Draft Detailed Project Report

New Technology Centre at Visakhapatnam (General Engineering)

Technology Centre Systems Program

December 2015

Submitted

To

The Office of Development Commissioner - MSME
Ministry of MSME, Govt. of India
Maulana Azad Road, New Delhi -110001

EY
Building a better working world

31 December 2015

Director (Tool Room)
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 Visakhapatnam, Andhra Pradesh 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 the 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 Visakhapatnam as part of consulting services to establish a Programme 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

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We would 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 **APIIC and MSME-DI (Hyderabad and Visakhapatanam)** for their support during the on site visit for the proposed Technology Centre at Visakhapatnam.

Also, we must extend our sincere thanks to all the stakeholders like **OEMs, Tier I & II suppliers, industry associations, Government Institutes and 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 insights would not have been possible.

Abbreviations

AICTE	All India Council For Technical Education
CAD	Computer-aided design
CAE	Computer-aided engineering
CAGR	Compound annual growth rate
CAM	Computer-aided manufacturing
CBIC	Chennai-Bangalore Industrial oridor
CDGI	Centre for Development of Glass Industries
CETP	Common effluent treatment plant
CFC	Common facility centre
CFTI	Central Footwear Training Institute
CIHT	Central Institute of Hand Tools
CITD	Central Institute of Tool Design
CLSUS	Chhattisgarh Laghu & Shayak Udyog Sangh
CMC	Construction management consultant
CNC	Computerized numerical control
CNM	Cluster network manager
CSIDC	Chhattisgarh State Industrial Development Corporation Limited
CSIR	Council of Scientific and Industrial Research
CST	Central sales tax
CTR	Commercial tool rooms
CTTC	Central Tool Room & Training Centre
DC	Development Commissioner
DIC	District Industrial Centre
EDM	Electrical discharge machining
ESDM	Electronics system design and manufacturing
ESTC	Electronics Service & Training Centre
EY	Ernst and Young LLP
FFDC	Fragrance & Flavour Development Centre
FRP	Fibre reinforced plastic
FSSP	Full social screening process
FTA	Free trade agreement
GDP	Gross domestic product
GESIP	Gender, equity and social inclusion plan
GIA	Gurgaon Industrial Association
GIZ	Gesellschaft für Internationale Zusammenarbeit

GoI	Government of India
HDI	Human development index
HSC	Higher secondary certificate
IDEMI	Institute for Design of Electrical Measuring Instruments
IDTR	Indo Danish Tool Room
IGTR	Indo German Tool Room
IISc	Indian Institute of Science
IP	Internet protocol
IPSSP	Indigenous people's social screening process
ITI	Industrial training institute
ITSP	IT Service Provider
KPI	Key performance indicator
KVIB	Khadi and Village India Board
KVIC	Khadi and Village Industries Commission
LLP	Limited liability partnership
MIG	Metal inert gas
MoMSME	Ministry of Micro, Small & Medium Enterprises
MOU	Memorandum of understanding
MSME	Micro, Small & Medium Enterprises
NCVT	National Council for Vocational Training
NPSP	National portal service provider
NSSP	No social screening process
O/o of DC-MSME	Office of Development Commissioner - Micro, Small & Medium Enterprise
OEM	Original equipment manufacturer
OP	Operational Policy
PDO	Program's development objective
PMU	Program management unit
PPDC	Process and Product Development Centre
PTA	Preferential trade agreement
PVC	Polyvinyl chloride
RFD	Result framework document
RPT	Rapid prototyping
SAIL	Steel Authority of India limited
SDC	Skill Development Centre
SFC	State Financial Corporation
SSC	Senior secondary certificate
STP	Sewage treatment plants

TAGMA	Tool & Gauge Manufacturers Association of India
TCs	Technology centres
TCSP	Technology Centres Systems Programme
TDC	Technology Development Centres
TIG	Tungsten inert gas
TP	Technology partner
TR	Tool room
TRTC	Tool room & training centre
UNIDO	United Nations Industrial Development Organization
UPS	Uninterruptible power supplies
VAT	Value added tax
VLSI	Very-large-scale integration
VMC	Vertical Machining Centre
VCIC	Visakhapatnam-Chennai Industrial Corridor

Revision History

Version	Issue date	Amendment description	Prepared by	Reviewed by
1.0	30th October 2015	Review of Market assessment section	Ayesha Ghoshal	Dr. Milind Mujumdar
2.0	4th December 2015	Review of DPR	Ayesha Ghoshal	Dr. Milind Mujumdar
2.1	17th December 2015	Changes made as per review	Ayesha Ghoshal	Dr. Milind Mujumdar

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Executive summary

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

Key Components

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

Opportunity and need assessment

Key clusters in Andhra Pradesh

- Metallurgy & Electronics clusters in Visakhapatnam
- Agro clusters in East Godavari and Srikakulam
- Chemicals clusters in Krishna, East Godavari

Potential Market opportunity in Visakhapatnam

- **Shipbuilding** – Presence of Hindustan Ship Yard
- **Automation** – Focus on developing semi-automatic and fully-automatic processes
- **Testing & Calibration services** – Provide services from MSMEs to carry out quality tests on final products

Stakeholder discussions

Key Stakeholders

- O/o DC-MSME
- Government of Andhra Pradesh
- MSME-DI (Visakhapatnam, Hyderabad)
- OEMs, Tier I & II suppliers,
- Industrial Association
- Government Institutes
- MSMEs

Key Training Requirement

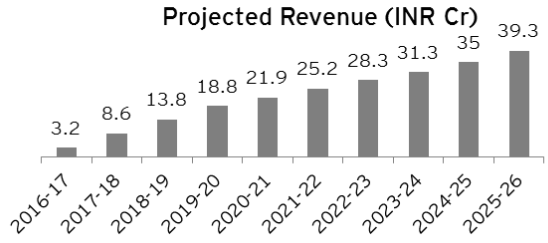
- Multi-skilled workforce
- Skills in basic & advanced welding tech.
- Non-destructive insp.
- Pipe-line design

Key Technology Requirement

- Reverse engineering
- Advanced welding technique
- Precision measurement tech
- QA & QC of welded structures

Financials

- Total Capital Expenditure: INR 108.1 Cr
- Training Machines: INR 29.7 Cr
- Production Machines: INR 24 Cr
- Civil & other Infra.: INR 54.5 Cr



Location Overview

- In the vicinity of 2 National Highways (NH43, NH5)
- Close proximity to industrial corridors (VCIC, CBIC, HWIC)
- Railways connectivity
- Connectivity with other districts in Andhra Pradesh and neighborhood states
- Visakhapatnam International Airport at Visakhapatnam

Heavy Fabrication Sector in Visakhapatnam

- 2nd largest shipping Port in India
- 7,700 out of 17,000+ MSMEs cater to fabrication and maintenance sector
- Ship building & heavy equipment account for 10% of state manufacturing activity

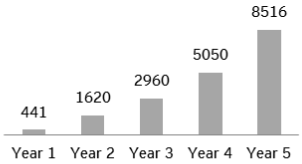
Focus area of the Technology Centre

1 Training

Over 36% of total revenue

Key Training Area

- Advanced welding
- QA/QC of welded structures
- Maintenance
- CNC Mfg.
- Tool Room courses



2 Production

- Advanced welding techniques
- Welding automaton
- Reverse engineering Infrastructure
- Mold & Tool making

3 Consultancy

Over 24% of total revenue

- Design Support
- Productivity improvement
- Support to training colleges

4 Other areas

- Productivity and Quality Clubs
- Entrepreneur development cell
- TP and CNM support

IRR: 12.1%
Positive income after depreciation is projected to be registered in 8th year

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 2012 was USD 1.8 Trillion ranking 10th amongst all countries[1]. The objective of the Government of India's, 12th Five-Year Plan (2012-13 to 2016–17) is to return to GDP growth rates in excess of 8 percent, with strong emphasis on the manufacturing sector. 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 will have to play an important role to take Indian economy to a high growth rate trajectory and achieve the planned objectives. Micro Small and Medium Enterprises 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. 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 also present in India e.g. automotive sector.

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

- access to finance (especially for MSMEs)
- access to technology and skilled manpower
- access to markets (domestic & export)
- infrastructure deficiencies

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, Die Casting, as well as testing and prototyping, serves as an interface between product 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 –

[1] http://unstats.un.org/unsd/snaama/dnltransfer.asp?fID=2
[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, Planning Commission

including in India) dominated by MSMEs (more than 80% of firms in India, Europe, US and Japan). Like other countries, the private tooling industry in India has grown hand in hand with the manufacturing industry. The turnover of the Indian tooling industry is approximately INR 13,000 crores, with more than a thousand firms employing over 120,000 workers (TAGMA 2011). 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 increased international competition.

1.1.1 Demographic overview and challenges

While India stands to benefit from an immense demographic dividend, with the largest youth population in the world (around 66 percent of the total population is under the age of 35), it has an overall employment rate of 4.7 percent (under usual principal status approach) and an overall labour force participation rate of 50.9 percent[4]. 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 have received skills training, either through formal or informal means[5]. About 13 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 providing decent employment opportunities to the growing young population, on the other. According to the National Skill Development Policy published in March 2009, India has set a target of skilling 500 million people by 2022[6]. This program will play a bigger role in the country's plan by setting a target of skilling 150 lakh people within the next 6 years.

Global experience shows that a workforce with higher schooling 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

[4] Report on the Third-Annual employment & unemployment survey (2012 – 2013) of the Ministry of Labor, Government of India.
[5] 11th and 12th Five Year Plan
[6] http://labour.nic.in/upload/uploadfiles/files/Policies/NationalSkillDevelopmentPolicyMar09.pdf

earned 14 percent more than did one-year course students[7]. 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[8].

1.1.2 Country's manufacturing objectives

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 has 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:

- Increase manufacturing sector growth 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.

[7] Vocational Training in the Private Sector (Goyal 2011)
[8] The Knowledge Economy and Education and Training in South Asia (World Bank 2007)

1.1.3 Recommendations of XII 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 trainings 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, as well as opportunities for technical skill development to the youth at varying levels.

Considering the performance of existing TCs, the Department related Parliamentary Standing Committee on Industry, in its 235th report submitted to Rajya Sabha on 4 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 money 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.

During the budget speech of 2013-14, following announcement was made;

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. 2,200 crore during the 12th Five Year Plan period to set up 15 additional Centres".

In pursuance of (i) the announcement made in the Budget (2013-14), (ii) the recommendations of the Department Related Parliamentary Standing Committee on Industry in its 235th Report submitted to Parliament (Rajya Sabha) on 4 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 INR2,200 crore 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.

1.1.4 Technology Centres Systems Program

The Technology Centres Systems Program, a national program, seeks to enhance the technological and skill base of MSMEs in selected manufacturing industries, via upgraded and new TCs (currently called TRs and TDCs). The TCs will have as their mission 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 will 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.).

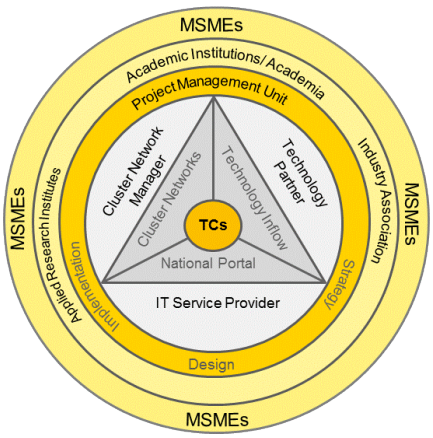
TCSP's Program Development Objective has been defined to enhance the competitiveness of MSMEs by improving their access to technology and business advisory services as well as skilled workers through systems of financially sustainable TCs. The program seeks to establish 15 new TCs and upgrade capabilities of select existing TCs and develop linkages between MSMEs, Indian and international research institutes and leading manufacturers. This would include upgradation in technology, land and building infrastructure and other associated infrastructure of the TC. The program will connect leading practices contributing to advance technology, knowledge, skilling and innovation which 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 offtake of these paid services of the TCs by MSMEs. Therefore, the key indicators that will be measured are;

- Number of enterprises paid for services rendered including placement services
- Number of long term trainees employed by industry, including MSMEs, within six months after being trained at TCs
- TCs' gross profit before depreciation (not including land)
- Access to Technology
  - Revenue of TCs from access to technology activities (production support and consultancy)
  - Capacity utilization of TCs machines
  - Number of technology strategies/roadmaps developed by TPs and endorsed by Industry Associations and IC
- Access to Skilled Workers
  - Number of trainees trained (direct program beneficiary)
    - external trainers trained
    - with newly developed contents
    - female
    - from low income states
    - from disadvantaged section of society (SC/ST)
  - Number of skills development contents (e.g. curricula, standards, certification schemes) developed and adopted by industry associations, and/or certifying agencies
- Access to Business Advisory
  - Number of needs assessment and related business plans developed by CNMs and endorsed by Industry Associations
  - Value of TCs' businesses generated with support of Cluster Network Managers

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 Technology Partner and Cluster Network Manager. Examples of such indicators include capacity utilization of machines, number of trainees trained, access to services by MSMEs, number of technology strategies / roadmaps developed by TPs and endorsed by industry associations and value of TCs' businesses generated with support of CNMs.

Figure 1: TCSP eco-system



This program will create an ecosystem to help MSMEs 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 the linkages with larger firms (e.g. as part of the supplier network of an OEM), which will provide 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 for better employment opportunities. The program will therefore benefit the Indian MSMEs, students and workers and help establish systems of TCs in the country wherein each centre will gain from the specialisation and experience of the others and improve the competiveness of MSMEs.

1.1.5 Key TCSP stakeholders

TCSP has multiple stakeholders who will need to work together to achieve the objective of enhancing 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:

- **MSME Units - Beneficiaries**

MSME units will be the prime beneficiaries of the program and the overall objective of the program centres around providing them with access to modern technology, access to business advisory services and access to skilled workforce.

- **Skill seekers**

Workers, job and skill seekers will also gain from this program with access to short term and long term training/skill development courses that will help job seekers to improve 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. O/O DCMSME has the mandate to support MSMEs and TCSP will serve this towards this purpose.

- **Technology Centres**

The TCs will serve MSMEs with 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 to upgrade selected existing TCs and development of 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.).

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

Strategic collaborations between TCs and various other organizations will be critical to foster research and development, business 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)**

Role of PMU is to assist the O/o DC MSME in designing and implementing this program. This includes developing framework for identifying sites/sectors for the new TCs, developing detailed project report, support in procurement of services and EPC contracts; developing and implementing environment and social safeguards, monitoring and evaluation, manage the roll out of the national portal, deployment of subject matter expertise and overall program management for TCSP over 6 years. EY LLP has been selected as the PMU for the TCSP by the O/o DC MSME via competitive bidding as per World Bank guidelines.

- **Technology Partner (TP)**

Role of TP is to 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.

- **Cluster Network Manager (CNM)**

CNMs for each System (or sub System) of TCs will specialize on specific geographic cluster(s)/ industry(s). The CNM will build capacity of the TC 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.

The CNM would seek to increase competitiveness of supply chains of large firms by enhancing quality, reliability and productivity of MSME suppliers by offering services of the TC, thus also helping in meeting revenue targets of the TC. The CNM 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. The CNM will also facilitate closer cooperation between the TC and MSMEs with key innovation stakeholders such as applied research institutes, autonomous institutions such as IISc, CSIR, academia, skill seekers, and students etc. to enhance product and process innovation. TC's capacity will be further enhanced through 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.

- **National Portal Service Provider (NPSP)**

Role of NPSP is to design, develop, set-up, operate and maintain the IT platform for MSMEs. The IT platform will act as a common platform for services that will be required by an MSME from the start of their business, to successful operations and closure e.g. access to regulatory services for entrepreneurs, assistance for financing, access to list of suppliers etc. The platform intends to extend the reach of the program to its remote beneficiaries well beyond the TCs' physical location through access to e-learning solutions, B2B service and product market place, e-recruitment, assistance for financial services and e-governance services (forum to address grievances, automation of customer facing operations of the O/o DC MSME) on paid basis.

- **Construction Management Consultant**

The Construction Management Consultant (CMC) shall be responsible for design, supervision of work and final closure of construction works for the TC. 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.

1.1.6 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. TPs, CNMs and ITP service provider).

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 others
  - Business given to private tool rooms
  - Production/training/consultancy with the help of CNM (territory/sectors to be identified Jointly by CNM and TCs 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 (CNM to assist the identification of courses and TP to design)
- 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 start 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 paid for services rendered including placement services
		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	TCs revenue from access to technology activities (production support and consultancy)
		Capacity utilization of machines in TCs
		No. of technology strategies/roadmaps developed by TPs 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 CNMs and endorsed by Industry Assocs.
		Value of TCs' businesses generated with support of Cluster Network Managers
		Number of users of IT Platform
Component 2-Investments to upgrade existing and develop new TCs		Number of new TCs built
Component 3-Technical assistance to MoMSME		Establishment of PMU for program implementation and capacity building of MoMSME

The program aims to have direct and indirect industrial and economic outcomes to the country, such as enhanced manufacturing competitiveness, improvement in the overall employment rate and increased GDP growth.

1.2 Overview of existing MSME TCs

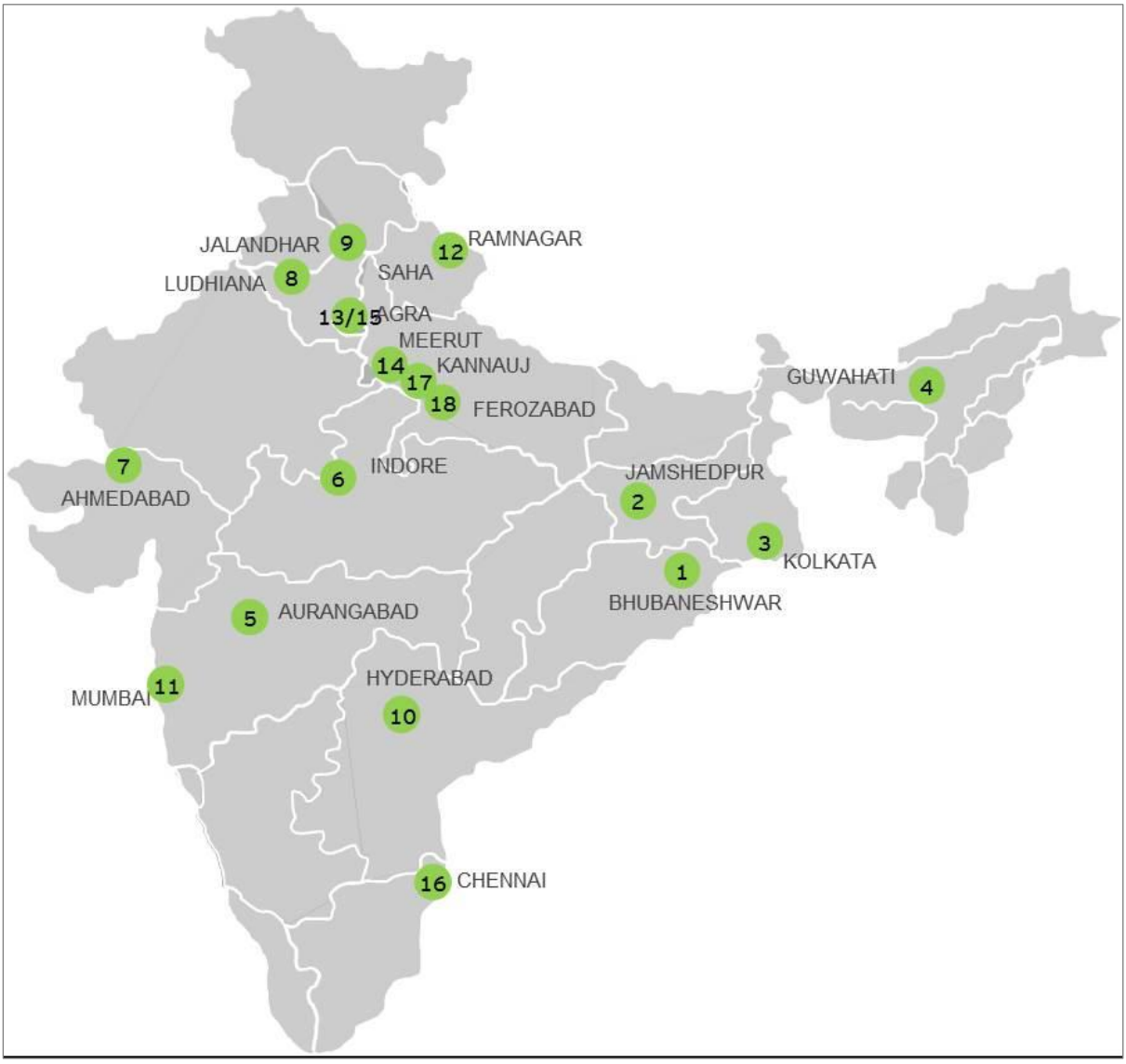
Out of the currently operational 18 Technology Centres (TCs) & Tool Rooms (TRs), 10 are for the tooling industry and 8 are for other industries such as ESDM (electronics system design and manufacturing), glass, footwear, and fragrance and flavour and sports. Half of these eighteen TCs are located in low income states (Uttar Pradesh, Madhya Pradesh, Odisha, Jharkhand and Assam). The TCs are self-sufficient institutions that provide design support, training, manufacturing, testing & calibration and consulting services to MSMEs and other enterprises. They have created a niche in the market in various fields such as hand tools, plastics, automotive, testing & calibration etc. The list of the existing TCs & TRs along with their specializations is given below:

Table 2: Existing TCs & TRs with focus sectors

SN	Name	Focus Sector
1	Central Tool Room & Training Centre (CTTC), Bhubaneswar (Odisha)	General engineering (Precision components)
2	Indo Danish Tool Room (IDTR), Jamshedpur (Jharkhand)	General engineering (Auto components)
3	Central Tool Room & Training Centre (CTTC), Kolkata (West Bengal)	General engineering
4	Tool Room & Training Centre (TRTC), Guwahati (Assam)	General engineering (Training in tool making)
5	Indo German Tool Room (IGTR), Aurangabad (Maharashtra)	General engineering (Auto components)
6	Indo German Tool Room (IGTR), Indore (Madhya Pradesh)	General engineering (Auto & Pharma)
7	Indo German Tool Room (IGTR), Ahmedabad (Gujarat)	General engineering (Auto & Plastic tools)
8	Central Tool Room (CTR), Ludhiana (Punjab)	General engineering
9	Central Institute of Hand Tools (CIHT), Jalandhar (Punjab)	General engineering (Hand tools)
10	Central Institute of Tool Design (CITD), Hyderabad, (Andhra Pradesh)	General engineering & ESDM
11	Institute for Design of Electrical Measuring Instruments (IDEMI), Mumbai, (Maharashtra)	ESDM and tool making
12	Electronics Service & Training Centre (ESTC), Ramnagar (Uttarakhand)	ESDM
13	Process and Product Development Centre (PPDC), Agra (Uttar Pradesh)	Foundry and forging

SN	Name	Focus Sector
14	Process cum Product Development Centre (PPDC), Meerut (Uttar Pradesh)	Sports goods
15	Central Footwear Training Institute (CFTI), Agra (Uttar Pradesh)	Leather & footwear
16	Central Footwear Training Institute (CFTI), Chennai (Tamil Nadu)	Leather & footwear
17	Fragrance and Flavour Development Centre (FFDC), Kannauj (Uttar Pradesh)	Fragrance & flavours
18	Centre for Development of Glass Industries (CDGI), Firozabad (Uttar Pradesh)	Glassware

Figure 2: Location of existing TRs & TCs



Several of these were set up through support from German and Danish Government under bilateral agreements as well as with the UNIDO. These TCs are largely self-sustaining entities that provide technical and vocational training programs to more than 1, 00,000 trainees annually. Some of these include 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 primary 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 specialisations with a view to improve employability and livelihood opportunities.

The key services offered by the TCs include:

- **Design & manufacturing**
  - Product Development
  - Design & Manufacturing of tools, dies, moulds, precision tools
  - Process Development & Improvement

- **Skill development**
  - Conduct long & short term training programs in the areas of CAD, CAM, CNC, automation, RPT, mechatronics, glass design, shoe design, aromatherapy etc.
  - Offers customised programs for industries

  The education level of the participating students ranges from school drop outs to 10^{th}/12^{th}/ITI/diploma/degree holders

- **Consultancy**
  - Process and Product Improvement
  - Automation solutions
  - Quality Systems support
  - Turnkey assignments
  - Course curriculum developments

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 and few TCs even after depreciation). Based on the recent reports and financial analysis, following are some of the key observations:

- **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. Majority of them have become profitable in the last three years.

- **Skew towards training**: Training and skill developed services have been a key revenue sources 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.

- **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.

- **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 training numbers from 2011-12 to 2012-13. The highest increase was observed at IGTR Ahmedabad. Although this is a positive trend, the staffs at these TCs needs to focus on production and 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.

There is a need to replicate the TCs at more places along with technological up gradation, improved training facilities and innovation in the business models etc. This will increase their capacities to train and strengthen the workforce supply. By improving the competitiveness of these facilities, the MSME TCs can be better utilized and expected to produce a bigger footprint in the Indian manufacturing sector.

1.3 Evaluation study of TCs and recommendations of the experts

A study of selected MoMSME TRs in India on *'Strategic Assessment and Recommendations'* was submitted under the *'Micro, Small and Medium Enterprises Umbrella Programme'*. The purpose of the study was to make comparison of the TRs with international TRs programmes. It is to be noted that these TRs have now been renamed as TCs. 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 train more people. 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.
- **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.
- **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.

Apart from above, several studies have been undertaken by O/o DC MSME in recent years to analyse the technology capabilities and governance framework established at the existing TCs. The key findings from these studies are summarized as follows:

- **Technology**
  - There is a possibility of improving the overall machine performance by suitable investments in large size milling machines and grinding machines to remove the bottleneck
  - Rationalization and standardization of all manufacturing processes
  - Reduction of in-machine set-up times using zero-point clamping systems and pallets
- **Organization**
  - Definition of requirements for improving 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 through the introduction of course offerings that address 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 Visakhapatnam has been proposed with the underlying fact and review of the catchment area which has some of the leading units in steel, shipbuilding & repair and power. Further a number of transformational industrial projects in power and steel sector are proposed and the TC can facilitate and support the MSME units coming up across this region. The TC at Visakhapatnam will play an important role in enhancing the competitiveness of the MSME Units in the area. TC will focus on improving access to technology, providing skill up-gradation 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 Visakhapatnam. This includes assessment of the market need in the region, technology and skillset requirement, amount of investment required, construction needed, its layout and subsequent requirements for implementation of the green field TC at Visakhapatnam. This DPR has been prepared in consultation with relevant stakeholders including O/o DC-MSME, Government of Andhra Pradesh, World Bank, OEMs, Tier I & II suppliers, industry association, Government Institutes and some ancillary units in the region. This DPR would facilitate the implementation plan of proposed TC at Visakhapatnam.

2.2 Approach

To start with, a comprehensive secondary research was carried out to understand the tooling and technological requirements of the General Engineering Sector and in particular of the Visakhapatnam 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 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 tooling & other technological requirements during the preparation of the DPR. Telephonic discussions with some of the General Engineering component manufacturers and suppliers across various regions (such as Hyderabad, Bengaluru, Chennai, Aurangabad and Ahmedabad) 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 General engineering sector across various stages of manufacturing.

Way forward: Post completion of the DPR for the proposed TC at Visakhapatnam under TCSP, the on-boarding of 3 main partners would be very much required to achieve the envisaged outcome in the defined time frame.

- Construction Management Consultant - For the development of the new facility
- Technology Partner – Procurement of machines and adoption of new technologies
- Cluster Network Manager – Marketing the centre an development of cluster with the right mix of products and services

Location Selection for New TCs

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[9]
   - 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.

c) **Alignment of Major Economic Projects:** Since a TC will create value for many years[10] and there are some mega projects in progress which will be completed in the next 10-15 years. This

[9] 2011-12 Current prices

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[11] 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.

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.

[10] Existing Technology Centers are more than 25 year old.
[11]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 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:

				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;
During these discussions additional considerations emerged:

- 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 Visakhapatnam location for setting up of new TC

As per the location selection framework and subsequent approval in the 8th PSC meeting held on 6th Aug 15, Visakhapatnam was selected as the location for setting up of new General Engineering TC focus. Visakhapatnam region has been found suitable from multiple perspectives:

- Visakhapatnam is located in an opportune area with the Bay of Bengal in the East, Orissa and Chhattisgarh in the North and rest of Andhra Pradesh in the West and South.
- Visakhapatnam is the second largest port in India with the largest shipbuilding and reparir services market in the district. The Hindustan Shipyard is located in the heart of the industrial region of Visakhapatnam with easy access to the Naval base and MSMEs
- Visakhapatnam is the most industrialised district in Andhra Pradesh and accounts of over 20% of industrial market of Andhra Pradesh
- Major industries include shipbuilding, welding, fabrication, steel production and agro based etc. These industries make up approximately 65% of all MSME units operating in the district
- Shipbuilding and steel industries dominate the landscape in Visakhapatnam, which in turn promotes welding and fabrication industries in the state

Location Brief

4. Location brief

4.1 Regional overview

Andhra Pradesh is located in the Southern peninsula of India and has a coast line of 974 km. The state is bound on the North by Odisha and Chhattisgarh, on the West by Telangana and Karnataka, on the South by Tamil Nadu and on the East by the Bay of Bengal. It is rich in mineral resources like coal, oil & natural gas, bauxite, limestone, gold, and diamonds. Andhra Pradesh, over the years, has established a strong presence in agro and food processing, textiles, chemicals & petrochemicals, pharmaceuticals, metallurgy, electronics and electrical engineering sectors.

The Government of Andhra Pradesh has introduced various investor-friendly policies for different sectors to facilitate availability of resources, provide conducive industrial environment, develop state-of-the art infrastructure, enhance inclusivity, foster innovation, create employment opportunities and improve exports.

The district of Visakhapatnam is one of the North Eastern Coastal districts of Andhra Pradesh. This district is located between 17º - 15' and 18º-32' Northern latitude and 18º - 54' and 83º - 30' in Eastern longitude. The district is surrounded by the state of Orissa in the North and partly by Vizianagaram District, on the South by East Godavari District, on the West by Orissa State and on the East by Bay of Bengal.

Figure 3: Location of Vishakhapatnam

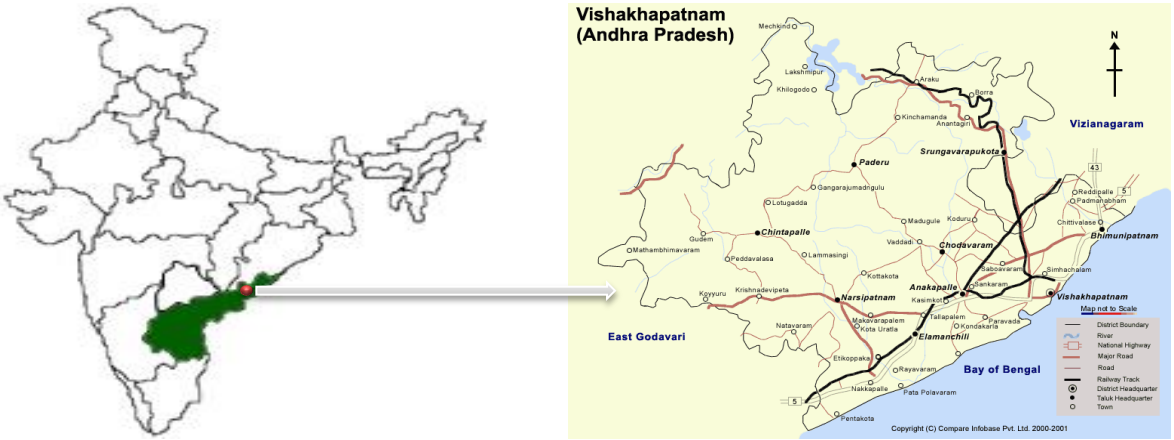


Table 3: State[12] and Vishakhapatnam[13] district snapshot

Andhra Pradesh	Quantity/ Value
Area	
Total geographical area	1,60,205 sq. km
Administration	
Districts	13
Population (census 2011)	
Total population (million)	**49.38**
Men **(million)**	24.73
Women **(million)**	24.64
Literacy (except 0-6)	
Total literate	67.4%
Men	74.8%
Women	60.0%
State secondary (10th) exam	
Total Student Appeared	6,50,000
Overall Pass Percentage	91.42%
Boys pass percentage	91.7%
Girls pass percentage	91.15%

Vishakhapatnam	Quantity/ Value
Area	
Total geographical area	11,161 sq. km
Administration	
Towns	10
Mandals	43
Population (census 2011)	
Total population	37,89,820
Men	19,03,890
Women	18,85,920
Literacy (except 0-6)	
Total literate	59.45%
Men	68.84%
Women	49.99%

[12] Andhra Pradesh State Government site
[13] Visakhapatnam Industrial district profile

Table 4: Status of power, water, wind and rainfall in the region[14]

Aspect	Status	Significance for TC
Water availability	▶ Annual available Ground water resources surmount to 71,689 Ha M[15] ▶ The district contain over 38 functional Dug wells	▶ Ensures availability of water on a daily basis to the proposed TC. This entails digging a borewell. This would require permission from Central Ground Water Board ▶ The same would be permitted on the condition of provisioning of a rain water harvesting system of double the capacity of consumption of ground water
Electricity availability	▶ Power consumption in the district surmount to 43,669 Mn KWH for industries ▶ There is a power deficit of around 1 million units/day	▶ Power back up to be designed keeping emergency and essential services/equipment's in mind
Wind flow	▶ Average annual wind speed is around 5.39 km/h	▶ Would be helpful to maximise natural ventilation during designing the layout of TC
Solar Isolation	▶ Average annual solar irradiation is around 5.07 (kWh/m^2/day) ▶ Over 3,335 villages[16] in the district have electricity through solar power generation	▶ There can a future requirement of using solar heating for utilities in the TC such as canteen, hostel electricity requirement etc.
Rainfall	▶ Vishakhapatnam collects an average of 955 mm (37.6 in) of rainfall per year, or 79.6 mm (3.1 in) per month.	▶ For estimation of capacity of rain water harvesting system in the TC campus
Temperature	▶ The annual average temperature is 28.4 degrees Celsius. May is the warmest month with maximum reaching 46 degree Celsius.	▶ For estimation of capacity of AC to be installed for adequate cooling, designing of building as well as estimate the potential for use of solar based equipment

[14] Visakhapatnam District profile
[15] Central Ground Water Board Visakhapatnam
[16] Visakhapatnam district profile

4.2 Demographic profile of the district

- **Population growth**: The total population of Visakhapatnam district is 40.53 lakhs (census 2011). The growth of population in the district was 14.85% approximately during the last decade (year 2001-11). Out of the total population of in 2011, around 50.3% (approximately 20.39 lakhs) are men and 49.7% (20.14 lakhs) are women. The density has increased from 200 people per square kilometres in year 2001 to 230 in year 2011.The graph depicts the growth of population over the decades of the district.

- **Rural-urban population composition:** Visakhapatnam district has an urban population of around 47.5% (approximately 20.3 lakhs) and a rural population of around 52.5% (approximately 22.5 lakhs) as per census 2011. In urban area, males constitute around 50.5% (approximately 10.3 lakhs) of the population and women constitute for around 49.5% (approximately 10.1 lakhs) of the population. In rural area, males constitute around 49.3% (approximately 11.1 lakhs) of the population and women constitute 50.7% (approximately 11.4 lakhs) of the population.

- **Sex Ratio: T**he district level sex ratio is 1006 for the year 2011 compared to the sex ration in 2001 of 985. The male sex ratio is 1025 whereas the female sex ratio is 985 per 1000.

- **Literacy Rate:** The literacy rate of Vizag district is around 66.9% compared to 59.9% in 2001. Among male and female this rate stands at 74.5% and 59.3% respectively. At the district level, the number of literates has increased by 26% from year 2001 to 2011. The male and female literates increased by 20% and 35% respectively during this period.

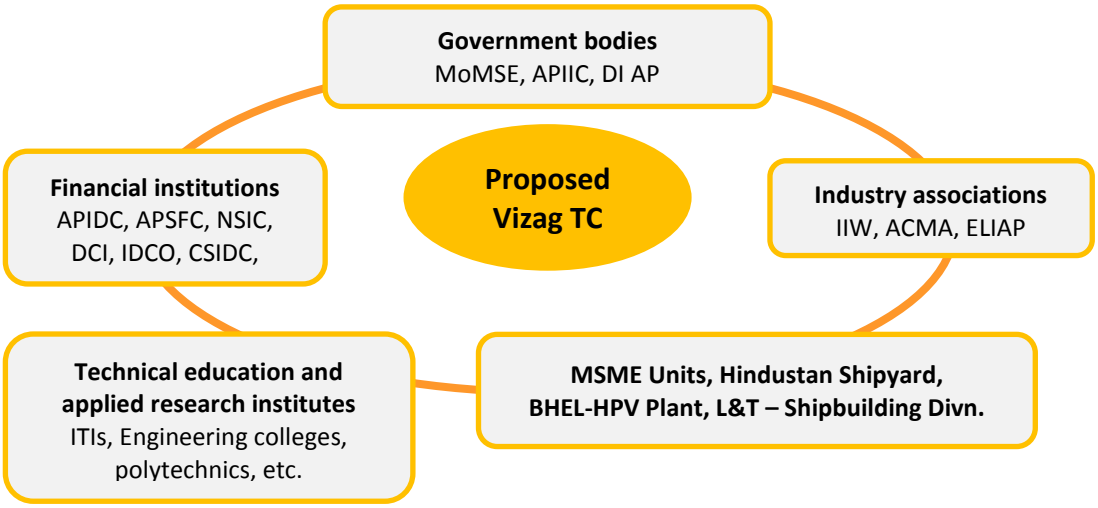
4.3 Regional stakeholders

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 to) designing capabilities, technological requirements, skillset requirement and cluster development.

Key stakeholders for Visakhapatnam TC would include; Government bodies, industry body associations, manufacturers and suppliers (e.g; OEMs, tier 1 and MSMEs etc.), financial institutions, technical and vocational training institutes, applied research institutes etc. in the catchment area. Vizag and its catchment area include Vizianagaram, Srikakulam, East Godavari districts (Andhra Pradesh), Malkangiri, Koraput, Rayagada, Gajjapati and Nowrangpur districts (Odisha), and Sukma, Kondagaon (Chhatisgarh). The following figure displays the catchment area:

The following figure depicts the stakeholders of the Vizag TC;

Figure 4: Stakeholders of Vizag TC



4.3.1 Government bodies

- **Andhra Pradesh Industrial Development Corporation Limited:** APIDC was established by the Government of Andhra Pradesh for planned development of medium and large-scale industries in the state on 16th December 1960, by the Government of Andhra Pradesh for planned development of medium and large scale industries in the state. Today, it has an authorized capital of Rs. 110 Crores and paid up capital of Rs. 96.23 Crores. The objectives of the official body include:
  - Identify and promote entrepreneurial talent for comprehensive industrial development
  - Conceptulize exploitation of resources for industrialization
  - Ensure economic, financial and social viability of promoted projects
- **Andhra Pradesh Industrial Infrastructure Corporation (APIIC)**

APIIC is the apex body for development of infrastructure and industry within the state. It operates in the state via a head office and 7 regional offices which are responsible for promoting and developing industrial activity in the state. The Key role of APIIC is;

- Site selection and acquisition of land.
- Financial assistance for projects.
- Technical consultancy for project identification and technical tie ups.
- Facilitation of government clearances.
- Merchant banking and financial tie –ups.

- Extending incentives and concessions according to the policy of State Government.

► **Department of Industries, Andhra Pradesh**

The department, through provisions in the industrial development policy of the state of Andhra Pradesh, aims:

- To ensure sustainable & inclusive industrial growth
- To be among the top 3 states in terms of industrial investments by 2022
- To be the most preferred logistics hub and India's gateway to East and Southeast Asia by 2029
- To enhance the quantum and quality of skilled manpower and create significant employment opportunities

4.3.2 Industry associations

► **Indian Institute of Welding (IIW)**

The institute, founded in 1996, is a non-profit body which aims to foster the development of welding science, technology and engineering in India. It has 13 branches in India, including one in Visakhapatnam and 1 each in both Chhattisgarh and Odisha, and over 4500 individual and corporate members throughout the country. Key objectives of this institute are

- Providing certification to human resources in welding through diploma training
- Conduction of technical meetings and workshops to empower the members in latest technologies
- Providing support to R&D activities in welding by instituting awards
- Provision and dissemination of technical information and advice
- Co-ordination with International Institute of Welding, and other technical / research institutes for transfer of technology

► **Automotive Component Manufacturers Association of India (ACMA)**

ACMA is the apex body representing the interest of the Indian national component industry. ACMA's charter is to develop a globally comprehensive Indian Auto Component industry and strengthen its role in national economic development, and to promote business through international alliances.

► **Electronic Industries Association of Andhra Pradesh (ELIAP)**

The association has been in existence since 1970 and represents all the electronic industries in Andhra Pradesh, with over 250 electronic component manufacturers as its members. It partakes in allotting land to members, and conducting electronic equipment expos.

4.3.3 Leading manufacturers

- **Large players**
  - Hindustan Shipyard Limited - The largest public sector shipyard in the country and the first yard to obtain ISO 9001-2000 accreditation.
  - Rashtriya Ispat Nigam Limited, Visakhapatnam – Vishakhapatnam Steel Plant is a Navaratna PSE under the Ministry of Steel. It is the first shore based Integrated Steel Plant in the country and is known for its Quality Products and Customer Delight. A market leader in long steel products, it caters to the requirements of the Construction, Manufacturing Automobile, General Engineering and Fabrication Sectors
  - Hindustan Petroleum Corporation Limited, Visakha Refinery - Visakha Refinery was commissioned with an installed capacity of 0.65 Million Metric Tonnes Per Annum (MMTPA) by Caltex Oil Refining (India) Ltd. in 1957. This was one of the first major industries of Visakhapatnam and first oil refinery on the East Coast. After the nationalization, HPCL has transformed itself into a mega Public Sector Undertaking and it is second largest integrated oil company in India.
  - ESSAR Steel Limited - Essar Steel India is one of India's leading integrated steel producers with an annual production capability of 10 MTPA. The state-of-the-art facilities comprise iron ore beneficiation, Pellet making, iron making, steel making, and downstream facilities, including a cold rolling mill, a galvanizing and pre-coated facility, a steel-processing facility, an extra-wide plate mill and three pipe mills with coating facilities
- **MSME Units**

Visakhapatnam district alone houses approximately 17,560 MSME units in total of which, around 10,670 MSME units cater to the manufacturing in General engineering sector. An overview of the spread of MSMEs in this region has been provided in the need assessment section.

4.3.4 Raw material suppliers

Some of the well-known suppliers of raw material to industries/TC are as follows;

Table 5: Key suppliers of raw materials

Raw material	Major suppliers/ brands
Mild steel	SAIL, TATA Steel, Jindal Steels, Vizag Steel Plant
Welding Consumables	Ador Welding, Surya Industrial Suppliers, Adinath Equipments, Macmet India
Tool & die Steel	ASSAB Sripad Steels, Buderus Edelstahl Gmbh, Bohler Uddeholm

Copper & copper wires	Nikunj Eximp Enterprises, Birla Copper
Casting	Melco (Faridabad)
Others	Sandwik Asia, Birla Kena Metal, L&T

4.3.5 Technical education institutions and vocational training

Major financial institutions across the region are Andhra Pradesh Industrial Infrastructure Corporation, Andhra Pradesh State Financial Corporation, nationalised banks and commercial banks.

4.3.6 Technical education institutions and vocational training

Table 6: Technical Education & Vocational training

Type of institutes	No. of institutions	Intake Capacity (2012-13)
ITI	729	1,45,074
Engineering	704	3,04,000
Polytechnic	134	38,480
Total	**1,567**	**4,87,554**

Source: Lok Sabha unstarred question No. 1580, EAMCET, eenadu.net

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

- **Technical education:** Around 1.5 lakhs students enrol in approximately 729 ITIs within the state. Andhra Pradesh houses many well-known academic institutions for higher education. Some of the key institutes are: Jawaharlal Nehru Technological University College of Engineering, AU College of Engineering, GMR Institute of Technology, etc.
- **Vocational training:** The state government has set up a skill development initiative scheme which trained 19,078 candidates under 950 vocational training providers in 2012. Under the Rajiv Udyogasri Society and the Rajiv Yuva Kiranalu, 21.54 lakh youths were trained, as a part of REEMAP.
- **Sai Welding & Fitter Training Institute:** The private institute, founded in 2005 has trained a total of 3650+ candidates, upto 2013.

Opportunity and Need Assessment

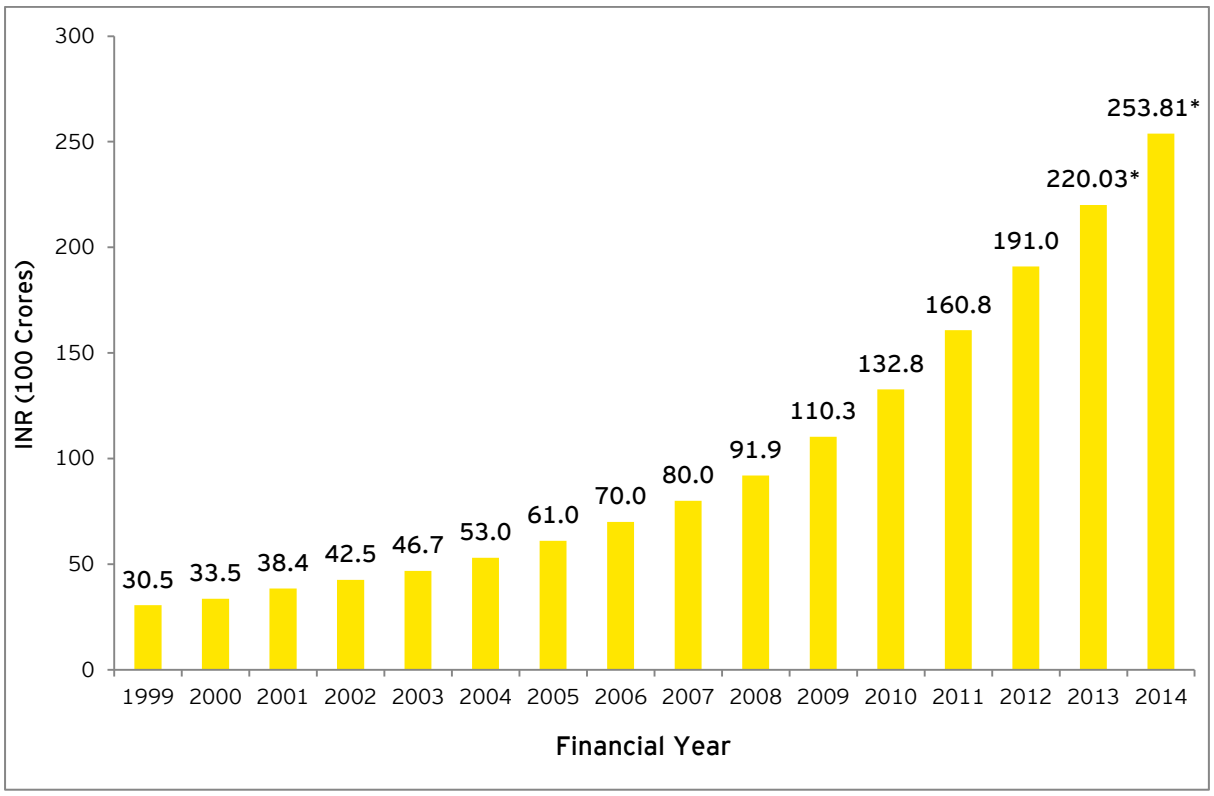
5. Opportunity and need assessment

5.1 India scenario

The tooling industry that consists of developing and manufacturing dies, moulds, jigs & fixtures as well as testing and prototyping serves as the interface between product design and product manufacturing. Growth of 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.

The trend of growing demand for tooling market is illustrated in the figure below:

Figure 5: Size of the tooling market in India



Source: Indian tool room industry report, TAGMA (2011)

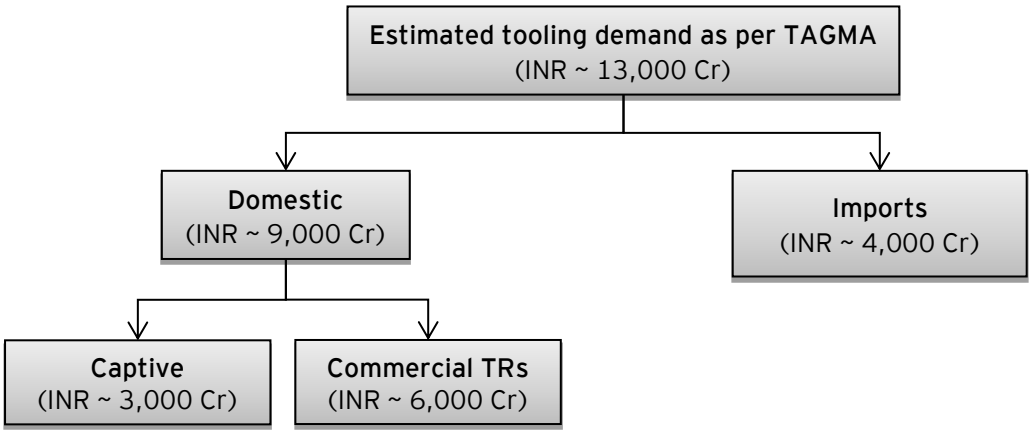
*Projections based on CAGR of 15.2%

Indian Tool Room industry size is estimated at ~INR 13,000 crore (2010-11)[17] which can be divided into two key segments - domestic (captive and commercial) and imports. Domestic Tool Rooms market is estimated at INR 9,284 crores out of which INR 3,129 crores is generated from captive tool rooms and commercial tool rooms (CTRs) account for INR 5,955 crores. Imports are to the

[17] Indian tool room industry report, TAGMA (2011)

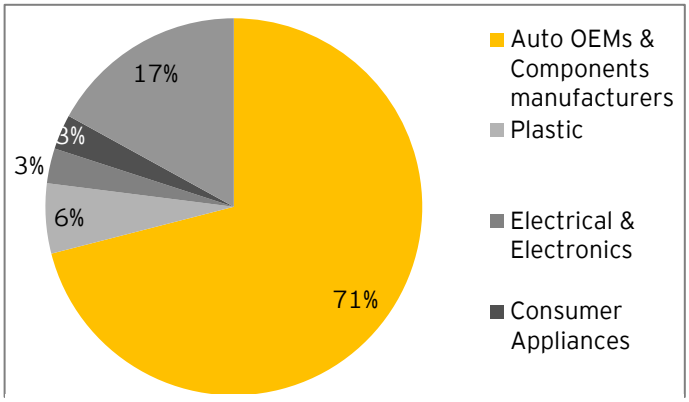
tune of INR 4,150 crores. In order to arrive at the addressable market for MSME TCs, a further analysis of the above three segments has been carried out.

Figure 6: Structure of tooling market[18]



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 manufacturers, plastic, packaging etc. Such Tool Rooms have state of the art equipment to meet the internal requirements. Auto OEMs and components manufacturers constitute around ~70% of this segment.

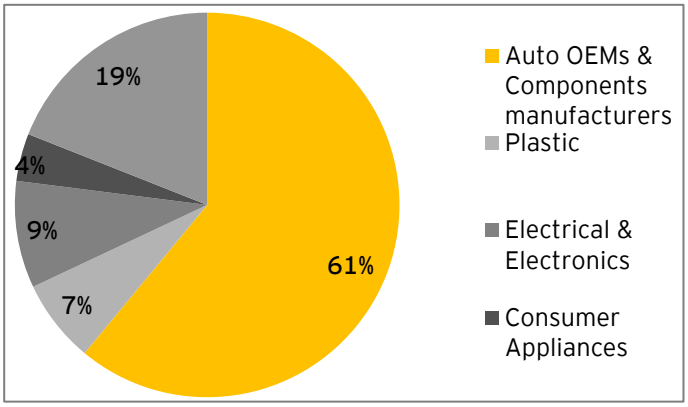
Figure 7: Composition of captive segment



Source: Indian tool room industry report, TAGMA (2011)

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

Figure 8: Composition of Commercial TRs segment



Source: Indian tool room industry report, TAGMA (2011)

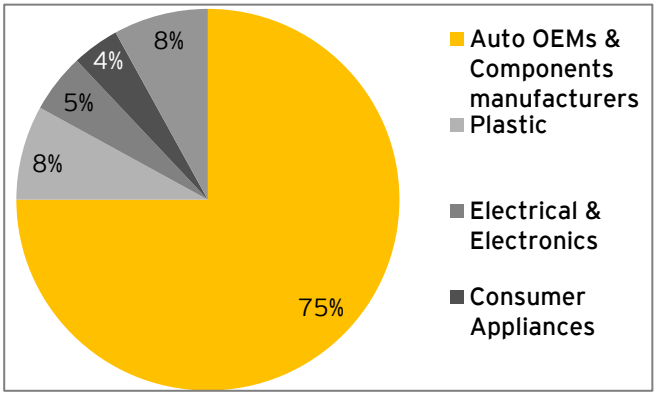
[18] Indian tool room industry report, TAGMA (2011)

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): CTRs account for ~ 46% 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 ~ INR 6,000 crores (in year 2011) 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.

Imports: Imports account for ~ 31% of the total tooling market which is around INR 4,000 crores. As per TAGMA report and our discussions with some of the Private Tool Rooms, key reasons for tooling imports are;

Figure 9: Composition of imports segment



Source: Indian tool room industry report, TAGMA (2011)

- **Quality:** Better surface finish, lower turnaround time and higher degree of accuracy by ability to meet the tolerance range.
- **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.
- **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.

Auto OEMs and components segment account for around 75% of the total imports in tooling. International companies like Volkswagen, General Motors and Siemens etc. still prefer international tool makers for superior quality. The rest 25 % i.e. accounts for tooling requirements from other

sectors which can be addressed by MSME Tool Rooms. This pushes the customers to look outward to fulfil their requirements.

Total addressable market for MSME Tool Rooms is about INR 7,000 crores (6,000 for Commercial Tool Rooms + 1,000 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 delivery times

5.1.1 Primary research

As part of preparing the DPR, discussions with some manufacturers and suppliers in General engineering across the region as well as in other industrial agglomerations across India was carried out. The objective of the primary research was to understand their business requirements, issues, challenges, and future requirements[19] to develop a deeper appreciation of the requirements that the Technology Centre Systems Program of the O/o DC MSME can serve in the future. The research also included the support requirements of these players' with respect to designing, training, manufacturing and consultancy.

Key inferences drawn from the primary research are as follows:

- The main items produced were sheet metal products, die casting products, rubber products and plastic parts
- The main manufacturing processes in use were welding, die casting, forging, CNC (Computer Numerical Control) such as VMC. There is a need for upgrading the processes from manual to automated
- Less than 30% of the companies have in-house facilities of production of tools
- 60% of these companies procure tools from domestic suppliers and rest 40% import tools
- Requirement for common facility for manufacturing of tools (sheet metal and fabrication) in the catchment

[19] Key questions asked during telephonic discussions in Annexure 18.4

- Approximately 30% of the companies face problems in tool quality and availability, high cost of tools.
- Only 10-20% of the companies have sought the support of MSME tool rooms previously
- More than half of the component suppliers are ready to accept the support of MSME tool rooms/ TC's with respect to tool designing, manufacturing and training
- There is scope for MSME's in making moulds, dies and sheet metal tools and welding and fabrication development
- The main managerial manpower requirements of these companies are engineering (B. Tech engineering/ diploma engineering and tooling engineering) with project management skills and manpower handling. The machine operators are generally ITI graduates in the respective field of manufacturing and further needs to be trained. Even some of the players (about 20%) expressed the need for training in management for their shop floor level manpower. In addition to the above training to motivate employees are also desired for maximization of output.
- There is a requirement of multi-skilling workers in terms of welders, cutters etc.

Further similar kinds of inferences were also observed during telephonic discussion with players[20] across Hyderabad, Bengaluru, Chennai, Aurangabad and Ahmedabad with respect to support requirements of these players for designing, training, manufacturing and consultancy carried on. **There is a need to position the MoMSME TRs to support the commercial tool rooms to strengthen their design capabilities and capacity to manufacture complex tools.** Further, there is also a need to create more awareness of new technologies and opportunities among private tool rooms to enable them to serve that market.

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

[20] List of players contacted is attached in the annexure 18.8

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
- **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

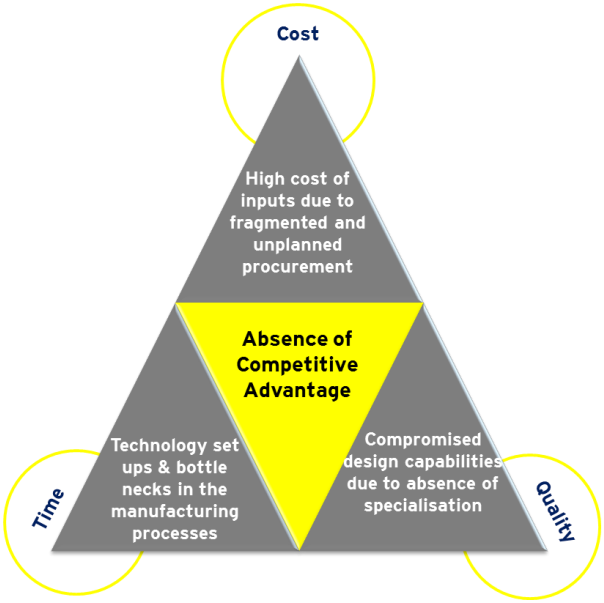
b. **Other macroeconomic factors**

- **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 10: 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

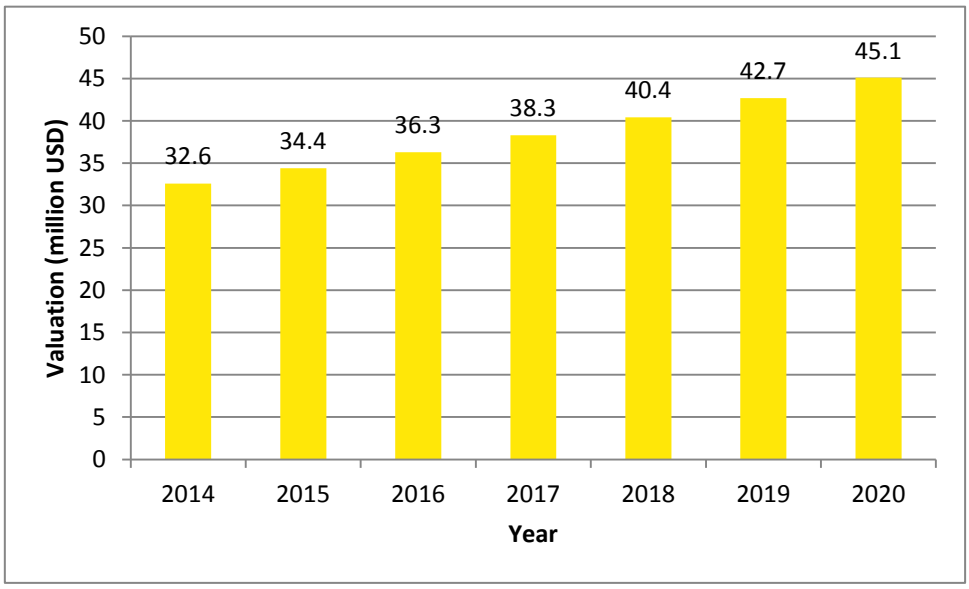
5.2 Market opportunity

5.2.1 Overview of Welding Industry

To achieve the level of development envisioned in the Vision 2029 Plan document, the State will have to drive the current annual GSDP growth rate of 7 percent to a higher trajectory of double digit growth rate of approximately 12%. The state intends to uphaul the contribution of the industrial sector to GSDP from 20.7% in 2014 to 25% by 2020[21]. This growth rate requires a consistent year-on-year growth rate target of 14% contribution to GSDP. Achievement of this target requires Andhra Pradesh to position itself as a highly competitive destination for industry, not only at the national level, but also at regional and global levels.

The district of Visakhapatnam is one of the foremost regions for cutting-edge technology in Welding and fabrication. Global market for welding consumables in 2014 surmounted to approximately US$10.7 Billion, which is forecasted to reach US$ 17.8 Biliion[22] by 2020. The expected CARG for the 5-year period from 2014 to 2020 is demonstrated to be 8.9%.

Figure 11: Global welding consumables market



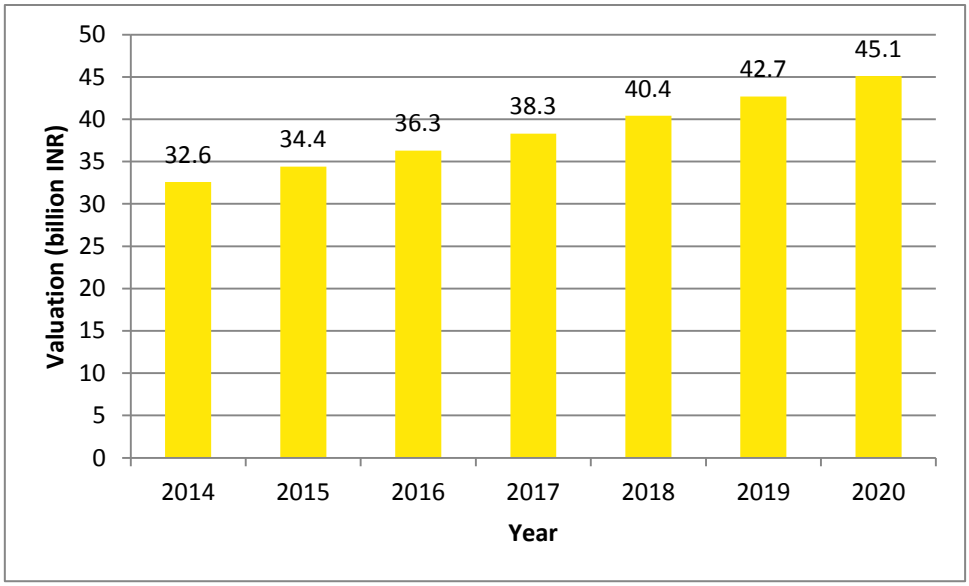
5.2.1.1 Overview of welding industry in India

In India, the welding consumables market is estimated to be at INR 32.6 billion in 2014, and is expected to reach INR 45.4 billion by 2020[23], growing at a compound annual growth rate (CARG) of 5.6% between 2014 and 2020. In terms of volume, the market stood at 255.1[24] kilo tons in 2013.

[21] Andhra Pradesh Industries Mission 2015
[22] Frost & Sullivan 2015
[23] India Consumables market; Transparency market research report
[24] Transparency Market research

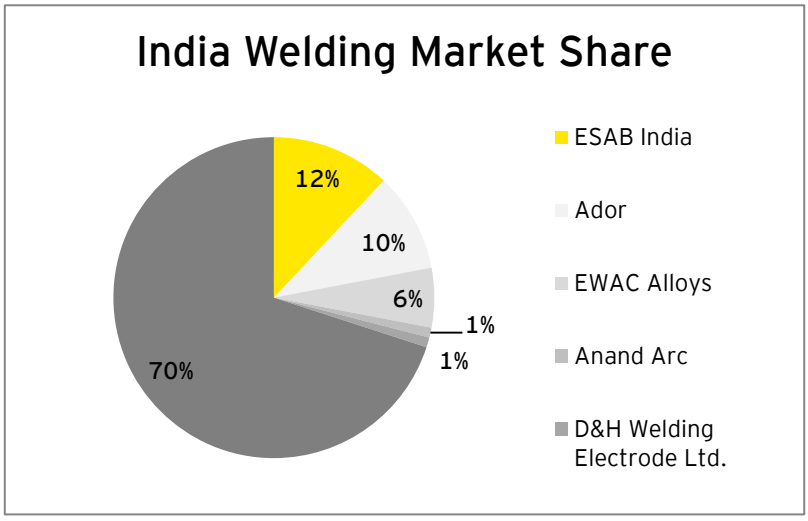
The welding industry is predominantly reliant on the steel industry that caters to various industries such as automobile, construction and transportation. The welding industry in India comprises of various large, medium and small companies which manufacture welding consumables. Large international players include Lincoln Electric, ESAB India, and Bohler Welding.

Figure 12: Indian welding consumables market



The welding consumables market accounts for a significant share in the welding industry, at over 30% compared to welding equipment, welding services and accessories. However, the consumable market is moderately fragmented, with large players occupying approximately 30% combined market share in 2013. ESAB dominated the market in 2013, followed by Bohler and Lincoln, respectively as shown in the figure below. Major raw material suppliers for the welding industry include Jayesh Group, Tata Steel Ltd, Indian Metals & Ferro Alloy Ltd and Vizag Steel Plant.

Figure 13: India welding Market share

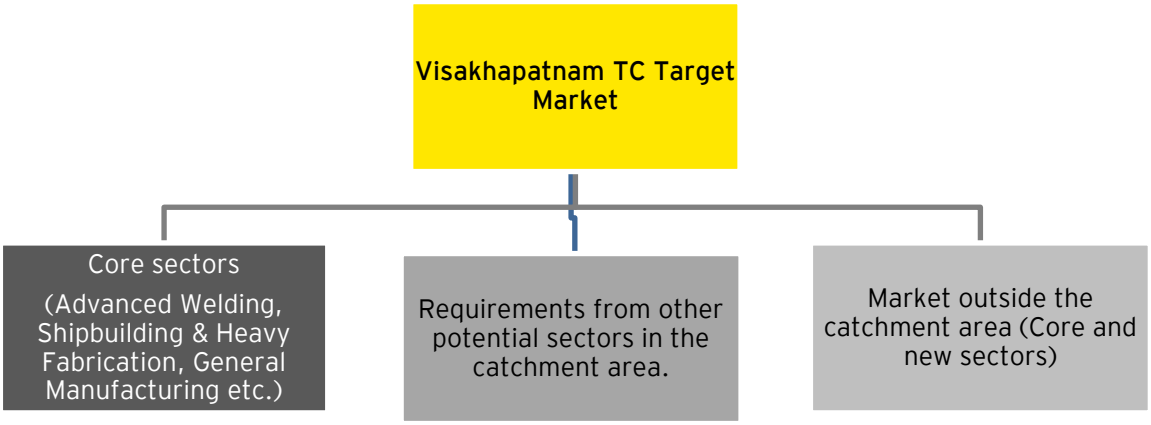


Demand for welding consumables has been observed to be in correlation to the Steel production rate in the country. Final user industries such as transportation, construction, oil & gas, and power

are likely to spearhead the Indian welding consumables market in the future. Demand for steel in India is projected to grow by 6.2%[25] in 2015 and 7.3% in 2016 as compared to the increase in global steel consumption by 0.5% and 1.4% in 2015 and 2016, respectively. These growth indicators showcase a strong case for the future of welding and its place in the manufacturing sector as a critical trade.

More than 25% share of the welding consumables produced is used up by the automobile and transportation sector in India, in 2013. Of these end-use industries, power sector is expected to grow the fastest at a CAGR of 5.8% from 2015 to 2020. Other applications such as wear plates and marine are expected to grow moderately in the next few years. Within the consumables sphere, the stick electrodes occupy 45%[26] of the market share. Demand for flux cored wires and SAW wires is expected to grow moderately in the next few years due to efficient performance, lower wastage, suitability for automatic welding systems and outdoor work.

Figure 14: Target market structure of Visakhapatnam TC



5.2.2 Markets in Core sectors in the Catchment

As per the Andhra Pradesh Reorganisation Act (2014), a new capital of Andhra Pradesh has been inaugurated on 22nd October 2015 in Amravati. The capital would be designed on 54,000 acres

[25] Welding consumables market dependency on Steel; Transparent Market research
[26] Welding& fabrication industry in India; Research and Markets

with a proposed budget of INR 20,000. The state aims to model the capital as a Smart city with investments in manufacturing, infrastructure and construction. Proximity of Visakhapatnam to the proposed capital city is beneficial for MSME players since the major sectors in Visakhapatnam cater to construction and fabrication; all of which are necessary in the development of a state of the art township.

Visakhapatnam is a major port of the country and India's second largest port by volume of cargo. The ports benefit from easy accessibility to South East Asia and beyond. The port houses a shipyard named the Hindustan Shipyard Limited, which undertakes manufacturing and repairs of ships and submarines. As of 2009, it had manufactured 170 vessels and repaired over 2000 ships and submarines. In 2013-14, a majority (87.7%) of the shipyard's revenue came from ship building (46.3%) and ship repair (41.4%). One of the major trades in shipbuilding is welding & fabrication. Therefore, the key industry that needs to be analysed is the fabrication industry.

The market share of the fabrication market in Visakhapatnam can be estimated. The state's construction activity (including pipeline) in Vizag was estimated to be INR 2758[27] crores IN 2013, of which 5.7% contributes to welding& fabrication, which surmounts to INR 157.2 crores. The total state manufacturing activity in 2012-13 was estimated at Rs 10840 crores, of which approximately 12% contributed to fabrication, which values at INR 1300.8 crore. A combination of the fabrication industry catering to the construction and manufacturing industry is therefore valued at INR 1458 crores.

Some of the major industrial sectors that dominate demand for fabrication & welding processes and consumables in the state of Visakhapatnam are:

- Heavy Engineering Fabrication – The sector is the key contributor to the development and utilization of latest welding technologies. The growth of the sector accounts significantly to state and national GDP. Some of the sectors that utilize fabrication as one of the major trades include power, refineries, petrochemicals, and process plant industries
- General Construction and Engineering – This industry category includes a large number of medium and small fabrication units, which present the general image of the fabrication industry
- Shipbuilding and Repair Services – Shipbuilding is one of the major contributors to the economy of the country. Worldwide, the overall improvement in the economic situation for inspection of pipeline painting has led to huge demand from the shipbuilding industry and in turn from the fabrication and welding consumables market. The district hopes to replicate the demand

Visakhapatnam district has a total of around 17,561 MSME units that employ around 173,847 people. Out of which, approximately 9,000 Micro, Small and Medium enterprises cater to the

[27] American welding Society; Overview of Indian Welding industry

manufacturing, welding and fabrication industries. Aside from fabrication, other major industries include electrical, chemical, pharmaceutical, repairing and servicing, textiles and agro based industries. Some of the large players in the vicinity include Hindustan shipyard, Dr Reddy's, Hindustan Zinc Ltd., Coca-Cola Ltd etc.

The following table enlists the prominent public sector and private players in and around Visakhapatnam in welding and fabrication, power, shipbuilding sectors.

Table 7: Key manufacturing players

Type	Key manufacturing players[28]
PSU's	▶ Hindustan Shipyard ▶ Hindustan Zinc Ltd. ▶ Hindustan Petroleum Corp Ltd. ▶ BHEL - Heavy Plates & Vessels Plant ▶ NTPC – Thermal Power Project ▶ Larsen & Toubro ▶ The Andhra Petrochemicals
Engineering	▶ AK Corp Ltd. ▶ Bhavani Engineering ▶ Sri Harsha Engineering & Construction Co. ▶ Synergy Castings
Power/Energy	▶ LVS Power Ltd. ▶ NTPC – Thermal Power Project ▶ Cosmic Power Systems Pvt. Ltd
Steels	▶ AKC Steel Industries ▶ Balaji Steel ▶ Beekay Structural Steels ▶ Essar Steel Ltd. ▶ Narayani Ispat pvt. ltd. ▶ Shree Shakti Steels ▶ Signet Steel ltd. ▶ Velagapudi Steels ltd. ▶ Vijaya Lakshmi steel Wires pvt. ltd.

Districts expected to be served by the proposed Visakhapatnam TC would be Visakhapatnam and its catchment area including East Godavari, Vizianagaram, Koraput, Malkangiri and Rayagada. Key highlights of the catchment area have been presented in the table below;

[28] Source : Vizag district info - industries

Table 8: Catchment area profile

District& No. of MSMEs[29]	District Profile	Welding and tooling applications
Visakhapatnam (17,601)	▶ There are 14 industrial areas in the district. ▶ Existing clusters of MSMEs in the district are Textiles, Electronics, Metallurgy, Engineering, Shipbuilding & Life Science ▶ Key products include: automobile, electrical, electronics, ships, agro, food processing, etc. ▶ The district has over 17,600 MSME units in total, out of which 9,000 cater to engineering, fabrication and electronics industries	▶ In the auto industry, ship repair, manufacture, electronics, forging, engineering and chemicals. ▶ Major PSU are established in the district such as; Hindustan Zinc Ltd., Hindustan Petroleum Corp Ltd., Bharat Heavy Plates & Vessels etc. ▶ The second largest port hub in India ▶ Majority of shipbuilding & repair is situated in the district ; Hindustan Shipyard operates out of Visakhapatnam
Vizianagaram (4,210)	▶ There are 4 industrial areas in the district namely Vizianagaram, Bobbili, Nellimarla, Kantakapelle, with a combined capacity of 645 units. ▶ Existing MSMEs in the manufacturing sector across the district predominantly cater to metal and mining	▶ Major applications in assembling the steel fabricated components, and chemical industries ▶ Key players include Jindal Stainless, GSAL, Andhra Ferro Alloys, Yona Smelters, etc.

[29] Total number of MSMEs in the district, source: District Industries Centre, District Industrial profiles-MSME

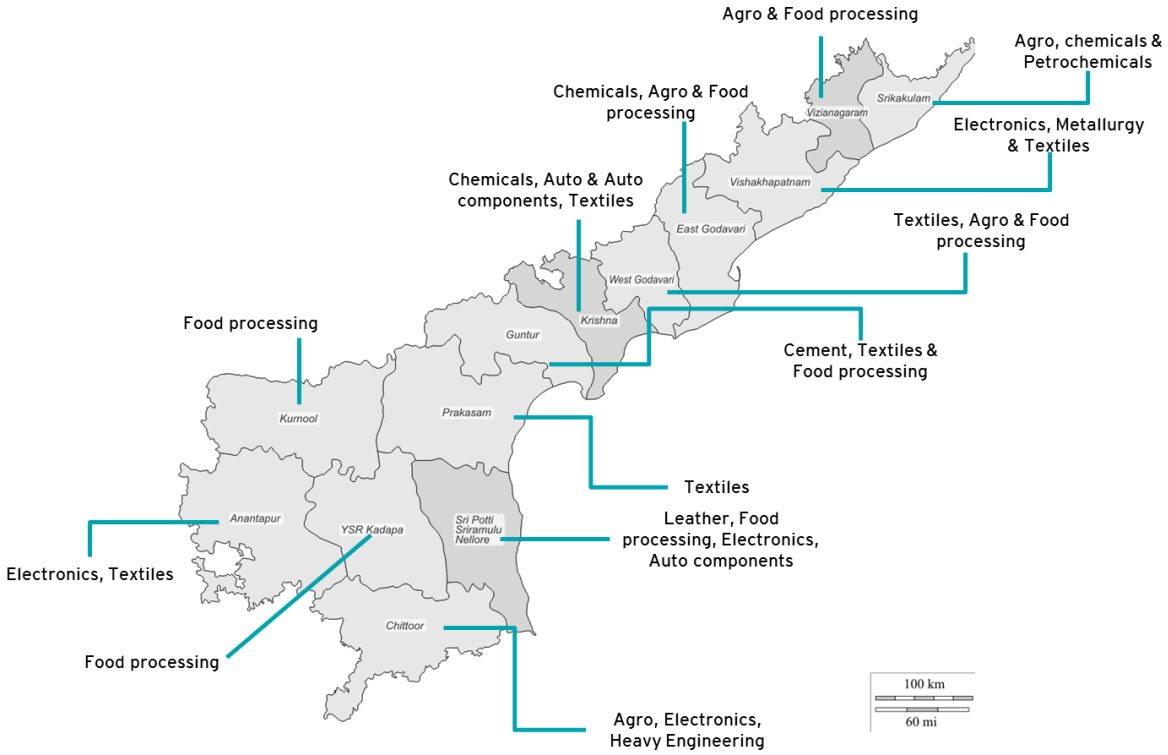
District& No. of MSMEs[29]	District Profile	Welding and tooling applications
	based (steel fab.) and engineering units. ▶ Key products include; motorcycles, zip fasteners, auto glass, etc. ▶ There are 4,210 MSME units operating in the district, out of which approximately 2,000+ units cater to the steel manufacturing, fabrication, casting and electrical industries	
East Godavari (2,743)	▶ The district has 24 indsutrial areas in total with a combined allotted plots of 1,663 ▶ There are 2,743 registered units in the district ▶ Existing MSMEs in the manufacturing sector across the district include furniture, textile, steel fabrication, and engineering units.	▶ The district has around 90 registered units that employ approximately 2,630 workers in welding and steel fabrication that cater to engineering, energy, mining and construction sectors ▶ Key players include GAIL, Rucha Infrastructure, Steel Exchange India, Ramdas Motors, Reliance Industries Ltd., Cairn Energy India Ltd., GMR Energy Ltd., Andhra Electronics Limited, etc. ▶ There are over 70 large scale and PSU establishments in the state, which leads to requirement of services by MSMEs
Koraput (4,938)	▶ There are three industrial areas in the district, Jeypore,	▶ The district has over 2000 MSMEs in relevant sectors of engineering, metal and service, and tooling

District& No. of MSMEs[29]	District Profile	Welding and tooling applications
	Sunabeda and Kaki ▶ A total of 4,938 MSME units operate out of the Odisha state, which is within the Visakhapatnam catchment area ▶ The MSMEs in the district has employed approximately 37,760 workers and invested around INR 9 Crores in plant and machinery ▶ Key sectors include foundry, engineering workshop, servicing and repair	industry. ▶ Easy accessibility to Visakhapatnam through Highways 25 and Delhi-Kolkata Haighway ▶ Key players in the region include HAL, NALCO, Mallick Engineering, OM Minerals, Aurobinda Precision Tools etc.
Rayagada (2,556)	▶ The district has two industrial areas, IID and Muniguda. ▶ Key sectors in the district include agro, fabrication, manufacturing, and repair and servicing. ▶ There are 1,106 registered MSME units operating in the district, and they employ approximately 12,000 workers ▶ Investment in plant and machinery by MSMEs surmount to around INR 120 Crores	▶ Key sectors that contribute the most to the state GDP include Metal works, manufacturing, repair and service and food processing ▶ Approximately 1,600 units cater to the engineering and repair & services industry ▶ Key players include IMFA, Utkal Alumina, Raykal Alumina

Source: District Industries Centre, District Industrial profiles-MSME

The following diagram represents the key manufacturing clusters in and around Visakhapatnam region.

Figure 15: Key clusters in Andhra Pradesh



5.2.3 Potential Market opportunity

Shipbuilding

The Indian shipbuilding industry is centred at around 27[30] shipyards comprising 8 public sectors (6 yards under Central Government and 2 under State Governments) and 19 private sector shipyards. Out of which Visakhapatnam house one of the largest shipbuilding and repairing services offered to the Indian Navy and private players in tandem.

The Visakhapatnam Steel Plant is a pride for Vizag. Major industries from all sectors includingBharat Heavy Plates & Vessels, Hindusthan Zinc Limited, Hindusthan Petroleum Corp. Ltd, Port Trust, Hindusthan Ship Yard, Fishing Harbor, Coramandel Fertilizers, L.G.Polymers, Essar Shipping are all present in Visakhapatnam.

However, the technology and capability in Indian shipyards are lacking. Technology up gradation and process efficiency need to be implemented in the shipyards to ensure competitiveness. Additionally, the technology transfer needs to benefit private operators and clients. Indian

[30] CII Shipping report

shipbuilders need to improve their capability to match foreign players in ship automation and technology. Development of training programs in various academies to produce high quality talent in the shipbuilding industry is identified as a principal focus area.

Automation

Growth of the steel industry, which is majorly contributed by the fabrication industry, in India needs to be focused on semi-automatic and fully-automatic welding & fabrication processes in the future. Some of the emerging trends include eliminating preheating and post-heating from the fabrication process and shifting to semi-automatic fabricating techniques through innovations such as lighter steel while upholding the quality. Requirement of equipment by production clients to ensure quality welding products with minimum skills include tools for automation for better productivity. Examples include:

- [31]**Rotator**: Automatic circular seam for rotating a circular job
- **Manipulator**: Positioning job for down-hand welding
- **Column & Beam**: When a welding head is fitted on a column & boom, it is capable of moving up & down and is able to travel to & fro, making it ideally suitable for pressure vessel industries
- **Mono-axial guide system**
- **Bio-axial guide system**
- **Fit-gap sensor**

In conjunction with the focus sector of the Visakhapatnam TC, automation should be the defining characteristic across all trades when deciding on the production and training services to be offered. Majority of MSMEs in the Visakhapatnam region use manual manufacturing processes, especially in the fabrication field. To bolster the competitiveness and efficiency of these MSMEs, automation needs to be introduced in fabrication equipment used. But, the MSMEs might not have the capacity to purchase or train their workers on the latest technologies. Therefore, it is pertinent to introduce semi-automatic or fully-automatic production equipment.

Testing & calibration Services

MSMEs are suppliers to major PSUs and OEMs in the general engineering and steel sectors in the state of Andhra Pradesh. Due to the requirement for accurate products in each of the mentioned sectors, MSMEs are required to carry out specified tests on their products before delivery. Examples of tests carried out include compound composition for the steel sector and mechanical stress/strain testing for the general engineering sectors etc. Subsequently, at the time of supply

[31] Efficient manufacturing: Future of welding

products to customers of MSMEs, MSMEs have to submit a certificate stating the suitability of their products as per the customer requirement. These tests are currently carried out at in-house testing labs belonging to the PSUs and OEMs whom the products are supplied to. The certification provided by the TC will be certified and recognised by all the major PSUs and OEMs. These tests will be charged as per the industry norms, which have been decided after studying numerous tests on offer by the Andhra Pradesh and Delhi Industrial Development corporations. Certifications could be an additional source of income for the TC

These testing & calibration centres require sufficient amount of investments in terms of testing equipment, certification licences etc. Hence, it has been proposed to outsource the testing & calibration of equipment to a reliable and reputed external party. These services can provide tests that are most commonly used by the MSMEs in Visakhapatnam and neighbouring districts.

Case study: Central Power Training Institute (CPTI)

SAIL has established its own Central Power Training Institute (CPTI) at Rourkela. The Institute has a full scope replica simulator for 60 MW coal fire units and an Area Operator Training Simulator (AOTS). This is the first of its kind simulator and the only one in the non-utility sector. The institute has an auditorium capacity of 80 seats, lecture halls, a well-stocked library, a model room and a large foyer. Latest audio-visual and reprographic aids have also been provided.

The Institute conducts training largely for operation and maintenance personnel of SAIL captive power plants and Power Distribution Network departments. Additionally, the training centre also outsources the facilities to participants from external participating organizations like M/s NTPC, ICCL, INDAL, TISCO, and IB Thermal etc. Furthermore, CPTI has the ability to tailor make personalised programmes as per the requirements of the customer.

5.2.4 Market in other potential sectors in catchment

The region has potential to tap the demand from other growth sectors in and across the neighbouring states within upcoming sectors in manufacturing and service particularly in the area of engineering, metal fabrication, transport, oil and gas, and construction.

- **Electronic Manufacturing Clusters[32]:**

APIIC hopes to attract investments in the electronic sector by introducing 20 Electronic Manufacturing units in the state of Andhra Pradesh. This investment is expected to lead to accelerated growth rate of the industry. Each cluster is expected to be allocated around 100 acres and provided with a common infrastructure grant of Rs 50 crore from APIIC. The state electronic policy expects investments upto INR 30,000 Crores and employ over 5, 00,000 people by 2020. Over 200 industries are expected to be set up across Visakhapatnam, Srikakulam, Vizianagaram, Kakinada etc. To promote the proposed clusters, mega electronic events are expected to be planned in Visakhapatnam, Vijayawada and Tripura. Additionally, the state has the expectation to set up 3 missions for Electronic & IT, Capacity building & innovation and e-governance.

Financial incentives provided to industry units by state:

- 100 per cent tax reimbursement on VAT/CST for a period of 10 years, equivalent to the capital cost incurred by the company on its particular investment.
- 10 percent of capital subsidy on the total investment up to a maximum of INR 5 crore in place of a similar percentage of capital subsidy but only limited to the new capital equipment purchased for the unit
- Enhanced interest rebate to 5 per cent for a period of seven years subject to a maximum of INR 1 crore a year
- The government has also enhanced the skill gap training subsidy to INR 10,000 per employee to the companies

- **Visakhapatnam-Chennai Industrial Corridor[33] (VCIC)**

Such a zone is being setup as per the Government of India guidelines to promote the manufacturing contribution to GDP. The proposed industrial corridor possess a long coastline and strategically located ports that provide it with an opportunity to capitalise on multiple international gateways to connect India with the vibrant global production networks of Southeast and East Asia that form the bedrock of global manufacturing today. The ports are critical to unlocking the potential of VCIC and should be seen as a source of value-addition to domestic and global supply chains.

The following industries have been identified as the focus drivers of the industrial corridor development:

- Food processing

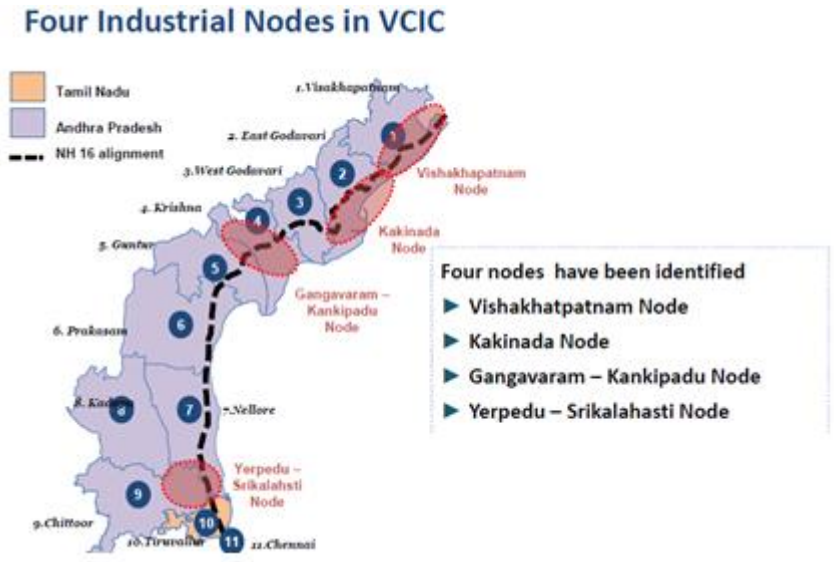
[32] The Hindu-'AP plans to introduce electronic clusters'; 2014
[33] AP Industries & Commerce Department and ADB

- Pharmaceuticals
- Auto and auto components
- Textiles
- Metallurgy
- Chemicals & Petrochemicals
- Electronics

The industrial corridor is expected to promote small and medium-sized enterprise (SME) development, with an emphasis on developing supply chains to integrate SMEs. By clustering producers and suppliers in the same location, their regular interactions will be strengthened and domestic suppliers can observe the business models and practices used by global firms and suppliers. The northern node is centred on Visakhapatnam and is in close proximity to the ports of Visakhapatnam and Gangavaram, and the industrial activities in the immediate hinterland of these ports.

The node-based industrialization strategy proposed for VCIC is targeted to achieve regional and global competitiveness. Infrastructure development and urbanization are critical to attain this core objective. While there are pockets of major urban and industrial clusters in the north and south of Andhra Pradesh, the rest of the state, including the two nodes in the central region, faces a challenge. This challenge can be overcome by putting in a place a synchronized infrastructure and urbanization strategy.

Figure 16: Industrial nodes within close proximity to Vizag



Source: ADP Master Plan

5.2.5 Market outside catchment area

In addition to the MSMEs in existing sectors (transport, construction, fabrication, electronics etc.), Vizag TC can also focus on MSMEs in outside the catchment area. Typical opportunities for TC outside the catchment in existing and new sectors would be from existing and proposed industrial zones in this area like.

- **Chennai – Bangalore Industrial Corridor (CBIC)**[34]

The industrial corridor between Chennai and Bangalore would be a key region for investment by MSMEs in Visakhapatnam. The strategic idea behind the development of the corridor is to achieve accelerated manufacturing development in the southern states and regional industry agglomeration in Andhra Pradesh, Tamil Nadu and Karnataka. The contribution to the national GDP of the CBIC is expected to surpass 25%. Establishment of the corridor is an expensive affair with a budget of INR 1180 1'000 Cr over a period of 20 years. The focus industries of this industrial corridor include food processing, Automobiles, Machinery, Textiles[35] etc.

- **Hyderabad-Warangal industrial corridor**

The Telangana State Industrial Infrastructure Corporation has identified 15 lakh acres land for industries in Telangana, of which 10 acres is located close to already developed industrial areas. And within the next six months, 25,000 acres is to be developed along the Hyderabad Warangal corridor.

- **Heavy industries in Tamil Nadu**

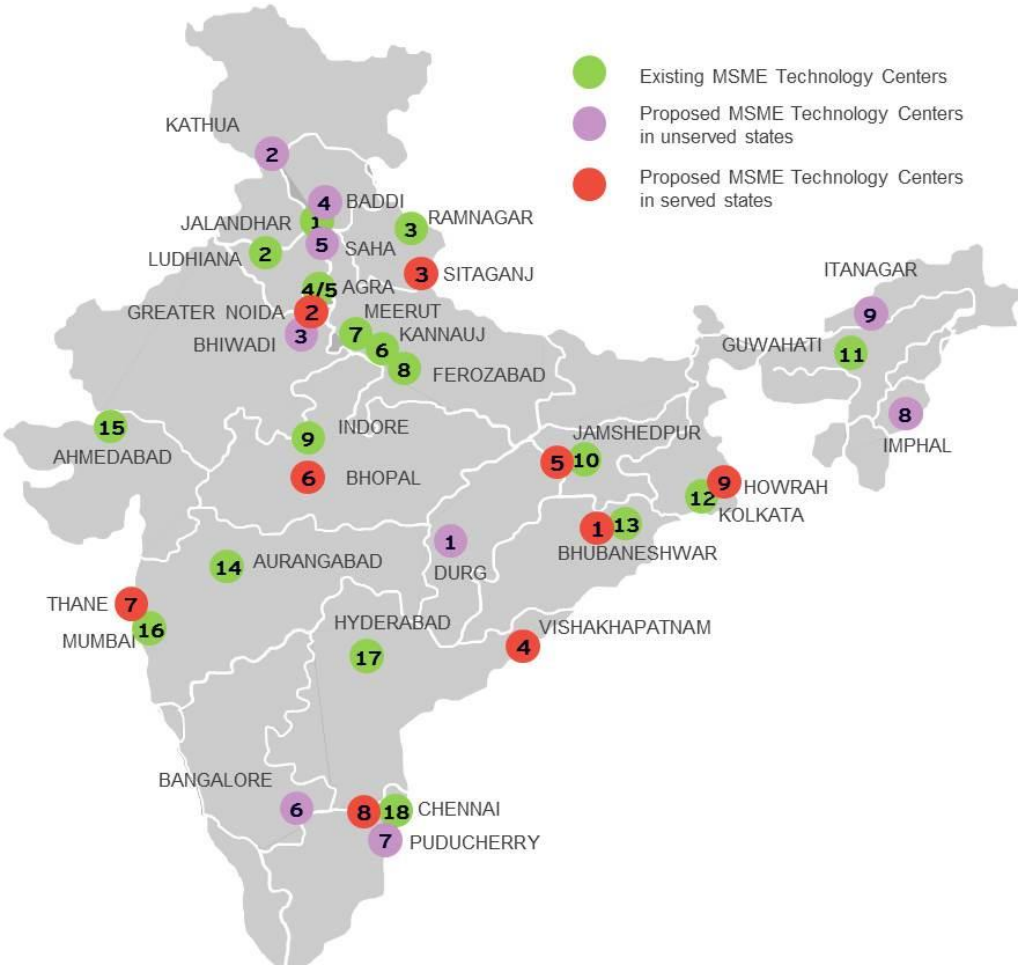
Tamil Nadu is known for its heavy industries, including SAIL and Sterlite under fabrication and Bharat Heavy Electricals for electrical equipment manufacturing. Fabrication applications are immense.

Andhra Pradesh borders the states of Orissa and Chhattisgarh in the north, Telangana in the northwest and Karnataka and Tamil Nadu in the south. Bay of Bengal encompasses the east of the state, which opens up accessibility to the South East Asia region. Odisha (Bhubaneswar), Telangana (Hyderabad), Chhattisgarh (Durg), Tamil Nadu (Chennai & Puducherry) and Maharashtra (Aurangabad), have existing TCs with focus on General Engineering. Therefore, the market of tool manufacturing and consulting in general engineering sector for Visakhapatnam TC in these neighbouring states would be extremely limited as these markets are being catered by their respective TCs with focus on general engineering sector. With respect to training, the students

[34] DIPP Schemes: CBIC
[35] Times of India - CBIC

trained by Visakhapatnam TC in courses such as fabrication, welding, precision engineering, casting, CAD/CAM, Automation, testing & calibration etc. would be able to avail employment opportunities across neighbouring states including Chhattisgarh where large scale mining activities are undertaken. Such states include; Odisha, Madhya Pradesh, Jharkhand etc. Further, students trained in courses such as; Tool Room & CNC Manufacturing, CAD/ CAM and Advance Welding would be able to avail employment opportunities outside Andhra Pradesh such as Nagpur, Aurangabad and Pune region where shortage of trained people are observed.

Figure 17: Map of existing & New TCs in TCSP program



5.3 Opportunities associated with other mega projects planned in Vizag

In Vizag catchment area, following are some additional upcoming mega projects planned in the near future.

- **Lalitanjali Group**, an infrastructure engineering and supply chain management firm, is the first firm to invest in Andhra Pradesh after its bifurcation with Telanagana. Welding applications include construction, transport and fabrication.

- **Expansion of Vizag port**: The port is to be nearly doubled in capacity from the current 65 mtpa to 110 mpta by 2016, including the modernisation of existing berths towards fully mechanised systems.

- **Odisha airstrips development**: The state government aims to develop eight airstrips and improve facilities in the existing ones to further the development of the state. The phased project includes one airstrip in Koraput district.

- **SAIL projects in Odisha & Chhattisgarh**: As part of the SAIL's goal to become the world's second largest steel producer, the authority aims to set up steel plants throughout Chhattisgarh and Odisha.

- **Tech Mahindra investing in Visakhapatnam**: The Company has been allotted 10 acres of land in the city's first IT SEZ region. The proposed facility is expected to specialise in skill development and training. Sources have indicated that establishment investment of around INR 100 Crores would be required. The endeavour would create over 5,000 jobs in the IT sector.

Social and Environmental Safeguards

6. Social and environmental safeguards

6.1 Socio-economic profile of district

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[36] 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

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

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.

In context of Visakhapatnam TC;

- The identified site for the proposed TC at Visakhapatnam;
  - Land has been allocated by the State Government to O/o DC-MSME for the development of the TC by O/o DC-MSME.
  - Declaration has been received from the state government to go ahead with the TC development.
  - Clearances received from the department for being free from any kind of encumbrances and squatter settlements. Further site visit by PMU consultants has resulted the same verification (Non-Incumbency certificate in respect of land is attached in Annexure).
- The allocated site for the proposed new TC at Visakhapatnam is in an SEZ area industrial area. So, 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 established and operational site of the industrial estate.

  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 even 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

TCs are like mini industries; hence planning, development and management of the TCs involve several critical environmental, health and safety obligations. Good environment practices and processes are required to be an integral part of any expansion or development of any green-field TC. The foremost and most essential stage of environment management is to conduct an environmental screening that highlights appropriate level and type of Environmental aspects and their likely associated environmental impact. The screening process aims to quickly identify those projects in which no potential environmental and social issues exist, so that only those with potential environmental and social implications will undergo a more detailed screening process. As a consequence, the outcome of the screening process will be a categorization of the project into one or more of the following categories:

- **Category 1:** 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;
- **Category 2:** 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.
- **Category 3:** 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.

The methodology for screening includes desk study, site visit and study of available literature.

- ***Desk study*** involves collection and review of the secondary data available in the public domain. This may involve the seismic activity of the area where new TC is proposed, soil type, land use pattern, etc. This will enable one to decide the methodology and level of Environment assessment and distributing the responsibility amongst the team members.
- **Site visit/s** is/are conducted to collect first hand data/information about the new site. This enables a cross check of the secondary data available during the desk review and assessing the likely environmental aspects and health and safety hazards. Also, this involves interaction with different stakeholder in the region to gauge any possibility of conflict related to TC.

During the study phase the team conducted a site visit and held discussions with CSIDC officials. Based on the discussion, the checklist used to conduct environment screening at the selected site in the RIICO is given below:

Table 9: Checklist for environmental screening

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 is clear from vegetation. There are only 2-3 trees that may not be required to be cut. Only wild grass, etc. will be required to be cleared.
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 in the vicinity which is likely to be affected by the operations of the tool room?	No	The tool room is planned in an industrial zone and there is no protected area or biodiversity sensitive area in the vicinity.
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?	Yes	There are few scheduled tribes in the Chhattisgarh district.
8	Will the construction activity affect the surrounding around the tool room?	Yes	The allocated land is enclosed by industries on all the sides. In the North, we have Pellet Shalimar, Sponge iron industry (Top worth) in the south, sponge iron industry (Jai Balaji) in the east and Sona beverage in the west. The construction activities may hinder operation of these adjoining industries.

			Therefore, appropriate measures should be undertaken to minimize dust emissions from the construction activity in the EMP.
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	The water shall be supplied by the Municipal authorities, as is the case in nearby industries. Moreover, the Tool room is not envisaged to be water intensive in comparison to the industries in the vicinity. Therefore, operations of the Tool Room shall not put additional pressure on water source.
10	Will the project lead to increased air emissions in the region?	Yes	The TC is envisaged to have insignificant dust emissions during the construction period. Care may be exercised to minimize dust emissions and its impact, if any, on the adjoining industry. Also, during the operation phase appropriate measures shall be undertaken to minimize air emission in case D.G set is used for electricity backup.
11	Will the project lead to increase in noise levels in the area?	No	Increase in noise level in not envisaged in the area due to TC. However, care like acoustic enclosures for D.G set, in case installed, etc. may be practiced.
12	Will the Tool room involve use of chemicals and/or solvents?	No	The envisaged TC will only use lubricating oil and water soluble coolants in the manufacturing process. However, in case any chemicals are used appropriate measures shall be undertaken to manage and store the chemicals.
13	Will the project involve handling, storage and disposal of hazardous waste? If yes, what are the different types of waste envisaged from the TC?	No	The envisaged TC will only use lubricating oil and water soluble coolants in the manufacturing process. In case, chemicals and any other hazardous materials are used measures shall be undertaken to manage the associated waste. Apart from this, there is no arrangement for waste water treatment, neither Sewage Treatment Plant (STP nor Effluent Treatment Plant (ETP) in

			the industrial zone. Also, there is no arrangement for discharge of treated waste water, in case TC decides to have its own treatment plant. Therefore, appropriate provision should be made in the budget for waste water treatment plant and measures should be adopted to recycle the waste water.
14	Is the project located in the area of seismic faults? In case yes, in which seismic does the location lie?	No	The TC location falls in the Seismic zone – II. This means that the area has very low seismic activity and is not an issue of concern.
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	The only record of natural calamity in the region was of a drought that was recorded in the year 2000. Therefore, there is no record of a natural calamity from the past that may impact the operations of the TC in the future.

Apart from this, in case of an expansion of the further data/information may be collected so as to identify the existing issues and plan appropriate measures to address the same in the brown-field development. A tentative checklist that may be used for the same is enclosed as Annexure – 18.1.

- Also, publically available literature review on the issues in the envisaged industrial sectors should be kept in mind. This may further help in a robust screening of the possible EHS impact of upcoming TC and may provide opportunity to MSME to have measures in place to mitigate the same.

After the initial screening, **Detailed Site Assessment f**or the proposed TC may be conducted using the environmental assessment checklist as annexure 18.2 so as understand the existing issues and the environment feasibility with respect to the proposed development.

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 Visakhapatnam 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 10: 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

Clearances Required and Respective Authorities

7. Clearances required and respective authorities

The proposed TC at Visakhapatnam is one of the first 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 11: Clearances required and respective authorities

SN	Required clearance/ approvals[37]	Department /agency	Tentative time limit for approval (days)
1.	Registration under VAT Act	Commercial Taxes Department	24 hours
2.	Registration under CST Act	Commercial Taxes Department	24 hours
3.	Tax Clearance Certificate	Commercial Taxes Department	1 day in case of non-default of tax payment
4.	Land conversion - Conversion of land use	Revenue Department	• 30 days for up to 10 hectares • 60 days for above 10 hectares
5.	Land Allotment	Revenue Department	• 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		30 days
7.	Issue of NOC to the authority concerned regarding conversion of land use		15 days
8.	Environmental	Ministry of	• Site/environment clearance: 90

[37] Indicative list of clearances/ approvals

SN	Required clearance/ approvals[37]	Department /agency	Tentative time limit for approval (days)
	Clearance (Consent of Air and Water Pollution)	Environment and Forests	days, • NOC to establish: 45 days, • NOC to operate: 30 days, Renewal of consent: 30 days
9.	Electricity Connection	Eastern Power Distribution Company of AP Ltd. (Divn. Of APEPDCL)	• 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, • Load above 3000 KW and up to 33KV: 375 days
10.	Water connection	Andhra Pradesh Industrial Infrastructure Corporation (APIIC),	NA
11.	Fire safety		NA
12.	Approval of place and for permission to construct building under the Factories Act)		NA
13.	Approval of factory layout plan under factories Act, 1948	Labour and Employment Department – Factories and Boilers Inspectorate	30 days
14.	License for running the factory	Labour and Employment Department	45 days
15.	Registration of shops and commercial establishments	Labour and Employment Department - Labour Department	10 days
16.	Permission to establishments having more than 50 labours under	Labour and Employment Department - Labour Department	45 days

SN	Required clearance/ approvals[37]	Department /agency	Tentative time limit for approval (days)
	Industrial Employment		
17.	Lift		NA
18.	Borewell	Central Ground Water Authority	NA
19.	Society registration	Indian societies registration act 1860	NA

Manpower and Human Resource Development

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 head 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.

8.1 Proposed organisation 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 Visakhapatnam TC, the main revenue streams are Production, Design and Consultancy and Training. These departments will be headed by Senior Managers who would directly report to GM/DGM.
- Contrary to the existing structures and target of sanctioned employee strength of not more than 60, we have proposed only 7 levels as compared 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 Visakhapatnam 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 TRs 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.
- To achieve the envisaged objectives of TCSP, equal focus should be given on all the three pillars namely, production, training and business advisory. Consistent efforts will have to be made to optimize the revenue from all these areas. 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 Cluster Network Manager to facilitate all the market linkages for the proposed TC. The role of CNM 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 Visakhapatnam 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 Visakhapatnam 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 30 demonstrates the target organizational structure to be achieved in 5 years (by 2020-21) from inception. Though, we have provided the figures till 2025-26 since we are estimating the revenue and expenditures for next 10 years.

As highlighted above, the proposed Technology Centre at Visakhapatnam 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 12: 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	6
5.	Production	18
6.	Training	25
7.	Marketing	2
Total		**60**[38]

In addition to the above sanctioned strength, we have recommended additional employees as contractual employees. Based on the requirement, we have estimated around 171 contractual employees (159 in training & 12 in production) by end of FY 2026. 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.

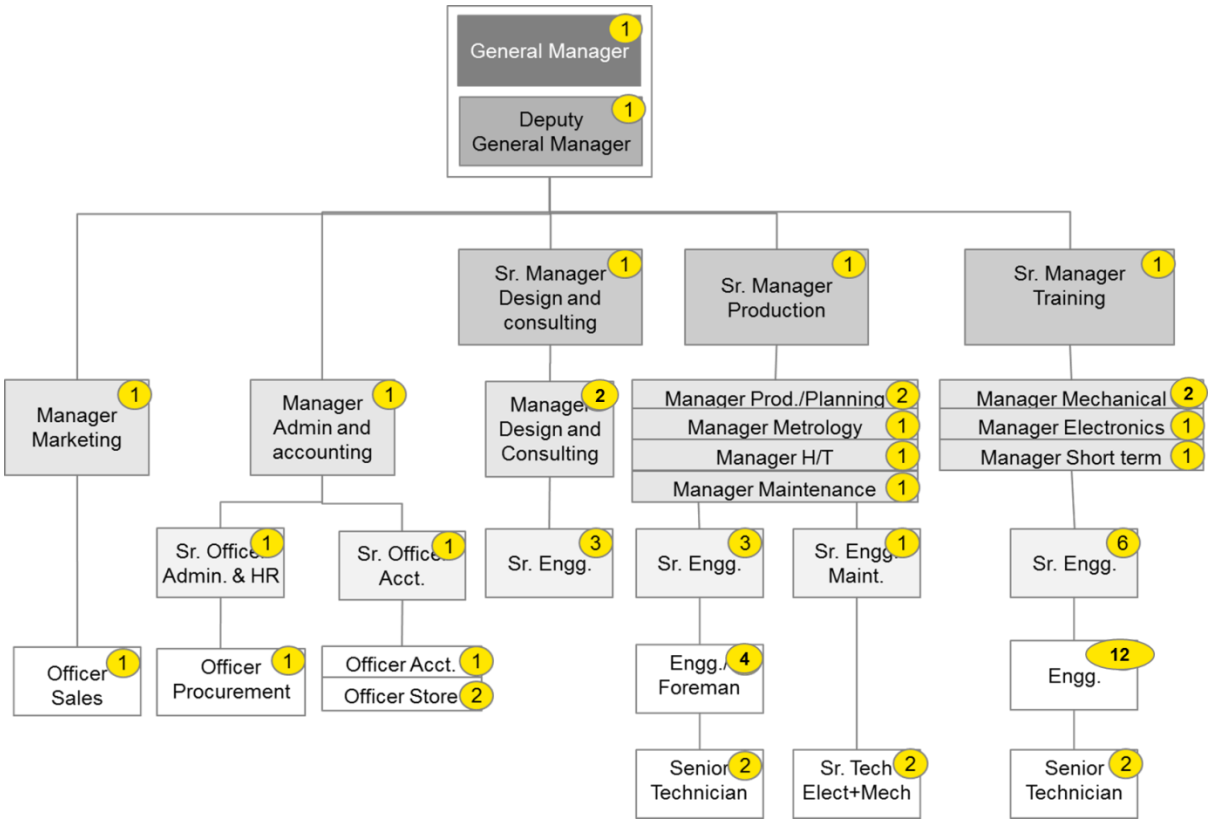
[38] The details and basis of number of employees is provided in the next section

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 18: Proposed organisation structure



8.2 Phase wise induction of human resources

As discussed in the above sections, the proposed TC will be have 60 employee as sanctioned strength and the target structure will be achieved within 5 years from 2015-16. 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 organisational 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 2015-16: 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 CNM and TP. 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 2016-17: 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 2017-18: 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 2018-19: 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 summarise the phasing of the organisational 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 2015 to 2026.

Table 13: Summary of phase wise induction of resources

Year	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26
Full time employees											
Total	2	20	42	52	57	60	60	60	60	60	60
Contractual employees											
Total	-	3	21	44	75	108	119	131	144	151	159

Below tables depicts the hiring of number resources in every department every year starting from 2015-16 to 2025-26. In the year 2020-21, the TC is recommended to hire the complete sanctioned strength of 60 employees.

Table 14: Department wise induction of fulltime resources

General Manager							
Year	15-16	16-17	17-18	18-19	19-20	20-21	25-26
General Manager	1	1	1	1	1	1	1
Total	1	1	1	1	1	1	1
Deputy General Manager							
Year	15-16	16-17	17-18	18-19	19-20	20-21	25-26
Deputy GM	-	-	-	-	-	1	1
Total	0	0	0	0	0	1	1
Administration and Accounting							
Year	15-16	16-17	17-18	18-19	19-20	20-21	25-26
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	15-16	16-17	17-18	18-19	19-20	20-21	25-26
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	15-16	16-17	17-18	18-19	19-20	20-21	25-26
Senior Manager	-	1	1	1	1	1	1
Manager Prod/ Planning	-	-	1	1	2	2	2
Manager Metrology	-	-	1	1	1	1	1
Manager H/T	-	-	1	1	1	1	1
Manager Maintenance	-	1	1	1	1	1	1
Sr Engg. Maintenance	-	-	-	-	1	1	1
Sr Engg. Production	-	3	3	3	3	3	3
Engg. / Foreman	-	2	4	6	6	6	6
Senior Technician	-	1	2	2	2	2	2
Senior Technician Maintenance (Mech + Elect)	-	1	1	2	2	2	2
Total	**0**	**9**	**15**	**18**	**20**	**20**	**20**
Training							
Year	15-16	16-17	17-18	18-19	19-20	20-21	25-26
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**
Sales and Marketing							
Year	15-16	16-17	17-18	18-19	19-20	20-21	25-26
Manager Marketing	-	1	1	1	1	1	1
Officer Sales	-	-	1	1	1	1	1
Total	**0**	**1**	**2**	**2**	**2**	**2**	**2**

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 Visakhapatnam 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 15: 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/R&D. ▶ 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 degree in	8 Years with 3 years in similar role	▶ Experience in the area of Administration, HR and Accounting ▶ The Manager must also have basic knowledge of government laws,	Head of Accounts, Administration and HR: ▶ General housekeeping of TC ▶ Bookkeeping, accounting and finance including financial analysis

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
	Commerce/ Accounting / Finance		regulations and state specific compliances ▶ Familiarity with ERP/accounting softwares	▶ 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 ▶ Experience in Computer systems / software for store keeping operation	▶ Managing store ▶ Issue of consumable and non-consumable stores and keeping records
Officer Procurement	M. Com. or MBA or Equivalent	3 Years	▶ Experience in Procurement processes ▶ Knowledge of Govt. Procurement rules	▶ Procurement ▶ Vendor Development

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			and processes will be desirable	
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 ▶ Proficiency in one of the areas in Tool Design, either Sheet metal press tool or Metal fabrication ▶ Practical Experience in use of CAD/CAM/CAE in product and tool design ▶ Knowledge of Tool trial	▶ Designing tools, moulds and die casting ▶ Automation Welding system ▶ Product development ▶ Quality systems ▶ Value engineering ▶ Tool try outs and proving ▶ Consultancy to MSMEs: Deliver functional consulting on assigned areas to ensure

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			▶ Experience of Jigs and Fixtures ▶ Knowledge of Quality systems ▶ Experience in technical consultancy will be preferred	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 ▶ Automation Welding system ▶ 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 ▶ 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	▶ Overall responsible for Production, production planning and control, including quality assurance of Tools and components, Tool trials etc. ▶ 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

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			▶ Experience to debug tool, analyse problems, root causes & take corrective improvement actions when tool is not able to produce as per part specifications	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 ▶ Knowledge of advanced welding methods ▶ 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
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 despatching of jobs ▶ Estimate & manage to get raw materials and component requirements

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
				▶ Responsible from issue of raw materials to despatch 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/ Electronic Engineering	8 Years with 3 years in a similar role	▶ Knowledge of Installation and commissioning of machines and equipment ▶ 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.	▶ Head of Machinery maintenance including preventive maintenance, repair etc. of machines and equipment ▶ Responsible for Power supply, energy conservation water system in the campus
Senior	B. Tech in	5 Years	▶ Knowledge and experience in tool	▶ CNC machine programming and supervision

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Engineer-Production	Mechanical Engineering		manufacturing, metal cutting through CNC programming and operation ▶ Experience of precision components ▶ Tool assembly ▶ Tool trial	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 ▶ Experience in handling CNC Welding machines ▶ 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
Senior Technician (Electrical maintenance / Mechanical	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

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
maintenance/ tool assembly & manufacturing)				
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 development of course material for long term and short term training and teaching	▶ 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 ▶ Curriculum design ▶ Lecture plans and course material
Senior Engineer-Training	B. Tech. Mechanical or Electronics/	5 Year	▶ Experience with tooling / manufacturing and training in metal cutting / tool engineering / industrial automation	▶ Undertake training courses in manufacturing/ tooling and related courses

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
	Electrical		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	
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- 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 Selection of the 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 Special 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 decentralised 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.

During the study and preparation phase of this DPR, we analysed different governance models for the new TCs. Under Indian law, there are three legal forms that exist for non-profit organisations. Mainly two forms are relevant for the purpose of the TCSP Program.

- Society as per society Registration Act, 1860
- Section 25 companies as per Companies Act, 1956

The two forms mentioned above have distinguishing features as per their respective acts.

Table 16: Comparison of Society Registration Act and Companies Act

Features	Registered Society	Not-for-profit Company u/s 25
Setting up and running cost	Nominal	Comparatively more than the society & trust
Formation	Simple	Takes 2-3 months, required to comply with provisions of Companies Act
Jurisdiction	Registrar of society	Registrar of companies
Meetings	Annual Meeting As per Law. Governing Body meeting as per the rules of Society.	Quite Extensive as per the provision of Company Law
Governance	Vests with governing body as per the rules framed by them. Law specifies no rules & regulation	Vests with Board of directors & management committee. Specific provisions for quorum, adoption, ratification and compliance

Features	Registered Society	Not-for-profit Company u/s 25
Membership transfer	Impossible	Free or control as per desire
Statutory Regulations	Limited	Exhaustive
Transparency	Transparent (As society act is not so exhaustive requiring statutory compliance for each and every step of business operation)	Fully Transparent (The Companies Law is quite exhaustive requires specific compliance in each activity of business operation)
Perception commercial lenders	Less comfortable	More comfortable
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	More secured, as exhaustive provisions in companies act about how the interest of lenders can be secured by distributing the assets of the company in case of liquidation
Accountability	More (Can be established, if the rules, regulation and by-laws of the Society are framed in manner to fix accountabilities)	More, (As per the statutory regulations)
Financial Management & Disclosures	Best practices can be adopted through framing regulations. However, Act doesn't provide anything specific on this	Exhaustive provisions in Companies Act providing for financial management and disclosure policies
Modification of Objects	Easy Legal Procedure	Complicated legal procedure
Penalties	Lesser	Higher
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	Greater degree of control through Auditing framework as per companies Act. E.g. Statutory Audit, tax audit, cost audit etc.
Basic Document	Memorandum of Association Articles of Association with rules & regulations	Memorandum of Association Articles of Association

The Table above outlines difference in the two prominent governance structures. Generally, Companies are construed as more reliable legal entity in the commercial world or to attract private participants because the transparency inherits from the statute itself under which it is incorporated.

However, a society may also bring forward discipline by framing rules and regulations of the society through the governing body. This fact together with the minimal cost of setting up and running and simplicity in its formation makes the society a popular model in the case where purpose is not to finance the cost of the project but optimise the cost and delays.

The existing 18 TCs formed as per society model have made it proven model because of the following facts:

- Very clear cut authority flow and ownership by other GC members and GMs (as permanent member secretary). It instils competition among individual TCs to excel.
- The Incentive schemes work better in small groups (individual TCs). It also allowed better performing and surplus generating TCs to retain surplus fund and deploy them best suited to them.
- Rules and regulation framed by the societies fix the accountability of various authorities in organisation.
- Delegation of financial power has been developed which fix the authority of each of the officer in management body.
- Well established system for procurement is being followed as per GoI guidelines and GFR, 2005
- Matters have been identified on which decision van be taken only by the Governing Body.
- Annual accounts are audited by the statutory auditors well in time and audit report is placed and adopted by the Governing Body in its annual meeting
- Compliance to audit observations are strictly complied with and observed by the O/o DC-MSME

Overall the present system is working well and at this stage raising fund is not the sole purpose, it is recommended to continue with the societies for proposed Visakhapatnam TC with following few minor modifications

- Governing council can make provision for more membership from OEMs
- Provision of membership from state technical University who controls most private Engineering colleges
- One more sector expert in the GC
- GC usually meets once in six months only and it is suggested to have one executive committee or advisory committee consisting of local MSME/Cluster association members,

sector experts and other stakeholders who can meet quarterly and can advise TCs and can also be delegated with powers higher then GMs

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 17: Governing Council of Visakhapatnam TC

Representation in the Governing Council	Suggestive recommendations
(i) Ex-officio members	
Representative from Government of India ▶ Development Commissioner, Ministry of MSME as Chairman, ▶ 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.	▶ Secretary, Industries ▶ Commissioner/Director, 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.	▶ CSIDC ▶ Urla Industrial Association ▶ Chhattisgarh Laghu & Shayak Udyog Sangh (CLSUS)
(iii) Professional and other members	

Representation in the Governing Council	Suggestive recommendations
▶ 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 Visakhapatnam TC

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

Figure 19: Suggestive framework for marketing of TC

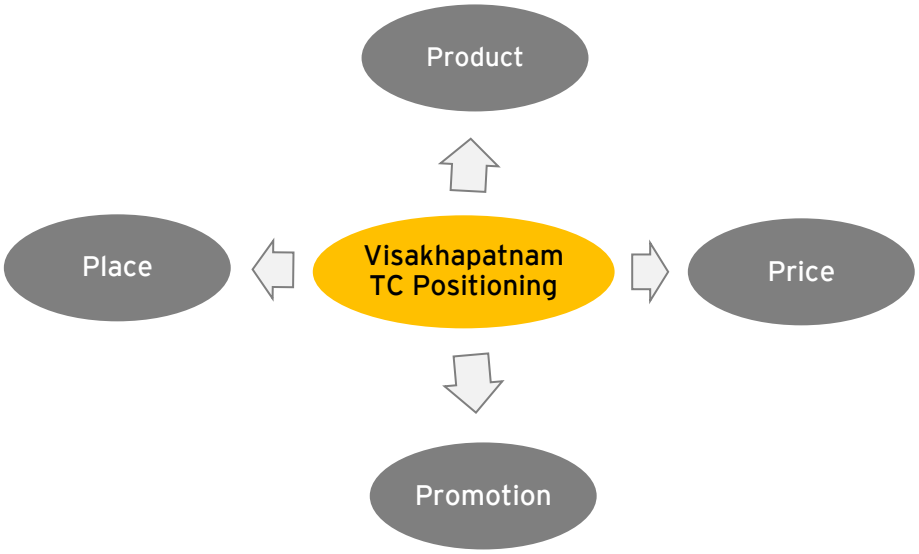
In line with the above suggestive framework, a detailed Go to Market plan of the proposed TC will be prepared subsequently by the Cluster Network Manager (CNM) along with the GM and marketing team of the TC. The role of CNM for marketing would be very crucial and will act as an additional arm of the marketing wing of the proposed TC. It will further strengthen its market linkages with the MSMEs in the cluster it serves. CNM 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, CNM would work closely with MSME clusters in the region to understand their needs and requirements and involve OEMs/ tier 1 player 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 CNM would be part of the consolidation of the results and recommendations of the diagnostic into a strategic plan for cluster development. The CNM would also represent the TC in various industry oriented outreach programmes 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 CNM would promote the TCs in among the newly developed partnerships for mutual benefit around identified programmes / 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 Visakhapatnam TC has been highlighted below:

Figure 20: Positioning of marketing mix for proposed TC



Product
A General Engineering TC is proposed to be developed at Visakhapatnam based on the presence of large engineering focused units (in steel, shipbuilding, power, aluminium etc.), analysis of the industry and market. 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. Further the shortlisted specialisations 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 centre would encourage final year trainees to start their own ventures by providing necessary support like finance, high end machining, availing benefits of Government schemes etc. for a period of 3 years. The summary is provided below: The key offerings of the proposed TC will be; manufacturing of tools, training for skill development with respect to various specialisations, consultancy services in general engineering. Focus areas would include: ▪ Manufacturing of tools for general engineering ▪ Long and short term training programmes in CNC/ CAD/CAM, advance welding, industrial

and process automation etc.

- Consultancy services in the field of product and tool design, manufacturing etc. for improved quality and productivity.
- Incubation support to the trainees/budding entrepreneurs for their start-up ventures

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 will strengthen 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 CNM

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 Visakhapatnam 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 this 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 Visakhapatnam 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
Visakhapatnam is strategically located with easy access to the Bay of Bengal and South East Asian economies. There is a large market of shipbuilding and steel works in the area with several large industrial units in steel, welding, fabrication, tool design, aluminium sectors in the region.

As a part of developing the go to market plan GM would work with the CNM, 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 CNM, 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 18: Suggestive marketing activities, ownership and timeline

Phases	Activity	Ownership	Timeline
Preparation of promotional	• Designing brochure of TC (through outsourcing) • Short video film of TC infrastructure and facilities available (through outsourcing- post	Marketing team, GM and CNM	Construction and Post construction

Phases	Activity	Ownership	Timeline
materials	completion of the infrastructure/construction) • Development of TC website (through outsourcing)		phase
Pre marketing activities	• Preparing list of industrial association bodies in the Visakhapatnam 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.	CNM 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 Visakhapatnam TC with respect to manufacturing of tools etc. • Send representatives to get the filled questionnaire or fill the questionnaire circulated earlier. • 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.	GM, Manager Marketing, CNM and TP	During installation and commissioning of machines for manufacturing
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	GM, Manager Marketing, CNM and TP	During installation and commissioning

Phases	Activity	Ownership	Timeline
	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 Visakhapatnam 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		
Targeting technical and vocational training institutes and high schools	• Meet the principle/ HoD of the institutes and present on the capability statement of Visakhapatnam 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. • Organise as well as participate in industry oriented outreach programmes/ seminars/ workshops/ boot camps etc.	Marketing team (GM) and CNM	During installation and commissioning of machines for training

Focus Area for Visakhapatnam TC

10. Focus area for Visakhapatnam TC

The proposed TC in Visakhapatnam will be focused on General Engineering with facilities such as; production, training and consultancy services. 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 partner for finalisation and to initiate procurement. The budgetary cost (landed cost) of these machines is approximately estimated at around INR 24.70 Cr. Emphasis on fabrication techniques will be implemented in the new TC along with welding and metallurgy Labs. In addition, the TC is proposed to be a major technical centre for testing and calibration services offered to SMEs and OEMs subsequently. The TC intends to become one of the forefront testing institutes in the state and possibly the country by offering the latest testing equipment. Certifications provided by the TC would be recognised by all associations and companies in the country. 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 19: Proposed list of machines for production/ manufacturing activities

S. N.	Machine	Size	Number	Value (lacs)	Total Cost
1	CNC Milling-5axis	1.2m*.8m*.8m	1	200	200
2	CNC Milling-3axis	1.2m*.8m*.8m	1	100	100
3	CNC Milling-3 axis	.8m*.6m* .45m	3	50	150
4	Horizontal Machining Centre	1.5m*1.5m*1m	1	150	150
5	CNC Milling-3 Axis (Pattern Making)*	.8m*.6m* .45m	1	50	50
6	CNC Lathe	400*1500	1	35	35
7	Turn Mill Centre	300*600	1	50	50
8	Conventional Milling	1200*300*400	2	25	50
9	Conventional Lathe	400*1200	2	20	40
10	Wire EDM	500*500*400 mm	1	100	100
11	EDM Die Sinking	500*500	1	100	100
	Radial drill machine	63mm			

S. N.	Machine	Size	Number	Value (lacs)	Total Cost
12			1	10	10
13	CNC 5-Axis Plasma Cutter	62*62*45.5 mm	1	25	25
14	3D Scanner	2500 mm (0.048 mm accuracy)	1	10	10
15	Surface Grinding Large	1000x600	1	50	50
16	Surface Grinding Medium	800x400	1	30	30
17	Cyl. Grinding	200mm*750mm	1	40	40
18	Toolings & Tooling Systems 10%		1	115	116
19	Hydraulic press	100 Tonnes	1	50	50
20	Mechanical press	100 Tonnes	1	40	40
21	Injection Moulding machine	200 tonne	1	50	50
22	Assembly Benches & Fixtures		1 Set	10	10
23	Auxilliary Equipts (Drill m/c, pedestrial grinder, trollies etc.)		1 Set	20	20
24	Compressor (approx. 250 CFM) Including piping and accessories		2	15	30
25	CNC CMM	1000*600mm	1	100	100
26	Metrology Lab Equipment		1 Lot	100	100
27	Chemical & Metallurgical Test Labs		1 Each	100	200
28	Calibration Equipment		1 Set	100	100
29	Welding Workshop incl. Testing Eqpt.		1 Set	50	50
30	CAD/CAM Softwares CATIA, UG etc		10 Seats	2	20
31	Heat Treatment System		1	200	200
32	Heat Treatment Plants Toolings & Tooling Systems 10%	6	1	60	60
33	Drafting/Printing		1	5	5
34	Workstations		10	1	10
	Misc. and Contingency 5%				118
	Total				2,469

10.2 Training

The TC at Visakhapatnam will provide professional training in various general engineering courses with focus on fabrication techniques by offering advanced welding courses. The TC will be able to produce highly skilled technical workforce, with greater career prospects in the General engineering industry. The duration of courses will be both short and long term, ranging from 2 weeks to 48 months in various specialisations like; Tool Room & CNC Manufacturing, CAD/ CAM, Advance Welding , Earthmoving Equipment Maintenance Training, Electronics and IT, Industrial and process Automation (Robotics), Training on Testing and calibration, etc. A key focus area, apart for fabrication, is to skill workers in quality testing of finished products. The batch sizes, number of batches per annum and respective fees have been decided on the basis of capacity of existing TCs and NCVT norms. A soft skill lab will be established in the TC that will focus on training in English language and communication facilities. 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 specialisations. The total capacity intake is expected to reach approximately 8,500 trainees over 5 years. The detail of courses in various specialisations is given below:

Table 20: Details of specialisation, courses, duration and capacity intake

No.	Specialisation	Course name	Duration (months)	Batch size	No. of Batch/ year	Annual intake
1	Tool Room & CNC Manufacturing, CAD/ CAM	Advanced Diploma in Tool & Die making	48	60	1	60
		Certificate course in Machinist	24	30	1	30
		Post Diploma in Tool Design	12	30	2	60
		Post Diploma in Tool Manufacturing	12	30	2	60
		Post Diploma in CNC-Prog & Op	12	30	2	60
		Master of CAD/CAM/CNC	6	30	4	120
2	Maintenance	Machine Maintenance-mech	3	20	4	80
		Maint. Technician	3	20	4	80
		Machine Maintenance-mech (Part Time)	6	20	2	40
		Maint Technician (Part Time)	6	20	2	40
3	CNC Manufacturing,CAD/	CNC lathe programming and operation (Full Time)	2	30	12	360

No.	Specialisation	Course name	Duration (months)	Batch size	No. of Batch/ year	Annual intake
	CAM	CNC lathe programming and operation (Part Time)	4	30	12	360
		CNC Milling Prog and Operation (Full Time)	2	30	12	360
		CNC Milling Prog and Operation (Part Time)	4	30	12	360
		CAD/CAM/CNC Programming (Full Time)	2	30	12	360
		CAD/CAM/CNC Programming (Part Time)	4	30	6	180
		CAD Modelling with different softwares (Full Time)	1	30	24	720
		CAD Modelling with different softwares (Part Time)	2	30	24	720
		Computer Integrated Manufacturing (CIM)	1	30	24	720
4	Advance Welding	Basic Arc and Gas welding (Full Time)	3	20	4	20
		Basic Arc and Gas welding (Part Time)	6	20	4	80
		TIG welding (Full Time)	1.5	10	4	10
		TIG welding (Part Time)	3	10	8	60
		MiG welding (Full Time)	1.5	10	8	10
		MiG welding (Part Time)	3	10	8	60
		Spot Welding (Full Time)	1.5	10	2	10
		Spot Welding (Part Time)	3	10	4	10
		Stainless Steel & Alluminium welding (Full Time)	1.5	10	2	10
		Stainless Steel & Alluminium welding (Part Time)	3	10	4	10
		Welding-NCVT	12	20	1	20
		Robotic Welding system	0.5	5	24	120

No.	**Specialisation**	Course name	Duration (months)	Batch size	No. of Batch/ year	Annual intake
5	Maintenance training	Electro-Mechanical Maintenance	3	20	4	80
		Diesel Engine Maintenance	3	20	4	80
6	Electronics and IT	Basic computer and Hardware (4 hours per day)	2	20	20	400
		Advanced Hardware & Networking (4 hours per day)	4	10	10	100
		Solar energy system technician	3	12	4	48
		Power plant instrument mechanic	3	12	4	48
7	Industrial and process Automation	Industrial Hydraulics	1	20	12	240
		Industrial pneumatics	1	20	12	240
		PLC Programming	1	20	12	240
		Automation Technician	4	20	3	60
		Process automation design	4	20	3	60
		Diploma in Mechatronics	36	60	1	180
8	Training on Testing	Chemical testing: Analysis of Metal and Non Metal, Coal, Cement etc.	4	20	12	240
		Mechanical: Physical Properties of metal and Non Metal product/material	4	20	12	240
		Metallurgical Testing	4	20	12	240
		Electrical	4	20	12	240
						7,926

Table 21: Details of courses

No.	Specialisation	Course name	Fee/ student (INR)	Annual Intake	Minimum Qualification	Classrooms		Laboratories		Workshops	
						Number	Area	Number	Area	Number	Area
1	Tool Room & CNC Manufacturing, CAD/ CAM	Advanced Diploma in Tool & Die making	1,60,000	120	10th Pass	4	300	3	162	1	756
		Certificate course in Machinist	30,000	240	10th Pass	2	150				
		Post Diploma in Tool Design	50000	60	Dip/Degree			1	54		
		Post Diploma in Tool Manufacturing	50000	60	Dip/Degree			1	54		
		Post Diploma in CNC-Prog & Op	25000	60	Dip/Deg			1	54		
		Master of CAD/CAM/CNC	15000	120	Degree			1	54		
		Machine Maintenance-mech	10000	80	Diploma			1	54		
		Maint Technician	18000	80	ITI-FIT/TUR/Mach			1	54		
		Machine Maintenance-mech (Part Time)	12000	40	Diploma						
		Maint Technician (Part Time)	9,000	40	ITI-FIT/TUR/Mach						
		CNC lathe programming and operation (Full Time)	9000	360	ITI	1	75	2	108	1	756
		CNC lathe programming and operation (Part Time)	10000	360	Pursuing ITI/Industrial workers						

No.	Specialisation	Course name	Fee/ student (INR)	Annual Intake	Minimum Qualification	Classrooms		Laboratories		Workshops	
		CNC Milling Prog and Operation (Full Time)	10000	360	ITI			2	108		
		CNC Milling Prog and Operation (Part Time)	10000	360	Pursuing ITI/Industrial workers						
		CAD/CAM/CNC Programming (Full Time)	10000	360	DIP/Deg			2	108		
		CAD/CAM/CNC Programming (Part Time)	12000	180	Pursuing DIP/Degree/Working						
		CAD Modelling with different softwares (Full Time)	6000	720	DIP/Deg			2	108		
		CAD Modelling with different softwares (Part Time)	7000	720	DIP/Deg						
		Computer Integrated Manufacturing (CIM)	7000	720	Deg						
2	Advance Welding	Basic Arc and Gas welding (Full Time)	10000	80	10th	1	75			1	756
		Basic Arc and Gas welding (Part Time)	12000	80	Pursuing ITI/Industrial workers						
		TIG welding (Full Time)	5000	40	ITI/Basic course						
		TIG welding (Part Time)	6000	80	Pursuing ITI/Industrial workers						

No.	Specialisation	Course name	Fee/ student (INR)	Annual Intake	Minimum Qualification	Classrooms		Laboratories		Workshops	
		MiG welding (Full Time)	5000	80	ITI/Basic course						
		MiG welding (Part Time)	6000	80	Pursuing ITI/Industrial workers						
		Spot Welding (Full Time)	7000	20	ITI/Basic course						
		Spot Welding (Part Time)	8000	40	Pursuing ITI/Industrial workers						
		Stainless Steel & Aluminium welding (Full Time)	7000	20	ITI/Basic course						
		Stainless Steel & Aluminium welding (Part Time)	8000	40	Pursuing ITI/Industrial workers						
		Welding-NCVT	24000	20	10th						
		Robotic Welding System	3000	120	Industrial workers/ITI graduate						
3	Maintenance training	Electro-Mechanical Maintenance	15,000	80	ITI						
		Diesel Engine Maintenance	15,000	80	ITI						
4	Electronics and IT	Basic computer and Hardware (4 hours per day)	8,000	480	10th/ITI/12th	1	75	2	108		
		Advanced Hardware & Networking (4 hours per day)	12,000	320	12th/DIP/Degree						

No.	Specialisation	Course name	Fee/ student (INR)	Annual Intake	Minimum Qualification	Classrooms		Laboratories		Workshops	
		Solar energy system technician	8,000	48	ITI Electrician/ Electronics			1	54		
		Power plant instrument mechanic	8,000	48	ITI Electrician/ Electronics			1	54		
5	Industrial and process Automation	Industrial Hydraulics	6,000	120	ITI/Dip/Deg	1	75	1	54		
		Industrial pneumatics	6,000	240	ITI/Dip/Deg			1	54		
		PLC Programming	6,000	240	Dip/Deg			2	108		
		Automation Technician	12,000	240	ITI			1	54		
		Process automation design	15,000	60	Dip/Deg						
		Diploma in Mechatronics	1,20,000	180	10th	1	75	2	108		
6	Training on testing	Chemical testing: Analysis of Metal and Non Metal, Coal, Cement etc.	8000	240	ITI/Dip/Deg	1	75	1	54		
		Mechanical: Physical Properties of metal and Non Metal product/material	8000	240	ITI/Dip/Deg			1	54		
		Metallurgical Testing	8000	240	ITI/Dip/Deg			1	54		
		Electrical	5000	240	ITI/Dip/Deg						
		Total		**8,816**		**13**	**975**	**32**	**1782**	**3**	**2268**

The TC will have adequate installed capacity of infrastructure like machines, software, computers etc. required to provide training to the proposed student capacity under various specialisations. The estimated cost of these machines is approximately INR 30.92 Cr. The following table provides the details of the same;

Table 22: Proposed list of machines for training

S.No.	Training Machines	Nos	Value (lakhs)	Total
1	Con-Milling-V-H-U	20	10	200
2	Con-Lathe	20	5	100
3	Surface Grinding	10	5	50
4	Cyl-grinding	5	10	50
5	Pedestal Grinding	10	1	10
6	Drills	15	1	15
7	Tool & Cutter Grinder	1	20	20
8	Work benches	30	0.33	10
9	CNC-Milling	15	30	450
10	CNC -Lathe	15	20	300
11	Wire EDM	1	25	25
12	EDM Die Sinking	1	40	40
13	Tooling & Tooling System			125
14	CNC-Simulation Modules	30	2	60
15	Computers+ (for CAD/CAM)	600	0.5	300
16	CAD/CAM software Licence	300	0.3	90
17	CMM+ metrology lab equipment	1	50	50
18	Welding workshop for 24 including simulator and Testing	2	100	200
19	Welding QC Lab incl. Radiographic Testing	1	50	50
20	Earth Moving Equipment Maintenance Lab	1	150	150
21	3 D Plastic Additive Manufacturing Machine	1	5	5
22	Tech aids (Audio Visual)	30	1	30
23	Tech aids (Smart Board)	10	1	10

S.No.	Training Machines	Nos	Value (lakhs)	Total
24	Solar Energy Lab	1	20	**20**
25	Basic Instrumentation Lab	1	25	**25**
26	Basic automation Lab for 20	1	200	200
27	Advance (Mining & Mineral) Automation lab (for 20)	1	250	250
28	Furniture of Labs	30	1	30
29	IT Hardware & Networking labs (2 labs)	40	1	40
30	Classroom Furniture @ 60 seats	8	5	40
	Misc, Unforseen & Contigency 5%			147
	Total			**3,092**

10.3 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, the Visakhapatnam 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 TP 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
- Maintenance support to institutes like ITIs, polytechnics and specialised machines of MSMEs
- Curriculum development, Course material development and lesson plan to ITIs, Polytechnic, Community Colleges and other institutes
- Trainers training to ITI, Polytechnic and Community Colleges
- Lean manufacturing
- Designing of Automation solutions
- Seminars/Workshops for MSMEs, Colleges
- Support to Community College of central university
- Business incubation services
- Other consulting projects

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, analysis software and 3D printing. 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 23: Areas of consulting and estimated revenue

S. No.	Consulting Areas	Suggestive Rev Year2	Suggestive Rev Year3	Suggestive Rev Year4	Suggestive Rev Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
						30%	30%	30%	30%	30%
		(2017-18)			50%					
1.	Design Support	48,48,000	77,56,800	96,96,000	1,16,35,200	1,35,74,400	1,49,31,840	1,64,25,024	1,80,67,526	1,98,74,279
2.	Product Design									
3.	Engineering Solutions	6,00,000	7,80,000	10,14,000	15,21,000	21,29,400	29,81,160	41,73,624	58,43,074	81,80,303
4.	Quality System Support	-	12,00,000	18,00,000	27,00,000	37,80,000	52,92,000	74,08,800	1,03,72,320	1,45,21,248
5.	Project Consultancy (curriculum devlop, community colleges, trainers etc.)	-	12,00,000	36,00,000	54,00,000	75,60,000	1,05,84,000	1,48,17,600	2,07,44,640	2,90,42,496
6.	Productivity Club	-	3,00,000	4,50,000	6,75,000	9,45,000	13,23,000	18,52,200	25,93,080	36,30,312
7.	Other									

	Consulting assignments	10,00,000	15,00,000	22,50,000	33,75,000	47,25,000	66,15,000	92,61,000	1,29,65,400	1,81,51,560
Total			**64,48,000**	**1,27,36,800**	**1,88,10,000**	**2,53,06,200**	**3,27,13,800**	**4,17,27,000**	**5,39,38,248**	**7,05,86,040**

*The suggestive revenue from design support during 2017-18 has been estimated on the basis of usage of CAD Software like CATIA, UG 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 @ 80%, the revenue from this stream during one shift of operation is estimated to be around 10*8*80%*200 = INR 12,800. Assuming 25% capacity utilisation for 300 days during 2nd year (2017-18), the total estimated revenue from CAD Software like CATIA, UG packages is INR 9.6 lakhs. Similarly, revenue assumptions from other engineering analysis software like ANSYS, mouldflow, autoform, etc. has been estimated to be around INR 48,000. Hence, the total estimated revenue from design support is around INR 10.08 lakhs for year 2017-18.

Table 24: Proposed areas of consulting

Consulting Stream	Focus Area (Recommended)
Design Support (incl. Product Design)	▶ Tool design in the field of sheet metal, press tool and plastic moulds. ▶ 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
Productivity Club	▶ To handhold MSMEs in improving productivity on a long term basis (1-3 years) on a membership basis
Low cost Automation Solution support	▶ Solutions to automate process for increasing efficiency at various stages of manufacturing

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

Table 25: Estimated revenue from consulting

Consulting Stream	Approximated Revenue Estimation
Design Support (incl. Product Design)	▶ 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 25% capacity. The installed capacity assumed to be 80% running for 300 days a year. Therefore the calculation would

Consulting Stream	Approximated Revenue Estimation
	be, 25%*[(10*200*8*300)*80%] = INR 9,60,000 per year ► Revenue from other Engg. Analysis software like ANSYS, mouldflow, autoform etc. estimated to be INR 48,000
Engineering Solutions	Rate of INR 250/hr with an estimation of minimum requirement 100 hours per product. We have estimated initially at least 2 products per month. Therefore, 2*250*100 = INR 50,000/month (50,000*12=6,00,000/year)
Quality System Support	Estimated rate of INR 50,000 per unit. We have estimated serving atleast 1 unit a month initially. Therefore, 50,000*12 = INR 6,00,000/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 5-6 assignment per year
Productivity Club	To start with, fee of INR 20,000 per from 30 units per year. Therefore, 30*20,000 = INR 3,00,000
Low cost Automation Solution support	To start with, fee of INR 1,00,000 per from 5 units per year. Therefore, 5*1,00,000 = INR 5,00,000

10.4 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 TP 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.

10.5 Technology collaboration

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

- The TP 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 over a period of six years. The Technology Partner (TP) 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 TP 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 TP, empowered by global networks and people.

- The CNM will be appointed for a period of six years to facilitate cluster and market development to realise improved competitiveness. The CNM will work closely with the MSME clusters to understand their needs and requirements and get OEMs/ buyers involved in the program. The CNM 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. The CNM 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 labor 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 CNM 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 CNM, empowered by global networks and people.

10.6 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

10.6.1 Entrepreneur Development Cell at Visakhapatnam TC

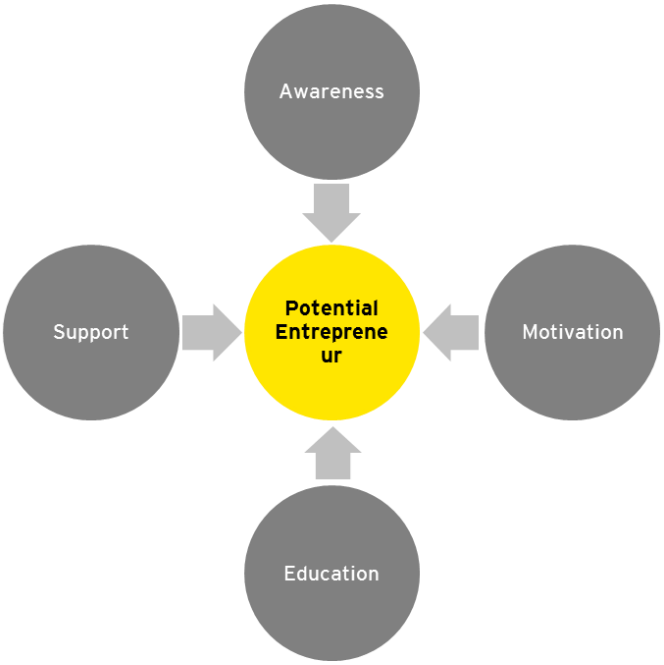
Entrepreneur cell at the TC shall consist of student and faculty (in house and visiting), adapt a systematic approach to guide students to become a leader to take global challenges and opt for self-employment. Following activities shall be taken up by the entrepreneur cell to accomplish its vision.

- 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 Noida) etc. to promote entrepreneurship. A close link will be made with leading bank and DIC/industry department to support the ecosystem.

Figure 21: Key areas of incubation support



Quality System

11. Quality system

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

Table 26: 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 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 systems and help organizations achieve better occupational health and safety performance and economic objectives
ISO/IEC	Chemical	▶ Is an internationally-applied British Standard for testing and

Name of certification	Area	Details
17025:2005	Testing Standard	calibration ▶ It covers testing and calibration performed using standard methods, non-standard methods, and laboratory-developed methods

- 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 Visakhapatnam 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 (attached as Annexure 18.6 for reference) in view of the same. Also leading practises form international training institutes have also been considered. The TC will be built on area of around 25 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 production activities. Depending on the space required by the machines, the area for manufacturing 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 which can be accessed by industry directly.
- **Training Block:** This area will have classrooms, labs, conference hall, faculty rooms 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.
- **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 –mechanical and electrical, electrician, store keeper 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 27: Details of proposed infrastructure

Details	Nos.	Total Area (Sq. mt.)
Production Block		**4,500**
Stores		200
Disposal yard		150
Trial Room		250

Details	Nos.	Total Area (Sq. mt.)
Heat Treatment		200
Tool Assembly		700
Machine Shop		2000
Metrology & Inspection		500
Production Office (Cabins, Documentation & others)		250
Design Office		200
Toilet Block		50
Training Block		**5,773**
Sr. Manager/HoD Room	1	54
Training Office		
Manager Room	1	54
Reception & Counselling		108
Faculty Room		216
Library with facility	1	108
Multi-purpose hall for examination/drawing/reading room	1	216
Classrooms	13	750
Labs	32	1,674
Workshops, including incubation centre	3	2,568

Details	Nos.	Total Area (Sq. mt.)
Toilet		150
Admin Block		**624**
GM Office & Sect		108
DGM Office		54
Purchase Officer cabin		54
Accounts cabin		
HR & Admin		
Marketing		54
Reception Area		108
Placement Cell with VC		54
Record Room		54
IT Dept/Server Room		54
Sr. Manager& Manager Admin Cabin		54
Toilet Block		30
Conference Rooms		**638**
Conference Hall 1 (for 30 people)	1	108
Conference Hall 2 (for 150 people)	1	400
Toilet		30
Lunch Area		100
Others		**1,805**
Dining Area (incl kitchen, toilet, store etc.)		300
Canteen (incl. toliets,kitchen,store etc.)		1,200

Details	Nos.	Total Area (Sq. mt.)
Parking		
Utilities Room - DG Set, Transformer, UPS		250
Security Room (incl toilet)		30
Bank Counter		25
Total		**13,340**

- **Hostel and staff accommodation:** The hostel block will comprise of accommodation for students enrolled under fulltime courses along with the hostel warden. Based on calculations, it has been estimated that around 1,649 trainees will be in fulltime courses at any given point of time. Further, on the basis of study conducted and discussions with heads of some of the existing MSME TCs, the provisioning of hostel facility has been done for approximately 25% of the above mentioned capacity. Therefore, it is proposed to develop the hostel capacity for around 412 trainees and out of which 15% (around 64) 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 28: Details of proposed infrastructure for hostel, staff quarters and guest house

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	240	8	1920
Hostel No.2	Boys	G+3	4	120	10	1200

Hostel No.3	Girls	G+3	3	64	10	640
Total						**3,760**

		Number	**Area (sq mtrs)**
Staff Qtrs	**G+2 (60sqmt/quarter)**		
	150	**2**	300
	100	8	800
	Total	10	1100

Guest House	250 Sqt Meter (4 Room 20 sqm +120 Hall +25% extra)	1	250

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 appointment of CMC for development of the campus for TC.

As per the details of proposed infrastructure given in above two tables, the construction of the Visakhapatnam TC will include development of 18,450 {13,340+ 3,760+1,350 (staff Quarters and Guest house)} square metre of built up area in total. Per square metre cost of construction has been estimated to be INR 22,000. Further, the tentative cost for development of underground water tank, rain water harvesting system, storm water drainage network, water treatment plant, sewage treatment plant, street lighting, development of internal roads, and landscaping and grey water treatment plant for entire campus has been estimated to be around INR 400 lakhs. Towards development of boundary wall an estimated cost of INR 100 lakhs has been provisioned. The detail for development of campus infrastructures is as follows;

Table 29: Cost for development of campus infrastructures

SN	Hostel	Cost (in INR lakh)
1.	Cost of development of build-up area @ 22,000 per sq. mt. for 18,450 sq. mt.	4,059
2.	Underground water tank, rain water harvesting system, storm water drainage network, water treatment plant, sewage treatment plant, street lighting, development of internal roads, landscaping and grey water treatment plant and boundary wall	400
3.	**Total**	**4,459**
4.	Contingency @ 5%	223
	Grand total	**4,682**

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

Table 30: 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	400	0.25	100
3	Canteen and Hostel Dining hall furniture	20	0.6	12
4	Kitchen equipment	2	20	40
5	Other Office equipment	50	1	50
6	Laptop	20	0.6	12
7	Desktop	40	0.5	20

SN	Other Infrastructure	Nos.	Budgeted Cost (INR lakhs)	Total Cost (INR lakhs)
8	Photocopier cum printer	3	2	6
9	Vehicle	2	12.5	25
10	AC Plant 100 Tons		25	25
11	Electrical Bus Bar		20	20
12	Transformer @2000KVA			20
13	DG Set @ 500KVA			40
14	UPS (for training & production)			25
15	Preliminary expenses	1	40	40
16	Others (Miscellaneous)	1	50	50
	Contigency 5%			25.75
	Total			**540.75**

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 may 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

Total capital expenditure will be to the tune of around INR 10,829 Crore for setting up of new TC at Visakhapatnam. Summary of the Capital Expenditure is provided as below:

Table 31: Capital expenditure

Capex(Inc. Contingency @5%)	Cost (INR Lakhs)
Production Machinery and equipment	2,404
Training machines and equipment	2,970
Other infrastructure	515
Building and construction	4,682
Pre-Operative Expenses	258
Total Capex including contingency	10,829

13.1.1 Plant and machinery

Total expenditure on machines to the tune of around INR 5,576 lakhs is envisaged for the setting up of new TC at Visakhapatnam.

Table 32: Plant & Machinery

Capex	INR Lakhs
Total Plant and Machinery including Contingency @ 5% of capex	5,632

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

- Technology workshop at Bhubaneswar; 2 day detailed sessions led by Dr. Clive Hickman on 'Future Manufacturing Technology Trends',
- Market opportunity assessment by EY team
- 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 Land & building cost

Visakhapatnam has around 25 acres of land available for setting up of the facility of the TC.

Table 33: Land & building cost

SN	Hostel	Cost (in INR lakh)
1.	Cost of development of build-up area @ 22,000 per sq. mt. for 21,318 sq. mt.	4,059
2.	Underground water tank, rain water harvesting system, storm water drainage network, water treatment plant, sewage treatment plant, street lighting, development of internal roads, landscaping and grey water treatment plant and boundary wall	400
3.	**Total**	**4,459**
4.	Contingency @ 5%	223
5.	**Grand total**	**4,682**

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**
- 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 34: 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 Visakhapatnam. There will be 60 employees on regular contract and ~ 170 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 35: 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 Prdnn. & Admin. Exps	%of income	8%
Insurance cost (New P&M)	% of P&M	0.5%
Marketing expenses (1st year)	Rs. Lakhs p.a	25
Marketing expenses (2 year onward)	Rs. 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 36: Manpower and salary assumptions

Top Management	Designation	Monthly salary (INR)	Year											
			Apr-15	Apr-16	Apr-17	Apr-18	Apr-19	Apr-20	Apr-21	Apr-22	Apr-23	Apr-24	Apr-25	Apr-26
	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

Top Management	Designation	Monthly salary (INR)	Year											
Production	Senior Manager	86,857		1	1	1	1	1	1	1	1	1	1	1
	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

Top Management	Designation	Monthly salary (INR)	Year											
	Manager Electronics	82,777			1	1	1	1	1	1	1	1	1	1
	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
	Officer Sales	35,744			1	1	1	1	1	1	1	1	1	1
Total (Mgt & Support staff)			**1**	**19**	**41**	**51**	**56**	**58**	**58**	**58**	**58**	**58**	**58**	**58**
Number of employees on temporary contract														
	Training	15,000	-	3	21	44	75	108	119	131	144	151	159	159
	Contractual Employees (Production)	10,000			4	10	10	10	12	12	12	12	12	12
employees on temporary contract				3	25	54	85	118	131	143	156	163	171	171

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 2015-2016. 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 37: Key assumptions

Start of Project	1-Mar-15
Construction period (Months)	15
Commencement of operation, date	1-May-17
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 38: Production assumptions

Sr. No.	Machine	Estimated Machine Rate/Hour*	Shift	Hours
1.	CNC Milling-5axis	3000	3	24
2.	CNC Milling-3axis	1500	3	24
3.	CNC Milling-3 axis	800	3	24
4.	Horizontal Machining Centre	2200	3	24
5.	CNC Milling-3 Axis (Pattern Making)*	800	3	24
6.	CNC Lathe	525	3	24
7.	Turn Mill Centre	800	3	24
8.	Conventional Milling	400	3	24
9.	Conventional Lathe	300	3	24
10.	Wire EDM	1500	3	24
11.	EDM Die Sinking	1500	3	24
12.	CNC 5-Axis Plasma Cutter	500	3	24

Sr. No.	Machine	Estimated Machine Rate/Hour*	Shift	Hours
13.	3D Scanner	1500	2	16
14.	Radial drill machine	150	2	16
15.	Surface Grinding Large	800	2	16
16.	Surface Grinding Medium	450	2	16
17.	Cyl Grinding	600	2	16
18.	Hydraulic press	800	2	16
19.	Mechanical press	600	2	16
20.	Injection Moulding machine	750	2	16
21.	CNC CMM	1500	2	16
22.	Metrology Lab Equipment	800	2	16
23.	Chemical and Metallurgical Test labs	3000	2	16
24.	Calibration Equipment	3000	2	16
25.	Welding Workshop incl. Testing Eqpt	750	2	16
26.	Heat Treatment Systems (yearly revenue)	31,20,000		

Machine utilisation	Year	
2nd year of production	2018-19	25%
3rd year of production	2019-20	40%
4th year of production	2020-21	50%
5th year of production	2021-22	60%
6th year of production	2022-23	70%
year on increase in machine utilisation 7th year onwards	2023-24	10%

- **Training revenue assumptions**

Table 39: Training revenue assumptions

No.	Specialisation	Course name	Duration (months)	Fee/ student (INR)	No. of batches / year	Batch size
1	Tool Room & CNC Manufacturing, CAD/ CAM	Advanced Diploma in Tool & Die making	48	1,40,000	1	60
		Certificate course in Machinist	24	40,000	1	30
		Post Diploma in Tool Design	12	50000	2	30
		Post Diploma in Tool Manufacturing	12	50000	2	30
		Post Diploma in CNC-Prog & Op	12	25000	2	30
		Master of CAD/CAM/CNC	6	20000	4	30
2	Maintenance	Machine Maintenance-mech	3	15000	4	20
		Maint Technician	3	10000	4	20
		Machine Maintenance-mech (Part Time)	6	18000	2	20
		Maint Technician (Part Time)	6	12000	2	20
3	CNC Manufacturing,CAD/ CAM	CNC lathe programming and operation (Full Time)	2	9000	12	30
		CNC lathe programming and operation (Part Time)	4	10000	12	30
		CNC Milling Prog and Operation (Full Time)	2	10000	12	30
		CNC Milling Prog and Operation (Part Time)	4	10000	12	30
		CAD/CAM/CNC ENGINEER (Full Time)	2	10000	12	30
		CAD/CAM/CNC ENGINEER (Part Time)	4	12000	6	30

No.	Specialisation	Course name	Duration (months)	Fee/ student (INR)	No. of batches / year	Batch size
		CAD Modelling with different softwares (Full Time)	1	6000	24	30
		CAD Modelling with different softwares (Part Time)	2	7000	24	30
		Computer Integrated Manufacturing (CIM)	1	7000	24	30
4	Advance Welding	Basic Arc and Gas welding (Full Time)	3	10000	4	20
		Basic Arc and Gas welding (Part Time)	6	12000	4	20
		TIG welding (Full Time)	1.5	5000	4	10
		TIG welding (Part Time)	3	6000	8	10
		MiG welding (Full Time)	1.5	5000	8	10
		MiG welding (Part Time)	3	6000	8	10
		Spot Welding (Full Time)	1.5	7000	2	10
		Spot Welding (Part Time)	3	8000	4	10
		Stainless Steel & Aluminium welding (Full Time)	1.5	7000	2	10
		Stainless Steel & Aluminium welding (Part Time)	3	8000	4	10
		Welding-NCVT	12	24000	1	20
		Robotic Welding System	0.5	3000	24	5
5	Maintenance training	Electro-Mechanical Maintenance	3	15000	4	20
		Diesel Engine Maintenance	3	15000	4	20

No.	Specialisation	Course name	Duration (months)	Fee/ student (INR)	No. of batches / year	Batch size
6	Electronics and IT	Basic computer and Hardware (4 hours per day)	2	8000	20	20
		Advanced Hardware & Networking (4 hours per day)	4	12000	10	20
		Solar energy system technician	3	8000	4	12
		Power plant instrument mechanic	3	8000	4	12
7	Industrial and process Automation (Mining & Mineral Processing)	Industrial Hydraulics	1	6000	12	20
		Industrial pneumatics	1	6000	12	20
		PLC Programming	1	6000	12	20
		Automation Technician	4	12000	3	20
		Industrial automation design	4	15000	3	20
		Diploma in Mechatronics	36	120000	1	60
8	Training on Testing	Chemical testing: Analysis of Metal and Non Metal, Coal, Cement etc.	4	8000	12	12
		Mechanical: Physical Properties of metal and Non Metal product/material	4	8000	12	12
		Metallurgical Testing	4	8000	12	12
		Electrical	4	5000	12	12

No.	Specialisation	Course name	Duration (months)	Fee/ student (INR)	No. of batches / year	Batch size
		Total			372	1,049

- **Consultancy revenue assumptions**

Revenue from consultancy is expected to start in 2nd year of operation i.e. 2018-19 when the TC is fully operational and all infrastructures are in place.

Table 40: Consultancy revenue assumptions

SN	Consulting Areas	Year2	Year3	Year4	Year5	Year 6	Year 7	Year 8	Year 9	Year 10
					50%	40%	40%	40%	40%	40%
1.	Design Support	48,48,000	77,56,800	96,96,000	1,16,35,200	1,35,74,400	1,49,31,840	1,64,25,024	1,80,67,526	1,98,74,279
2.	Product Design									
3.	Engineering Solutions	6,00,000	7,80,000	10,14,000	15,21,000	21,29,400	29,81,160	41,73,624	58,43,074	81,80,303
4.	Quality System Support	-	12,00,000	18,00,000	27,00,000	37,80,000	52,92,000	74,08,800	1,03,72,320	1,45,21,248
5.	Project Consultancy (curriculum devlop, community colleges, trainers etc.)	-	12,00,000	36,00,000	54,00,000	75,60,000	1,05,84,000	1,48,17,600	2,07,44,640	2,90,42,496
6.	Productivity Club	-	3,00,000	4,50,000	6,75,000	9,45,000	13,23,000	18,52,200	25,93,080	36,30,312
7.	Other Consulting assignments	10,00,000	15,00,000	22,50,000	33,75,000	47,25,000	66,15,000	92,61,000	1,29,65,400	1,81,51,560
Total		64,48,000	1,27,36,800	1,88,10,000	2,53,06,200	3,27,13,800	4,17,27,000	5,39,38,248	7,05,86,040	9,34,00,198

14.1.2 Project cost and financing

The project construction will be undertaken in a phased manner. The initial phase will be of about 7 months and final phase will be of about 8 months. Phase 1 is expected to be completed in 2015-16, while phase 2 is expected to get completed by 2016-17. In the initial phase, construction of infrastructure for basic training courses is planned along with procurement of basic machines.

Table 41: Project cost and financing

Project cost and phasing		In lakhs
Particulars	2015-16	2016-17
Project Cost	1,306	9,807
Total	**11,112**	

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, (P&M)	1.0%	of P & M
Repair & maintenance, (Building)	1.7%	of Building
Insurance cost of new P&M (Post commissioning)	0.5%	of Plant & machinery and Building

Working Capital Assumptions		
Bank borrowing	%	0%
Margin money	%	100%
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	SLM	Max Depreciation
Tangible Assets				
	Plant and machinery	13.91%	10.34%	95.00%
	Buildings	10.00%	3.34%	95.00%

14.2 Working capital and cash flow statement

Overall net working capital requirement for the TC is expected to grow from about INR 48 lakhs in 2017-18 to INR 871 lakhs by year 2025-26.

Figure 22: Net working capital requirement

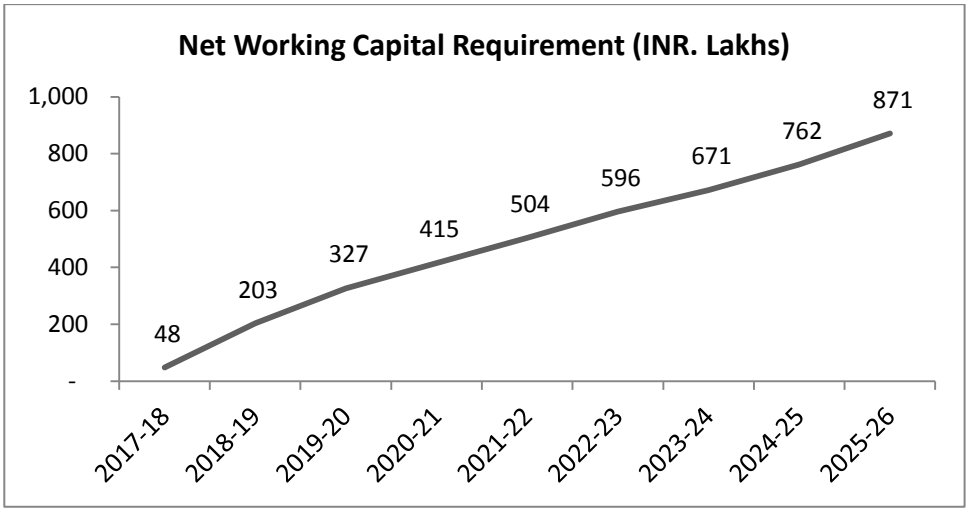


Figure 23: Cash flow closing balance

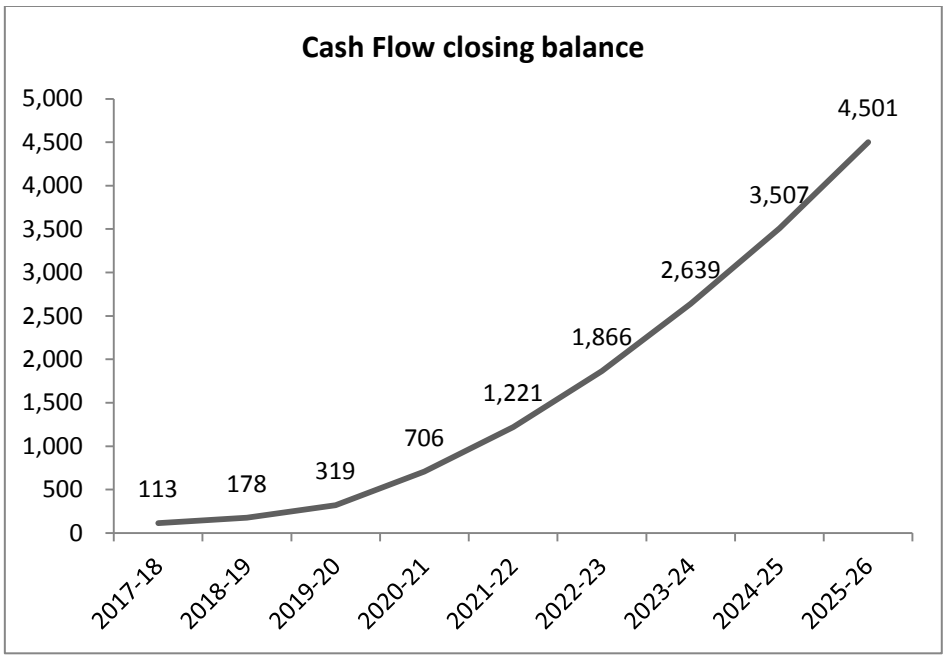


Table 42: Working capital schedule

Working Capital Schedule - With TCSP											
Years	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
											INR Lakhs
Raw Material Storages											
Finished goods	-	6	23	38	47	56	66	72	79	87	96
Training	0.22	1	1	2	3	3	3	4	4	4	4
Consumable tools											
Finished goods	-	1	3	5	6	7	8	9	10	11	12
Training	0.22	1	1	2	3	3	3	4	4	4	4
Consumable stores											
Finished goods	-	1	2	4	5	5	6	7	8	8	9
Training	0.12	0	1	1	2	2	2	2	2	2	2
Finished Product Storages											
Finished goods	-	9	38	61	76	91	106	117	129	141	156
Accounts Receivables	0.20	30	137	226	291	358	427	486	559	649	760
Gross Working Capital	**0.75**	**48**	**206**	**337**	**432**	**525**	**622**	**701**	**794**	**907**	**1,044**
Suppliers Credit		0	3	11	17	21	26	30	33	36	39

Working Capital Schedule - With TCSP											
Years	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
	0.19										
Net Working Capital Requirement	**0.57**	**48**	**203**	**327**	**415**	**504**	**596**	**671**	**762**	**871**	**1,005**

Table 43: Cash flow statement

Cash Flow												
Years	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
												INR Lakhs
Income post Depreciation	-27	-235	-1,595	-1,150	-738	-406	-171	54	246	429	636	915
Add: Depreciation		131	1,298	1,140	1,002	881	776	683	601	530	467	412
Inflow from capital fund	1,306	9,807										
Capital fund to balance -ve cash flows, if any	30	160	400	230								
Total Cash Inflow	1,309	9,862	102	220	264	475	604	737	848	959	1,104	1,327
Investment in Assets	1,306	9,807										
Net Change in WC		1	47	156	123	88	89	92	75	91	109	134

Total Cash Outflow	1,306	9,807	47	156	123	88	89	92	75	91	109	134
Opening Balance		3	58	113	178	319	706	1,221	1,866	2,639	3,507	4,501
Surplus/Deficit	3	55	55	65	141	387	515	645	773	868	994	1,193
Closing Balance	3	58	113	178	319	706	1,221	1,866	2,639	3,507	4,501	5,695

14.3 Income & expenditure statement

The income to the proposed centre from training will start accruing from year 2016-17 with completion of phase 1 (basic training infrastructure and procurement of basic machines) and start of basic courses. Initially an income of around INR 72 lakhs is expected in year 2016-17. Once the overall construction is complete, the TC revenue is expected to grow from INR 326 lakhs in 2017-18 to INR 3,937 lakhs by year 2025-26.

Table 44: Income and expenditure

Income and Expenditure												
Year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
INR Lakhs												
Income												
Training income	-	71	227	408	627	910	1,001	1,101	1,211	1,272	1,335	1,402
Sale of finished goods	-	-	95	380	607	759	911	1,063	1,169	1,286	1,415	1,556
Sale of Scrap	-	0.7	4	12	18	24	28	32	35	38	41	45
Consultancy Income	-			64	127	188	253	327	417	539	706	934
Total Income		72	326	864	1,380	1,881	2,193	2,523	2,833	3,135	3,497	3,937
Expenditure	Sarita rawat											
Variable Operating expenditure												
Raw materials		1	22	82	132	166	198	230	253	278	305	335

Income and Expenditure												
Year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Finished goods			20	78	125	156	188	219	241	265	291	321
Training		1	2	4	6	9	10	11	12	13	14	14
Consumable tools		**1**	**5**	**14**	**22**	**29**	**33**	**38**	**42**	**45**	**49**	**52**
Finished goods			2	9	15	19	23	27	29	32	35	39
Training		1	2	4	7	10	10	12	13	13	14	15
Consumable stores		**0**	**3**	**10**	**16**	**20**	**24**	**28**	**39**	**33**	**36**	**39**
Finished goods			2	8	12	15	18	21	23	26	28	31
Training		0	1	2	4	5	6	6	7	7	8	8
Utilities (Electricity & water)		**3**	**17**	**45**	**70**	**94**	**108**	**123**	**136**	**146**	**158**	**170**
Finished goods			6	25	39	49	59	69	76	84	92	101
Training		3	11	20	31	45	49	54	60	63	66	69
Variable Operating expenditure		**5**	**47**	**151**	**239**	**309**	**364**	**419**	**461**	**503**	**548**	**598**
Fixed Operating Expenditure												
Salary & Wages/ Establishment expenses	27	146	336	432	524	678	772	878	1,001	1,121	1,258	1,384
Repairs and Maintenance			**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**
P&M			56	56	56	56	56	56	56	56	56	56

Income and Expenditure

Year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Buildings			85	85	85	85	85	85	85	85	85	85
Training Expenses			23	41	63	91	100	110	121	127	134	140
Other Prdnn. & Admin. Exps			25	67	107	146	170	195	219	243	271	305
Marketing expenses		25	25	15	15	15	15	15	15	15	15	15
Insurance of new machines			27	27	27	27	27	27	27	27	27	27
Fixed Operating Expenditure	**27**	**171**	**576**	**723**	**876**	**1,097**	**1,225**	**1,367**	**1,524**	**1,674**	**1,846**	**2,012**
Total Expenditure	27	176	623	874	1,115	1,406	1,589	1,786	1,985	2,176	2,394	2,610
Income (Gross Margin)	(27)	(105)	(298)	(10)	264	475	604	737	848	959	1,104	1,327
Depreciation	-	131	1,298	1,140	1,002	881	776	683	601	530	467	412
Income post Depreciation	(27)	(235)	(1,595)	(1,150)	(738)	(406)	(171)	54	246	429	636	915

14.4 Balance sheet

Table 45: Balance sheet

INR Lakhs

Balance Sheet												
Years	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Liabilities												
Capital fund	1,309	11,112	11,112	11,112	11,112	11,112	11,112	11,112	11,112	11,112	11,112	11,112
Total	1,309	11,040	9,845	8,926	8,188	7,782	7,610	7,665	7,911	8,340	8,977	9,891
Fixed Assets	1,309	11,112	11,112	11,112	11,112	11,112	11,112	11,112	11,112	11,112	11,112	11,112
Net Block	1,306	10,982	9,684	8,544	7,542	6,661	5,885	5,202	4,601	4,71	3,604	3,192
Current Assets												
Cash	3	58	113	178	319	706	1,221	1,866	2,639	3,507	4,501	5,695
Other Current Assets	-	0.6	48	203	327	415	504	596	671	762	871	1,005
Total	1,309	11,040	9,845	8,926	8,188	7,782	7,610	7,665	7,911	8,340	8,977	9,891

14.5 Profitability

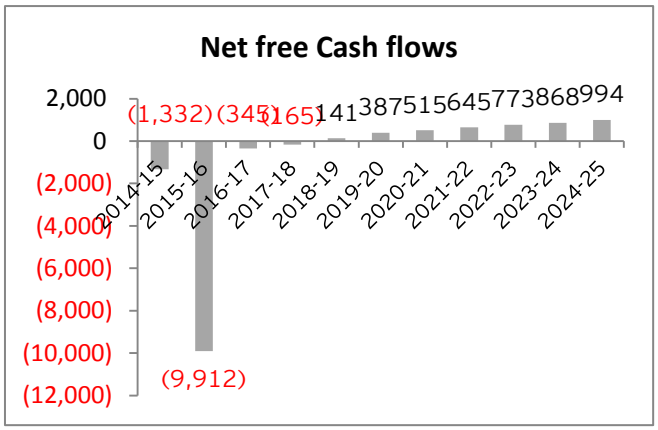
Overall project profitability has been estimated considering phased investment in plant & machinery and infrastructure. The full-fledged operations are expected to start from the year 2017-18. Hence the project IRR for a period of 12 years till 2026-27 is 12.1%.

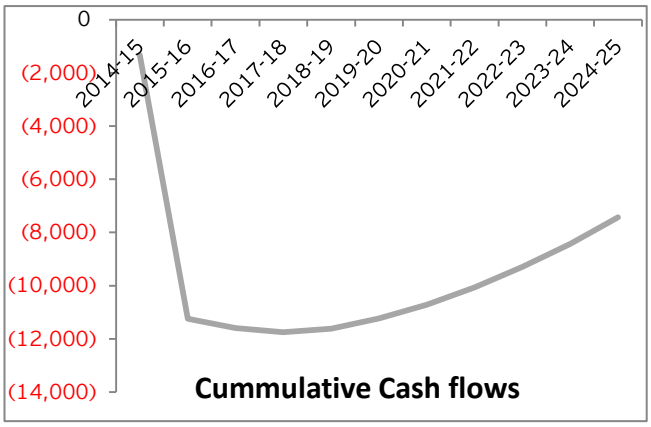
Table 46: Profitability with investment plant & machinery

Project IRR	12.1%
Payback period	>11 years

The project is expected to generate positive net free cash flows starting year 2018-19.

Figure 24: Net free Cash flows and Cumulative Cash flows





14.6 Sensitivity analysis

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

- Project cost
- Revenue from Training
- Revenue from production
- 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.

Training forms majority of revenue for the TC followed by production and consultancy. 5 percent increase/decrease in training revenue increases / decreases the project IRR by about 0.54%.

5 percent increase/decrease in project cost decreases/ increases the project IRR by about 0.55%

5 percent increase/decrease in production revenue increases / decreases the project IRR by about 0.48%.

Consulting being the lowest contributor to revenue has the lowest impact on project sensitivity. 5 percent increase/decrease in production revenue increases / decreases the project IRR by about 0.38%.

Table 47: Sensitivity of IRR

		Construction period (15 Months)
Increase in Project cost	-5%	12.6%
	0%	12.1%
	5%	11.5%
	10%	11.0%

		Construction period (15 Months)10.9%
Increase in Consultancy revenue	-5%	11.7%
	0%	12.1%
	5%	12.4%
	10%	12.8%

Increase in Training revenue	-7.5%	11.1%
	-5%	11.4%
	0%	12.1%
	5%	12.7%
	10%	13.2%

Increase in Production revenue	-10%	11.1%
	-5%	11.6%
	0%	12.1%
	5%	12.5%
	10%	13.0%

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 (e.g. shot, sand blasting), 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 CO_2-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 aluminium; use of sulphuric 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 sulphuric 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. aluminium) 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. sulphuric 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 aluminium 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 refuelling 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 Visakhapatnam during the construction phase, operation and maintenance phase and tool manufacturing have been observed as stated below:

- The land is surrounded by road on 3 sides, and an empty industrial plot on the fourth side. A road is also being constructed on the fourth side. There is no boundary wall around the plot of land. Rocks have been placed on the corners of the land for demarcation.
- There are some huts located just outside the land area (about 5 meters away). The people living in these huts are doing construction work on the adjacent industrial plot.
- The people living in these huts are also collecting coconut leaves from the coconut trees on the allotted plot of land, which could be seen as a source of livelihood.
- There is a small patch of agricultural land in the middle of the plot, where bottle gourd and bitter gourd are being grown. In addition there are some banana trees from the previous season which have not been cleared, but are not producing bananas anymore. As per a discussion with the Assistant Director, MSME DI Hyderabad and the Dy. Zonal Manager – AP Industrial Infrastructure Corporation Limited, the farmer who is cultivating the bottle gourd has been compensated for the land already, but is using the land for farming as it is vacant, and has agreed to clear the land whenever required.

- There are two wells on the land. A pump has been connected to one of the wells, and the water is being channelled to some other area. It was stated by the local people that this was being used for construction on the adjoining plot. The other well also has a pump connected, and the water is being used for the plot of agricultural land. Thus, the use of these wells could be viewed as a dependency for source of livelihood.
- There is also an underground source of water with a tap connected to it.
- Locals were grazing cattle on the land.
- A discussion was conducted with the locals, and they stated that they have already been compensated and are willing to move out whenever required. However, this can still be viewed as an issue, as they are currently utilizing the land and water sources.
- There are also the remains of a structure which has been built by the locals, but broken down after the land was acquired from them.

15.3.1 Construction phase

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

Table 48: 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. ▶ 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.

Activity	Associated impact	Recommendation for mitigation
	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. iii) Six large size sterilized dressings. iv) Six large size sterilized burn dressings. v) Six (1/2 oz.) packets sterilized cotton wool.

Activity	Associated impact	Recommendation for mitigation
		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	Air pollution	▶ All the vehicles entering the site will be asked to have updated PUC (Pollution under control)

Activity	Associated impact	Recommendation for mitigation
movement shall 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.)		certificate. ▶ Vehicle speed will be restricted to 15km/hour at site. ▶ 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	Soil contamination	▶ A covered area will be defined for storage of HSD with concrete flooring

Activity	Associated impact	Recommendation for mitigation
availability for D.G sets)	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.
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	▶ Emphasis will be given on optimization of water usage and supply of potable drinking water

Activity	Associated impact	Recommendation for mitigation
	wastage	for labour camps.
	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 49: 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 50: 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	Injury due to	▶ Cleaning schedule will be developed for the site.

Activity	Associated impact	Recommendation for mitigation
premises	trips	▶ Proper demarcation of the storage area for waste material will be done according to the different type of waste material.
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	▶ SOP would be formulated for handling and storage of waste oil and coolant.

Activity	Associated impact	Recommendation for mitigation
	contamination due to waste 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	

Activity	Associated impact	Recommendation for mitigation
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
	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 ltrs/Day).
  - Water purification with suitable RO and UV (25,000 Ltrs/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-odouring 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

- The production area 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 e 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 51: Risk & 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 ▶ Building Completion Certificate – Town	▶ 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
	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	✓		✓
	Air pollution due to digging and levelling activities	▶ Water sprinkling shall be practiced ▶ Construction machinery shall be properly	✓		✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
		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 ▶ Proper maintenance of the DG Set should be carried out on regular basis			

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
		▶ 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 Partner • Construction Network Manager • Construction Management Consultant	▶ Clearly defined scope and incentives for stakeholders. ▶ Timely contracts with the project stakeholders.		✓	✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	Quality Assurance				
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 ▶ Lack of cluster development in the target	▶ 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
	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.	✓		
Performance of key stakeholders	Poor performance of Outsourced agencies like TP, CNM and PMC	▶ Establishment of KPIs ▶ Periodic review of performance. Suitable			✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
		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 TC at Visakhapatnam is proposed to be a General Engineering TC. Tool manufacturing, training and consultancy / advisory streams would be the prominent activities to be undertaken by the TC. This also includes support to 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. Additionally, the TC will strive to focus on strengthening the welding trade by introducing innovative technologies for the MSMEs. For improvement in productivity, TC would initiate design clinics, training in lean manufacturing and project based consultancy. Furthermore, the TC would emphasise on building expertise in providing 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 innovative ideas for the TC like;

- The new TC will take steps to form consortium with MSMEs including TRs 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.

- The TC aims to introduce a welding innovative lab that will be equipped with cutting-edge technologies. This R&D lab would be accessible to all MSMEs, PSU, large manufacturing companies to develop innovative and new technologies in the field of automation and fabrication by developing technical skills in welding.

The proposed 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


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18. Annexure

18.1 Checklist for social screening for establishment of new TCs

In RPF, particular attention will be paid to the needs of vulnerable groups among the affected especially those living Below the Poverty Line (BPL), the landless, the elderly, women and children. The Entitlement Matrix that is a part of this RPF has provisions for compensation and resettlement assistance to all Project Affected Persons as categorized above in broad terms. This Resettlement Policy Framework and its Entitlement Matrix are based on World Bank's social safeguard policy that consists of OP 4.12 – Involuntary Resettlement and OP 4.10 – Indigenous Peoples and also Government of India's The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, (RFCTLAR&R Act) 2013.

- The World Bank's Social Safeguard Policy consists of OP 4-12 – Involuntary Resettlement and OP 4.10 – Indigenous Peoples. The OP on Involuntary Resettlement has clearly stated policy objectives, impact covered, mitigation measures and eligibility criteria. It also has guidelines for preparing Resettlement Policy Framework and this RPF is in accordance with these guidelines.

- As far as OP 4.10 – Indigenous people are concerned; it uses the term Indigenous people in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing certain characteristics in varying. The RPF uses the term Scheduled Tribes (ST) rather than Indigenous people.

- The social screening process as set out in this document would help to determine whether or not Bank's social safeguard policy either on Involuntary Resettlement or Indigenous Peoples will be triggered.

Following is the resettlement policy framework, for social screening, which have been agreed in the initial stages and have been addressed during the site visit in Visakhapatnam;

18.2 Checklist for environmental and social assessment

Checklist for environmental screening

Name of the site	Visakhapatnam
Brief on upcoming Tool Room and Technology Centre (TRTC)	The planned TRTC in Visakhapatnam shall be focusing on General engineering. It will have in-house production to cater to the industry, Advisory services and shall also focus on skill development in the sector.
Latitude and Longitude of the site	Latitude: 21.19228; Longitude: 81.20596
Date of the site visit	5th May 2015
Name of the officials conducting site visit	Sushmita Sarkar (World Bank) and Tushar Jindal (EY)

During the study phase the team conducted a site visit and held discussions with the officials from industrial development and MSME office. Based on the discussion, the checklist used to conduct environment screening at the selected site is given below:

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 is clear from vegetation. There are only 2-3 trees that may not be required to be cut. Only wild grass, etc. will be required to be cleared.
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

SN	Issues	Yes/No	Remarks
5	Is there any protected area or biodiversity sensitive area in the vicinity which is likely to be affected by the operations of the tool room?	No	The tool room is planned in an industrial zone and there is no protected area or biodiversity sensitive area in the vicinity.
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?	Yes	There are few scheduled tribes in the Chhattisgarh district.
8	Will the construction activity affect the surrounding around the tool room?	Yes	The allocated land is enclosed by industries on all the sides. In the North, we have Pellet Shalimar, Sponge iron industry (Top worth) in the south, sponge iron industry (Jai Balaji) in the east and Sona beverage in the west. The construction activities may hinder operation of these adjoining industries. Therefore, appropriate measures should be undertaken to minimize dust emissions from the construction activity in the EMP.
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	The water shall be supplied by the Municipal authorities, as is the case in nearby industries. Moreover, the Tool room is not envisaged to be water intensive in comparison to the industries in the vicinity. Therefore, operations of the Tool Room shall not put additional pressure on water source.
10	Will the project lead to increased air emissions in the region?	Yes	The TC is envisaged to have insignificant dust emissions during the construction period. Care may be exercised to minimize dust emissions and its impact, if any, on the adjoining industry. Also, during the operation phase appropriate measures shall be undertaken to minimize air emission in case D.G set is used for electricity backup.
11	Will the project lead to	No	Increase in noise level in not envisaged in the area

SN	Issues	Yes/No	Remarks
	increase in noise levels in the area?		due to TC. However, care like acoustic enclosures for D.G set, in case installed, etc. may be practiced.
12	Will the Tool room involve use of chemicals and/or solvents?	No	The envisaged TC will only use lubricating oil and water soluble coolants in the manufacturing process. However, in case any chemicals are used appropriate measures shall be undertaken to manage and store the chemicals.
13	Will the project involve handling, storage and disposal of hazardous waste? If yes, what are the different types of waste envisaged from the TC?	No	The envisaged TC will only use lubricating oil and water soluble coolants in the manufacturing process. In case, chemicals and any other hazardous materials are used measures shall be undertaken to manage the associated waste. Apart from this, there is no arrangement for waste water treatment, neither Sewage Treatment Plant (STP nor Effluent Treatment Plant (ETP) in the industrial zone. Also, there is no arrangement for discharge of treated waste water, in case TC decides to have its own treatment plant. Therefore, appropriate provision should be made in the budget for waste water treatment plant and measures should be adopted to recycle the waste water.
14	Is the project located in the area of seismic faults? In case yes, in which seismic does the location lie?	No	The TC location falls in the Seismic zone – II. This means that the area has very low seismic activity and is not an issue of concern.
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	The only record of natural calamity in the region was of a drought that was recorded in the year 2000. Therefore, there is no record of a natural calamity from the past that may impact the operations of the TC in the future.

B-Establishment of New Technology Centre in clearly demarcated, protected and functioning Industrial Area- Social Screening Certificate

Location and Address of the Technology Centre

Name of The Technology Centre	**Name of Cluster :-** Answer for this requires more elaboration
Street Address : Industrial Growth Centre Borai, Village Rasmada , District Durg, Chattisgarh	Phone : Fax :
Email id- dcdi-raipur@dcmsme.gov.in	Website : -

Person-in-charge of Technology Centre

NAME OF PERSON -IN-CHARGE -	**DESGNATION-**
CONTACT DETAILS Phone :- Fax :- No such Mobile:-	Email ID:- details available

Name , Location, Address and Details of Industrial Area

NAME OF INDUSTRIAL AREA(e.g. Industrial Growth Centre, Borai ,Village Rasmada, District Durg, Chattisgarh	**YEAR OF ESTABLISHMENT-** 1989
Total Area of Land (In Acres):-25 Acres	**Type of Industries(Tick Appropriate Ones)** **Manufacturing:** √ **Service:** **Energy:** **Others(Specify):**

List of Industrial Units Surrounding the Allotted Plot

Sl No	**Name of Industrial Units**	**Type of Industry**
01	M/s Jai Balaji Industries Ltd.	Manufacturing
02	M/s Shalimar Pellet Feeds Ltd.	Manufacturing
03	M/s Sona Beverages Pvt. Ltd.	Manufacturing
04	M/s Jai Shree Solvex(India) Pvt. Ltd.	Manufacturing
05	M/s Topworth Steels And Power Private Limited	Manufacturing

DETAILS OF PLOT OF LAND ALLOTTED :-

Plot Serial No: Zone-'B'	Area of land(In Acres):- 25 Acres	Date of Allotment:- 29-10-2012	Date of Possession : 02-07-2013
Name of Allotting Official:- Shri Dinesh Shrivastav,IAS Secretary, Department of Commerce & Industries, Government of Chattisgarh	**Name of Allotting Organization** :- Department of Commerce & Industries, Government of Chattisgarh	**Allotment Letter No:-** 4179/2650/2007/11/6	**Date of Letter :-** 29-10-2012

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:…… Designation:…….

Date :……. Place:……

18.3 Budgetary estimates of machines

Machine	Make	Model	Specification	Price			Price (INR) @20 Escalation
				Euro	USD	INR	
3 AXIS VMC	HAAS	VM3	1016X660X635		117215	70,32,900	84,39,480
	DMG MORI	CTX450 (TURN MILL)	650X465 C AXIS	107190		86,82,390	1,04,18,868
	HARTFORD	HEP 2150	2250X1500X780		170000	1,02,00,000	1,22,40,000
CNC LATHE	DMG MORI	CTX450 V1	650	90900		7362900	88,35,480
	HAAS	ST-40	648X1118		157155	94,29,300	1,13,15,160
Grinder	KENT	KGS920AHD	2000X900		124275	74,56,500	89,47,800
	KENT	KGS925AHD	2500X900		137270	82,36,200	98,83,440
Cylindrical Grinder	PAC	PACGRID Z3040X8/1	1000X200			850,000	10,20,000
Radial drilling machine	PAC	PACDRIL Z3040X8/1	240			450,000	5,40,000
	PAC	PACDRIL Z3050X16/1	1250			750,000	9,00,000
Injection moulding machine	PAC	ESM 60 TON SERVO SRIVE	600 TON		140000	84,00,000	1,00,80,000
UPS	AIRCOM	ht series3:3	20kva,5min 20X20 battery				2,32,920
	AIRCOM	ht series3:3	40kva,5min 12x20battery				2,32,920
3D Scanner	Accurate Gauging	ACCUFLEX	2500 mm (0.048 accuracy)			20,00,000	

18.4 Key questions asked during stakeholder discussions

1. What are the key types of tools/ products manufactured?
    a.
    b.
    c.
    d.

2. What are the key sectors catered?
    a.
    b.
    c.
    d.

3. Have you ever taken any support from MSME Tool room? If yes, in which field?
    a. tool design
    b. tool manufacturing
    c. Training
    d. Consultancy

4. Would you be interested to take support from MSME Tool room? If yes, in which field?
    a. tool design
    b. tool manufacturing

c. Training
d. Consultancy

5. Can you mention key areas/ products you plan to venture in future, where MSME tool rooms can support?

6. Would you be open to formation of consortium with MSME Tool Rooms and for manufacturing?

7. What are the key manufacturing technologies/ processes currently in use?

8. What are the key issues and challenges faced in current processes/ technologies to cater to current requirements?

9. What are key technologies that are required but currently not available?

10. What are key skills required for managerial manpower and machine operators?

11. Existing gaps in skills required for Managerial manpower and Machine operator level?

12. Additional skills required to cater to new requirements

18.5 AICTE norms for engineering and technology institutes

a) Land requirement for technical institutions

Other than Rural Places			Rural Areas		
UG Programs	**Diploma**	**Standalone PG Programs**	**UG Programs**	**Diploma**	**Standalone PG Programs**
2.5	1.5	2.5	10	5	10

Land area requirements in acres

- Land Area Requirements:
  - Land area shall cover hostel facilities, if any
  - Land shall be in one continuous piece
  - Considering hilly nature of land in North Eastern States, land may be made available in 3 pieces which are not away from each other by more than 1 Km
- Number of students generally allowed per acre land available when FSI = 1 is 300.
- Built up Area Requirements
  - The Institution area is divided in, Instructional area (INA, carpet area in sq. m.), Administrative area (ADA, carpet area in sq. m.), Amenities area (AMA, carpet area in sq. m.)
  - Circulation area (CIA) is equal to 0.25 (INA+ADA+AMA).
  - Total built up area in sq. m. is equal to (INA+ADA+AMA) + (CIA)

- Instructional area (carpet area in sqm)

	Number of Divisions (UG class of 60)	Duration of course (in yrs)	Class Rooms (C)	Tutorial Rooms(D) PG class rooms (H)	Laboratory	Research Laboratory	Work Shop	Additional WS/Labs for Category X courses	Computer centre	Drawing Hall	Library and Reading Room	Seminar Halls
Carpet area in sqm per room			66	33	66	66	200	200	150	132	400	132
Engineering/ Technology (Degree Institute)												
Number of rooms required for new institution	A	4	C=A	D=C/4	10	-	1	-	1	1	1	1
Total number of rooms (UG)	A	4	C=Ax 4	D=C/4	10/Course*	-	1	2/Course (Max 4)	1	1	1	1/Course
Total number of rooms (PG)	F	2	-	H=Fx2	1/Specialization	1/Specialization	1	2/Course (Max 4)	1	1	1	1/Course

	Number of Divisions (UG class of 60)	Duration of course (in yrs)	Class Rooms (C)	Tutorial Rooms(D) PG class rooms (H)	Laboratory	Research Laboratory	Work Shop	Additional WS/Labs for Category X courses	Computer centre	Drawing Hall	Library and Reading Room	Seminar Halls
Where, • Category X of courses: Mechanical, Production, Civil, Electrical, Chemical, Textile, Marine, Aeronautical and allied courses of each. • Classrooms, Tutorial rooms and Laboratories required for 2nd, 3rd and 4th year may be added progressively to achieve total number as stated. • Additional Library (Reading room) area of 50 sq m / per 60 student (UG+PG) intake beyond 420. • UG laboratories if shared for PG courses shall be upgraded to meet requirements of PG curriculum • Progressive requirement, 2nd year onwards shall be calculated as 3+3+2 labs/course • Additional 5 Labs/Course when number of divisions are more than 2/course. • Round off fraction in calculation to the next integer.											
Engineering/ Technology (Diploma and Post Diploma Institute)												
Carpet area in sqm per room			66	33	66	200	200	150	132	400	132	
Number of rooms required for new institution	A	Y	C=A	D=C/4	06	1	-	1	1	1	-	
Total number of	A	Y	C=AxY	D=C/4	06/Course*	1	2/Course	1	1	1	1	

	Number of Divisions (UG class of 60)	Duration of course (in yrs)	Class Rooms (C)	Tutorial Rooms(D) PG class rooms (H)	Laboratory	Research Laboratory	Work Shop	Additional WS/Labs for Category X courses	Computer centre	Drawing Hall	Library and Reading Room	Seminar Halls
rooms								(Max 4)				

Where;

- Category X of courses: Mechanical, Production, Civil, Electrical, Chemical, Textile, Marine, Aeronautical and allied courses of each.
- Classrooms, Tutorial rooms and Laboratories required for 2nd, 3rd and 4th year may be added progressively to achieve total number as stated.
- Additional Library (Reading room) area of 50 sq m / per 60 student (UG+PG) intake beyond 420.
- #Progressive requirement, 2nd year onwards shall be calculated as 2+2 labs / course
- Round off fraction in calculation to the next integer.

b) Duration and Entry Level Qualifications for the Technical Program (Engineering and Technology Programs/ Degrees)

SN	Diploma/ Degree	Duration	Eligibility
1	Under graduate degree program (full time)	4 years	▶ Passed 10+2 examination with Physics and Mathematics as compulsory subjects along with one of the Chemistry / Biotechnology / Biology ▶ Obtained at least 50% marks (45% in case of candidate belonging to reserved category) in the above subjects taken together
2	Diploma Programs (full time)	3 / 4 years	▶ Passed 10 std. / SSC examination Obtained at least 35% marks at the qualifying examination

3	Post diploma programs	1.5 years/ 2 years	▶ Passed Diploma examination ▶ Obtained at least 50% marks (45% in case of candidate belonging to reserved category) at the qualifying examination.

c) Norms for Intake & Number of Courses / Divisions in the Technical Campus

Diploma/ Degree	Intake per division	Maximum Number of UG/PG courses and/ or divisions allowed in the new division (single shift working)	
		Divisions	Intake
Diploma/ Post diploma level	60	5	300
Undergraduate level	60	5	300
Post graduate degree and post graduate diploma level	18	6	108

New technical campus in Engineering and technology shall necessarily opt for courses from the following:

- Applied Electronics & Instrumentation
- Chemical Engineering/Technology
- Civil Engineering/Technology, Construction Engineering Computer Science, Computer Science and Engineering, Computer Science & Information Technology
- Computer Technology Electrical Engineering or Electrical & Electronics Engineering
- Electronics and Communication Engineering
- Information Technology
- Instrumentation and Control Engineering
- Mechanical Engineering
- Production Engineering

d) Norms for Essential and Desired requirements for Technical Campus (Marked as essential need to be made available at the time of the Expert committee visit)

SN	Details of requirement	Provisioning
1.	Language Laboratory The Language Laboratory is used for language tutorials. These are attended by students who voluntarily opt for Remedial English classes. Lessons and exercises are recorded on a weekly basis so that the students are exposed to a variety of listening and speaking drills.	Essential
2.	Potable Water supply and outlets for drinking water at strategic locations	Essential
3.	Electric Supply	Essential
4.	Backup Electric Supply	As required
5.	Sewage Disposal	Essential
6.	Telephone and FAX	Essential
7.	First Aid facility	Essential
8.	Vehicle Parking	Essential
9.	Institution web site	Essential
10.	Barrier Free Built Environment for disabled and elderly persons including availability of specially designed toilets for ladies and gents separately	Essential
11.	Safety provisions including fire and other calamities	Essential
12.	General Insurance provided for assets against fire, burglary and other calamities	Essential
13.	All weather approach road	Essential
14.	General Notice Board and Departmental Notice Boards	Essential
15.	Medical and Counselling Facilities	Essential
16.	Public announcement system at strategic locations for general announcements/paging and announcements in emergency.	Desired

SN	Details of requirement	Provisioning
17.	Enterprise Resource Planning (ERP) Software for Student-Institution-Parent interaction	Desired
18.	Transport	Desired
19.	Post, Banking Facility / ATM	Desired
20.	CCTV Security System	Desired
21.	LCD (or similar) projectors in classrooms	Desired
22.	Group Insurance to be provided for the employees	Desired
23.	Insurance for students	Desired
24.	Staff Quarters	Desired

e) Norms for Faculty requirements and Cadre Ratio for Technical campus

- Diploma

Diploma	Faculty: Student ratio	Principal/ Director	Head of the Department	Lecturer	Total
		A	B	C	D
Diploma/ Post diploma	1:20	1	1 per department	S/20	A+B+C

S = Sum of number of students as per Approved Student Strength at all years

- Degree

Degree	Faculty: Student ratio	Principal/ Director	Professor	Associate professor	Assistant professor	Total
		A	B	C	D	A+B+C+D
Undergraduate	1:15	1	(S/15 x R) - 1	(S/15 x R) x2	(S/15 x R) x6	S/15

Postgraduate	1:12	-	(S/12 x R)	(S/12 x R)	(S/12 x R)	S/12

Note:

For undergraduate: S = Sum of number of students as per Approved Student Strength at all years, R = (1+2+6)

For Postgraduate: S = Sum of number of students as per Approved Student Strength at all years *R = (1+2), #R = (1+2+6)

18.6 Minute of stakeholders meeting at Visakhapatnam

Minutes of Meeting with Stakeholders

Date	14/10/2015 - 15/10/2015	
Time	All day	
Location	Visakhapatnam	
	Name	**Designation**
MSME-DI Personnel	Mr. N. Yuvraj Mr. Prabhakara Rao Mr. M. Kalebu Mr. Murthy Cdr K Chinnaiya	Collector & District Magistrate Chairman of MSME association Asst. Director, MSME-DI Hyderabad Asst. Director, MSME-DI Hyderabad Hindustan Shipyard, General Manager (Corporate Planning)
EY Personnel	Dr. Milind Mujumdar Devesh Gautam Ayesha Ghoshal	Adviser Consultant Consultant
Agenda	**Discussion on the following points** ▶ Overview of Visakhapatnam industry sector-wise; with a focus on the welding industry and its requirements ▶ Key requirements/ Challenges of Associations/MSMEs ▶ Manufacturing technologies ▶ Key skills ▶ Current trends ▶ Insights on potential sectors for growth in terms of production and training	

Sr. No.	Industry Representative		Key points discussed during the meeting
	Name	Designation	
Meeting at APIIC, Viskhapatnam on 14 October 2015			
1	Mr. Prabhakara Rao	Chairman of MSME association	▶ Key industries in Andhra Pradesh are Power, Steel and cement, fabrication of metals and Aluminium plants ▶ Multi-park planned near naval base ▶ Defence sector in the district needs to source manufacturing parts from MSMEs more actively ▶ Expansion of sea-based technology that incorporates welding expertise ▶ SMEs can't afford to buy latest technology in the field of casting,
2	Mr. M. Kalebu	Asst. Director, MSME-DI Hyderabad	
3	Mr. Murthy	Asst. Director, MSME-DI Hyderabad	

			machining and maintenance ▶ Acute requirement of sensors & robotics in fabrication
Meeting with Visakhapatnam District collector on 14 October 2015			
1.	Mr. N. Yuvraj	Collector & District Magistrate	▶ District collector offered to provide temporary land for training and skilling courses if construction of TC is delayed
2.	Mr. Prabhakara Rao	Chairman of MSME association	
3.	Mr. M. Kalebu	Asst. Director, MSME-DI Hyderabad	
4.	Mr. Murthy	Asst. Director, MSME-DI Hyderabad	
Meeting with Industry associations on 15 October 2015			
1.	Mr. Prem Chand	VANTECH Association	▶ Requirement of technology transfer to SMEs – current situation is fragmented ▶ Better quality ITIs need to be developed to impart the right skills to students ▶ Proper implementation of MSME policy is required ▶ Lack of CNC Machines in the Autonagar clusters
2.	Mr. Prabhakara Rao	Chairman of MSME association	
3.	Mr. M. Kalebu	Asst. Director, MSME-DI Hyderabad	
4.	Mr. Murthy	Asst. Director, MSME-DI Hyderabad	
Meeting at Hindusthan Shipyard on 15 October 2015			
1.	Cdr K Chinnaiya	Hindustan Shipyard, General Manager (Corporate Planning)	▶ Outsources most of its welding work ▶ There is a requirement for imparting multi-skilling trainings to workers – Trades such as welding, fitting, casting etc. ▶ Outsource standard stock items to the MSMEs ▶ Require the TC to offer quality certificates to MSMEs
2.	Mr. Murthy	Asst. Director, MSME-DI Hyderabad	
Meeting with various Industry associations on 15 October 2015			
1.	D. Krishna Chaitang	V.S.D Industries	▶ Majority of manufacturing units in Visakhapatnam consist of Metal foundries and forging units, steel casting etc. ▶ Some Of the machinery proposed by the association members include: ○ CNC Plasma/profile cutters ○ CNC Tool grinding machines ○ Measuring & Calibration machines ○ Cloud point machine/ 3D Scanners ○ Hydraulic press
2.	M.P.C & Co		
3.	A. Ramesh	Power plant	
4.	B.Venkateshwar Rao	O/o GM, DC, VSP	
5.	V.M. Kishor	Seera Metal Process	
6.	A.K. Bajaj	Lalita Metals	
7.	B.S.B Prabhakar Rao	Sapphire Engg.	
8.	B. Ramakrishna	L.G. Eng. works	
9.	L. Bapirajo	S.L.N	
10.		Aluminium Rally	
11.	Kobli Satyanarayan	Himagiri Chemicals	
12.	Mr. Murthy	Asst. Director, MSME-DI Hyderabad	
13.	Santosh Kusahu	Br MSME-DI Vizag	

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