Draft Detailed Project Report

New Technology Centre, Kochi (Ernakulam) (General Engineering)

Technology Centre Systems Program (TCSP)

Submitted

To

Report No: 2017-Delhi-0022

The Office of Development Commissioner - MSME
Ministry of MSME, Govt. of India
Maulana Azad Road, New Delhi -110108

EY
Building a better working world

08 March 2017

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 Kochi, Kerala 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 the development of a Technology Centre at Kochi has been prepared by Ernst & Young LLP (hereinafter referred to as 'EY' or 'Ernst & Young' or 'Us' or 'We') 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'), as part of consulting services to establish a Program Management Unit (PMU) for designing the project, undertaking the pre-project activities and providing implementation support during the course of the Technology Centre Systems Program (TCSP) .

The inferences and analyses made by EY in this report are based on information collated through primary research, secondary research, discussions with the client personnel and key stakeholders and our knowledge about the program and its objectives. EY has taken due care to validate the authenticity and correctness of the information from various sources, however, no representations or warranty, expressed or implied, is given by EY or any of its respective partners, officers, employees or agents as to the accuracy or completeness of the information, data or opinions provided to EY by third parties or secondary sources.

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Acknowledgement

We would like to express our sincere gratitude to MoMSME and its officials for their involvement and valuable inputs during the preparation of this DPR. We extend a special thanks to
Shri S N Tripathi, IAS, (AS&DC-MSME), Shri Nikunja K. Sundaray (JS-MSME) and Shri S. Chawla (Director-ABD MoMSME) for their proactive support and guidance during the entire process.

We would like to thank Shri P.V. Velayudhan, Director as well as other staff members of MSME-DI Thrissur for their guidance and valuable inputs during preparation of the DPR.

We would like to convey our sincere thanks to officials of MSME-DI, State Govt. Authorities such as Department of Commerce and Power, KSIDC and Industries Associations in Kerala for their support during the on-site visit for the proposed Technology Centre at Kochi.

We also extend our sincere thanks to all the stakeholders such as large enterprises, 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 the industry requirements would not have been possible.

Abbreviations

AICTE	All India Council for Technical Education
AS&DC	Additional Secretary and Development Commissioner
CAD	Computer-Aided Design
CAE	Computer-Aided Engineering
CAM	Computer-Aided Manufacturing
CCNA	Cisco Certified Network Associate
CFC	Common Facility Centre
CIHT	Central Institute of Hand Tools
CITD	Central Institute of Tool Design
CNC	Computerized Numerical Control
CNM	Cluster Network Manager
CSIR	Council Of Scientific And Industrial Research
CTR	Commercial Tool Rooms
CTTC	Central Tool Room & Training Centre
DC	Development Commissioner
DMSRDE	Defence Materials and Stores Research and Development Establishment
EDM	Electrical Discharge Machining
ESDM	Electronics System Design And Manufacturing
ESTC	Electronics Service & Training Centre
FFDC	Fragrance & Flavour Development Centre
ICTT	International Container Transhipment Terminal
IDEMI	Institute For Design of Electrical Measuring Instruments
IDTR	Indo Danish Tool Room
IGTR	Indo German Tool Room
IISc	Indian Institute of Science
ITI	Industrial Training Institute
ITSP	IT Service Provider
JS	Joint Secretary
KPI	Key Performance Indicator
KVI	Khadi and Village Industries
LCA	Light Combat Aircraft
MOU	Memorandum of Understanding
MSME	Ministry of Micro, Small & Medium Enterprises
NCVT	National Council for Vocational Training
OEM	Original Equipment Manufacturer
PDO	Program Development Objective
PMU	Program Management Unit
PPDC	Process and Product Development Centre
TCs	Technology Centres
TCSP	Technology Centres Systems Programme
TDC	Technology Development Centre

TP	Technology Partner
TR	Tool Room
TRTC	Tool Room & Training Centre
UNIDO	United Nations Industrial Development Organization

Revision History

Version	Issue date	Amendment description	Prepared by	Reviewed by
1.1	14 Jan 2017	First draft	Rajkumar Deegwal	Dr. Milind Mujumdar
1.2	30 Jan 2017	Changes incorporated as discussed with Dr. Milind Mujumdar	Rajkumar Deegwal	Dr. Milind Mujumdar
1.3	6 March 2017	Change in construction area in line with Kanpur & Bhopal TC	Rajkumar Deegwal	Dr. Milind Mujumdar

Executive Summary

Objective of DPR: Evaluate the feasibility of the proposed Kochi (Ernakulam) TC.

Key Components

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

Opportunity and need assessment

Vendors serving large manufacturers in Kochi and catchment area

- **General Engg.:** Cochin Shipyards, BPCL Kochi Refinery
- **Automotive:** BEML, Apollo Tyres
- **Transport:** Proposed railways coach factory
- **Food Processing:** various large food processing units

Over 20,000 engineering-focused MSMEs in catchment area

Stakeholder discussions

Key Stakeholders

- O/o DC-MSME , MSME-DI (Thirussur)
- KSIDC, Cochin University of Science & Technology (CUSAT)
- EMs, Tier I & II suppliers,
- Industrial Association
- Government Institutes
- MSMEs

Key Training Requirement

- Multi-skilled workforce
- Welders , CNC operators, fabrication
- Short-term trainings for vendors
- Business skills for vendors

Key Technology and Tooling Requirement

- Tools, Dies and Moulds
- Additive Manufacturing & Reverse engineering
- Vacuum Heat Treatment
- Spare Parts manufacturing

Financials

- Total Capital Expenditure: INR 111.35 Cr
- Production Machines: INR 28.45 Cr
- Training Machines: INR 26.31 Cr
- Building Infrastructure: INR 50.83Cr
- Other Infra. incl. Pre -Operative Expenses : INR 5.76 Cr

IRR: 8.8%

Positive income after depreciation is projected to be registered in 9th year

Location Overview

- In the vicinity of 5 National Highways National Highways 544, 966A, 966B, and 66
- Very strong railways connectivity, Central Railways hub
- Kochi Metro under development

- International Kochi Airport
- 3 other international Airport: Thiruvananthapuram, Kozhikode & Kannur

- One of the largest ports of India
- ICTT: largest container trans-shipment facility in India

Notable features of Kochi

Presence of large manufacturers such as Cochin Shipyard, BEML and notable engineering firms

Availability of well literate manpower which need to be trained for industry specific skillsets

TC centrally located in Kochi with good connectivity to neighboring districts

Strong industry and infrastructure push in and around Kochi from state Govt.

Focus area of the Technology Centre

1 Training

- CNC Machining
- Advanced welding
- Tool Room courses
- Maintenance
- M. Tech courses in collaboration with local university

2 Production

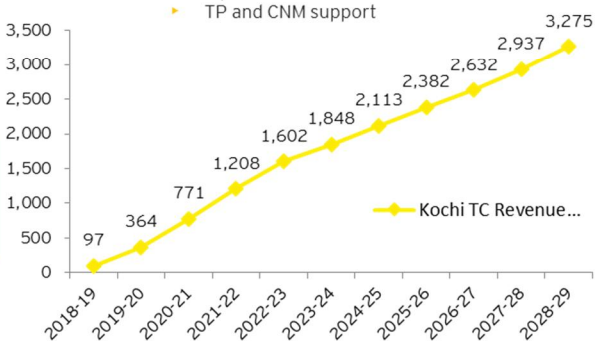
- Advanced welding techniques
- Welding automaton
- Tool & Die Manufacturing
- Material testing facility
- Reverse engineering Infrastructure
- Spare part manufacture

3 Consultancy

- Design Support
- Productivity improvement
- Support to training colleges

4 Other areas

- Productivity and Quality improvement
- TP and CNM support



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1 Context

India is one of the largest and most dynamic global economies. India's GDP in 2016 stands at over USD 2 trillion, making it the 7th largest economy in the world. 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. However, manufacturing constitutes a mere 16% of India's GDP, compared to over 30% in other Asian countries. Significant efforts are currently underway in the country to boost manufacturing.

POLICY EFFORTS AT BOOSTING MANUFACTURING

"Make in India" and the National Manufacturing Policy are significant policy efforts aimed at boosting Indian manufacturing sector. Some of the provisions of the NMP are as follows:

National Manufacturing Policy

- Increase manufacturing sector growth to 25% over the medium term to make it the engine of growth for the economy.
- 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.

India's manufacturing sector has been facing challenges, such as low value addition, low productivity, and low scale-up and clustering. 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[1].

[1] http://www.dnb.co.in/Nashik2013/PDF/MSMEsInIndia.pdf

However, this particular sector is challenges on multiple front: access to finance, access to technology and skilled manpower, access to markets (domestic & export), infrastructure deficiencies.

In order to address multiple technical, skill and tooling challenges faced by MSMEs, the Ministry of MSME Government of India, established Tool Rooms and Training Centres starting in the year 1967. The primary focus of these organizations 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.

At present, the Office of Development Commissioner [O/o DC (MSME)], Ministry of Micro, Small and Medium Enterprises, operates 10 Tool Rooms and 8 Technology Development Centre (both hereinafter called as TCs) spread across the country. 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 1,50,000 trainees annually. Some of these include training programs certified by the AICTE and NCVT. The TCs also provide design and manufacturing support to entrepreneurs alongside technical consultancies.

The list of the existing TCs along with their specializations is as follows:

TABLE 1: SUMMARY OF EXISTING TECHNOLOGY CENTRES

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)	Auto & 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

SN	Name	Focus Sector
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
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

1.1 Understanding the Technology Centres Systems Program

The Technology Centres Systems Program is a USD 400 million pan-India program jointly funded by the World Bank and the Ministry of MSME, Government of India. It seeks to enhance the technological competencies and skill base of MSMEs in select manufacturing sectors by establishing upgraded and new Technology Centres (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. As a part of the TCSP program 15 new such Technology Centres are being set up in different states across India and the existing 18 centres are being upgraded.

These TCs will provide 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 enhance the productivity of MSMEs by improving their access to technology and business advisory services as well as skilled workers through systems of financially sustainable TCs.

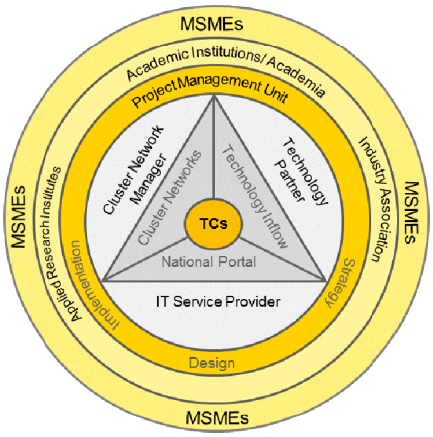
KEY SERVICES OFFERED BY TECHNOLOGY CENTERS

(Sample for a General Engineering TC)

- Design & Manufacturing
  - Product Development
  - Design & Manufacturing of tools, dies, moulds, precision tools
  - Process Development & Improvement
- Skill Development
  - Long & short term training programs in the areas of CAD, CAM, CNC, automation, additive manufacturing, mechatronics etc.
  - Customised programs for industries
  - Catering to student ranges from school drop outs to 10th/12th/ITI/diploma/degree holders
- Consultancy
  - Process and Product Improvement
  - Automation solutions
  - Quality Systems support
  - Turnkey assignments
  - Course curriculum developments

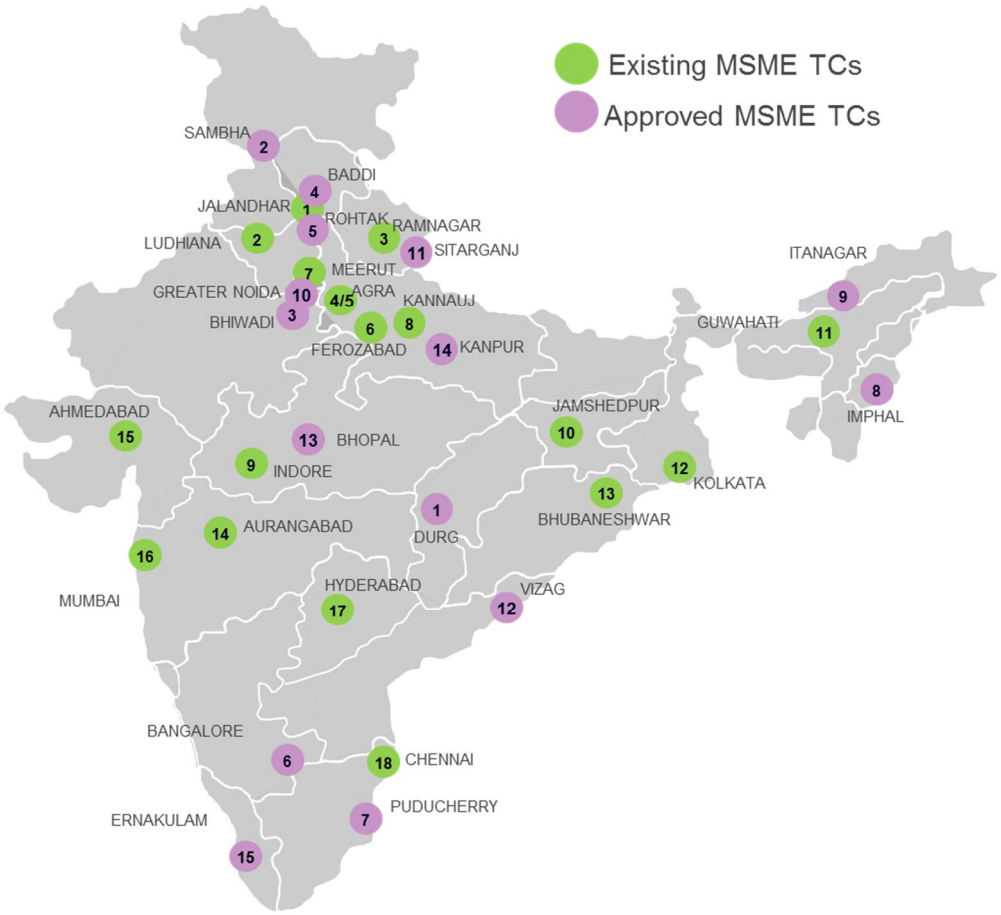
The stakeholders in the TCSP program include beneficiaries, implementation partners and strategic collaborators. Beneficiaries include MSME Units, who would benefit from access to technology, trained manpower and consultancy services, as well as the larger manufacturers and skill seeks. Strategic collaborators include Industry Associations, Applied Research Institutes and Academic Institutes and Academics.

FIGURE 1: THE TCSP ECOSYSTEM



The implementation team comprises a Project Management Unit (PMU), pivotal to implementing the program, a Technology Partner (TP) firm who would study and upgrade the technologies at the TCs and a Cluster Network Manager (CNM) firm who would enhance market linkages and other economic development cooperation amongst key stakeholders. A web-based National Portal Service Provider (NPSP) would provide a digital connect between different stakeholders. A Construction Management Consultant (CMC) shall be responsible for design, supervision of work and final closure of construction works for the TC.

FIGURE 2: LOCATION OF ALL TECHNOLOGY CENTRES



1.2 Objective

The objective of this DPR is to evaluate the feasibility of the proposed Technology Centre at Kochi. This includes assessment of the market needs 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.

This DPR has been prepared in consultation with relevant stakeholders including O/o DC-MSME, the World Bank, OEMs, Tier I & II suppliers, industry associations, Government Institutes and some ancillary units in the area.

1.3 Regional Overview

Kochi is a major port city located on the south-west coast of India by the Arabian Sea. It is a part of Ernakulam district Kerala. It is industrial and commercial capital of Kerala and one of the fastest-growing Tier-2 metro cities in India. Availability of electricity, fresh water, long coastline, backwaters,

good banking facilities, presence of a major sea port and airport, International Container Trans-shipment Terminal etc. are some of the factors, which contribute to the industrial growth of the city. Kochi is located at 9° 58"N, 76° 17"E

FIGURE 3: LOCATION OF THE KOCHI TECHNOLOGY CENTRE

Cochin International Airport (CIAL) located about 28 km north of Kochi city, handles both domestic and international flights. It is the world's first fully solar energy powered airport. Kochi is very well connected by rail, it has two major railway stations – Ernakulam Junction and Ernakulam Town.

The Kochi Metro is an under-construction metro rapid transit system for the city, intended to considerably ease traffic congestion in the city and its surrounding metropolitan area. Kochi is well connected to neighbouring cities and states via several highways. Several national highways pass through Kochi such as National Highways 544, 966A, 966B, and 66.

Allotted land for the Technology Center is located in the KSIDC Industrial Area Angamaly, Ernakulam. Transformers and Electricals Kerala (TELK), INKEL business Parks and De Paul Institute of Science are present in the neighbourhood of the proposed location. The location is easily accessed through rail, road and air as Angamaly Railways Station and Cochin International Airport are located nearby.

FIGURE 4: CATCHMENT AREA OF THE KOCHI TECHNOLOGY CENTRE

1.4 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 guidance on key aspects including (but not limited to) product design, tool and die manufacturing/support, and manufacturing skill development. Key stakeholders for the Kochi 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. These are summarized below.

The overall industrial stakeholder ecosystem in Kochi is rich and encompasses leading national players, as summarized below.

Government Bodies: Kerala State Industrial Development Corporation (KSIDC) formed in 1961, is the premier Government agency working for industrial and investment promotion in Kerala. Key objectives of KSIDC are to promote, facilitates and finance large and medium scale industries and catalyses the development of physical and social infrastructure required for industrial growth in the state. It acts as a single point contact for investments to the State. It offers a comprehensive set of services that include developing business ideas, identifying viable projects, feasibility study and providing financial assistance and guidance for implementation. The corporation has so far promoted more than 750 projects in the State which include pioneering organisations such as Cochin International Airport Limited, KELTRON, Hindustan Latex Ltd, Kerala Minerals & Metals Ltd, Tata Tea Ltd, Harrisons Malayalam Ltd, BrahMos Aerospace Trivandrum, Nitta Gelatin India Ltd. etc.

Kerala Small Industries Development Corporation (SIDCO) addresses overarching needs of Small Scale Industries in the State such as provision for land and building, supply of scarce raw materials at low cost, marketing of MSME Products etc. SIDCO is a fully owned Government Corporation formed after merging Kerala Small Industries Corporation and Kerala Employment Promotion Corporation. SIDCO owns and operates production units, raw materials depots, Industrial Estates/ Mini Industrial Estates, marketing cell/emporia/centres, Civil Construction Division, IT&TC Division, Export & Import/ Project Division and Industrial Parks.

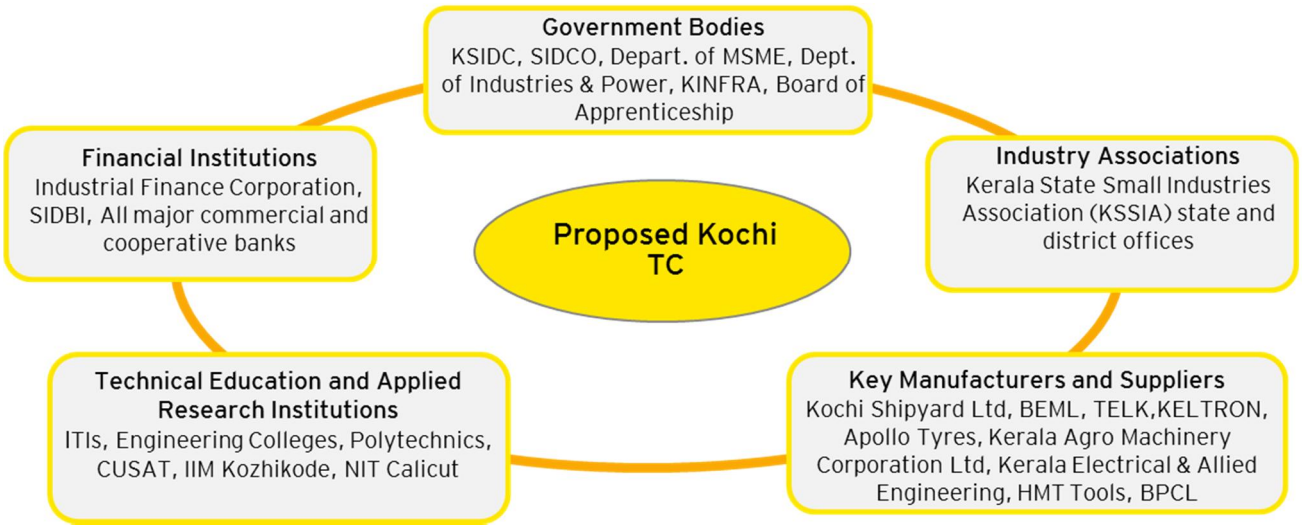


FIGURE 5: SUMMARY OF KEY STAKEHOLDERS FOR THE KOCHI TC

Industry Associations: Kerala State Small Industries Association (KSSIA), founded in 1961, is working as main spokes body of small scale industries in Kerala. It has representation of individual members from various sectors such as Wood, Plastics, Engineering, Rubber, Printing Information Technology, Chemical etc. It has more than 20,000 members and it has offices in all 14 districts of Kerala. Key activities such as addressing the needs of small scale industries from time to time, policy

formulation, resolving problems of members, and strengthening the link between SSI and State and Central Governments are undertaken by the association.

Technical Institutions: Kerala has a total of 162 Undergraduate colleges (over 54,000 seats), 86 Engineering colleges with over 5700 seats offering PG courses, 61 Polytechnic colleges with intake capacity of over 12,400, 78 MBA colleges with over 5800 seats 39 Technical High Schools with over 2400 seats and17 Commercial colleges of intake capacity of over 1000 students[2]. In addition, there are 3 main R&D institutes i.e. Centre for Engineering Research and Development (CERD), Transportation Engineering Research Center (TRC) and The TrEST (Trivandrum Engineering, Science & Technology) Research Park are functional under directorate of technical education.

Key Manufacturers and suppliers: Kochi represents one of the most commercially developed city of Kerala. Major business sectors including manufacturing, shipbuilding, construction, transportation/shipping, seafood and spices exports, chemical industries, Information technology, tourism, health services, and banking are present in the city. Kochi Shipyards, Transformers & Electrical Kerala (TELK), Appolo Tyres, Hindustan Lever Ltd, HLL Life Care, Kerala Agro Machinery Corporation Ltd, Kerala Electrical & Allied Engineering, HMT Tools, KITCO Ltd, Manufacturers such as Fertilisers and Chemicals Travancore (FACT), Travancore Cochin Chemicals, Indian Rare Earths Limited, Chita Motor works Pvt Ltd, Edaran Precision India Ltd, Ray-hans FCI OEN connectors are major manufacturers in Kochi and surrounding areas.

Financial Institutions: Kochi have a strong presence of all leading commercial and cooperative banks such as BoI, Vijaya Bank, Corporation Bank, Bank of Baroda, SBI, Catholic Syrian bank Kumbalangi Service Cooperative Bank etc. In addition, industrial finance leaders such as the Industrial Finance Corporation of India, Small Industries Development Bank of India (SIDBI) and Kerala Financial Corporation are all present in the region.

Overall, the regional stakeholder ecosystem is robust and when brought together with the TC, could significantly enhance the manufacturing competencies of the region,

1.5 Opportunity and Need Assessment

Kochi is the one of fastest growing cities of Kerala. Chemical, Ship building, Oil, IT and Electronics hardware are few of the key dominant sectors in Kochi. Manufacturers such as Fertilisers and Chemicals Travancore (FACT), Indian Rare Earths Limited, Cochin Shipyards, BPCL Kochi Refinery, are key players in Kochi and Ernakulam. A high-level snapshot of the industrial scenario of Ernakulam district, is as follows:

[2] Directorate of Technical Education Kerala

TABLE 2: INDUSTRIAL SUMMARY OF ERNAKULAM

S. No.	Head	Data
1.	Registered Industrial Units	21,004
2.	Registered Medium units	89
3.	Total Employment in registered units	1,92,675
4.	Estimated Average number of daily workers employed in small scale industries	24.6
5.	Employment in medium industries	4,355
6.	Number of industrial areas	6

Source: District Industrial Profile of Ernakulam

The sectorial composition of firms in Ernakulam district is dominated by engineering units including Metal based fabrication and repair and servicing. Agro based industry is the next big sector in the district. A complete sectorial composition of the district is presented as below:

TABLE 3: SECTORIAL PROFILE OF KOCHI INDUSTRIES

Type of Industry	Number of Units	Investment (INR Lakhs)	Employment
Repairing and Servicing	7,363	140675	26267
Engineering Units	2,097	52625	8873
Metal Based (Steel fab.)	228	7650	2430
Electrical Machinery & Transport Equipment	331	10275	5979
Agro Based	2332	56300	13988
Cotton Textile	1375	35964	8551
Readymade garments & embroidery	1608	10008	22553
Wood/Wooden based furniture	1008	3920.29	4,232
Rubber, Plastic and Petro-based	513	16550	5832
Chemical/Chemical Based	357	14475	5241

Source: District Industrial Profile of Ernakulam

1.6 Assessing Industry Requirements in the Kochi Catchment Area

Kochi is an important revenue contributor to the Kerala economy, designated as a "commercial Capital of Kerala," and offers some of the following advantages:

- Kochi enjoys good connectivity via road, railway and air.
- The Kochi International Container Transhipment Terminal (ICTT), locally known as the Vallarpadam Terminal, is India's first international container trans-shipment facility. It has a capacity of handling cargo up to one million TEUs (twenty-foot equivalent units) per annum.
- Kochi is almost centrally located in Kerala and offers accessibility to large markets within Kerala and its neighbouring states including Tamil Nadu and Karnataka.
- The city is home to some premier technical and research institutes in the country - Cochin University of Science and Technology (CUSAT), National Institute of Oceanography (Regional Centre), Central Marine Fisheries Research Institute, National Institute of Fisheries Post Harvest Technology & Training. It is also home to large number of ITIs such as Women's Polytechnic College, Ernakulam.
- Cochin Shipyards, HMT Machine tools, Kerala Electrical Ltd., Indian Rare Earth Ltd. Fertilisers and Chemicals Travancore, Traco Cable, Transformers and Electricals Kerala Ltd (TELK) are key large manufacturing units in Ernakulam.

The catchment area of the proposed Kochi Technology Centre extends for a 250 Km radius around the Ernakulam district and includes most of the districts of Kerala such as Palakkad, Kannur, Kozhikode and Thiruvananthapuram etc. and neighbouring states districts such as Coimbatore, Madurai and others. , which are home to some large industrial units in general engineering, ESDM, textiles, wood, chemical, and other sectors.

TABLE 4: INDUSTRIAL PROFILE OF THE KOCHI CATCHMENT AREA

S. No.	District Name (Total registered MSME units)	District summary	Large scale clusters	Key large manufacturers
1.	Ernakulam (21004)	Ernakulam is the highest contributor (14.47%) to State GDP. It is home to several large industries and clusters in engineering, shipbuilding, transportation/shipping, seafood and spices exports, chemical industries, Information technology, tourism, health services, and banking. Kochi is the fastest growing commercial city Ernakulam as well as of Kerala. Ernakulam occupies highest growth in MSME development during 2014-15 with 2248 new MSMEs and 15648 new employment generation among all districts of Kerala. It has 6 industrial area i.e. Angamaly, Edayar, Aluva, Vazhakulam and Kalamassery. Most of the manufacturing units fall under general engineering sector which is followed by food processing industry.	► General Engineering and electrical equipment ► Plastic ► Wood/wooden goods ► Food processing ► chemical	► Cochin Shipyards ► HMT Machine tools, ► Kerala Electrical & Allied Engineering Co. Ltd. ► Indian Rare Earth Ltd. ► Fertilisers and Chemicals Travancore ► Traco Cable ► Transformers and Electricals Kerala Ltd (TELK)

S. No.	District Name (Total registered MSME units)	District summary	Large scale clusters	Key large manufacturers
2.	Palakkad (17488)	Kerala's 2nd most industrialized district is Palakkad. In rural area, agro based industries is the main sector. Textile based and building materials units are growing very fast for the past few years. The key concentration of SSI units is in Alathur, Malampuzha, Palakkad and Pattambi Blocks as also in Palakkad Municipal Area. There are around 55 large and medium industries, 17488 MSME units and more than 125 KVI industries units operating in the district. There are around 1948 manufacturing units from engineering sector which is 11% of total MSMEs in the district	► Food Processing ► Secondary Steel Manufacturer ► Electrical Equipment ► Textile ► Engineering ► Plastic	► BEML ► HPCL ► Paragon Steels ► SMM Steel ► Surabhi Steel ► Instrumentation Ltd ► Kerala Electrical & Allied Engineering Co. Ltd(KEL), ► Pepsico ► M.P.S. Steel Casting
3.	Kottayam (18088)	Kottayam is popularly referred to as the 'Land of Lakes, Latex and Letters'. It is the first district in India to have achieved 100% literacy. Tourism is a major contributor to the economy of Kottayam. Besides Tourism, the industries in Kottayam are mainly agro-based with commercial crops like Rubber, paddy, pepper, cocoa, coconut, fruits, tea and coffee. There are around 3924 units which are involved in engineering works, Metal fabrication and repair maintenance.	► Food Processing ► Engineering ► Textile ► Rubber & plastic ► Wooden products	► Travancore Cements ► Cochin Cements ► MRF Limited ► Canara Paper Mills ► Hindustan News Print

S. No.	District Name (Total registered MSME units)	District summary	Large scale clusters	Key large manufacturers
4.	Malapuram (11728)	Malappuram depends mainly on agriculture for their living with other major economy contributors of the district being timber industry, fishery, tourism and spice trading. The small scale industries in the district, which are Engineering and repair and servicing, wood and textile based also adds revenue to the district. Keltron NTTF Training Centre (KNTC) in Kuttipuram in partnership with Keltron is providing training in Tool & Die manufacturing and manufacturing technology. There are more than 4100 units functioning under engineering and related sector.	► Metals & Engineering ► Wood ► Textile	► Keltron NTTF Training Centre (KNTC) ► Keltron Electro Ceramics Ltd, Room ► KSRTC Body workshop ► MALCOTEX ► Malappuram Cooperative Spinning Mill

S. No.	District Name (Total registered MSME units)	District summary	Large scale clusters	Key large manufacturers
5.	Kollam (1820)	Kollam is an important commercial, industrial & trading Centre in Kerala. Immensely rich in Mineral resources. Mineral hub of Kerala - beach sands have large concentrations of heavy minerals like Thorium, Ilmenite, Rutile, Monazite and Zircon which offer scope of exploitation for industrial purpose. Thrust sectors in the district are Cashew processing industry, Handloom industry, Spinning mills, Paper mills, Aluminum industry, Mineral Industry, Fisheries, Rubber plantations etc.	▶ Electrical Equipment Manufacturing ▶ Mineral Processing ▶ Ceramics	▶ United Electrical Industries ▶ Kerala Electrical and Allied Engineering Company ▶ Kerala Ceramics Limited, ▶ Kerala Minerals and Metals Limited, ▶ Kerala Agro-Fruit Products ▶ Aluminum Industries Limited etc.

S. No.	District Name (Total registered MSME units)	District summary	Large scale clusters	Key large manufacturers
6.	Kasargod (8674)	Kasaragod is the northernmost district of Kerala, bordering the State of Karnataka. Agriculture is the mainstay of the population of the district. The District has huge potential for small and medium industries and offers ample scope for the development of industries in sectors like Textiles, Agro Processing, Engineering, Wood based Minerals, Construction materials, etc. MSME units in Textile (236) and engineering and repair service (206) represent overall manufacturing in the district.	► Textile ► Engineering ► Wood/Wooden based furniture	► HAL-Strategic factory ► BHEL ► Cheemeni Power Project
7.	Coimbatore (59766)	Coimbatore is a major commercial and business hub in the state of Tamil Nadu. Coimbatore is considered as one of the largest foundry cluster in India. More than 50,000 engineering units function in and around Coimbatore city. The Engineering industry in Coimbatore making high quality inputs such as castings and forgings and a wide variety of ancillary products. The engineering industry of Coimbatore is credited with offering customized and cost effective engineering solutions. Motor and Pumps, Auto Components, wet grinders, tooling, furniture are other key engineering products in the district.	► Textile Manufacturing ► Automobile components ► Pump, Motor and foundry Industry ► Wet grinders ► Electronics and electrical products ► Textile Machinery	► Robert Bosch GmbH ► L&T ► Laxmi Machine works ► PRICOL ► Suzlon ► LGB ► Craftsman Automation ► Roots Industries ► Aquasub engineering ► BEST Pumps ► CRI Pumps

Source: District Industrial Profiles, Ministry of MSME

1.7 Key Challenges Faced in the Region

The bulk of industries in the Kochi catchment area are general engineering based, automotive, Electrical equipment manufacturing, metal fabrication and other sectors. Thus, the Technology Centre has been premised with a General Engineering focus.

As part of preparing the DPR, discussions were held with MSMEs in General engineering sectors across the region including Ernakulam, Palakkad and Thiruvananthapuram. The objective of the primary research was to understand their business requirements, issues, challenges, and future requirements to develop a deeper appreciation of the requirements so that the Technology Centre Systems Program of the O/o DC MSME can address the same in future. The research also included the support requirements of these players' with respect to product design, training, manufacturing and consultancy.

In order to understand the industry requirements in the region, detailed primary and secondary research was conducted for the region with desktop research, site visits and stakeholder consultations with several large OEMs, MSME units, industry associations, training units and government bodies. Some of the key challenges faced by stakeholders in the region are as follows:

- Shortage of tooling facilities: Keltron NTTF Training Centre (KNTC) in Kuttipuram is the only Government run Tool room training centre. The centre is only in providing training in tool and die making. Additionally, there are captive tool rooms in and around Kochi. These are nowhere near the capacity required to service the region. The majority of MSME units, have to rely on the tool room/ precision machining facilities outside the catchment area (i.e. Chennai, Bangalore, Mumbai etc.) and international suppliers.

- Shortage of skilled manpower: Although Kochi is home to several high quality technical institutes, the local units are unable to retain talented graduates in the region. A large pool of graduates from ITIs and other institutes do not bring the quality skills required. Additionally, several OEMs that have existed in the region for decades are seeing large segments of their workforce retiring, without sufficient replacement.

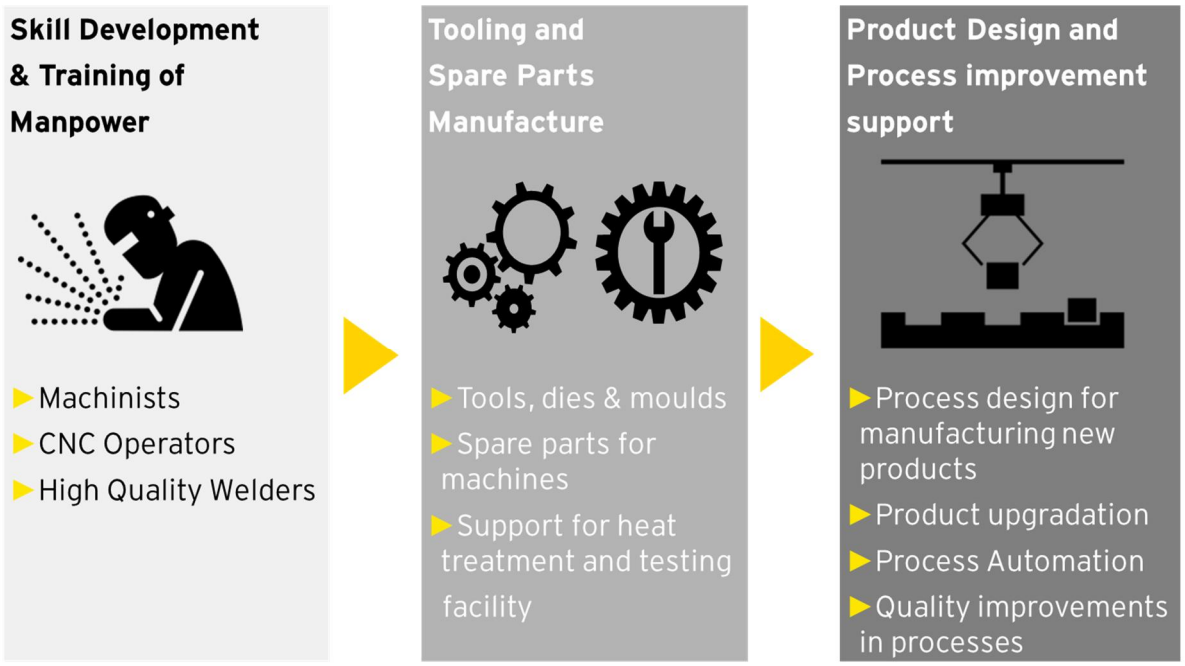
- Poor product quality of local vendors: Although large OEMs outsource significant chunks of production, most of them are reliant on vendors outside the region ranging from far-off domestic locations such as Chennai to international suppliers in East Asia. Local vendors are either unavailable for high precision sectors or do not produce supplies of the required quality.

- Poor technical and process quality of local vendors: Local vendors have generally not upgraded to latest technologies and quality processes in their manufacturing. In addition, the business skills and other soft skills of local units are also weak.

- Difficulty in procuring spare parts: Several units which have upgraded to new or complex machinery face challenges in procuring spare parts and are often reliant on international suppliers for these components, significantly raising their costs and lead times.

- Inability to identify and certify quality of products of local MSMEs: The unavailability of product catalogues or lists of MSMEs in the region has made it difficult for some large OEMs to identify suitable MSME vendors. Additionally, there is no significant local infrastructure for testing/validation of input materials and products manufactured by MSMEs in the region.

TABLE 5: SUMMARY OF MARKET OPPORTUNITY FOR THE KOCHI TC



Sector	Units Benefited by Technology Center	Services Provided
General Engineering	MSMEs in the sector and vendors of Cochin Shipyards, BEML, BPCL Kochi Refinery,	Training, consultancy, tooling,
Automotive	Automotive sector MSMEs such as vendors of BEML etc	Training, tooling
Transport	MSMEs in the sector and vendors of proposed Railway Coach Factory (Palakkad)	Training, consultancy, tooling
Process Automation	Food processing sector	Process automation

1.8 Upcoming Industrial and Infrastructure Projects in the Kochi Catchment Area

The Kochi catchment area is receiving a big infrastructure push which could have transformational effects on its connectivity and access to new markets, vendors and suppliers. Some of the key projects are summarized below:

Coimbatore- Cochin Industrial Corridor

- Industrial corridor to connect Kochi and Coimbatore will have an expected investment of Approx. INR 23,541 Crore.
- State Governments (Kerala &Tamil Nadu), Central Government and Private sector is actively participating in this prestigious project
- This corridor development plan and its infrastructure components is estimated to attract industrial and social infrastructure investment to the tune of INR 1 Lakh Crore to the corridor districts over a period of the next 10 years.
- It is comprised of 12 potential industrial nodes and two tourism/ recreational nodes.
- Ernakulam and Kottayam will fall under NIMZ- I (National Industrial Manufacturing Zone) whereas Thrissur and Palakkad will constitute NIMZ-II based on the identified industrial nodes along the corridor.

Kochi Metro Rail

- A rapid transit metro system is being developed in Kochi. Being thickly populated area and with narrow roads, Kochi's traffic needs cannot be met by any road-based system.
- Estimated completion cost of phase-I is over 5100 cr. In phase-I the Metro would connect Aliva to Petta covering total 22 stations which is expected to complete by march 2017
- Phase-II of the project will cover Petta to Thirupuonithura and Nehru Stadium to Info Park.
- Detailed Project Report for the project was prepared by Delhi Metro Rail Corporation (DMRC) in 2011.

Industrial Growth Centres

- Under Central Government's Growth Centre Scheme, Kerala Govt. has entrusted Kerala State Industrial Development Corporation Ltd (KSIDC) for developing and managing Industrial Growth Centres in various locations in the state.
- KSIDC has identified and initiated to develop Industrial Growth Centres in four industrially backward locations i.e. Kannur, Kozhikode, Malappuram and Alapuzza.
- KSIDC has already developed basic infrastructure such as roads, water, power, telecommunications etc. in above 4 locations.

- In these Growth Centres, Land would be allotted to prospective entrepreneurs in the form of industrial plots and built-up areas.
- These Growth Centres would attract entrepreneurs and manufacturing units to set up their units in the IGCs, which would give trust to the industrialization of these districts.

Light Engineering Park, Palakkad

- KSIDC has proposed to set up a Light Engineering Park in Walayar industrial belt in Palakkad.
- Total extend of land is 35 Acre.
- It is proposed to set up 35 units of light engineering in this park providing employment opportunity to more than 500 skilled workers.
- It is proposed to provide land on lease for 90 years to the light engineering units.
- Other infrastructure such as power, water, industrial gas, rail & road connectivity would be provided by KSIDC

Integral Coach Factory

- An aluminium coach factory under PPP mode to manufacture light weight railway coaches in Kanjikode Palakkad has been proposed by Railway Board.
- Total budget of around 550 crore is proposed for the project.
- It would boost the light engineering industry in the region as Kanzikode is considered the 2nd biggest industrial concentration of the State after Kochi.
- The state government have already allotted required land at Kanjikode for the upcoming industry.
- It would generate employment of more than 1500 directly and 1000 semiskilled workers in directly.

BEML Expansion Project

- Bharat Earth Movers Limited is planning to expand under phase II. Currently, Palakkad unit of BEML is producing Tatra trucks.
- Under 2nd phase, they are planning to manufacture LHB coaches, aluminium and stainless steel goods for railways. This expansion would lead to development of ancillary units in general engineering sector.
- Around INR 400 crore will be invested in this expansion.
- It would generate direct and indirect employment of 500 and 1000 respectively.

KINFRA Parks

- Kerala Industrial Infrastructure Development Corporation (KINFRA) has developed more than 20 industrial parks across the State. While some are theme parks (such as the film and video park in Thiruvananthapuram), the others are multi-purpose parks.
- Kerala Industrial Infrastructure Development Corporation (KINFRA) is planning to develop an Electronics Manufacturing Cluster at Kakkanad in Ernakulum. It would be an Industrial Park with all modern facilities for the Electronic manufacturing Industry.
- A defence industrial park is proposed to be established in Ottappalam near Palakkad. An investment of INR 231 Cr would be provided by Central and State Government. The park is to be established as part of 'Make in India, Make in Kerala'. The project will have modern common infrastructure facilities aimed at attracting component manufacturers in the defence industry.
- Other industrial parks under KINFRA are
    - KINFRA Techno Industrial Park, Malappuram
    - KINFRA Park, Seethangoli, Kasaragod
    - KINFRA Industrial Park, Wayanad
    - KINFRA Industrial Park, Thalaserry
    - KINFRA Industrial Park, Nellad
    - KINFRA Industrial Park, Kunnamthanam, Pathanamthitta
    - KINFRA Industrial Park, Koratty
    - KINFRA Industrial Park, Adoor

INKEL Business Park Angamaly

- INKEL Ltd (INKEL) is promoted by the Government of Kerala as a PPP Company with investment from NRI Investors, Entrepreneurs, Public Sector Banks, Institutional Investors, the Government and the PSUs.
- INKEL is developing a Business park to provide exquisite ready to occupy business space with all basic infrastructure facilities for IT/ITES, BPO's, Educational, Skill Development, Financial Institutions, Data Centers, and Green Industries like Electronics etc, and other Service Sector Industries.
- When completed INKEL BUSINESS PARK will have 9 TOWERS with a combined area of 2.5 Million sq.ft.
- Already completed TOWER I with 2 Lakhs sq.ft. is fully functional and is a grand success. A number of reputed institutions are functioning here.
- This park is next to proposed Technology Centre in Angamaly.

Implementation Plan

2 Implementation Plan

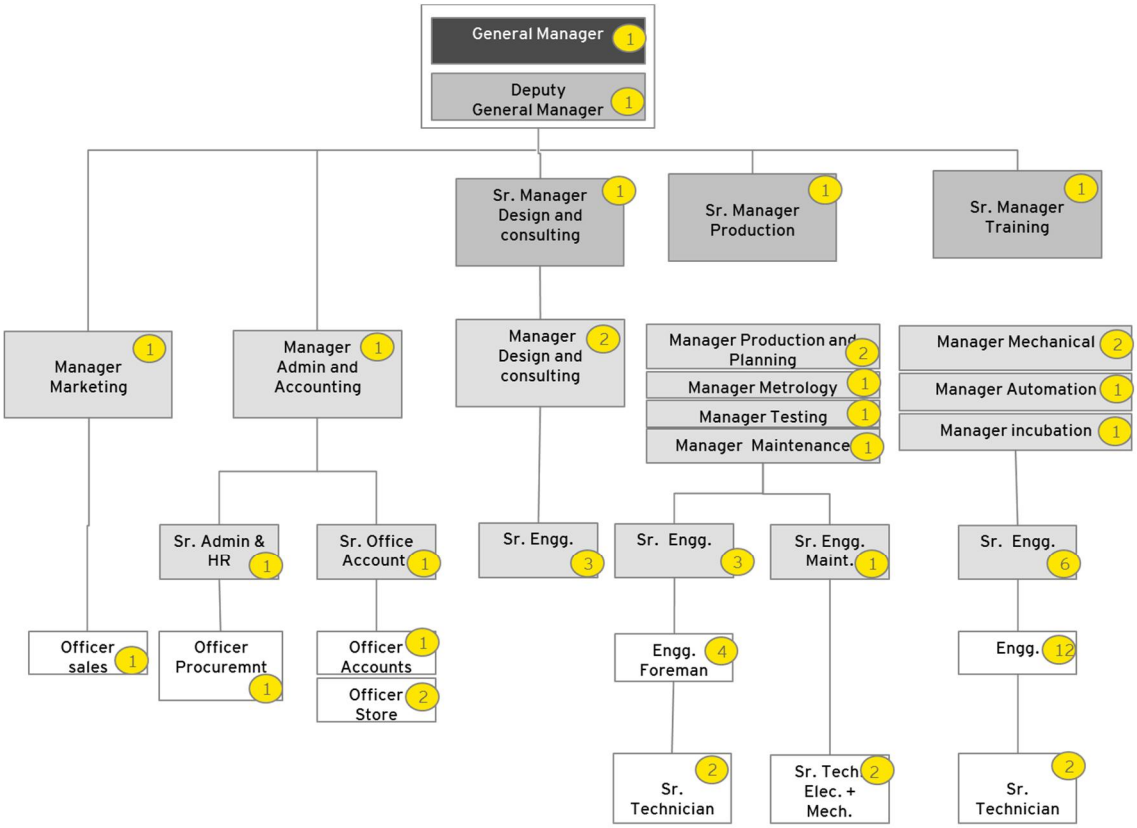
2.1 Manpower and Human Resource Planning

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

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

Based on our own research and design, as well as detailed consultations with some of the existing Technology Centres, o/o MSME-DC and other tool rooms, we have devised the following organizational structure for the Kochi TC. The detailed Roles and Responsibilities are provided in Appendix 3.

FIGURE 6: ORGANIZATIONAL STRUCTURE



The following key considerations have been taken into account in devising this structure:

- The Empowered Finance Committee has mandated a total sanctioned strength of 60 for any new TC, in contrast to existing strengths of 110-120.

- Due to the 60 staff limit, 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 are clubbed into one.

- 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.

- In the proposed organizational structure for the Kochi 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.

- To strengthen the key revenue arms of the TC – training and consultancy - a sanctioned strength of 7 experts has been provided, 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 a need basis.

- In contrast to existing TC, the marketing department has been reduced from 4-5 employees, 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 would strengthen the marketing activities of the proposed TC. Taking all the above factors into account, a lean marketing department has been proposed for the proposed Kochi 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 incubation. Keeping in mind the scale and the emphasis to promote entrepreneurship, the manager incubation would mainly be responsible for administration, planning, quality control, issue of certificate to trainees, fee collection and others. Even one of the manager would be additionally responsible for organising workshops and providing other support services.

- While estimating the numbers we have considered the following factors:

  - 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 addition, 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 requirement of staff for the house-keeping and security will be outsourced to a third party agency on yearly contract basis

TABLE 6: SANCTIONED STRENGTH OF KEY RESOURCES

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

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

In addition to the above sanctioned strength, we have recommended additional employees as contractual employees. Based on the requirement, we have estimated around 140 contractual employees (128 in training & 12 in production) by end of FY 2026-27. 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.

2.2 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 2017-18. 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.

Year 2017-18: 2 Staff Members

- GM will be involved in project implementation and in working 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 2018-19: 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 Indore 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 2019-20: 42 Staff Members

- 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 2020-21: 52 Staff Members

The proposed TC would be fully operational by this period. 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.

2.3 Planning for Production, Training and Consultancy

The Kochi TC would offer production, training and consultancy services linked to General Engineering. The details of these facilities are explained below.

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 the Technology Partner for finalisation and to initiate procurement. The budgetary cost (landed cost) of these machines is approximately estimated at around INR 28.45 Cr.

TABLE 7: PROPOSED LIST OF MACHINES AND EXPECTED REVENUE FOR PRODUCTION/ MANUFACTURING ACTIVITIES

Machine	Make	Suggestive Specs	Number	Value (lacs)	Total Cost	Estimated Machine Rate/ Hour*	Shift	Hours
CNC Milling-5axis	Foreign	0.75xo.5x0.5 m	1	150	150	2000	2	16
CNC VMC-3axis	Foreign	1.6mx0.9mx0.9m	2	100	200	1200	2	16
CNC VMC-3axis (High Precision)	Foreign	0.8mx0.6mx0.5m	1	125	125	1500	2	16
CNC Turning Centre	Foreign	300*600	1	35	35	500	2	16
Conventional Milling	Indigenous	1200*300*400	2	25	50	250	2	16
Conventional Lathe	Indigenous	400*1200	2	20	40	200	2	16
CNC Wire EDM	Foreign	500*500*400 mm	1	100	100	1500	3	24
CNC EDM Die Sinking	Foreign	500*500*400 mm	1	100	100	1000	3	24
Toolings & Tooling Systems (@ 10% of machine value)					80			
Laser profile Cutting Machine	Foreign	1.6mX1.6m	1	200	200	1500	2	16
3D Scanner	Foreign		1	100	100	500	2	16
3d Polymer Printer	Foreign		1	200	200	1500	2	16

Radial drill machine	Indigenous	63mm	1	10	10	150	2	16
Surface Grinding Large	Indigenous	1000x600 mm	1	60	60	500	2	16
Surface Grinding small	Indigenous	600x400 mm	1	30	30	300	2	16
Cylindrical Grinding	Indigenous	Dia 200x750mm	1	40	40	400	2	16
Injection Moulding machine	Indigenous	125 Tonne	1	50	50	350	2	16
Hydraulic press	Indigenous	200 Tonne	1	75	75	800	1	8
Mechanical press	Indigenous	250 Tonne	1	60	60	600	1	8
Work Benches with Bench Vices & Assembly Kits	Indigenous		10	1	10			
Auxiliary Equipment (Drill m/c, pedestal grinder, trollies etc.)	Indigenous		1	20	20	0	2	0
Material. Handling Equipment.- EoT 5T, Jib Crane 2T (2 nos.), Trollies	Indigenous	1 nos. EoT Crane (5 Tonne) & 2 nos. Jib Crane (2 Tonne each)	1	100	100	0	2	0
CNC CMM	Foreign	1250mmx1000 mm	1	260	200	1000	2	16
CAD/CAM Software CATIA, UG etc	Indigenous		10	10	100	500	2	16
Vacuum HT Plant, Aux. Equipment & Metallurgy Testing Lab	Indigenous	Dia. 600x800 mm	1	260	260	1500	2	1
Testing and Certification	Indigenous		1	300	300	500	2	16
Scanning/Drafting/Printing	Indigenous		1	5	5	0	2	0
CAD-CAM Workstations	Indigenous		10	1	10	0	2	0
Subtotal					2710			
Contingency @ 5%	Indigenous				135.5			
Total					2845.5			

Training

The TC at KOCHI will provide professional training in various courses with focus on general engineering. The duration of courses will be both short and long term, ranging from 1 month to 48 months in various specialisations like; Tool Room & CNC Manufacturing, CAD/ CAM, Advance Welding, Training on Testing, etc. 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. 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.

During discussion with stakeholders, it was identified that there are significant number of engineering colleges in Kerala and a large number of students are passing out of these colleges with B. Tech and B.E. Degree. But there is a huge demand and supply gap for diploma students. Companies find it difficult to find enough skilled diploma students. On the other hand, students are highly motivated to opt for Degree courses. It would be a good idea to start few PG level courses at Technology Centre in collaboration with other university or colleges. Masters of Engg. (M.E.) courses in Mechatronics, Tool Design, CAD/CAM would be jointly run by the TC and the partner college where few courses will be taught at TC and rest at the partner college/university. These courses would have a curriculum based on industry requirement and theoretical concepts. The TC can take up the industry specific courses and rest theoretical courses can be taken up by the partner college. These courses would open up opportunities for undergraduates to upgrade their skillset as per industry requirement and simultaneously the industry would get skilled manpower.

The detail of courses in various specialisations is given below:

TABLE 8: DETAILS OF SPECIALISATION, COURSES, DURATION AND CAPACITY INTAKE AND REVENUE

No.	Trade	Course name	FT/PT	Duration (months)	Fee/ student (INR)	Yearly Revenue per student	Batch size	No. of Batch/ year	Capacity
1	Tool Room	Advanced Diploma in Tool & Die making	FT	48	1,40,000	35000	60	1	240
		Certificate course in Machinist	FT	24	40,000	20000	30	1	60
		Post Diploma in Tool Design	FT	12	50000	50000	30	2	60
		Post Diploma in Tool Manufacturing	FT	12	50000	50000	30	2	60
		Post Diploma in CNC-Prog & Op	FT	12	35000	35000	30	2	60
		Post Diploma CAE (manufacturing)	FT	12	60000	60000	30	2	60
		Adv. Certificate Course in Tool Design & CAD/CAM	FT	12	60000	60000	30	2	60
		Adv. Certificate Course Tool & Die Manufacturing	FT	12	60000	60000	30	2	60
		Certificate Course in Tool & Die Making	FT	12	40000	40000	30	2	60

No.	Trade	Course name	FT/PT	Duration (months)	Fee/ student (INR)	Yearly Revenue per student	Batch size	No. of Batch/ year	Capacity
		Master Certificate Course in Tool Design	FT	6	40000	40000	30	2	30
		Certificate Course in Machine Tool Operations (Conventional L,M,G)	FT	12	30000	30000	30	2	60
		M.E. CAD/CAM in joint with Engg. University/college	FT	24	120000	60000	30	1	60
		M.E. Tool Design in joint with Engg. University/college	FT	24	120000	60000	30	1	60
		M.E. Mechatronics in joint with Engg. University/college	FT	24	120000	60000	30	1	60
		Master of CAD/CAM/CNC	FT	6	20000	20000	30	2	30
2	Maintenance	Machine Maintenance-mechanical	FT	3	15000	15000	20	4	20
		Maintenance Technician	FT	3	10000	10000	20	4	20
		Machine Maintenance-mechanical (Part Time)	FT	6	18000	18000	20	2	20
		Certificate Course in Machine Maintenance	PT	12	25000	25000	30	2	60
		Diploma in Design, Manufacturing & Maintenance	FT	6	18000	18000	30	2	30
		Maintenance Technician (Part Time)	PT	6	12000	12000	20	4	80
3	CNC Manufacturing/ CAD/ CAM	CNC lathe programming and operation (Full Time)	FT	2	9000	10000	30	6	30
		CNC lathe programming and operation (Part Time)	PT	4	10000	8000	30	12	120
		CNC Milling Prog and Operation (Full Time)	FT	2	10000	10000	30	6	30
		CNC Milling Prog and Operation (Part Time)	PT	4	10000	8000	30	12	90
		CNC Turning	FT	1	5,000	5000	30	6	30

No.	Trade	Course name	FT/PT	Duration (months)	Fee/ student (INR)	Yearly Revenue per student	Batch size	No. of Batch/ year	Capacity
		CNC Milling	FT	1	5,000	5000	30	6	30
		CAD/CAM/CNC ENGINEER (Full Time)	FT	2	10000	12000	30	6	30
		CAD/CAM/CNC ENGINEER (Part Time)	PT	4	12000	10000	30	12	120
		CAD Modelling with different softwares (Full Time)	FT	1	6000	6000	20	12	20
		CAD Modelling with different softwares (Part Time)	PT	2	7000	7000	30	12	60
		Computer Integrated Manufacturing (CIM)	FT	1	7000	7000	30	12	30
		CAD Modelling with different softwares (Part Time)	PT	2	7000	7000	30	24	120
4	Advance Welding	Basic Arc and Gas welding (Full Time)	FT	3	10000	10000	20	4	20
		Basic Arc and Gas welding (Part Time)	PT	6	12000	12000	20	4	40
		TIG welding (Full Time)	FT	1.5	6000	6000	20	4	20
		TIG welding (Part Time)	PT	3	6000	6000	20	8	40
		MiG welding (Full Time)	FT	1.5	6000	6000	20	8	20
		MiG welding (Part Time)	PT	3	6000	6000	20	8	40
		Spot Welding (Full Time)	FT	1.5	8000	8000	20	2	20
		Spot Welding (Part Time)	PT	3	8000	8000	20	4	20
5	Electronics and IT (Part Time Courses)	Basic computer and Hardware (Part Time - 4 hrs)	PT	2	8000	8000	30	12	60
		Advanced Hardware & Networking (Part Time - 4 hrs)	PT	4	12000	12000	30	6	60
		VLSI Design	PT	4	12000	12000	30	4	60
		Embedded System Design	PT	4	12000	12000	30	4	60
		Electronics Maintenance	PT	4	12000	12000	30	4	60

No.	Trade	Course name	FT/PT	Duration (months)	Fee/ student (INR)	Yearly Revenue per student	Batch size	No. of Batch/ year	Capacity
		Field Instrumentation & Controls	PT	4	12000	12000	30	4	60
		SCADA	PT	4	12000	12000	30	4	60
		Power Electronics and Industrial Drives	PT	4	12000	12000	30	6	60
		Solar energy system technician	FT	3	8000	8000	30	4	30
		Power plant instrument mechanic	FT	3	8000	8000	30	4	30
7	Industrial and process Automation	Industrial Hydraulics	FT	1	6000	6000	20	12	20
		Industrial pneumatics	FT	1	6000	6000	20	12	20
		PLC Programming	FT	1	6000	6000	20	12	20
		Automation Technician	FT	4	12000	12000	20	3	20
		Industrial automation design	FT	4	15000	15000	20	3	20
		Post Diploma in Mechatronics	FT	12	60000	60000	30	2	60
		Diploma in Mechatronics	FT	36	120000	40000	30	1	90

No. of students trained are expected to increase from over 800 in first year to over 8000 in 5th year.

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 26.31 Cr. The following table provides the details of the same:

TABLE 9: PROPOSED LIST OF MACHINES FOR TRAINING AND ASSOCIATED COSTS

S.No.	Training Machines	Nos	Value (lakhs)	Total(lakhs)
1.	Con-Milling-V-H-U	10	12	120
2.	Con-Lathe	10	4	40
3.	CNC-Milling	8	30	240
4.	CNC -Turning Centre	10	25	250
5.	CNC Machining Centre	3	50	150
6.	CNC Turn Mill	1	30	30
7.	CNC EDM Wire Cut	1	35	35
8.	CNC EDM Die Sinking	1	25	25
9.	Tooling for machine tools @ 5% of Machine Cost	1	44.5	58
10.	Surface Grinding	5	5	25
11.	Cylindrical Grinding	3	10	30
12.	Pedestal Grinding Machine	4	0.1	0.4
13.	Piller Drilling Machine (25 mm)	4	10	40
14.	Tool & Cutter Grinder	1	20	20
15.	Work benches	30	2	60
16.	CNC-Simulators	30	2.5	75
17.	Computers+ (for CAD/CAM/Pro E/CATIA etc.)	300	0.75	225
18.	Workstation	10	0.8	8
19.	Heat Treatment Lab for Training	1	30	30
20.	Injection Moulding Machine for Training	1	10	10
21.	Hydraulic press for Training	1	10	10
22.	CAD/CAM software Licence	250	0.3	75
23.	Welding workshop for 24 including simulator	1	150	150
24.	Welding Qc Lab incl. Radiographic Testing	1	50	50
25.	Solar Energy Lab	1	30	30

26.	Basic Instrumentation Lab	1	50	50
27.	Automation Lab for 20	1	200	200
28.	Metrology Lab Equipment	1	100	100
29.	Chemical and Metallurgical Test labs	1	200	200
30.	Maintenance Lab	1	50	50
31.	Additive Manufacturing Lab (3 priniting & hand held scanner)	1	20	20
32.	Subtotal 1			2406.4
	Training Infrastructure			
33.	Tech aids (Audio Visual)	30	1	30
34.	Tech aids (Smart Board)	10	1	10
35.	Furniture of Labs	60	0.25	15
36.	IT Hardware & Networking labs	20	1	20
37.	Classroom Furniture @ 60 seats	8	3	24
Subtotal 2				99
Total Contingency @ 5%				125.27
Total				2630.67

Total expense on other infrastructure such as office & Hostel furniture, canteen etc. will be around 576 Lacs.

	Other Infrastructure	Nos	Value (lakhs)	Total
1.	Office & Storage Furniture	60	0.5	30
2.	Hostel Furniture	160	0.25	40
3.	Canteen and Hostel Dining hall furniture	20	0.6	12
4.	Kitchen equipment	2	20	40
5.	Other Office equipment	50	1	50
6.	Laptop	20	0.6	12
7.	Desktop	40	0.5	20

8.	Photocopier cum printer	6	2	12
9.	Vehicle	2	12.5	25
10.	Pre-Operative Expenses		258	258
11.	Others	1	50	50
12.	Contingency @5%			27.45
	Total			576.45

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 Kochi TC would have a dedicated professional wing, staffed by skilled professionals, 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

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.

TABLE 10: 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 Improvement	▶ 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

The table below represents the projected revenue estimates for 10 years for consulting services for the proposed TC.

TABLE 11: AREAS OF CONSULTING AND ESTIMATED REVENUE

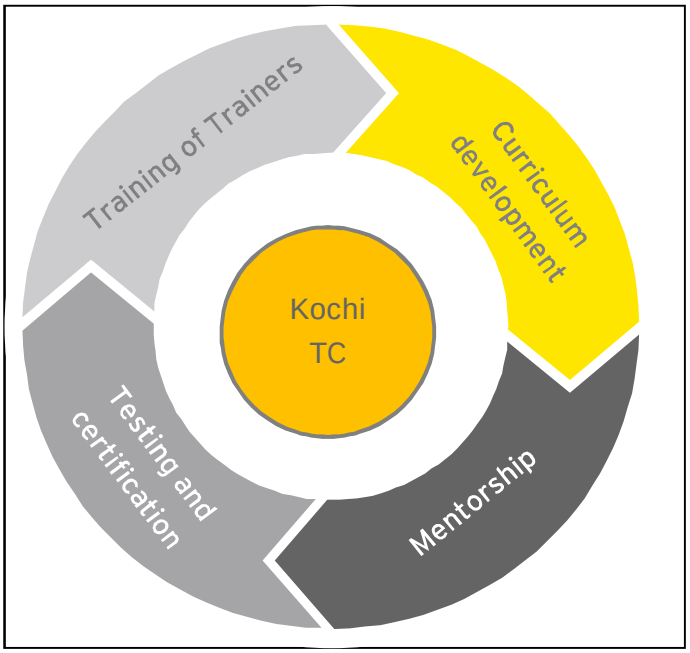
S. No.	Consulting Areas	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11
1.	Design Support (incl. Product Design)		12.80	20.48	25.60	30.72	35.84	39.42	43.37	47.70	14.08
3.	Engineering Solutions (Development of Jigs & Fixtures for Machining, Welding etc.		6.00	7.80	10.14	15.21	21.29	29.81	41.74	58.43	81.80
4.	Quality System Support	-	-	12.00	18.00	27.00	37.80	52.92	74.09	103.72	145.21
5.	Project Consultancy (curriculum development, community colleges, trainers etc.)	-	-	12.00	36.00	54.00	75.60	105.84	148.18	207.45	290.42
6.	Low cost Automation Solution support	-	-	3.00	4.50	6.75	9.45	13.23	18.52	25.93	36.30
7.	Productivity Improvement		10.00	15.00	22.50	33.75	47.25	66.15	92.61	129.65	181.52
	Total Revenue (INR Lakhs)		28.80	70.28	116.74	167.43	227.23	307.38	418.50	572.89	749.34

2.4 Centre of Excellence for Manufacturing Skill Development

Kerala represents a key industrial hub of the country with significant presence of large and medium manufacturers. In order to supply skilled manpower to this hub and other states, The TC is going to play a vital role. It shall work as a nodal skill development centre. It shall not only provide advanced training in manufacturing technology but also work as a key facilitator for existing ITIs and polytechnic institutions in the catchment area. The following services shall be provided by the TC in order to increase competitiveness of ITIs and Polytechnic institutions.

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

FIGURE 7: SUPPORT FOR OTHER TRAINING INSTITUTIONS



2.5 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.

2.6 Technology Collaboration

The TC at Kochi 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 labour market stakeholders to increase the number of workers/ trainees from TCs finding long term employment to improve their livelihood.
- Establish a business model which ensures financial self-sustainability of the 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.

2.7 Technology Information Centre

Access to information is important. People need information to develop their potential through education and training, to succeed in business, to enrich their technological knowledge. Information is a key contributor for the development of new technology or a product.

The Technology Information Centre (TIC) will provide access to latest books, journals, engineering standards etc. to the MSMEs and students at an affordable cost. This will help the MSMEs in enhancing their knowledge and using latest standards for the development of products. Apart from books, journals etc., the TIC would also have Audio Visual rooms where students can go and learn about latest courses available. The TIC will have audio visual courses as per the requirement of industry in catchment area. The courses will cover areas like principles of electric drives, product design, product validation etc.

2.8 Incubation Centre

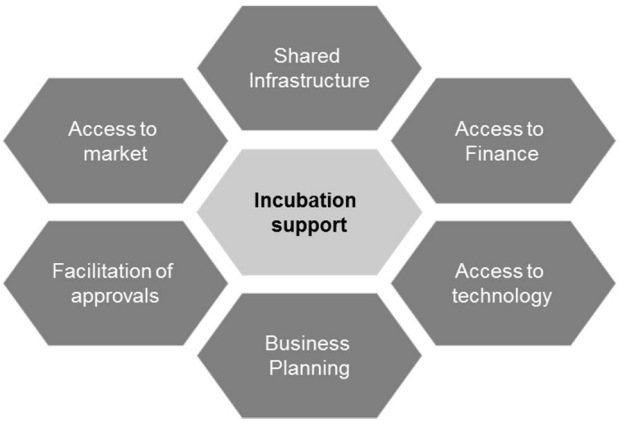
Promoting emerging technological and knowledge-based innovative ventures that seek to nurture ideas from professionals is important for development MSMEs. Such entrepreneurial ideas need to

be fostered and developed in a supportive environment before they become financially sustainable or attractive enough for venture capital. Hence need arises for incubation centres to promote budding individual innovators and to assist them to become technology based entrepreneurs. Typical areas of Incubation support include

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

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

FIGURE 8: KEY AREAS OF INCUBATION SUPPORT



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

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

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

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

  The term 'innovation' covers a very wide domain. According to MoMSME, innovation signifies any activity and new/ ingenious procedure or product that is likely to be of use to society and

marketable in the long run. The scheme seeks to provide small dose of assistance, to students/ ex-students of science and technology and entrepreneurs to try out their innovative ideas (new processes/ products) at the laboratory or workshop stage and beyond (to the extent possible) with an objective to carry the idea from concept stage to 'know-how" stage and then to 'do how' stage.

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

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

The proposed MSME technology centre at Kochi will house incubation facilities to promote new entrepreneurs and MSMEs in the catchment area.

Incubation Centre at Kochi TC

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

The incubation centre proposed at the Kochi TC will offer the basic infrastructure and access to latest technologies, world class manufacturing plant and machinery. This incubation centre is expected to fuel the growth of enterprise which has successfully crossed the stage of pilot order and ready to execute larger orders. The incubation centre would support entrepreneurs to develop end products for commercialization. The incubation centre would comprise of the following facilities:

a) Support business facilities like office space, conference rooms, reception area etc.

b) Business support: provides assistance in company formation, provides assistance for regulatory clearances, vetting business plans, etc.

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

d) Financial support: the mic will provide financial support to the incubatee companies in the form of soft loan with minimum simple interest, from the funding agencies.

e) Legal support: the incubatee companies would also be assisted in filling patent, patent harnessing as and when required on chargeable basis.

f) Networking: It will provide networking with domains experts, consultants, venture capitalist and other funding agencies.

g) It support services like internet, video conferencing, Wi-Fi etc.

h) Electricity and power connection with sub-meters

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

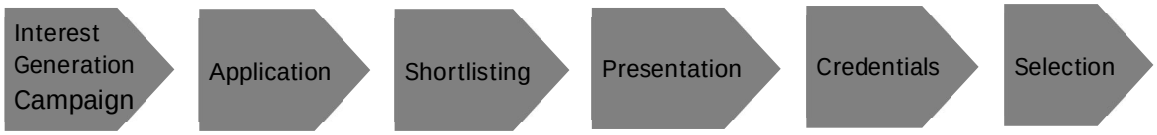
No common plant and machinery has been planned for the first phase of the TC. The technology partner will assess the required common equipment than can be purchased by the TC and offered to MSMEs on rent. This will also be driven by the need of the entrepreneurs and will become a part of the incubation centre. In the meantime, the entrepreneurs can utilize the common facilities already available at the TC.

The incubation centre would not only provide space, latest technologies but also help in connecting with suppliers and skilled workers. One of the key points this incubation centre aims to achieve is to ensure focus on quality control from the get-go. Members of the incubation centre would be

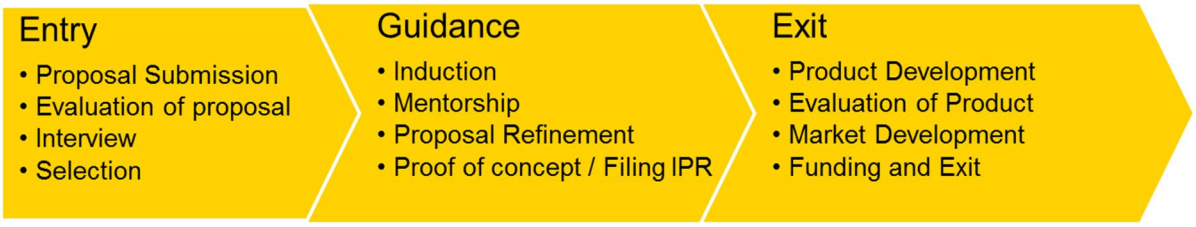
encouraged to start work in a setup concentrated on following environment, protocols and ethics from day one. It is therefore expected that when these enterprises come out of the incubation centre they could be examples of world class manufacturing practices.

Proposals & Selection

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



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



The key parameter for the exit of incubates can be:

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

Investments/ Sustainability of incubation centre

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

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

b) Few of the facilities within the Incubation Centre can be set up on PPP model in collaboration with existing reputed companies present in state such as Cochin Shipyards, BPCL, BEML etc.

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

2.9 Infrastructure Planning

The infrastructure of the proposed TC at Kochi has been developed based on the requirements, recommended norms, capacity data of the existing TCs capacity, discussions with key stakeholders and the experience of the team in providing professional advice on similar projects. The team has studied the applicable AICTE/ NCVT norms for development of infrastructure facilities for engineering and technology institutes and detailing out the infrastructure provisions for the proposed TC in view of the same. Also leading 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.
- 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.
- Hostel and staff accommodation: A girl's hostel facility would be provided in addition to staff quarters.
- 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, personal storage, fire safety provisions and others.

TABLE 12: DETAILS OF PROPOSED INFRASTRUCTURE

Item	Area (sq mtrs)
Hostels and Quarters	2396
Staff Quarters	420
Boy's Hostel	1156
Girl's Hostel	820
Others	1318
Canteen (incl. toilets, kitchen, store, common facility etc.)	913
Utilities Room - DG Set, Transformer, UPS	325
Security Room (including toilet)	80
Admin Block	494
GM Office & Sect	45
Board Room	20
DGM Office	15
Purchase Officer	15
Accounts	15
Personnel	15
Reception Area	50
IT Dept./Server Room	15
Sr. Manager Admin Cabin	15
Manager Admin Cabin	10
Toilet Block	35
UPS/Electrical	15
Pantry	10
Examination control office	30
Staircase	25
Maintenance	10
Housekeeping	10
Fire control room	10
Circulation and wall	134
Training Block	4506
Sn. Manager/HoD Room	15
Manager Room	10
Reception	50
Counselling/placement cell	25
Technical Information centre	320
language Lab	50
Faculty Room & Record Room	50
Classrooms	525
Drawing hall	150
Labs	400
Incubation Centre	250

Workshops (M/c Maintenance, staircase, Store Drawing Hall etc.)	1262
Toilet	90
Conference Room	40
Seminar Hall	200
Tool Store	25
Metrology & Mechanical testing lab	100
Record Room	40
Server Room	25
Staircase/cirulation etc.and wall areas	879
Production Block	3926
HOD room/Senior manager room	20
Toilet for staff	
Staircase & circulation	696
Server Room	30
Stores & raw Material Rooms	200
Trial Room	300
Heat Treatment	150
Tool Assembly	400
Machine Shop (Conv. & CNC M/c	1500
Metrology & Inspection	100
Production Office (Cabins, Documentation & others)	100
Additive manufacturing Lab	100
PPC	100
Entrance Lobby	50
Program Room	50
Meeting Room	40
Toilet Block	90
Total Size	12640
Cost of External Services: Landscaping, Water, Sanitation, Internal Roads, Lighting and Others (AC, DG Set, UPS transformer etc.) (INR in Lacs)	1025.64
Boundary Wall Construction Cost Estimation	150
Construction Cost @INR 29,000/sqm (in Lacs)	4841.24
Total Cost incl. contingency (INR in Lacs)	5083.30

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 after discussion with CMC for development of the campus for TC.

TABLE 13: DETAILS OF OTHER INFRASTRUCTURE

	Other Infrastructure	Numbers	Value (INR Lakhs)	Total (INR Lakhs)
1	Office & Storage Furniture	60	0.5	30
2	Hostel Furniture	160	0.25	40
3	Canteen and Hostel Dining hall furniture	20	0.6	12
4	Kitchen equipment	2	20	40
5	Other Office equipment	50	1	50
6	Laptop	20	0.6	12
7	Desktop	40	0.5	20
8	Photocopier cum printer	6	2	12
9	Vehicle	2	12.5	25
17	Preliminary expenses	1	258	258
18	Others (Miscellaneous)	1	50	50
	Contingency 5%			27.45
	Total			576.45

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.

2.10 Marketing Plan of Kochi TC

The broad suggestive framework for marketing of Kochi TC would include the following;

TABLE 14: 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. The CNM would help strengthen market linkages of the TC 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.

The plan should clearly position the proposed TC's marketing mix with respect to its four Ps - product, price, place and promotion.

Product
A General Engineering TC is proposed to be developed at Kochi based on the presence of large engineering focused units, 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. 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 Kochi TC.

- Increasing visibility to external audience
- Engaging internal stakeholders
- Other Activities such as website, social media management, newsletters and so forth

Place

Kochi is a key industrial hub of Kerala and it houses several large manufacturers. Further, the Kerala Government is heavily focused on driving investment into the state and has undertaken several infrastructure projects around the Kochi region for this purpose.

2.11 Governance Structure

All the existing 18 TCs have been set up under the Societies Registration Act, 1860. 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.

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

TABLE 15: GOVERNING COUNCIL OF KOCHI 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.	▶ KSIDC ▶ Kerala SIDCO ▶ MSME Industrial Associations in Kochi
(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.

Social, Environmental and Quality Safeguards

3 Social, Environmental and Quality Safeguards

The 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 screenings enhance the environmental and social sustainability of a proposed project. It further allows the Identification and management of environmental and social risks that could be associated with a proposed project.

3.1 Social screening

As per World Bank guidelines TCSP has a two-tier approach[4] to Social Screening Process (SSP) as defined by World Bank which is as follows:

- No Social Screening Process (NSSP) is applicable if a 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;
  - If the area is covered by Govt. Policies and Plans such as Tribal Sub Plans and Panchayati Raj Extension to Scheduled Areas.

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

- The identified site for the proposed TC at Ernakulam
  - The land (15 acres) is within a gated industrial area, i.e. KSIDC Industrial Area Angamaly
  - The land has been taken over from TELK and has been assigned to Development Commissioner, Ministry of MSME

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

- A site visit by PMU consultants has verified that the site is free from any kind of encumbrances and squatter settlements.

- The allocated site for the proposed new TC at Ernakulam is in a developed 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 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 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.

Note: While the land has been cleared from the social safeguards perspective based on the site visit by the PMU, the collection of documentary evidence is still underway and will be updated as per the receipt of the required documents. The Social Safeguards certificate will also be appended upon receipt.

3.2 Environmental screening

Environmental screening helps to identify the risks for the development project and puts it under three categories:

- No further action is needed;
- 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;
- Further environmental and social review and management is needed because potential environmental and social impact or risks are associated with the project.

Based on the discussions with the Site representative and site visit conducted, the following potential environmental concerns were identified:

- Presence of trees were observed on the site. The Site needs to prepare an inventory of trees on site which will be shared with EY. Further, the development of TRTC will lead to cutting of certain trees on the land. Care should be exercised while developing the layout of the TRTC so as to minimize the number of trees to be cut. Due permission needs to be taken under the Trees Protection Act, 1976 during construction phase for felling of trees from the competent authority. The following steps should be undertaken:

- Approval should be taken from the committee (headed by the district collector including forest officials);
- Auction arranged for the tress cut as part of the development

- The design phase should consider seismic rating and flood vulnerability of the area in order to mitigate risks due to natural calamity if future.

The Site needs to mitigate the possible environmental concerns identified above. The design and construction of the TC should be done accordingly. The mitigation factors should be incorporated in DPR.

3.3 Quality system

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

TABLE 16: 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	▶ For quality professional practice, performance and enhance transparency

Name of certification	Area	Details
	education and training	▶ 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 17025:2005	Chemical Testing Standard	▶ Is an internationally-applied British Standard for testing and calibration ▶ It covers testing and calibration performed using standard methods, non-standard methods, and laboratory-developed methods

The TC will 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.

Financial Analysis

4 Financial Analysis

4.1 Financial assumptions

The project construction is expected to start in the financial year 2017-2018. The key assumptions are as follows:

TABLE 17: KEY ASSUMPTIONS

Start of Project Construction	1-June-17
FY of start of project	1-Apr-17
	Months
Construction Period	15
Commencement of Operation, Date	1-Aug-18
FY of Commencement of Operation	1-Apr-18
Number of Years, Useful Life	10

4.2 Income and Expenditure assumptions

Capital Expenditure (Including contingency @5%)	Cost (INR Lakhs)
Production Machinery and equipment	2845
Training machines and equipment	2631
Other infrastructure and pre-project expenses	576
Building and construction	5083
Total Capex including contingency	11135

Detailed assumptions and figures around income for all three revenue streams have been described in the tables above (in previous sections) as follows: production revenue estimates (Table 7), training revenue estimates (Table8), consultancy revenue estimates (Table 11). Expenditure on production and training machines, as well as construction and other infrastructure have been defined in Tables 7,9,12 and 13 respectively.

The year on year revenue and expenditure figures for the different streams have been detailed out in the Income statement provided in Table 22.

TABLE 18: UTILIZATION ASSUMPTION FOR PRODUCTION

Period	Year	Utilization
2nd year of production (Year 3)	2020-21	25%
3rd year of production (Year 4)	2021-22	40%
4th year of production (Year 5)	2022-23	50%
5th year of production (Year 6)	2023-24	60%
6th year of production (Year 7)	2024-25	70%
year on year increase in machine utilisation 7th year onwards	2025-26	10%

4.3 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. In the initial phase, construction of infrastructure for basic training courses is planned along with procurement of basic machines.

TABLE 19: PROJECT COST AND FINANCING

Project Cost and Phasing (TCSP)		Year 1	Year 2
Particulars	Unit	1-Apr-17	1-Apr-18
Project Cost w/o IDC	Rs. Lakhs	1,415	9,721

4.4 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%
Repair & maintenance, (Building)	1.7%

Insurance cost of new P&M (Post commissioning)	0.5%
Working Capital Assumptions	
Cash in Hand	60 Days
Accounts Receivables	90 Days
Suppliers Credit (A/P)	30 Days
Finished goods Storage	30 Days
Inventories (RM, Consumables)	
Finished goods	90 Days
Job Work	90 Days
Training	90 Days
Days in a year	90 Days
Tax and Others	
Inflation (Salary etc.)	10%

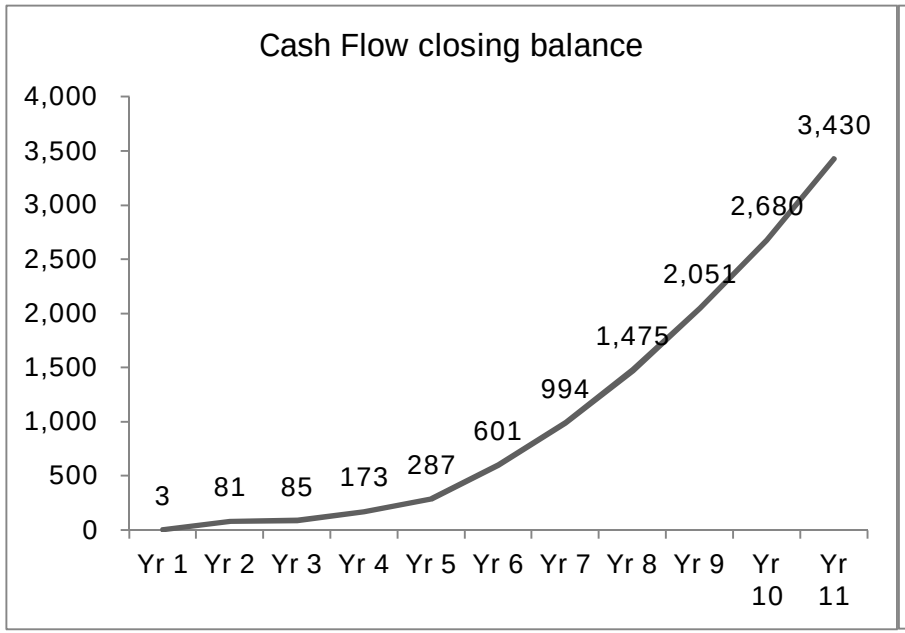
Depreciation Rates		
Asset Class		WDV
Tangible Assets		
	Plant and machinery	13.91%
	Buildings	10.00%

4.5 Financial Statements

Working capital and cash flow statement

Overall net working capital requirement for the TC is expected to grow from about INR 77,000 in 2018-19 to INR 574 lakhs by year 2027.

FIGURE 9: NET WORKING CAPITAL AND CASH FLOW CLOSING BALANCE



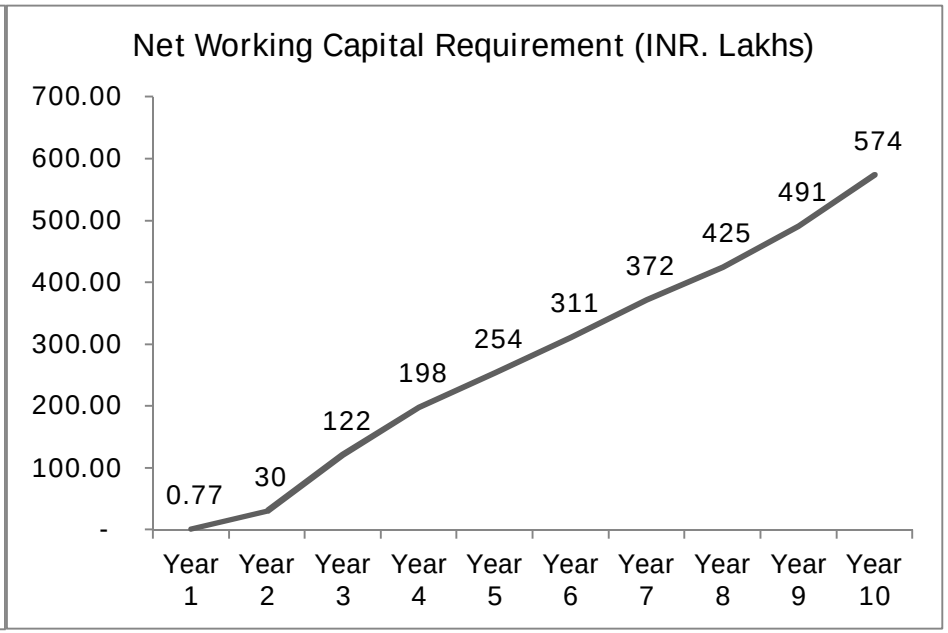


TABLE 20: WORKING CAPITAL SCHEDULE

Working Capital Schedule (Figures Rs in lacs)											
Year	Apr-18 (Yr 1)	Apr-19 (Yr 2)	Apr-20 (Yr 3)	Apr-21 (Yr 4)	Apr-22 (Yr 5)	Apr-23 (Yr 6)	Apr-24 (Yr 7)	Apr-25 (Yr 8)	Apr-26 (Yr 9)	Apr-27 (Yr 10)	Apr-28 (Yr 11)
Raw Material Storages											
Finished goods	-	4	14	23	28	34	39	43	48	53	58
Training	0.29	1	2	2	3	3	4	4	4	5	5
Consumable tools											
Finished goods	-	0	2	3	3	4	5	5	6	6	7
Training	0.29	1	2	2	3	3	4	4	4	5	5
Consumable stores											
Finished goods	-	0	1	2	3	3	4	4	5	5	6
Training	0.17	1	1	1	2	2	2	2	2	3	3
Finished Product Storages											
Finished goods	-	6	23	36	46	55	64	70	77	85	93
Accounts Receivables	0.26	18	80	135	177	221	267	311	366	436	515
Gross Working Capital	1.02	31	124	205	265	326	389	445	512	597	691
Suppliers Credit	0.25	0	2	7	11	14	17	19	21	23	25
Net Working Capital Requirement	0.77	30	122	198	254	311	372	425	491	574	666
Increase/Decrease In Net Working Capital	0.77	30	91	76	56	57	60	53	66	82	93

Table 21: Cash flow statement

Cash Flow (Rs in Lacs)												
Years	1-Apr-2017	1-Apr-2018	1-Apr-2019	1-Apr-2020	1-Apr-2021	1-Apr-2022	1-Apr-2023	1-Apr-2024	1-Apr-2025	1-Apr-2026	1-Apr-2027	1-Apr-2028
Income post Depn and interest	-27	-81	-1,565	-1,192	-815	-516	-331	-148	22	157	359	570
Add: Depreciation			1,297	1,142	1,005	886	781	689	608	537	474	419
Inflow from Capital Fund/Grant	1,415	9,721										
Capital Fund to balance -ve cash flows, if any	30	160	302	230								
Total Cash Inflow	1,418	9,800	34	179	190	370	451	541	630	694	833	989
Investment in Assets	1,415	9,721										
Net Change in WC		1	30	91	76	56	57	60	53	66	82	93
Total Cash Outflow	1,415	9,722	30	91	76	56	57	60	53	66	82	93
Opening Balance		3	81	85	173	287	601	994	1,475	2,051	2,680	3,430
Surplus/Deficit	3	78	4	88	114	314	393	480	576	628	751	897
Closing Balance	3	81	85	173	287	601	994	1,475	2,051	2,680	3,430	4,327

Income & expenditure statement

The income to the proposed centre from training will start accruing from year 2018-19 with completion of phase 1 (basic training infrastructure and procurement of basic machines) and start of basic courses. Initially an income of around INR 97 lakhs is expected in year 2018-19. Once the overall construction is complete, the TC revenue is expected to grow from INR 364 lakhs in 2019-20 to INR 3275 lakhs by year 2028-29.

TABLE 22: INCOME AND EXPENDITURE STATEMENT

Income and Expenditure												
Year	1-Apr-17	1-Apr-18	1-Apr-19	1-Apr-20	1-Apr-21	1-Apr-22	1-Apr-23	1-Apr-24	1-Apr-25	1-Apr-26	1-Apr-27	1-Apr-28
Income (Rs in Lacs)	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11
Training Income		96	303	505	758	1,011	1,112	1,223	1,345	1,412	1,483	1,557
Sale of Finished goods			57	228	365	456	547	638	702	772	850	935
Sale of Scrap		0.9	4	9	14	19	21	24	27	29	31	34
Consultancy Income		-	-	29	70	117	167	227	307	418	573	749
Total Income		97	364	771	1,208	1,602	1,848	2,113	2,382	2,632	2,937	3,275
Expenditure												
Variable Operating expenditure												
Raw materials		1	15	52	83	104	124	144	158	174	190	208
Finished goods			12	47	75	94	113	132	145	159	175	193
Training		1	3	5	8	10	11	12	14	14	15	16
Consumable tools		1	5	11	17	22	25	29	32	34	37	40
Finished goods			1	6	9	11	14	16	18	19	21	23
Training		1	3	5	8	11	12	13	14	15	16	16

Income and Expenditure												
Year	1-Apr-17	1-Apr-18	1-Apr-19	1-Apr-20	1-Apr-21	1-Apr-22	1-Apr-23	1-Apr-24	1-Apr-25	1-Apr-26	1-Apr-27	1-Apr-28
Consumable stores		1	3	8	12	15	17	20	22	24	26	28
Finished goods			1	5	7	9	11	13	14	15	17	19
Training		1	2	3	4	6	6	7	8	8	9	9
Utilities (Electricity & water)		5	19	40	61	79	90	102	112	120	128	137
Finished goods			4	15	24	30	36	42	46	50	55	61
Training		5	15	25	37	50	55	60	66	69	73	77
Variable Operating expenditure		7	41	110	173	221	257	294	324	351	381	413
Fixed Operating Expenditure												
Salary & Wages/ Establishment expenses	27	146	336	414	488	599	698	804	921	1,054	1,160	1,276
Repairs and Maintenance			146	146	146	146	146	146	146	146	146	146
P&M			55	55	55	55	55	55	55	55	55	55
Buildings			92	92	92	92	92	92	92	92	92	92
Training Expenses			30	51	76	101	111	122	135	141	148	156
Other Production. & Admin Expenditure			28	60	94	124	143	164	184	204	227	254
Marketing expenses		25	25	15	15	15	15	15	15	15	15	15
Insurance of new machines			26	26	26	26	26	26	26	26	26	26
Fixed Operating Expenditure	27	171	592	712	845	1,011	1,140	1,278	1,428	1,587	1,723	1,872
Total Expenditure	27	178	632	822	1,017	1,232	1,397	1,572	1,752	1,938	2,104	2,286
Income (Gross Margin)	(27)	(81)	(268)	(51)	190	370	451	541	630	694	833	989
Depreciation	-	-	1,297	1,142	1,005	886	781	689	608	537	474	419
Income post Depn and interest	(27)	(81)	(1,565)	(1,192)	(815)	(516)	(331)	(148)	22	157	359	570

Income and Expenditure												
Year	1-Apr-17	1-Apr-18	1-Apr-19	1-Apr-20	1-Apr-21	1-Apr-22	1-Apr-23	1-Apr-24	1-Apr-25	1-Apr-26	1-Apr-27	1-Apr-28
Income TAX	-	-	-	-	-	-	-	-	-	-	-	-
Income after tax	(27)	(81)	(1,565)	(1,192)	(815)	(516)	(331)	(148)	22	157	359	570

Balance sheet

TABLE 23: BALANCE SHEET

Balance Sheet (Rs in Lacs)												
Years	1-Apr-17	1-Apr-18	1-Apr-19	1-Apr-20	1-Apr-21	1-Apr-22	1-Apr-23	1-Apr-24	1-Apr-25	1-Apr-26	1-Apr-27	1-Apr-28
Liabilities												
Capital fund	1,415	11,136	11,136	11,136	11,136	11,136	11,136	11,136	11,136	11,136	11,136	11,136
Capital for -ve cashflows	30	190	492	722	722	722	722	722	722	722	722	722
Reserves & Surplus	(27)	(108)	(1,673)	(2,865)	(3,681)	(4,196)	(4,527)	(4,675)	(4,654)	(4,496)	(4,137)	(3,568)
Total	1,418	11,218	9,955	8,993	8,177	7,661	7,331	7,183	7,204	7,362	7,721	8,290
Fixed Assets												
Gross Block	1,415	11,136	11,136	11,136	11,136	11,136	11,136	11,136	11,136	11,136	11,136	11,136
Net Block	1,415	11,136	9,839	8,698	7,692	6,806	6,025	5,336	4,728	4,191	3,716	3,297
Cash	3	81	85	173	287	601	994	1,475	2,051	2,680	3,430	4,327
Other Current Assets	-	0.8	30	122	198	254	311	372	425	491	574	666
Total	1,418	11,218	9,955	8,993	8,177	7,661	7,331	7,183	7,204	7,362	7,721	8,290

4.6 Profitability and IRR

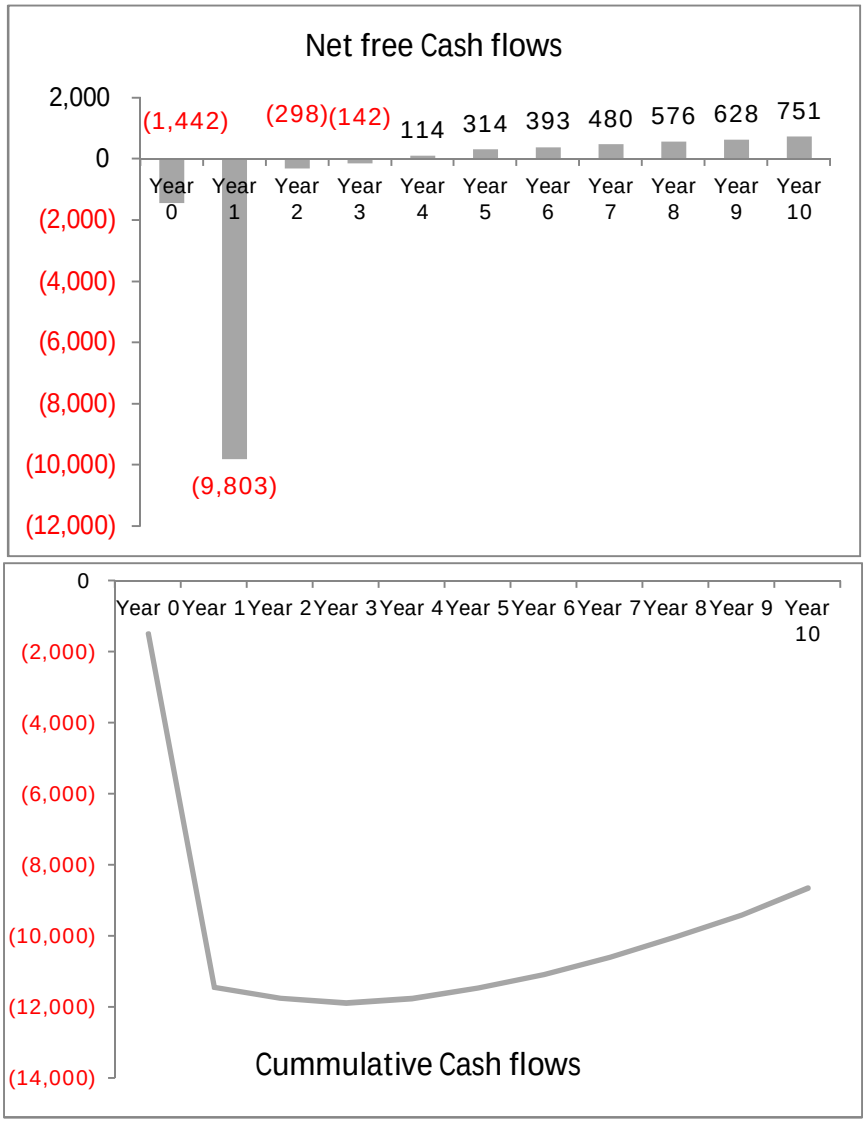
Overall project profitability has been estimated considering phased investment in plant & machinery and infrastructure. The full-fledged operations are expected to start from the year 2019-20. Hence the project IRR for a period of 12 years till 2028-29 is 8.6%.

TABLE 24: PROFITABILITY WITH INVESTMENT PLANT & MACHINERY

Project IRR	8.8%
Payback period	>11 years

The project is expected to generate positive net free cash flows starting year 2028-29.

FIGURE 10: NET FREE CASH FLOWS AND CUMULATIVE CASH FLOWS



4.7 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, Consultancy revenue and production revenue.

- For every 5% change in revenue from training, average change in IRR is 0.74%.
- For every 5% change in project cost, change in IRR is -0.53%.
- For every 5% change in revenue from consultancy, change in IRR is 0.38%.
- For every 5% change in revenue from production, change in IRR is 0.36%.

TABLE 25: SENSITIVITY OF IRR

% Change in Project Parameter	Impact on IRR			
	Project Cost	Revenue from Training	Revenue form Production	Revenue from Consultancy
-5	9.4%	7.9%	8.4%	8.4%
0	8.8%	8.8%	8.8%	8.8%
5	8.3%	9.6%	9.2%	9.2%
10	7.8%	10.4%	9.5%	9.5%

Key Risks and Mitigation

5 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;

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	P	P	P
Approvals and Clearances	Risk of delay in clearances from local authorities like ▶ Plan Sanction – Town Planning Authority/ Local Body ▶ Commencement Certificate – Town Planning Authority/ Local Body ▶ Fire NOC – Provisional and Occupancy – Local Fire Authority ▶ Plinth Checking Certificate – Town Planning Authority/ Local Body	▶ Appointment of CMC firm. ▶ Timely application of approvals for relevant authorities by CMC ▶ Monitoring of status of Approvals.		P	

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	▶ Building Completion Certificate – Town Planning Authority/ Local Body ▶ Consent to Establish and Operate – Pollution Control Board ▶ MAP Approval and Factory License – Directorate of Industrial Health and Safety ▶ Labour License – Labour Commissioner ▶ Fuel Storage – Chief Controller of Explosives ▶ Tools, Tackles, Pressure Vessels, Hoists – Competent Engineer ▶ Electrical Systems – Electrical Inspector				
Environmental risk	Loss of top soil	▶ Top soil excavated from the site should be carefully handled. ▶ Maximum effort should be made to utilize the top soil for landscaping within the site	P		P
	Air pollution due to digging and levelling activities	▶ Water sprinkling shall be practiced ▶ Construction machinery shall be properly maintained to minimize exhaust emissions of CO, SPM and Hydrocarbons	P		P

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
		▶ 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	P		P
	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	P		P
	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 ▶ Acoustic enclosures are to be provided with the D.G sets to minimize the noise levels			

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
Construction	Delay in construction due to cost over-run, management of building contractors.	▶ Appoint a CMC for a design and build contract for managing construction. ▶ Strict timeline will be made and agreed with CMC. ▶ Regular M&E, Built in mechanism for penalty for delays and incentive for timely completion, ensuring timely payment based on milestones.	P	P	
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.	P	P	P
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 Quality Assurance	▶ Clearly defined scope and incentives for stakeholders. ▶ Timely contracts with the project stakeholders.		P	P

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
Procurement of machinery	Delay in receiving inputs from MTP and procurement of machines and goods due to high Lead time and time taken for clearances	▶ Timeline for each deliverable and monitoring ▶ 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.		P	
	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.	P	P	
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.			P
Market	▶ Change in product mix ▶ Change in customer mix ▶ Change in technology ▶ Change in product pricing ▶ Competition from Govt./Public tool rooms	▶ Expansion of product base. ▶ Increase in customer base. ▶ Develop a backup plan for retiring of obsolete machines.			

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	► Lack of cluster development in the target region				
Policy	Change in Government Policy/ Schemes for ► Training ► key sectors E.g. Change in Government space programme, increase in imports may affect orders from major clients	► Increase existing customer base. ► Diversify into new sectors.	P		P
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.	P		P
Management risk	Lack of capable management to run the TC	► Leadership training. ► Succession planning.			P
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.	P		

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
Performance of key stakeholders	Poor performance of Outsourced agencies like TP, CNM and CMC	▶ Establishment of KPIs ▶ Periodic review of performance. Suitable penalty clauses to be added in the ToRs.			P
Weather	Delay in construction due to monsoon season	▶ Planning for lean periods and periods of low construction activity.	P	P	

Conclusion

6 Conclusion

The proposed TC at Kochi will focus on General Engineering. It will aim to support and strengthen MSMEs and help them improve competitiveness through training, production support and advocacy. Training, Tool manufacturing and consultancy / advisory streams would be the prominent activities to be undertaken by the TC. TC shall also support MSMEs in technology and engineering solutions and for improvement of their quality systems and productivity. For improvement in productivity, TC would initiate design clinics, training in lean manufacturing and project based consultancy and provide consultancy services to MSMEs in the field of product design and development, tool design, manufacturing and innovations in process and productivity. Some recommended next steps, in addition to the provisions of the DPR, are as follows:

- The TC shall build itself up as a key regional skill development centre. It could not only provide advanced training in manufacturing technology but also work as a key facilitator for existing ITIs and polytechnic institutions in the catchment area. It could provide curriculum development support, training for trainers, mentoring to new institutions, and testing and certification services to increase competitiveness of ITIs and Polytechnic institutions.
- The new TC shall take steps to form consortium with MSMEs 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 shall support MSMEs in following areas – Tooling, machining, repair and maintenance, spare parts manufacture, training and process automation.
- The TC could 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 and handhold for a visible improvement at the end of 12 months period. Membership can be for a nominal fee.

All these initiatives of the TC would not only strengthen the expertise of MSMEs in manufacturing but also help to develop a sustainable ecosystem for MSMEs in the region in the long run. On the same line, even investments have been proposed keeping the focus area and adherence to EHS guidelines in mind. Above all, TCSP program will enable TC to showcase the best practices not only in the adoption of new technologies and skilling the youth but also managing all the associated environmental and social aspects.

Annexures

7 Annexures

Annex I: Minutes of Meeting (Stakeholder Consultation)

Date	26-30 December 2017	
Time	All day	
Location	Kochi, Palakkad and Thiruvananthapuram	
	Name	Designation
MSME-DI Personnel	P.B. Suresh Babu	Asst. Director, MSME DI Thrissur
EY Personnel	Dr. Milind Mujumdar Rajkumar Deegwal	Project Team Leader Senior Consultant
Agenda	Discussion on the following points ► The industrial landscape of Kochi and the catchment area. ► Key requirements / challenges faced by MSME units in o Access to technology o Access to skills o Business advisory services ► General engineering challenges across sectors such as Shipping, automotive, equipment manufacture and others. ► Key trends in the industry and insight on potential areas of growth	

Sr. No.	Industry Representative		Key points discussed during the meeting
	Name	Designation	
Meeting at KSIDC Kochi Office , on 26 Dec 2016			
	M.T. Binil Kumar	CEO (Mega Food Park), KSIDC	Food processing is a dominant sector in Kerala. There are various institutions which are dedicated to food processing sector. Second biggest sector is general engineering. Since there is not much scope for ESDM in the region, It was suggested that the focus of the proposed TC should be General Engineering. Following are the technology and training requirements of the region which can be catered by the proposed TC. ► Gas Welding and X-Ray Quality Welding ► CNC machine Operations
	Tom Thomas	Secretary KSSIA	
	Sheeba S	Ass. Director, DIC Ernakulam	
	Savio Mathew	Deputy Director &	

		Head, FICCI Kerala State Council	▶ Automation & Instrumentation for food processing units ▶ NABL accredited Testing & Calibration (Mechanical/Chemical) ▶ Preventive maintenance of machines ▶ Electronic Hardware ▶ 3D Scanner and Manufacturing machine for Design and prototype development for Jewellary sector.
Meeting at BEML, Palakkad on 27 Dec 2017			
	P. Shivakumar	Chief General Manager	BEML is facing problem in development of vendors for its components for Tatra Trucks. Currently, BEML is dependent on venders from Coimbatore, Pune Kolkata etc. for outsourcing. The CGM appreciated the government's initiative to set a TC in Kochi. The TC can provide following common facilities and training courses which would help in development of quality venders. ▶ Metrology Lab ▶ Calibration services ▶ Repair maintenance Repair & maintenance ▶ Reverse engineering ▶ Material Testing (tensile / radiology ▶ Skill development for fitter, welding and testing
Stakeholder Consultation at DIC Palakkad on 27 Dec 2016			
	C.S. Hakeem	KASSIA Dist. President	There are variety of general engineering manufacturers functioning in Palakkad such as steel reprocessing, sheet metal works (square and rectangular channel), plastic bottles, woven begs, water tank manufacturer, Telephone body manufacturers such as BPL. Agriculture implant manufacturer cluster is also a key engineering cluster. There are more than 50 CNC manufacturing machines in the region. It was suggested by the stakeholders that the focus of the TC should be general engineering only. Following common facilities and training courses which would help in development of quality venders. ▶ Material Testing
	T.S. Chandran	Manager DIC Palakkad	
	Rahmat Ali	ADO, DIC Palakkad	
	Damodar Avanoor	State President KSSIA	

			▶ Heat Treatment (Quenching) ▶ Dies for pipe extrusion ▶ Valve testing ▶ 3D manufacturing ▶ Wood working machine
Meeting at Cochin University of Science and Technology(CUSAT) on 28 Dec 2016			
	Dr. K Saju	Director IRAA, CUSAT	Following points were discussed during meeting with professor at CUSAT. ▶ Industry specific courses can be started such as automotive repairing and maintenance. ▶ Due to high demand of Degree courses, there are very few takers for Diploma Courses. But recruiting companies demand for Diploma students. ▶ Joint Training program (CUSAT / engg. College/ engg. firm & TC) can be started. ▶ More courses on hands on training should be there for students. ▶ Training program for building material and renewable energy can be started by the TC. ▶ Welding courses for fabricators ▶ Capacity building courses for metal fabricators
	Dr. George Mathew	Professor	
	Dr. Abdulla	Director Centre for Innovation, Technology and Industrial Collaboration	
	K G Joseph	Nimisha Engg. Industries	
	M J Paul	Techno Craft Engg. Industries	
	Ashok Kumar	Mekha Engg. Works	
	I m Joseph	Gracy Industries	
Meeting at Cochin Shipyard 28 Dec 2016			
	Neelakandhan A N	G M (Materials) Cochin Shipyard Ltd.	Vendor development for Cochin Shipyard can be supported by Technology Centre with provision of following training courses and technology. ▶ Material Testing ▶ Welding Courses ▶ Vacuum heat treatment
Meeting with stakeholders at KSIDC on 28 Dec 2016			

<table>
<tr><td></td><td>Tenson T Venattu</td><td>Thermo System</td><td rowspan="5">Following requirements of common facility and training courses were discussed during the meeting.
Sheet Rolling Machine
Laser/water profile cutting machine
Hydrollic Press of 400-500 Tonnes
Tools and dies for Metal and plastic
Heat treatment
Welding courses on TIG/MIG
CNC machine operations
Surface grinder</td></tr>
<tr><td></td><td>Shajan Varghese</td><td>Bright Engineering Works</td></tr>
<tr><td></td><td>K. G. Ajith Kumar</td><td>GM KSIDC</td></tr>
<tr><td></td><td>P K Somanathan</td><td>Kairali Chemical</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="4">Meeting in Thiruvananthapuram & Kochi</td></tr>
<tr><td></td><td>Paul Anthony</td><td>Add. Chief Secretary, Govt. of Kerala</td><td rowspan="10">Following requirements of common facility and training courses were discussed during the meeting.
Training Courses for
Plant Instrumentation maintenance
Pipe fabrication : Pipe Profiling & Pipe welding (3G/4G Welding)
High Speed turbomachinery maintenance
Maintenance of electric motors, pumps, valves
Ship Structure Design Software Tools
Material testing facilities
Vacuum heat treatment facility
High Capacity Hydraulic Press (@400 T)
Plastic Injection Moulding machine
Metal 3-D printing machine
Support to KELTRON
Product Development
Sensor Development
Electronic Device Development
Set-top boxes / Networking Equipment</td></tr>
<tr><td></td><td>M Beena</td><td>MD KSIDC</td></tr>
<tr><td></td><td>K G Ajith Kumar</td><td>GM, KSIDC</td></tr>
<tr><td></td><td>Jaison James</td><td>Crystal Aluminium Prod. Pvt. Ltd</td></tr>
<tr><td></td><td>K K Paul</td><td>Engg. Maintenance, Primus Global</td></tr>
<tr><td></td><td>M C Arun Kumar</td><td>GM Operations, Ray-hans Precision Tools</td></tr>
<tr><td></td><td>A N Neelakandhan</td><td>G M (materials) Cochin Shipyards</td></tr>
<tr><td></td><td>Richi M R</td><td>Director, Edaran</td></tr>
</table>

		Precision India Ltd.	
	Representatives from KSIDC, KSSIA,CII and BPCL and MSME		

Annex II: Environment, Health and Safety

The TC proposed in Kochi will be focussed on general engineering and will involve the following activities:

- Manufacturing of tools for general engineering
- Long and short term training programs in CNC/ CAD/CAM, advance welding, industrial and process automation etc.

Management

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

Planning and design

As per the environmental screening conducted for the Site conducted in September 2016, the TC is located in an industrial zone and was observed with potential environmental impacts which will be covered under the planning design and construction phase.

Table 26: Potential environmental issues during planning phase

Component	Associated impact	Mitigation measures
The geographical location of the site is in seismic zone III and the region has experienced earthquake tremors in the recent past.	Loss to property	It is important that the design phase of the TC considers earthquake resilience (capable of handling earthquakes in seismic zone IV).

Construction phase

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

Activity	Associated impact	Recommendation for mitigation
Clearing of land (before initiating the construction work, clearing of the shrubs and bushes shall be carried out)	Loss of trees, Soil erosion	· Due permission will be taken under the Trees Protection Act, 1976 during construction phase for felling of trees from the competent authority. Efforts will be made to replant trees, wherever possible, and compensatory afforestation may be considered in accordance with the State legislation, in case trees are cut. · 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.

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

Activity	Associated impact	Recommendation for mitigation
		· Six medium size sterilized dressings. · Six large size sterilized dressings. · Six large size sterilized burn dressings. · Six (1/2 oz.) packets sterilized cotton wool. · One (2 oz.) bottle containing a 2 per cent alcoholic solution of iodine. · One (2 oz.) bottle containing sal-volatile having the dose and mode of administration indicated on the label. · One roll of adhesive plaster. · One snake-bite lancet. · One (1 oz) bottle of potassium permanganate crystals. · One pair of scissors. · 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.

Activity	Associated impact	Recommendation for mitigation
		· Adequate drinking water facilities, sanitary facilities and drainage in the temporary sheds of the construction workers would be provided to avoid the surface water pollution.
	Land contamination	· Basic sanitary facilities will be provided for the workers staying at the labour camp and at the project site. · Dustbins will be provided at the camp by the contractor.
Movement of vehicles (Vehicle movement shall 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.)	Air pollution	· All the vehicles entering the site will be asked to have updated PUC (Pollution under control) certificate. · Vehicle speed will be restricted to 15km/hour at site. · 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.

Activity	Associated impact	Recommendation for mitigation
Use of D.G set (D.G sets shall be used at site to provide electricity to labour camps in the night time. Also, in case of non-availability of power from grid, D.G sets shall be used to provide electricity at the site for construction activity)	Air pollution	· D.G will be optimally used with proper orientation and adequate stack height. · Stack monitoring will be carried out on regular basis. · Proper maintenance of the DG will be carried out on regular basis.
	Noise pollution	· Acoustic enclosures will be provided with the D.G sets to minimize the noise levels.
Storage of diesel (Diesel shall be stored on-site so as to ensure availability for D.G sets)	Soil contamination	· A covered area will be defined for storage of HSD with concrete flooring
	Safety risks	· The diesel storage area will not be in proximity of the labour camps. · Inflammable substance will not be allowed at the project site.
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.

Activity	Associated impact	Recommendation for mitigation
Construction labour management	Child labour and forced labour	· Provision of clause in contractor's agreement will be made that bans child labour and forced labour at project site. · Adequate procedures to avoid or prevent hiring/entry of child labour at the project site will be undertaken; · Random check will be undertaken at the site.
	Health and safety risks for children of workers	· Temporary crèche facility will be provided in case of migrant labourers children residing in the camps to ensure safety.
	Water wastage	· Emphasis will be given on optimization of water usage and supply of potable drinking water for labour camps.
	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.

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 27: 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 and soil 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.

Manufacturing

Table 28: 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.

Activity	Associated impact	Recommendation for mitigation
Non-maintenance of clean premises	Injury due to trips	· Cleaning schedule will be developed for the site. · Proper demarcation of the storage area for waste material will be done according to the different type of waste material.
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	· Paper would be recycled for rough work.

Activity	Associated impact	Recommendation for mitigation
	resource (paper)	
Machining activities	Land contamination due to waste oil and waste coolant	· SOP would be formulated for handling and storage of waste oil and 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.

Activity	Associated impact	Recommendation for mitigation
	Cut/injury due to metal scrap lying unmanaged	
Use of D.G sets	Noise pollution	· Acoustic enclosures would be provided to avoid noise pollution.
	Land contamination	· Diesel would be poured in D.G set using funnel. · Concrete flooring would be made near the D.G set.
	Air pollution	· Chimney with appropriate height would be provided to minimize air pollution and compliance with the legislation.
Storage of hazardous waste like empty printer cartage, waste coolant, oil soaked cotton waste, etc.	Land and water contamination due to leakage and/or spill over	· The storage area of the hazardous waste will be cemented in order to avoid land contamination. · Proper demarcation of storage area for hazardous waste will be done to avoid chances of spill over during handling. · All the waste will be stored under a shed so as to avoid contamination and washing away of waste in nearby water stream or ground water in case of rain
	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.

Environment

Air Emissions

The expected manufacturing processes in the proposed TC with air emissions would be 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, chemical conversion, painting and other metal finishing techniques (Including polishing, hot dip coating). To counter the problems, the following techniques will be used:

- Volatile Organic Compounds (VOC) emissions management strategies will be used which include:
  - Installation of refrigerator coils (or additional coils) above the degreaser vapour zone
  - Application of an air flow over the top of the degreaser that should not typically exceed 40 m / minute
  - Rotation of parts before removal from the vapour degreaser, including:
    - Installation of thermostatic heating controls on solvent reservoirs and tanks
    - Installation of in-line filters to prevent particulate build- up
    - Use of solvent recovery to reduce emissions of VOC from curing ovens
    - Use of activated carbons to recover solvent vapours
  - In order to reduce emissions during welding and coating, metal surfaces would be carefully cleaned
  - Coatings would be removed from the base metal before welding preferably using mechanical cleaning (for example blasting with CO2-pellets) instead of solvents.

- Dust: Dust emissions management strategies will be used which include:
  - Installation of in-line aspirators with filters or scrubbers. Electrostatic precipitators (ESP) will also be employed
  - Where possible, maintaining wetness on the metal surface in order to prevent or minimize dust production

- Acid / Metals Content in Mists and Fumes: Management strategies for acid / metal content in mist and fume emissions will be used which include:
  - Use of fume suppressants as additives to electroplating baths to reduce air emissions of electroplated metals (e.g. chromium)
  - Installation of in-line aspirators with filters to eliminate acid compounds
  - For metals or metal oxides abatement, installation of filters capable of handling complex metals

- Welding fumes (a mixture of metals, oxides, and smoke from burning off oil) would be controlled by removing coatings from base metals

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. aluminum) salts through use of hydrolysis of sodium aluminate;
  - Stocks of finishing material would be limited with short shelf lives;
  - Painting jobs (light to dark) and the selection of spraying techniques would minimize wastewater production (e.g. use of a spray gun for particular applications, use of an electrostatic finishing system instead of conventional air spray);
  - The use of chlorinated solvents would be avoided and substituted (including carbon tetrachloride, methylene chloride, 1,1,1- trichloroethane, and perchloroethylene) with non-toxic or less toxic solvents as cleaning agents;
  - Chromic acid and trisodium phosphate would be substituted by less toxic and non-fuming cleaners (e.g. 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 aluminum based alloys);
  - Solutions containing cyanide salts (e.g. for hardening processes) would be replaced with solutions using a fluidized bath of nitrogen and corundum;
  - Hexavalent chromium would be substituted for plating. If this is not possible closed loops and covered vats would serve to minimize emissions.
  - Process Wastewater Treatment: Since general manufacturing operations, including metals, plastics and rubber products use a myriad of raw materials, chemicals and processes, wastewater treatment will require the use of unit operations specific to the manufacturing process in use. Techniques for treating industrial process wastewater in this sector include source segregation and pre-treatment of concentrated wastewater streams. Typical wastewater treatment steps include:
  - Greasing of traps, skimmers, dissolved air floatation or oil water separators for separation of oils and floatable solids
  - Filtration for separation of filterable solids
  - Flow and load equalization
  - Sedimentation for suspended solids reduction using clarifiers
  - Biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD)
  - Biological nutrient removal for reduction in nitrogen and phosphorus
  - Chlorination of effluent when disinfection is required
  - Dewatering and disposal of residuals in designated hazardous waste landfills.

Waste water management

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

- Industrial Wastewater: Industrial wastewater generated from industrial operations includes process wastewater, wastewater from utility operations, runoff from process and materials staging areas, and miscellaneous activities including wastewater from laboratories, equipment maintenance shops, etc.
- Process Wastewater: Adequate treatment technology will be used to achieve the desired discharge quality and to maintain consistent compliance with regulatory requirements. The design and operation of the selected wastewater treatment technologies will be done to avoid uncontrolled air emissions of volatile chemicals from wastewaters. Residuals from industrial wastewater treatment operations will be disposed in compliance with local regulatory requirements or will be consistent with protection of public health and safety, and conservation and long term sustainability of water and land resources.
- Wastewater from Utilities Operations: Utility operations such as cooling towers and demineralization systems in the TC may result in high rates of water consumption, as well as the potential release of high temperature water containing high dissolved solids, residues of biocides, residues of other cooling system anti-fouling agents, etc. Water management strategies for utility operations will be used which include:
  - Adoption of water conservation opportunities for facility cooling systems
  - Use of heat recovery methods (also energy efficiency improvements) or other cooling methods to reduce the temperature of heated water prior to discharge to ensure the discharge water temperature does not result in an increase greater than 3°C of ambient temperature at the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity among other considerations;
  - Minimize use of antifouling and corrosion inhibiting chemicals to ensure appropriate depth of water intake and use of screens. Least hazardous alternatives would be used with regards to toxicity, biodegradability, bioavailability, and bioaccumulation potential. Dose applied would accord with local regulatory requirements and manufacturer recommendations;
  - Testing for residual biocides and other pollutants of concern would be conducted to determine the need for dose adjustments or treatment of cooling water prior to discharge.

- Storm Water Management: Storm water includes any surface runoff and flows resulting from precipitation, drainage or other sources. Typically, storm water runoff contains suspended sediments, metals, petroleum hydrocarbons, Polycyclic Aromatic Hydrocarbons (PAHs), coliform, etc. Rapid runoff, even of uncontaminated storm water, also degrades the quality of

the receiving water by eroding streambeds and banks. In order to reduce the need for storm water treatment, the following principles would be applied:

- Storm water would be separated from process and sanitary wastewater streams in order to reduce the volume of wastewater to be treated prior to discharge
- Surface runoff from process areas or potential sources of contamination would be prevented
- Where this approach is not practical, runoff from process and storage areas would be segregated from potentially less contaminated runoff
- Runoff from areas without potential sources of contamination would be minimized (e.g. by minimizing the area of impermeable surfaces) and the peak discharge rate would be reduced (e.g. by using vegetated swales and retention ponds)
- Where storm water treatment is deemed necessary to protect the quality of receiving water bodies, priority would be given to manage and treat the first flush of storm water runoff where the majority of potential contaminants tend to be present;
- When water quality criteria allows, storm water would be managed as a resource, either for groundwater recharge or for meeting water needs at the facility;
- Oil water separators and grease traps would be installed and maintained as appropriate at refueling facilities, workshops, parking areas, fuel storage and containment areas.
- Sludge from storm water catchments or collection and treatment systems will contain elevated levels of pollutants and would be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety , and conservation and long term sustainability of water and land resources.
- Sanitary Wastewater: Sanitary wastewater from industrial facilities includes effluents from domestic sewage, food service, and laundry facilities serving site employees. Miscellaneous wastewater from laboratories, medical infirmaries, and water softening etc. can also be discharged to the sanitary wastewater treatment system. Sanitary wastewater management strategies will be used which include:
  - Segregation of wastewater streams to ensure compatibility with selected treatment option (e.g. septic system which can only accept domestic sewage)
  - Segregation and pre-treatment of oil and grease containing effluents (e.g. use of a grease trap) prior to discharge into sewer systems
  - If sewage from the industrial facility is to be discharged to surface water, treatment to meet national or local standards for sanitary wastewater discharges or, in their absence, the indicative guideline values applicable to sanitary wastewater would be met
  - If sewage from the industrial facility is to be discharged to either a septic system, or where land is used as part of the treatment system, treatment to meet applicable national or local standards for sanitary wastewater discharges will be done.
  - Sludge from sanitary wastewater treatment systems would be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent

with protection of public health and safety , and conservation and long term sustainability of water and land resources.

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

Annex III: 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 Kochi 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 29: DESCRIPTION OF ROLES AND RESPONSIBILITIES

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
General Manager	M.Tech or equivalent (Mechanical/Production/Industrial Engineering) Desirable: MBA	15 Years with 8 years in similar role	► Tool Manufacturing/Design/ Product development/ Training. ► Experience in Project Implementation will be preferred	► Over all responsible for the administration and financial health of the TC ► Key responsibility areas include (but not limited to); Marketing, Administration, HR, Accounts, Production, Design & consultancy etc. ► Responsibility for achieving the target KPIs set by the GC
Deputy General Manager	B.Tech or equivalent (Mechanical/Production/Industrial Engineering)	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

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Manager - Admin. and Accounting	CA/ICWA or MBA with bachelor's degree in Commerce/ Accounting / Finance Desirable: Familiarity with labour laws and IR, LLB	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, regulations and state specific compliances ► Familiarity with ERP/accounting softwares	Head of Accounts, Administration and HR: ► General housekeeping of TC ► Bookkeeping, accounting and finance including financial analysis ► TC security ► Payroll ► Procurement management and store keeping
Sr. Officer - Admin. & HR	MBA (HR)	5 Years	► Experience in the area of HR and Administration ► Familiarity with Industrial laws, industrial relations, labour 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 Taxation ► Should be familiar with latest accounting software	► Bookkeeping and accounting ► Financial analysis

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Officer - Accounting	M. Com. or MBA or Equivalent in Accounting	3 Years	► Experience in accounting and Taxation ► 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 and processes will be desirable	► Procurement ► Vendor Development
Senior manager - Design & Consultancy	B.Tech or equivalent (Mechanical/Production/Industrial 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	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

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			► Experience in technical consultancy will be preferred	
Manager- Design & Consultancy	B.Tech or equivalent (Mechanical/Production/Industrial 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 Plastic mould ► Practical Experience in use of CAD/CAM/CAE in product and tool design ► Knowledge of Tool trial ► Experience of Jigs and Fixtures ► Knowledge of Quality systems ► Experience in technical consultancy will be preferred	► Designing tools, moulds and die casting ► Product development ► Quality systems ► Value engineering ► Tool try outs and proving ► Consultancy to MSMEs: Deliver functional consulting on assigned areas to ensure MSMEs are able to successfully use the solutions

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Sr. Engineer-Design & Consultancy	B.Tech or equivalent (Mechanical/Production/Industrial Engineering)	5 Years	► Experience with designing sheet metal tools, plastic moulds or die casting ► Knowledge of high end CAD software, analysis software and metrological instruments ► Experience of consultancy in the areas of product development, quality systems and value engineering	► Designing tools, moulds and die casting ► Product development ► Quality systems ► Value engineering ► Tool try outs and proving ► Consultancy to MSME
Sr. Manager Production	B.Tech or equivalent (Mechanical/Production/Industrial 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 ► Experience to debug tool, analyse problems, root causes & take corrective improvement actions when tool is not able to produce as per part specifications	► Overall responsible for 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 quality standards ► Manpower deployment and controlling manpower costs as per target

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Manager-Production	B.Tech or equivalent (Mechanical/Production/Industrial Engineering)	8 Years with 3 years in a similar role	► Experience with tooling or manufacturing ► Knowledge of metal or plastic mould and/or die casting ► Hands on experience with CAD and CAM software, and programming of CNC machines ► Experience to debug tool, analyse problems, root causes & take corrective improvement actions when tool is not able to produce as per part specifications	► Production ► CAD/CAM/CNC programming and operation ► Responsible for timely delivery of tools and components ► Responsible for Tool Trial ► Responsible for Consultancy to MSMEs ► Should have good knowledge of Quality and inspection
Manager-Production planning	B.Tech or equivalent (Mechanical/Production/Industrial 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 ► Responsible from issue of raw materials to despatch of final product to customers including routing

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Manager-Metrology	B.Tech or equivalent (Mechanical/Production/Industrial 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-Testing	M.Tech/M.Sc.	8 Years with 3 years in a similar role	Practical Experience in Testing mechanical/Chemical/metallurgy	Head of Testing Department
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 Engineer-Production	B.Tech or equivalent (Mechanical/Pro	5 Years	▶ Knowledge and experience in tool manufacturing, metal cutting through CNC programming and operation ▶ Experience of precision components	▶ CNC machine programming and supervision of machining and assembly of tools ▶ Machinery maintenance ▶ Quality assurance

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
	duction/Industrial Engineering)		► Tool assembly ► Tool trial	► Team work
Engineer-Production	B.Tech or equivalent (Mechanical/Production/Industrial Engineering)	3 years	► Knowledge and experience in tool manufacturing, metal cutting through CNC programming and operation ► Tool assembly ► Tool trial	► CNC machine programming and operation ► Assembly and trial of Tools
Foreman	Promotion from Senior Technician	3 years as Sr. Technician	► Knowledge and experience in tool manufacturing, metal cutting through CNC programming and operation ► Tool assembly ► Tool trial	CNC machine programming and operation Assembly and trial of Tools
Senior Technician (Electrical maintenance / Mechanical maintenance/ tool assembly & manufacturing)	Diploma/ ITI in respective areas	1 year after Diploma or 5 Years after ITI in respective areas	Experience in Maintenance of machines and equipment (electronics or mechanical)/ Experience in CNC machine programming and operation/ Experience in Tool assembly and trial	► CNC machine programming and operation ► Assembly and trial of Tools ► Also work as Maintenance Technician in Mechanical/ Electronics

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Senior Manager-Training	B.Tech or equivalent (Mechanical/Production/Industrial 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/ Automation	B. Tech. (or equivalent) in Mechanical / Electronics or Electrical Engineering or Automation	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-Incubation	B. Tech. Mechanical or Electronics/ Electrical	5 Year	► Experience in incubation ► Experience with designing curriculum, lectures and organising workshops for entrepreneurs	► Undertake training courses for entrepreneurs
Engineer-Training	B. Tech. Mechanical or	3 Years	► Experience in tooling / manufacturing and training in metal cutting / tool engineering	► Undertake training courses ► Demonstrate practical skills to trainees

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
	Electronics/ Electrical		/ industrial automation systems and teaching	► Deliver theory lectures
Manager- Sales & Marketing	B. 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 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.

Annex IV: Clearances Required and Respective Authorities

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 the development of TC, some of these regulations may not be applicable.

TABLE 30: CLEARANCES REQUIRED AND RESPECTIVE AUTHORITIES

SN	Required clearance/ approvals[5]	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	KSIDC	30 days
7.	Permission for felling of trees	Department of forest	35 days
8.	Issue of NOC to the authority concerned regarding conversion of land use		15 days
9.	NOC and Consent to Establish under Water and Air Pollution Control Acts	1. Municipal and Local authority 2. Kerala State Pollution Control Board	· 90 days

[5] Indicative list of clearances/ approvals

SN	Required clearance/ approvals[5]	Department /agency	Tentative time limit for approval (days)
10.	Consent to Operate (Consent of Air and Water Pollution)	Kerala State Pollution Control Board	· Consent to operate:30 days, · Renewal of consent: 30 days
11.	Authorization under the Hazardous Waste Management, Rule, 1989, if required	Kerala State Pollution Control Board	· 60 days
12.	Electricity Connection	State Electricity Board	· 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
13.	Water connection	SIPB/DIPC	NA
14.	Fire safety	Fire department	15 days
15.	Approval of place and for permission to construct building under the Factories Act)		NA
16.	Approval of factory layout plan under factories Act, 1948	Labour and Employment Department – Factories and Boilers Inspectorate	30 days
17.	License for running the factory	Labour and Employment Department	45 days

SN	Required clearance/ approvals[5]	Department /agency	Tentative time limit for approval (days)
18.	Registration of shops and commercial establishments	Labour and Employment Department - Labour Department	10 days
19.	Permission to establishments having more than 50 labours under Industrial Employment	Labour and Employment Department - Labour Department	45 days
20.	Lift	Kochi Development Authority	NA
21.	Permit for Borewell (There is an onsite borewell for which approval needs to be taken)	Central Ground Water Authority	NA
22.	Society registration	Indian societies registration act 1860	NA

Annex III: Checklist for Environmental Screening

Location	Ernakulam
Address	Opp. Infrastructure Kerala Limited (INKEL) Tower 1, Angamaly South, Angamaly, Kerala 683573
Brief on upcoming Tool Room and Technology Centre (TRTC)	The planned TRTC in Ernakulum shall be focusing on general engineering.
Latitude and Longitude of the site	Latitude: 10° 10'53'N Longitude: 76° 22.24"E
Date of the site visit	23th February 2016
Name of the officials conducting site visit	EY: Ms. Shubhra Aprajita, Ms. Shagun M World Bank: Ms. Sushmita Sarkar, Mr. Samuel Thangaraj
Officials interacted	Ministry of Micro, Small and Medium Enterprises (MSME): Mr. Suresh Babu Kerala State Industrial Development Corporation Ltd. (KSIDC): Mr. M.T.Binil Kumar (AGM, Projects), Mr. K.G.Ajith Kumar (General Manager) District Industries Centre: Ms. Jaya (Manager), Ms. Sheeba (Assistant District Industries Officer)
Site description and history	Allotted land for the Technology Center is located in the KSIDC Industrial Area Angamaly, Ernakulam (having an area of approximately 56 acres). The Site has an approximate area of 15 acres and can be accessed from Angamalay-Manjaly Road. The site is currently has a cover of trees within the site boundary. The Site is currently an unused land. Trees and shrubs were present throughout the southern, eastern and western portion of the Site. The land was initially a part of Transformers and Electricals Kerala (TELK) which included 110 acres. In 1960, during the establishment of the industrial park, 56 acres of land was resumed by government. Of the 56 acres, 15 acres has been allocated for establishment of the TRTC.
Site vicinity	The Site is within KSIDC Industrial Area. The land use type of the area is predominantly industrial. North and north west: TELK;

	South: DIC (The industries primarily fall under plastic manufacturing and food industries); West: INKEL business Parks and De Paul Institute of Science