a part of the curriculum ○ Industry Experts to be part of the academic committee, etc. ▶ The TC should constantly interact with the Industry by updating its syllabus, according to the industry requirement, Guest lectures by Industry experts, students to be given exposure to the industry environment through Industrial Visits ▶ Requests for laser welding, spot welding, 3D robot welding, sheet metal cutting were also made ▶ It was conveyed to have machinery for space and precision engineering application, introduce the concept of re- engineering testing facility – for material testing, precision measuring machine, metal printing tech etc. ▶ It was also suggested that the TC collaborates with other institutes like CIPET, NTTF, GTTC etc. and have live interaction for technology exchange. Also provide exposure through industry associations like TAGMA. Foreign tie-ups with countries leading in manufacturing technologies like Japan, Germany and South Korea were also recommended. ▶ Recommendation for large sized CNC machines were made for the MSMEs to take up larger machining jobs as per the Client requirement. The unavailability of such huge machines serve as a major bottleneck for the growth and expansion which result in lost opportunities due to high investment.

18.2. Major Machines, usage and utilization

S. No	Major Machines Proposed	Justification	Usage
1	5 Axis CNC Milling Double Colum Large	Large size jigs & fixtures for automotive industry and complex shapes of aerospace components like blades, vanes etc.	Available with few private Tool Rooms which do mid to large size tooling for automobile industry and are fully booked. (E.g. – JBM Auto, Nagata, etc.)
2	3 Axis CNC Milling double Column Large	Mould bases, die sets and large size core and cavity, punch and die machining The tooling activity is primarily for auto sector	Available with few private Tool Rooms which do mid to large size tooling for automobile industry and are fully booked. (E.g. – JBM Auto, Nagata, etc.)
3	CNC VMC 3 Axis – Mid Size	Same as above for mid- sized tools	Available with IGTR Aurangabad, IDTR Jamshedpur and are in good demand from the auto ancillary units
4	CNC VMC 3 Axis – Small Size with High RPM	Intricate core and cavity for tooling and aerospace component manufacturing	Most of the international Tool Rooms are using higher speed machines, and that is why they are able to improve the delivery time, accuracy and surface finish
5	CNC HMC – Large Size	Deep holes in moulds, die block and engine block machining. This also can be used as Common Facility for machining of larger parts	This machine is available at IDTR Jamshedpur with high utilisation in the auto industry
6	Machining Centre for Composite Material machining	Aerospace components of composite material machining	New technology; This will be procured after the TC starts functioning and after ascertaining the quantitative demand; however it is felt there is a good demand from the aircraft and aerospace industry
7	Additive manufacturing-Metal LASER	Required for aerospace industry where lot size of components is small	IGTR Aurangabad and CTTC Bhubaneswar has this machine and are attracting customers

		but profile is complex Also, used in medical implants like dental etc.	
8	EMI/EMC ESS Chamber	Will be used for testing of large electronic equipment and components	IDEMI Mumbai has this facility and has high demand
9	Metro-tomography (NDT & Dimensional Metrology)	New technique which combines metrology and non-destructive inspection of metallic as well as non-metallic components; Possible users are automotive, aerospace and ESDM sectors	Internationally it is being used and it will be a unique facility in Southern India.

18.3. Social Screening Certificate

ANNEX 3B – ESTABLISHMENT OF NEW TECHNOLOGY CENTRE IN CLEARLY DEMARCATED, PROTECTED AND FUNCTIONING INDUSTRIAL AREA – SOCIAL SCREENING CERTIFIATE

Location and Address of the Technology Centre

NAME OF THE TECHNOLOGY CENTRE	NAME OF THE CLUSTER
Street Address: New Technology Centre at Sriperumbuthur, Chennai Site No. G-105/1, SIPCOT Industrial park, Vallam-Vadagal, Kanchipuram District	Phone: Fax:
Email ID:	Website:

Person-in-charge of Technology Centre

NAME OF PERSON-IN-CHARGE V. RAMAKRISHNAN	DESIGNATION Deputy Director
CONTACT DETAILS Phone:044-22501011 / 12 / 13 Fax: 044 - 22501014 Mobile: 9865005403	Email ID: dcdc-chennai@dcmsme.gov.in ramakrishnan.v@gov.in

Name, Location, Address and Details of Industrial Area

NAME OF INDUSTRIAL AREA SIPCOT Industrial Park, Vallam-Vadagal	YEAR OF ESTABLISHMENT
TOTAL AREA OF LAND (IN ACRES): 10 Acres	TYPES OF INDUSTRIES (Tick Appropriate Ones) Manufacturing

List of Industrial Units Surrounding the Allotted Plot

Sl No	NAME OF INDUSTRIAL UNITS	TYPE OF INDUSTRY
1.	Royal Enfield	2 wheelers manufacturing
2.	AMITA	Net machines

Details of Plot of Land Allotted:

PLOT/SERIAL NO.	AREA OF LAND (IN ACRES)	DATE OF ALLOTMENT	DATE OF POSSESSION
105/1	10 Acres	19.03.2018	02.11.2018
NAME OF ALLOTTING OFFICIAL	**NAME OF ALLOTTING ORGANIZATION**	**ALLOTMENT LETTER NUMBER**	**DATE OF LETTER**
Chairman and Managing Director	SIPCOT	D-I/SIP/V-V /MSME/2018	19.03.2018

CERTIFICATION

This is to certify that the proposed Technology Centre will be located on a plot of land allotted by a Competent Authority of the State Government and that the plot of land is located within clearly demarcated, protected and functioning Industrial Area and that the allotted land is free from any claims, use and encumbrances.

This is also to certify that copies of the following original documents are attached with this Social Screening Certificate.

1. Site Plan of the Industrial Area with clearly marked allotted plot;
2. Letter of Allotment of Land;
3. Certificate of Handing Over of Land;
4. Certificate of Non-Incumbency

SIGNATURE OF COMPETENT AUTHORITY

Name: K.R.K. PRASAD Designation: DIRECTOR

Date: 08/02/2019 Place: CHENNAI

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