



REPORT

ON

DOMESTIC MANUFACTURING

OF

ITEMS WHICH ARE HAVING HIGHER IMPORT

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(AS & DC , O/o. DC (MSME), MINISTRY OF MSME, NEW DELHI)

NAME OF THE ITEM: Over Head Transmission line hardware items such as Steel Cross bars, Cross Arms, Clamps, Brackets, Dampers & Arching horn, etc.

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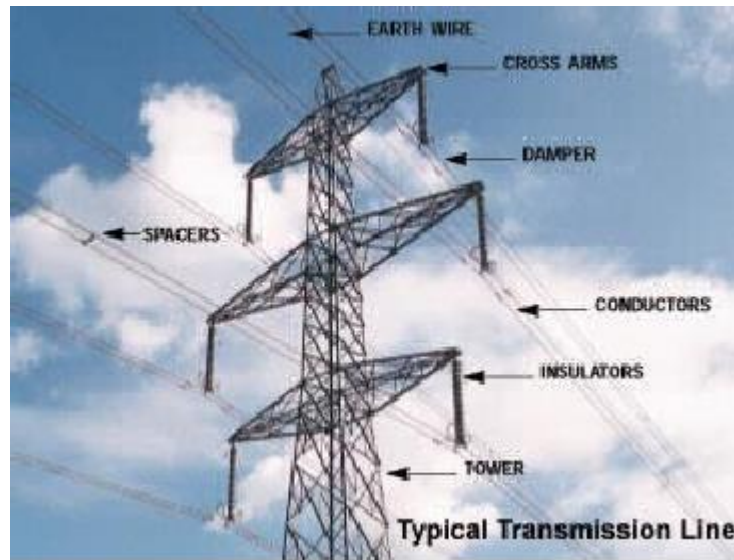
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Chapter 1 Nomenclature of the Product :

The overhead transmission line equipments comprises of Transformers, Circuit breakers, Aluminium conductors, Busbars, Bushings, Fuses, Insulators, Isolators, & air break switches, Lightning arrestors, earth wire accessories, Electric power connectors, Line traps, Metal fittings, Transmission line spacers / dampers and Others miscellaneous items



Overhead power transmission line hardware items for High Tension (HT) & Low Tension (LT) power supply comprises the following accessories / parts with different dimensions based on the transmission supply power:

- Adjustable Plate
- Aerial Bundle Cable Suspension Clamp
- Aluminium Stirrups for Centre Binding for Pin Insulator
- Arcing Horn
- Anchor Shackle
- Ball Clevises
- Ball Eye
- Ball Eyes - Horn Holder
- Ball Hooks
- Ball Hooks -Horn Holder
- Ball Link
- Ball Link Horn Holder
- Brackets
- Compression Dead End for Hyena
- Compression Dead End for Jaguar
- Compression Connectors
- Double Eye Bolt
- Eye Bolt
- Half Arcing Horn
- Helical Fittings

- HV Pole Clamps
- Insulator Pin
- Line Side Arcing Horn
- LV Pole Clamps
- Mid-span Compression Joints
- Parallel Groove Clamps
- Pig Tail Hook
- Pilot Pin
- Pre-formed Armour Rods for DOG
- Repair Sleeves for G.S. Earth Wire
- Rock Bolt with Nut & Washer
- Socket Eye
- Socket Eye - Horn Holder
- Socket Clevises
- Shackle Straps
- Steel cross Arm, Cross bars
- Suspension Clamps
- Tension Clamp (Compression Type)
- Tie Rod & Nut
- Triangular Bracket
- Turn Buckles (mild steel, HDG)
- Twisted Straps
- U Bolts
- U Clamp 5/8"
- Vibration Dampers for Conductors
- Y Type Socket Clevises
- Y Fittings

Based on the application, combinations of the above accessories/parts are formed as assembly. These assemblies are categorised as tension assembly, suspension assembly, cross arm assembly, H – Pole accessories, Earth Wire accessories, substation clamps and connectors.

In this project report we are analysing few items manufactured by MSMEs viz Cross Arm Accessories (Steel Cross bars , Cross Arms, Brackets), Dampers, Spacers, Tension Assembly (for arcing horn) and suspension assembly (for arching horn). However the manufacturing processes for the entire transmission line hardware items are similar in nature. The product name differs based on the place of usage and its application. The bankable project report enclosed in this report is to manufacture all kinds of transmission line material.

The products are being manufactured based on Indian and International standard. However, the power transmission / Distribution agency such as State Electricity Board, National Thermal Power Corporation, Power Grid, demand the supplier with specific superior materials such as Stainless Steel bolts & nuts instead of G.I bolts & nuts.

Chapter 2 COMMERCIAL DETAILS

2.1 HSN Code of the Product :

Harmonised System of Nomenclature (HSN Codes) is used for the Stamping Machines, Metal Working products under Goods and Service Tax classification. In the HSN Code First two digits (73) represent the chapter number, next two digits (08) represent the heading number. Next two digits (90 / 20) represent the product code and last two digits (90 /11) are for final or deeper classification. All 8 digits of HSN code is mandatory for export & imports for tax invoice of GST.

73089090 - OTHER STRUCTURE AND PARTS OF STRUCTURES OF IRON AND STEEL
(EXCLUDING FLOATING STRUCTURES)

73082011 - TOWERS FOR TRANSMISSION LINE W/N ASSEMBLED
(This includes Steel Cross bars, Cross Arms, Dampers, Arching Horns, etc.)

2.2 NIC Code of the Product :

National Industrial Classification 2008 (NIC-2008) is used for Manufacture / Servicing a particular product / Process. NIC-2008 seeks to provide a basis for the standardized collection, analysis and dissemination of industry (economic activity) wise economic data for India. The structure for NIC Code is illustrated below. Level Description Section C Manufacturing Division 24 / 25 / 35 / 42 and 5 digit code represents individual products as below:

24320 - Casting of non-ferrous metals

25112 - Manufacture of metal frameworks or skeletons for construction and parts thereof

25119 - Manufacture of other structural metal products : Steel Cross bars , Cross Arms,
Brackets

25910 - Forging, pressing, stamping and roll-forming of metal; powder metallurgy

25920 - Machining; treatment and coating of metals

35107 - Transmission of electric energy

35109 - Collection and distribution of electric energy to households, industrial, commercial
and other users n.e.c.

42202 - Construction/erection and maintenance of power,telecommunication and
transmission lines (towers, masts, trusses, bridges etc.)

These Products manufacturing can be established either at State Capital, on account of availability of skilled manpower and reduced Transport charges to Electricity corporation or Aspirational Districts / Labour intensive area Reduced Labour cost, this product manufacturing involves less technical skills and scope for development of aspirational districts.

2.3 Clusters under MSE-CDP :

Forging, casting, small fabrication industries are available all over India however there are few states have more than 100 industries in each category, these states will be hub of industry to produce the transmission line equipments. As discussed in earlier chapter more number of MSMEs are available in Maharashtra, Gujarat, and Tamil nadu, Karnataka, Andhra Pradesh, Utter Pradesh, Haryana and Punjab. These states have attracted sizable investments and are the key industrial hubs.

In 1996, United Nations Industrial Development Organization (UNIDO) initiated the Cluster Development Programme (CDP) in India. Under the MSME (CDP) Programme EB Line Materials (Engineering) Cluster was setup at Paramakudi, Ramanathapuram District, Tamil nadu, which is the aspirational District. This cluster become more successful.

Major Products manufactured by member units of the Common Facility Centre (CFC) :

All the MSME units take part in this cluster is supplying products to Tamil Nadu Electricity Board, in the Transmission and Distribution of Electricity. There is scope to improve further, but due to financial crunch they have not developed further. The following are the major products (Accessories in Transmission and Distribution Lines).

1. Fabrication of 400 kV Substation Structure
2. Double and Single Air Break switches (With and Without Isolators)
3. Cross Arm, Clamps, Cross Bars (Transformer Structure)
4. LT / HT Fittings
5. Distribution Boxes, Metering Boxes, Pillar Boxes, Fuse units, etc.
6. Open Type Fuse unit with eye bolt, nut, U Bolt,, Bimetallic Clamps and Earthing Rods. etc.

After the implementation of CFC under MSE-CDP, The cluster units expanded their supply to Kerala State Electricity Board, Puducherry state Electricity Board, Indian Railways and Installation companies like BHEL and L&T. The cluster units have vision to improve their production to Export their products and to manufacture the items at EHV transmission lines.

Machineries installed in the cluster :

Sl. No.	Item	Qty	Name of the Supplier	Price (Amount in Rs)
1	Laser Cutting Machine	2	M/s.Craftsman Machinery Pvt. Ltd.,	Rs.1,98,50,000/-
2	Shearing Machine	1	M/s. Hindustan Hydraulics Private Ltd., Jalandhar	Rs. 30,19,661/-
3	Press Brake Machine	3	M/s.Hindustan Hydraulics Private Ltd., Pubjab	Rs.55,74,672
4	Power Press	5	M/s.Sadhu Engineering Works, Ludhiana, Punjab	Rs.15,75,084/-
5	EOT Crane	6	M/s. Future Tech Cranes & Hoists	Rs.34,75,395/-

Application of the Machineries installed at CFC under MSE-CDP

Sl. No.	Machine Specification	Intended Purpose
1	Laser Cutting Machine With Isolation transformer	This machine is used to cut various types of materials such as Stainless steel, Mild Steel, Aluminium, etc., to the required size with better accuracy. This machine operation includes, boring, drilling, Cutting, punching, slotting, profile cutting, etc. in quicker time with waste reduction.
2	Shearing Machine	To cut the stainless sheets and copper sheets to the required size and shape.
3	Press Brake Machine (with Punch Semi Groove neck)	To fold the SS and copper sheets with good finish
4	Power Press with Die Plate (Bolsten Plate)	To manufacture the components with required shape, cutting, punching, etc.
5	EOT Crane	For lifting the finished items and raw materials.

Other machineries such as Arc Welding machines, Gas welding set, Heavy duty lathe, Grinding machine, Drilling machine, etc. are installed at the MSME units itself.

Raw Materials uses by these industries are Mild Steel, Stainless Steel, Aluminium, Copper and GI Pipes. These raw materials are procured in the form of flats, channels, angles, square rods, pipes, sheets, etc.,

Transportation of Raw materials from Northern part of India increase the raw material cost and delay in transit. Hence, the cluster is proposed to expend the CFC by a rolling mill then they can product the above from Ingots.

Encouraging growth prospects of this cluster is increasing demand on infrastructure development. This CFC shall also support for the structural development activities other than Electrical power transmission. There is scope for diversification also.

Testing facilities such as Tensile Testing machine, Hardness testing machine, Thickness gauges, weighing machine, temperature rise test apparatus, etc. available at MSMETC, Chennai. The MSME units availing the facilities.

2.4 Possibility to create cluster on this Project

During the survey / visit to the MSME units it is found that the industrial production activity and the nature of the products are categorised in to two main groups viz., 1. Structural works and 2. Forging and Die casting. Hence there is scope for two types of clusters namely Hardware fitting cluster (Forging and Die casting activity – Line materials) and structural accessories (Post materials) cluster.

Based on the MSME registered details in Udyog Aadhar memorandum, There is scope of

structural accessories (Post materials) cluster at Labour intensive area and aspirational districts due to the advantage of availability of man power. The Hardware fitting cluster (Forging and Die casting activity – Line materials) can be setup at District headquarters due to easy transportation.

Moreover it is suggested that the states having more MSME units is preferred as phase 1 and next in phase 2 then at Phase 3. The State wise MSME units are enclosed at Annexure 1 for reference.

Type of Cluster	Phase 1	Phase 2	Phase 3
Structural works cluster	Maharashtra, Gujarat & Utter Pradesh (Existing at Tamil nadu)	Karnataka, West Bengal & Telangana	Rajasthan, Haryana, Madhya Pradesh & Delhi
Forging & Die casting Cluster	Maharashtra, Tamil Nadu, Gujarat & Utter Pradesh	Karnataka, Haryana & Punjab	Telangana, West Bengal, Rajasthan & Delhi

2.5 Number of Industries registered as MSME :

There are no direct 5 digits NIC Code for manufacturing these products however the process based industries Data available at UAM is considered in this project. Further product activity the Industries are classified as 3 groups viz.,

1. Forging & Die casting
2. Fabrication
3. Installation of OHE Details enclosed (Details enclosed in Annexure A)

Top 11 State wise total number of MSMEs (Forging & Die Casting)

Sl. No.	5 digits NIC code	24320				25910				25920				Total MSME Units
	Product / Process	Casting of non-ferrous metals				Forging, pressing, stamping and roll-forming of metal; powder metallurgy				Machining; treatment and coating of metals				
	State	Micro	Small	Medium	Total	Micro	Small	Medium	Total	Micro	Small	Medium	Total	
1.	MAHARASHTRA	473	129	29	631	821	260	70	1151	1332	240	38	1610	6784
2.	GUJARAT	619	145	15	779	318	133	16	467	441	62	6	509	3510
3.	TAMIL NADU	279	67	10	356	493	134	17	644	636	104	11	751	3502
4.	UTTAR PRADESH	337	40	6	383	124	48	8	180	159	46	6	211	1548
5.	KARNATAKA	90	31	14	135	180	62	11	253	265	60	8	333	1442
6.	HARYANA	120	52	5	177	135	90	13	238	157	59	3	219	1268
7.	PUNJAB	62	14	10	86	172	82	25	279	111	32	10	153	1036
8.	TELANGANA	48	20	6	74	91	39	4	134	145	31	2	178	772
9.	WEST BENGAL	80	24	9	113	84	43	15	142	86	31	7	124	758
10.	DELHI	93	37	5	135	75	29	13	117	86	30	3	119	742
11.	RAJASTHAN	126	15	4	145	67	26	4	97	91	16	7	114	712
	INDIA	2590	616	137	3343	2802	1028	219	4049	3930	795	116	4841	24467

Top 11 State wise total number of MSMEs (Fabrication – Cross Arm, Cross Bar etc.)

	5 digits NIC code	25112				25119				Total MSME Units
	Product / Process	Manufacture of metal frameworks or skeletons for construction & parts (towers, masts, trusses, bridges etc.)				Manufacture of other structural metal products				
Sl.No.	State	Micro	Small	Medium	Total	Micro	Small	Medium	Total	
1.	MAHARASHTRA	362	64	17	443	1523	289	56	1868	4622
2.	TAMIL NADU	263	53	1	317	990	192	20	1202	3038
3.	GUJARAT	88	27	5	120	503	103	16	622	1484
4.	UTTAR PRADESH	111	25	5	141	370	85	11	466	1214
5.	KARNATAKA	110	17	2	129	375	64	10	449	1156
6.	WEST BENGAL	73	23	9	105	237	84	24	345	900
7.	TELANGANA	62	23	3	88	261	82	8	351	878
8.	RAJASTHAN	78	17	2	97	268	53	8	329	852
9.	HARYANA	59	22	2	83	210	104	16	330	826
10.	MADHYA PRADESH	76	13	3	92	224	45	7	276	736
11.	DELHI	053	27	12	92	188	63	17	268	720
	TOTAL	1852	407	75	2334	6252	1381	228	7861	20390

Top 5 State wise total number of MSMEs (Involved in Installation and Maintenance activity)

Top 5 State wise total number of licenses involved in installation and maintenance activity)														
Sl.No	5 digits NIC code	35107				35109				42202				TOTAL
	Product / Process	Transmission of electric energy				Collection and distribution of electric energy to households, industrial, commercial and other users n.e.c.				Construction/erection and maintenance of power, telecommunication and transmission lines) Under Udyam Registration				
	State	Micro	Small	Medium	Total	Micro	Small	Medium	Total	Micro	Small	Medium	Total	
1.	MAHARASHTRA	102	12	3	117	297	17	0	314	292	52	6	350	1562
2.	TAMIL NADU	78	8	1	87	129	9	6	144	191	22	4	217	896
3.	UTTAR PRADESH	67	16	2	85	104	6	0	110	186	43	6	235	860
4.	GUJARAT	122	11	0	133	92	7	1	100	111	30	7	148	762
5.	RAJASTHAN	34	4	2	40	87	5	1	93	116	16	11	143	552
	INDIA	669	95	15	779	1229	103	22	1354	1791	371	74	2236	8738

2.6 Number of Large scale industries available :

Few Large Scale Industries are available at West Bengal, Maharashtra & Gujarat.

1. M/s Utilex, 229 Blue Rose Industrial Estate, Western Express Highway, Near TATA Steel, Borivili (East), Mumbai 400 066. India.
2. TRANSMISSION (INDIA) ENGINEERS, Howrah, West Bengal · 098041 81603
3. Transmission Line Products, Kolkata, West Bengal · 033 2485 8818
4. ANINDITA ENGINEERING, Howrah, West Bengal · 080 3726 8177
5. Kthl Krsna Transmission Hardware Manufacturing Pvt Ltd, PlotNo 390-391 GIDC Manjusar, Alindra, Gujarat,
6. Power-grid Switchgears Private Limited, Khadia, Ahmedabad

2.7 Import Data for the past three years :

Year	2017 – 18	2018 – 19	2019 – 20
Value in Rs. Crores	502.198	322.839	287.536

Note : Country wise, HSN code wise (Commodity wise) details downloaded from Department of Commerce web site (from Import – Export data bank), major import (top 10 countries) are:

Sl.No.	Country	2017 – 18 (Rs. in crores)	2018 – 19 (Rs. in crores)	2019 – 20 (Rs. in crores)	Till Q3 of 20-21 (Rs. in crores)
1.	China	84.893	25.287	81.722	74.095
2.	Malaysia	6.895	9.514	45.229	17.169
3.	Korea	28.369	13.919	16.721	4.413
4.	U.A.E	51.245	133.582	24.052	1.752
5.	Germany	8.045	7.963	9.524	4.314
6.	USA	5.573	4.036	2.281	2.081
7.	Japan	3.724	3.029	1.604	2.026
8.	Indonesia	17.816	2.202	3.617	1.910
9.	U.K	1.232	1.496	1.663	1.598
10.	Thailand	14.379	4.069	0.319	0.642

2.8 Export Data for the past two years

Year	2017 – 18	2018 - 19
Value in Rs. Crores	372.089	437.332

Note : Country wise, HSN code wise (Commodity wise) details downloaded from Department of Commerce web site (from Import – Export data bank), major export (top 10 countries) are:

Sl.No.	Country	2017 – 18 (Rs. in crores)	2018 – 19 (Rs. in crores)	2019 – 20 (Rs. in crores)	Till Q3 of 20-21 (Rs. in crores)
1.	USA	34.741	55.179	74.49	61.548
2.	Mauritania	3.693	23.345	2.036	5.659
3.	Kenya	8.420	4.721	7.213	10.496
4.	U.A.E	15.366	19.360	14.462	9.606
5.	Bangladesh	11.038	10.145	7.213	9.559
6.	U.K	8.957	10.443	11.097	9.459
7.	Nigeria	2.371	7.710	13.000	7.997
8.	Nepal	4.302	8.548	10.844	8.084
9.	Qatar	3.895	9.184	6.663	6.985
10.	Ghana	0.839	1.568	4.914	6.058
11.	Germany	5.129	6.700	14.573	6.051
12.	Thailand	0.622	7.051	2.036	5.659
13.	Oman	7.208	5.853	4.969	5.464
14.	Australia	9.227	6.382	8.435	5.356
15.	Afghanistan	15.020	15.080	6.096	4.058
16.	Tanzania	4.348	10.245	3.393	4.739
17.	SouthiArabia	7.071	7.763	5.574	4.134

Other countries having potential: Colombia, Georgia, Mali, Snail, Canada & Srilanka

2.9 The Demand in the domestic market :

Regular demand due to expansion of increase in usage of electricity as well as regular maintenance and replacement of transmission lines.

2.10 Demand of the Export market :

Electrical equipment has export potential due to exponential growth in power sector growth. In 2017-18, exports of electrical equipment stood at about 3% of India's total exports. Europe and Japan, followed by the U.S., are other prominent sources of India's electrical equipment imports.

From the Import – Export data it is evident that there is huge potential for Exporting these products by maintaining good quality standards. By strengthening our testing Laboratories with NABL Accreditation and expanding the scope of production by adopting the international standards the import is gradually reduced and Export is increased year by year. This may be further increased, by adopting cluster development and promoting these industries by creating more awareness programmes on Export.

Meanwhile, India imported electrical equipment about 2% of the country's total imports from China was the leading source of low-cost equipment imported by India.

The government of India has de-licensed the electrical machinery sector and allowed 100% foreign direct investment. It plans to set up an Electrical Equipment Skill Development Council (EESDC), which will focus on identifying critical manufacturing skills needed for the electrical machinery industry.

While the U.S. market share of India's electrical equipment and commodities segment is rather low, there is room for growth in this high-value market. Electricity market reforms, will further create a large demand for power transmission and distribution equipment, creating export opportunities for MSME companies.

Uzbekistan Power transmission line equipment is importing transmission line accessories, there is a business opportunity for MSMEs to Pitch for the business and explain how your company meets their requirements.

The requirements are :

- ❖ galvanised tower steel structures and accessories
- ❖ Insulators and hardware
- ❖ Conductors, cables and optical ground wire
- ❖ Structure for concrete foundations and piles

Brazil - Transmission lines is importing transmission line accessories, there is a business opportunity for MSMEs to Pitch for the business by meeting their requirements.

Similarly, UK Electricity department requires supply of equipment and services to develop new transmission assets on the following of transmission line accessories such as protection, control and supervision systems, disconnectors, etc.

2.11 Further Industrial Development

India is the world's third-largest producer and consumer of electricity, and has the world's fifth-largest installed capacity for electricity. Continuous scope for Electrical equipment to support power sector and is adding capacity under the "Power for All" initiative. Supportive government policies have triggered rapid growth of the power sector, which in turn is driving growth in the electrical equipment industry.

The electrical equipment market is forecast to rise year by year. The electrical Industry sector contributes about 8% to the overall value of the manufacturing sector and 1.5% of India's total GDP. The electrical equipment industry provides direct employment to more than half a million people and indirect employment to over 1 million. It therefore plays a key role in the growth of India's economy.

Among subsectors of the power equipment industry, the generation equipment sector makes up 25%, while transmission and distribution equipment along with allied equipment such as transformers, cables, transmission lines, switchgears, capacitors, energy meters, instrument transformers and winding wires constitute the remaining 75%.

By considering all the above facts there is Scope for development of these MSME Units approximately 100 to 200 units at every state, this may increase gradually as power sector grows up. This industry can be established within 6 months to 1 year. The bankable project report as per DC(MSME) guidelines is discussed in chapter 4.

Chapter 3 Technical Details

3.1 Sector in which product is falling

This product category falls under hardware fittings of Overhead Transmission line Equipments. The products are manufactured by MSMEs viz Cross Arm Accessories (Steel Cross bars , Cross Arms, Brackets), Dampers, Tension Assembly (for arcing horn) and suspension assembly (for arching horn).

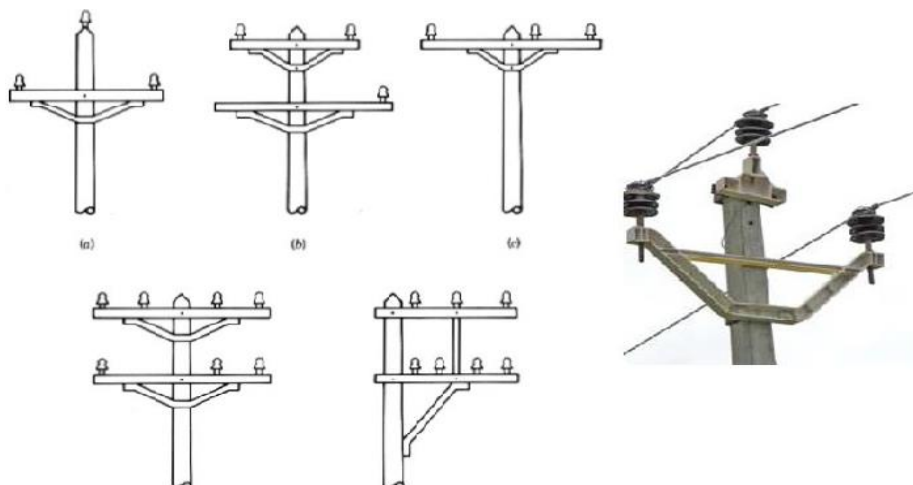
3.1.1 Steel cross bars.



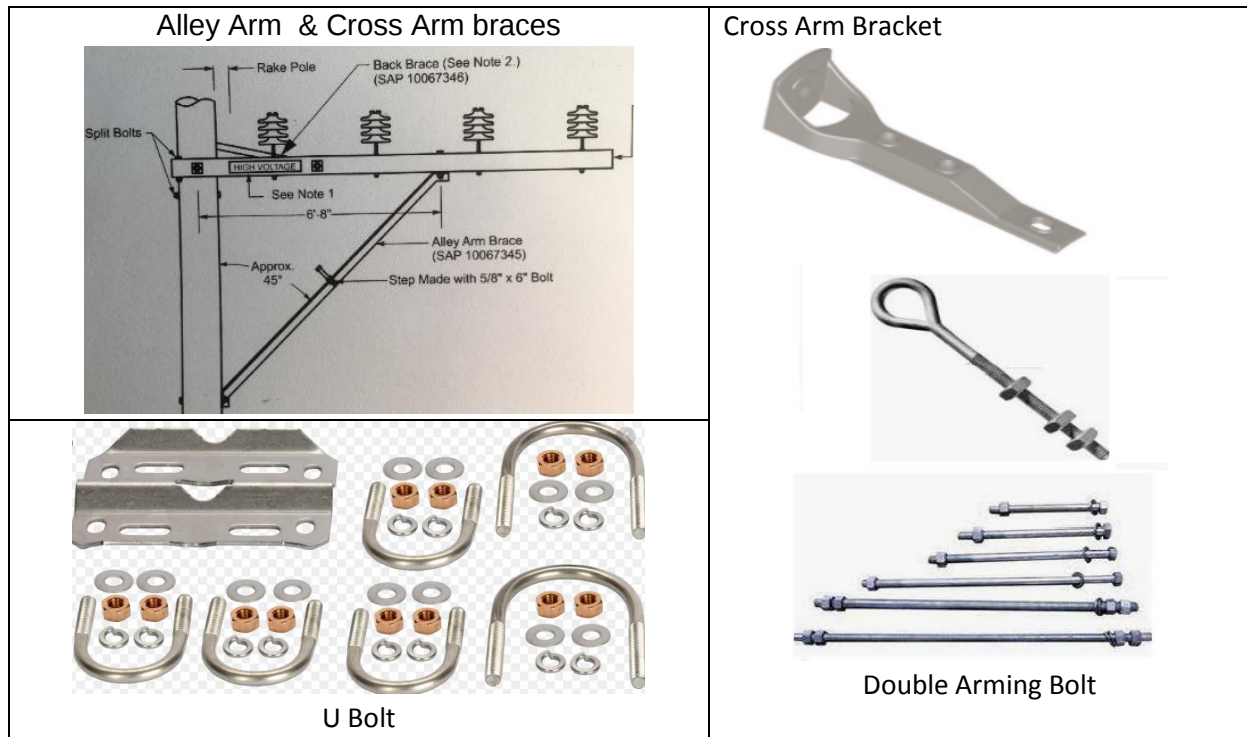
The Steel Cross bars are fitted in H Pole Structure to cater (house) the transformer. This made up of Galvanised Iron Steel according to the specification of IS 5613.

3.1.2. Steel Cross Arm

There are different types of Steel cross arm includes alley arm, cross arm braces, cross arm bracket, power pole cross arm, and v cross arm. The function of the steel cross arm is to support distribution transformers, fuses, isolating links, and other line equipment. Steel cross arms of different configurations are used on overhead lines, transmission towers, transmission lines, wood poles, utility poles, power poles, and light poles.

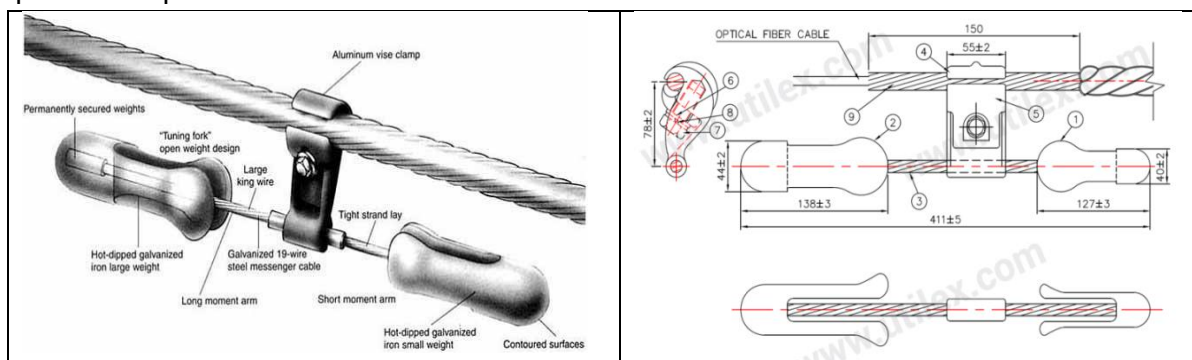


To make the steel cross arm more stable, there will be two cross arm braces to support the main cross arm by delta connection. Jing young Steel cross arms in overhead lines is mainly support the overhead line and the many holes on the steel cross arm are used to connect the other pole hardware fittings. The cross arm on the power pole or on the light pole is used to support the insulators by double arming bolt or u bolt. The types of steel cross arms are different in each country. Jing young can do the new steel cross arm design according to your unique drawing.



3.1.3. Dampers

Dampers are hanged in transmission line for its stability during wind. Otherwise, during heavy wind, the conducts should oscillate and create short circuit, to avoid this Dampers and Spacers are provided.

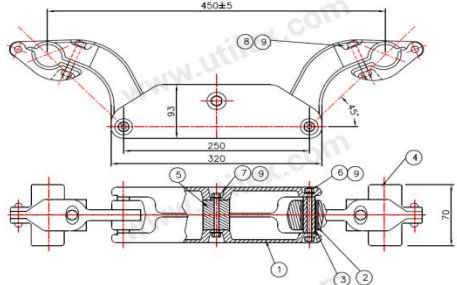


Dampers are made up of Hot dipped galvanised iron with permanently secured weights with opening wedges and hinged by galvanised steel messenger wire with balance on both sides and hanged by aluminium clamps. The mass of the damper must be similar to the specified

value in IS 2633, The bolt and nuts to be used as per IS 1367. The dimensions are well explained in IS 2486.

Description	Material	Surface Treatment
Spring Washer	Spring Steel	Electro plating Galvanised (E.G.)
Bolt M16	Mild Steel	Hot Dipped Galvanised (H.D.G.)
Plain Washer	Mild Steel	H.D.G.
Cover Half Clamp	Al Alloy	–
Hook Half Clamp	Al Alloy	–
Messenger Cable (19 strand)	H.T. Steel	H.D.G.
Damper Weight	Cast Iron	H.D.G.
Damper Weight	Cast Iron	H.D.G.

Spacer dampers

 TECHNICAL DATA :- 1. TENSILE STRENGTH – 7.5 KN. 2. COMPRESSIVE STRENGTH – 15 KN. 3. SLIPPING STRENGTH OF CLAMP: 2.5 KN. 4. GENERAL TOLERANCE ±0.3% 5. ALL DIMENSIONS ARE IN MM.	Description	Material	Qty.
	Body	Aluminium Alloy	2
	Insert	Aluminium Alloy	2
	Bush	Neoprene	2
	Arm with Cover	Aluminium Alloy	2 sets
	Weight	C.I., H.D.G.	1
	M12 Bolt & Nut	Galvanised Steel	2
	M12 Bolt & Nut	Galvanised Steel	1
	M12 Bolt & Nut	Galvanised Steel	2
	Lock Washer	Spring Steel, Galvanised	5

3.1.4. Arcing Fitting.

Arcing Fitting A metal fitting or fittings attached to one or both ends of an insulator string and arranged to prevent damage to the insulator string by a power arc. Arcing horns are basically made up of Galvanised Iron where ionisation takes place by a power arc during lightning.

Generally Arcing Horns are supplied with its associated fitting only, the fittings are basically classified as its nature of loading, such as Suspension and Tension type. The fitting must be capable to with stood mechanical load which can be applied to a fitting under the prescribed conditions of test.

Different types of Arcing Horn



Arcing fittings are classified as follows:

Insulator Pin : A stud passing up inside the metal base of the line post insulator and intended to be fixed rigidly to a supporting structure.

Suspension Insulator String Fitting : An assembly of metal parts used with a string insulator unit or an insulator string hung from a supporting structure and to carry a line conductor at its lower end. This assembly essentially comprises the following.

Suspension Top Fitting : A hook or anchor shackle or other fitting for flexibly suspending the suspension insulator string from the supporting structure either directly or through a hanger.

Suspension Clamp Adopter : A fitting for flexibly connecting the conductor suspension clamp to the suspension insulator string.

Conductor Suspension Clamp : A fitting holding the conductor and flexibly suspended from the clamp adopter.

Tension Insulator String Fitting : An assembly of metal parts used with a string insulator unit or an insulator string attached to a supporting structure and to secure in tension a line conductor. This assembly essentially comprises the following.

Whenever the Suspension or Tension fittings used at crossing of road, rail and pedestrian then its factor of safety increased to double by providing additional strength.

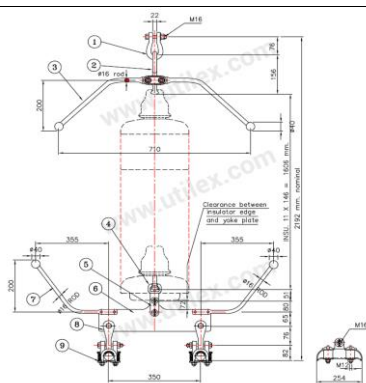
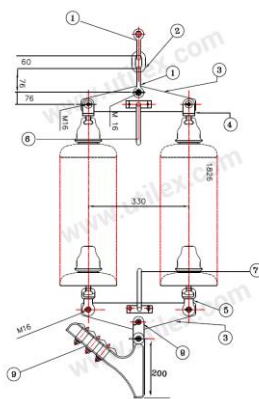
All the above fitting comprises of Ball Hook, Socket Tongue, Anchor Shackle, Yoke Plate, Ball Eye, Arcing Horns, Grading Rings, Clevis Tongue, and Twisted Shackle. The diagram of all parts are explained with dimensions in IS 2486, the manufacturer has to follow the same.

All the parts in the fittings are either made up of Steel or aluminium only. The production process involves Hot & Cold forging, Aluminium Die casting & Machining. The manufacturing process and list of machineries are explained in the chapter 4.

However the test setup diagrams to be done by the individual manufacturers. As per the Indian standard, the test conditions like room temperature, humidity, etc. to be specified by the manufacturer or as agreed between manufacturer and purchaser.



Few commonly used Arcing fittings with parts illustrated below:

No.	Fitting type	Single suspension for single ACSR	Single suspension for Twin ACSR			
1.	Arcing horn with Single Suspension fitting					
				Description	Material	Qty.
				Anchor Shackle	Forged Steel	1
				H.H. Ball Link	Forged Steel	1
				T.S. Arcing Horn (Rod type)	Galvanised Steel	1
				Socket Eye	Forged Steel	1
				Extn. Strap	GalvanisedSteel	1 set
				Yoke Plate	GalvanisedSteel	1
				L.S. Arcing Horn (Rod / Pipe type)	GalvanisedSteel	2
				Clevis eye	Forged Steel	2
Suspension Clamp Assembly	Aluminium Alloy & Steel	2				
2.	Arcing horn with Double Suspension fitting					
	Sl. No.	Description	Material	Qty.		
	1	Twisted Shackle	Forged Steel	1		
	2	Yoke-plate (T.S.)	Galv. Steel	2		
	3	T.S. Arcing Horn	Galv. Steel	2		
	4	Ball Clevis	Forged Steel	2		
	5	Socket Clevis	Forged Steel	2		
	6	L.S. Arcing Horn	Galv. Steel	2		
	7	Clevis Eye	Forged Steel	1		
	8	Suspension Clamp Assembly	Al. Alloy & Rubber Neoprene	1		

3.2. End user of the products / sectors:

This product is used in the Electricity power transmission / Distribution, hence this is used mostly at Power Transmission, Distribution. Limited quantity is also required at power generation. Hence the end users are Electricity Boards, Railways, National Thermal Power corporation (NTPC), Power Grid, L&T constructions.

3.3 Governing Indian specification

IS 2121(P1) : 1981 (Re-2002)	-	Armour Rods, Binding wires and Tapes for Conductors
IS 2121(P2) : 1981 (Re-2002)	-	Mid Span Compression Joint and Repair sleeve for conductor
IS 2121(P3) : 1992	-	Conductor and Earth wire accessories
IS 2486(P1) : 1993 (Re -2003)	-	Metal Fittings insulator Accessories (General Requirements & Tests)
IS 2486(P2) : 1989 (Re-2004)	-	Insulator Fittings for Overhead power lines (Dimensional requirements)
IS 2486(P3) : 1989 (Re-2004)	-	Locking Devices (General Requirements)
IS 2486(P4) : 1989 (Re-2004)	-	Locking Devices (Tests)
IS 5613 (P1) : 1985 (Re-2002)	-	Installation and Maintenance of Overhead Power lines up to 11 KV (Sec.1& Sec.2)
IS 5613 (P2) : 1985	-	Installation and Maintenance of Overhead Power lines 11 KV to 220 kV
IS 5613 (P3) : 1989	-	Installation and Maintenance of Overhead Power lines 400 kV
IS 5561 : 2018	-	Electric power connectors
IS 9708 : 1993 (Re-2004)	-	Stockbridge vibration dampers for overhead power lines
IS 10162 : 1982	-	Spacers and spacer dampers for twin horizontal bundle conductors
IS 7935 : 1975	-	Insulator fittings for overhead power lines with a nominal voltage up to and including 1000 v
IS 731 : 1971	-	porcelain insulators for overhead power lines with a nominal voltage greater than 1000 V

3.4. Governing International specification

Indian specification	International specification
IS 2121 : Part 1 : 1981	BS 3288: Part I : 1973
IS 2121 : Part 2 : 1981	BS 3288: Part I : 1973
IS 2121 : Part 3 : 1992	BS 3288: Part I : 1973, AS I 154.1 : Part 1 : 1985
IS 2486 : Part 1 : 1993	No Cross Referenced International Standard.
IS 2486 : Part 2 : 1989	BSI 137 : 1 : 1970, IEC 60274 : 0 : 0 0
IS 2486 : Part 3 & Part 4 : 1989	No Cross Referenced International Standard.
IS 5613 : Part 1 1985 (Re-2002)	No Cross Referenced International Standard.
IS 5613 : Part 2 : 1985	No Cross Referenced International Standard.
IS 5613 : Part 3 : 1989	No Cross Referenced International Standard.
IS 5561 : 2018	ANSI/ NEMA CC1 : 2009, BS 159 : 1992, BS 3288-1 : 2014, IEC 61284 : 1997, IS/IEC 62271 (Part 1) : 20
IS 9708 : 1993	IEEE standard 563-1978
IS 10162 : 1982	No Cross Referenced International Standard.
Is 4659	BS 729 - Hot dipped galvanised Iron

3.5. Flow process chart for the manufacturing / Process of manufacturing

As discussed earlier these products are made from assembly of common sub products. These sub products are produced by one or more process as discussed below.

Forging : Hooks are manufactured by closed die forging process produces forged hooks of superior mechanical properties with minimum waste of material. Forging is always better for hooks because of the part size (same strength from a smaller part), weight, strength, toughness and ductility properties.

Bolts & Nuts are made from steel wire rods. After spending hours in a furnace to soften it enough to be worked, the wire rods go in a bath of sulphuric acid to remove any rust particles on it, which is then followed by various other procedures to mould it into the desired form. Nuts and bolts can be made from many types of metal. Carbon steel is the most common; however, to prevent corrosion (rust), this is often coated with zinc. Bolts used in corrosive atmospheres are often made from a special grade of steel known as stainless steel, which has a high nickel or chrome content.

Cold forging of Steel Products : Cold forging is the process of molding the steel into the right shape at room temperature. Bolt head heads are progressively formed by forcing the steel into various dies at high pressure. Threads are formed by rolling or cutting. The bolt is exposed to extreme heat to harden steel by heat treatment process. The cross Arm, Cross bars are also manufactured in the cold forging process.

Pressure Die casting : Aluminium alloy is die cast in cold chamber pressure die casting machine. In pressure die casting the molten metal is introduced under pressure into a metallic die and allowed to solidify to produce near-net-shapes. Two types of die casting machines known as cold chamber and hot chamber are usually used. The production rate depends on casting thickness, specified properties of the cast metal and the complexity of the cast shape. This technique produces castings of very good surface finish with high dimensional accuracy. The process provides high yield due to absence of riser and feeding system. Production rate is high and the casting generates more metallurgical integrity. Finer grains and absence of porosity make the casting mechanically compact. Casting size, weight, design and melting point of cast metal limit the use of the process. Cost of die confines the process only to relatively small parts.

Metal for a single shot is loaded into a cylindrical chamber through a pouring aperture. A piston then forces the metal into the die, the entire operation being completed in a few seconds, so that iron contamination is virtually eliminated. Using this technique much higher injection pressure in the range of 70 – 140 Mpa is feasible, enabling lower metal to be employed and greater intricacy achieved. The castings are less prone to entrapped air and a higher standard of soundness ensures from the smaller amount of liquid and solidification shrinkage occurring within the die.

In cold chamber operations the molten metals is usually maintained at constant temperature in an adjacent holding furnace, where transfer of successive shots to the machine chambers can be accomplished manually. Holding furnaces may be electrically heated types or the one using immersion heating device, which has a close control over the molten metal.

The molten metal should be thoroughly degassed by chlorine gas followed by modification with suitable modifier. For thinner sections the working temperature of the molten metal should be 680°C to 690°C and for thicker sections this should be between 650°C to 680°C. The die temperature should be maintained so that castings of good quality are produced. The die cast components are subjected to fettling operation for removal of getting system and fins, if any.

Machining : Process in which a cutting tool is used to remove small chips of material from the work piece (the work piece is often called the "work") is called machining. Machining operations may be performed on stock mill shapes such as bars and flats or they may be executed upon parts made by previous manufacturing methods such as casting or welding.

With the recent advancement of additive manufacturing, machining has of late been labeled as a “subtractive” process to describe its taking material away to make a finished part. The shape of the tool and its penetration into the work surface, combined with these motions, produce the desired shape of the resulting work surface.

Two primary machining processes are turning and milling. The secondary processes are grinding, drilling and wire drawing.

Turning : Turning is a machining process performed by a lathe; the lathe spins the work piece as the cutting tools move across it. The cutting tools work along two axes of motion to

create cuts with precise depth and width. Lathes are available in two different types, the traditional type, and the computer numerical controlled (CNC).

The turning process can be performed on either the exterior or interior of a material. When performed on the inside, it is known as "boring", this method is most commonly applied to create tubular components. Another part of the turning process is called "facing" and occurs when the cutting tool moves across the end of the work piece, it is typically performed during the first and last stages of the turning process. Facing can only be applied if the lathe features a fitted cross-slide. It used to produce a datum on the face of a casting or stock shape that is perpendicular to the rotational axis.

Milling : Milling uses rotating cutters to remove material, unlike turning operations where the tool does not spin. Traditional milling machines feature moveable tables on which the work pieces are mounted. On these machines, the cutting tools are stationary and the table moves the material so that the desired cuts can be made. Other types of milling machines feature both table and cutting tools as moveable implements.

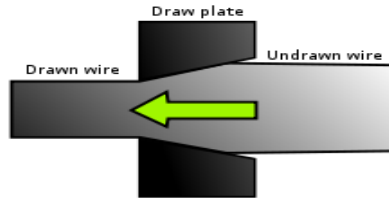
CNC Milling Centre: It has combine head and tail stocks of traditional lathes with additional spindle axes to enable the efficient machining of parts that have rotational symmetry (pump impellers, for instance) combined with the milling cutter's ability to produce complex features. Complex curves can be created by rotating the work piece through an arc as the milling cutter moves along a separate path, a process known as 5-axis machining.

The universal milling machine allows for both vertical and horizontal mounted cutting tools, making it one of the most complex and flexible machines available. It is capable of performing operations include planning, cutting, rabbeting, routing, die-sinking, and so on.

Drilling : Drilling produces cylindrical holes in solid materials using drill bits. It is one of the most important machining processes as the holes that are created are often intended to aid in assembly. A drill press is often used but bits can be chucked into lathes as well. In most manufacturing operations, drilling is a preliminary step in producing finished holes, ones that are subsequently tapped, reamed, bored, etc. to create threaded holes or to bring hole dimensions within acceptable tolerances. Drill bits will usually cut holes larger than their nominal size and holes that are not necessarily straight or round due to the flexibility of the bit and its tendency to take a path of least resistance. For this reason, drilling is usually specified undersize and followed by another machining operation that takes the hole out to its finished dimension.

Grinding : Grinding is used to remove small amounts of material from both flat surfaces and cylindrical shapes. Surface grinders reciprocate the work on a table while feeding it into the grinding wheel. The depth to which the wheel cuts usually falls between 0.00025 and 0.001 in. Cylindrical grinders mount the work piece on centers and rotate it while simultaneously applying the periphery of a spinning abrasive wheel to it. Centre-less grinding is used to produce small parts in high volumes where the ground surface has no relation to any other surface except as a whole. Ground surfaces of 200-500 min. rms are usually considered acceptable for many applications and are a starting point for further finishing operations which include lapping, honing, and super finishing.

Wire drawing : It is a metalworking process used to reduce the cross-section of a wire by pulling the wire through a single, or series of, drawing die(s). This is different from extrusion, because in drawing the wire is pulled, rather than pushed, through the die. Drawing is usually performed at room temperature, thus classified as a cold working process, but it may be performed at elevated temperatures for large wires to reduce forces. The strength-enhancing effect of wire drawing can be substantial. The highest strengths available on any steel have been recorded on small-diameter cold-drawn austenitic stainless wire.



3.6. Qualitative parameters of the product

- Slipping strength of clamp should be min. of 95% of UTS conductor or as specified value.
- Tensile strength, Compressive strength, Breaking strength of clamp should be higher than the specified value in the relevant Specification
- Tensile strength, Compressive strength, Breaking strength of complete hardware assembly should be higher than the values specified in relevant Indian Standard.
- Installation Torque and mass pull of strength should be more than the specified value.
- All ferrous parts shall be hot dip galvanised.
- Size of ball & socket 16 mm, 20 mm with in the tolerance for easy movement.
- All dimensions are in mm as per the standard specification. General tolerance $\pm 3\%$
- The raw materials used in manufacturing must be confirmed to the following specification.

3.7 Details of the product license to be obtained :

These Products are not under the category of “mandatory License”. However the MSME units are asked to have the facility of routine test/acceptance test as per IS standard to maintain the quality at their work place. For the finished product, testing at NABL Accredited Testing laboratory is requested by the customers.

3.8 Equipment required for the manufacturing the products

- | | |
|---------------------------|--------------------------|
| ➤ Hydraulic Press | ➤ Aluminium Furnace |
| ➤ Sheet bending machine | ➤ Die set |
| ➤ Laser cutting machine | ➤ Cold forging press |
| ➤ Pillar Drilling machine | ➤ Centre lathe |
| ➤ Pillar Hoist | ➤ Wire drawing machine |
| ➤ EOT Crane | ➤ Cutting machine |
| ➤ Organ Gas welding | ➤ Machining centre |
| ➤ Electric Arc welding | ➤ Thread cutting machine |

3.9 Test facilities required for the product :

Specific Test facilities required for every product is listed with Indian standard specification along with the test facility available at MSMETC, Chennai (marked *) in the remarks column.

SI No	Product	Specific tests or types of tests performed	Remarks
1.	ARMOUR RODS, BINDING WIRES AND TPAES FOR CONDUCTORS (IS 2121 P-1)	Visual Examination	*
2.		Verification of Dimension	*
3.		Tensile Test	*
4.		Electrical Resistance Test	*
5.		Wrapping Test (<i>for binding wires & tapes</i>)	*
6.		Slip Strength Test (<i>Armour rod</i>)	*
7.		Bend Test	*
8.		Resilient Test	*
9.		Radio Interface Test	
10.		Corona Test	
11.	MID SPAN COMPRESSION JOINT AND REPAIR SLEEVES FOR CONDUCTOR (IS 2121 P2)	Visual Examination	*
12.		Verification of Dimension	*
13.		Filing Load Test	*
14.		Electrical Resistance Test	*
15.		Heating cycle test	*
16.		Galvanising test	*
17.		Radio Interface Test	
18.		Corona Test	
19.	CONDUCTORS AND EARTH WIRE ACCESSORIES (IS 2121 P3)	Visual Examination and Verification of Dimension	*
20.		Electrical Resistance Test	*
21.		Slip Strength Test	*
22.		Mechanical Strength Test	*
23.		Chemical composition test	*
24.		Galvanising test	*
25.		Radio Interface Test	
26.		Corona Test	
27.	METAL FITTINGS OF INSULATOR ACCESSORIES (IS 2486 P-1&2)	Visual Examination	*
28.		Verification of Dimensions (<i>Insulator pin & studs pin, others</i>)	*
29.		Galvanising Test	*
30.		Mechanical Strength Test (<i>on Suspension Clamps & Insulator String Fittings</i>)	*
31.		Chemical Composition Test	*
32.		Slip Strength Test (<i>Suspension/Tension / Compression Clamps & Joints ex. Tee joints</i>)	*
33.		Electrical Resistance Test	*
34.		Ultimate Tensile Strength test	
35.		Heating cycle test (<i>Tension Joints, Non-Tension Joints and Anchor Clamps</i>)	*

Sl No	Product	Specific tests or types of tests performed	Remarks
36.	METAL FITTINGS OF INSULATOR ACCESSORIES (Locking Devices – IS 2486 - P3)	Verification of Dimensions	*
37.		Resistance to Bending	
38.		Hardness test (Vickers / Brinell / Rockwell)	
39.		Operational test	*
40.		Resistance to Corrosion	
41.	ELECTRIC POWER CONNECTORS (IS 5561)	Pull out strength test	*
42.		Electrical Resistance Test	*
43.		Temperature rise test	*
44.		Verification of Dimension	*
45.		Galvanizing test	*
46.		Short Time Current test	
47.	STOCKBRIDGE VIBRATION DAMPERS (IS 9708)	Visual Examination	*
48.		Verification of Dimension	*
49.		Mass pull off test	*
50.		Clamp Slip Test	*
51.		Clamp Bolt Torque Test	*
52.		Galvanising test	*
53.		Magnetic Power Loss Test	*
54.		Resonance Frequency Test	
55.		Fatigue Test	
56.		Dynamic Characteristic Test	
57.		Damping Efficiency Test	
58.		Corona Test	
59.		Radio Interference Test	
60.	SPACERS AND SPACER DAMPERS FOR TWIN CONDUCTORS (IS 10162)	Visual Examination	*
61.		Verification of Dimension	*
62.		Movement Test	*
63.		Clamp Slip Test	*
64.		Resilience Test	*
65.		Clamp Bolt Torque Test	*
66.		Assembly Bolt Torque Test	*
67.		Tensile Load Test	*
68.		Compression and Pull off Test	*
69.		Magnetic Power Loss Test	*
70.		Galvanising Test	*
		Chemical tests Covered in the above Products	
71.	IS – 6745	Mass of Zinc Coating (Iron & Steel – Wire, Tube, Bolts & Nuts)	*
72.	IS 2633	Uniformity of Zinc Coating	*
73.	IS 4759	Mass of Zinc Coating (Steel fabrication)	*

Remarks – * Indicates that the test Facilities for testing Overhead Transmission lines with NABL Scope is available at MSMETC, Chennai. It is proposed to enhanced further facility.

	
Resistance test (1000 Amps)	Temperature Rise Test & Heating cycle Test (3500 Amps)

3.10 The technology existing for manufacturing the product :

In most of MSME units, the present manufacturing process like casting, forging and galvanizing partially available at every unit.

The raw materials purchased as per Indian standard, The various processes used in the fabrication of this include Measurement, Marking out, Cutting, Machining, Drilling, Welding, Fastening, Grinding are carried out only with the help of conventional machines.

In fact, most of the MSMEs have partial facility and purchasing other products from ancillary units due to less utilization and more cost involvement. Ex. Casting facility is not available with one unit, Forging facility is not available in another unit, but mutually both given consent to each other and surviving in competition by making similar products.

3.11 Suggested modern technology for implementation or available in the market :

Technology development is crucial for improving productivity, efficiency and competitiveness. The transmission line hardware material manufacturers are lagging behind large scale industries and other international manufacturers.

By increasing the manufacturing capability by improving their production process by continuous Technology up gradation and availing the modern technology in Common facility services, the MSME units will increase their production capacity and quality to equip them for global competitive.

Central Power Research Institute, Bangalore, which helps the companies to attain international levels of competitiveness based R & D infrastructure.

By implementing various techniques such as

1. Updating advanced manufacturing practices and processes
2. Implement lean manufacturing concepts
3. Energy efficiency management
3. Vendor development and supply chain management
4. Improving capacity utilization by utilizing modern technology machines from cluster

5. Resource sharing between units
6. Continuous improvement from the test results obtained on finished products from reputed laboratories (Tested as per specifications) and customer feedback.
7. Design clinic scheme to be implemented.

3.12 Raw material required and availability :

The following raw materials are required for manufacturing the Over Head Transmission line hardware assembly, the raw materials should be as per covering standards of Indian / International.

Generally cross arm and cross bars are made up of mild steel or structural steel plates welded frames. Clamp accessories are made up of Aluminium. Arcing horn are made from G.I rods and G.I Pipes the individual specification mentioned in the next chapter.

3.13 Raw materials standards of Indian / International.

<u>Sl.</u>	<u>IS Number</u>	<u>Title</u>
1.	IS 209 : 1992	Zinc ingot – Specification (Fourth Revision)
2.	IS 226 : 1975	Structural steel (Standard quality)
3.	IS 383 : 2016	Coarse and Fine Aggregate for Concrete - (Third Revision)
4.	IS 410 : 1977	Specification for cold rolled brass sheet, strip and foil (Third Revision)
5.	IS 456 : 2000	Plain and reinforced concrete - Code of practice (Fourth Revision)
6.	IS 617 : 1994	Cast aluminium and its alloys - Ingots and castings for general engineering purposes - Specification (Third Revision)
7.	IS 731 : 1971	Specification for porcelain insulators for overhead power lines with a nominal voltage greater than 1000 V (Second Revision)
8.	IS 802 : Part 2 : 1978	Code of practice for use of structural steel in overhead transmission line towers: Part 2 fabrication galvanizing, inspection and packing
9.	IS 802 : Part 3 : 1978	Code of Practice for Use of Structural Steel In Overhead Transmission Line Towers, Part 3 Testing
10.	IS 1199 : 1959	Methods of sampling and analysis of concrete
11.	IS 1363 : Part 3 : 2018	Hexagon Head Bolts, Screws and Nuts of Product Grade Part 3 - Hexagon Nuts (Size Range M 5 to M 64)
12.	IS 1367 : Part 1 : 2014	Technical supply conditions for threaded steel fasteners: P.1 general requirements for bolts, screws, studs and nuts (Fourth Revision)

<u>Sl.</u>	<u>IS Number</u>	<u>Title</u>
13.	IS 1367 : Part 6 : 2018	Technical supply conditions for threaded steel fasteners: Part 6 mechanical properties of fasteners made of carbon steel and alloy steel - Nuts with specified property classes - Coarse thread and fine pitch thread (Fourth Revision)
14.	IS 1498 : 1970	Classification and identification of soils for general engineering purposes (First Revision)
15.	IS 1445 : 1977	Specification for porcelain insulators for overhead power lines with a nominal voltage up to and including 1000 v (Second Rev.)
16.	IS 1570 : Part 2 : 1979	Schedules for wrought steels: Part 2 carbon steels (Unalloyed Steels)
17.	IS 1573 : 1986	Specification for electroplated coatings of zinc on iron and steel (Second Revision)
18.	IS 1865 : 1991	Iron castings with spheroidal or nodular graphite - Specification (Third Revision)
19.	IS 1875 : 1992	Carbon steel billets, blooms, slabs and bars for forgings - Specification (Fifth Revision)
20.	IS 1885 : Part 54 : 2021	Electro technical Vocabulary: Part 54 Insulators
21.	IS 2004 : 1991	Carbon steel forgings for general engineering purposes - Specification (Third Revision)
22.	IS 2016 : 1967	Specification for plain washers (First Revision)
23.	IS 2107 : 1977	White heart malleable iron castings
24.	IS 2108 : 1977	Blackheart Malleable Iron Castings
25.	IS 2502 : 1963	Code of practice for bending and fixing of bars for concrete reinforcement
26.	IS 2544 : 1973	Porcelain post insulators for systems with nominal voltage greater than 1000 Volts
27.	IS 2629 : 1985	Recommended practice for hot-dip galvanizing of iron and steel (First Revision)
28.	IS 2633 : 1986	Metiiod for testing uniformity of coating on zinc coated articles (Second Revision)
29.	IS 3043 : 2018	Code of practice for earthing (Second Revision)
30.	IS 3063 : 1994	Fasteners - Single coil rectangular section spring lock washers specification (Second Revision)

<u>Sl.</u>	<u>IS Number</u>	<u>Title</u>
31.	IS 3188 : 1980	Characteristics Of String Insulator Units
32.	IS 3764 : 1992	Code of safety for excavation work
33.	IS 4081 : 2013	Blasting and related drilling operations - Code of safety (Second Revision)
34.	IS 4091 : 1979	Code of practice for design and construction of foundations for transmission line towers and poles (First Revision)
35.	IS 4218 : Part 2 : 2001	ISO general purpose metric screw threads: Part 2 general plan (Second Revision)
36.	IS 4759 : 1996	Hot - Dip zinc coatings on structural steel and other allied products - Specification (Third Revision)
37.	IS 4826 : 1979	Specification for hot - Dipped galvanized coatings on round steel wires (First Revision)
38.	IS 4905 : 2015	Random sampling and randomization procedures (First Rev.)
39.	IS 5082 : 1998	Wrought aluminium and aluminium alloy bars, rods, tubes, sections, plates and sheets for electrical applications (Second Revision)
40.	IS 5522 : 2014	Stainless steel sheets and strips for utensils - Specification (Third Revision)
41.	IS 6051 : 1970	Code for designation of aluminium and its alloys
42.	IS 6603 : 2001	Stainless steel bars and flats - Specification (First Revision)
43.	IS 7814 : 2005	Phosphor bronze sheet, strip and foil - Specification (Second Revision)
44.	IS 7861 : Part 2 : 1981	Code of practice for extreme weather concreting: Part 2 recommended practice for cold weather concreting
45.	IS 7935 : 1975	Specification for insulator fittings for overhead power lines with a nominal voltage up to and including 1000 v
46.	IS 8218 : Part 2 : 1982	Safety code for plant railways: Part 2 locomotives, wagons and their movement
47.	IS 8263 : 2018	Radio interference test on high - Voltage insulators (First Revision)
48.	IS 8792 : 1995	Line traps for ac power specification . systems (First Revision)
49.	IS 9759 : 1981	Guidelines for dewatering during construction
50.	IS 10136 : 1982	Code of practice for selection of disc insulator fittings for highest system voltages of 72.5 kV and above

CHAPTER 4. DETAILED BANKABLE PROJECT REPORT

Project at a Glance

Product Description : Transmission Line overhead hardware materials
Such as cross arm, cross bar, clamps, dampers,
spacers, arcing fittings, etc.

Category of MSME Unit : Micro for first 2 years, then small Enterprises.

PRODUCT CODE (NIC) :

24320 - Casting of non-ferrous metals

25112 - Manufacture of metal frameworks or skeletons for construction and parts thereof

25119 - Manufacture of other structural metal products : Steel Cross bars , Cross Arms, Brackets

25910 - Forging, pressing, stamping and roll-forming of metal; powder metallurgy

25920 - Machining; treatment and coating of metals

35107 - Transmission of electric energy

35109 - Collection and distribution of electric energy to households, industrial, Commercial and other users' n.e.c.

42202 - Construction/erection and maintenance of power,telecommunication and transmission lines (towers, masts, trusses, bridges etc.)

Production capacity - Steel : 60 MT per month.

- Aluminium : 10 MT per month

Capacity Utilisation on this Project : 80 %

Investment on Machinery & Equipment : Rs. 89,50,000 /-

Total Capital Investment : Rs. 1,11,64,500 /-

Beneficiary Contribution : Rs. 30,00,000 /- (Approx. 25%)

Total Turnover (Sales) : Rs. 6,20,83,200 /-

Profit on sales : 13.62 %

Rate of return : 48.34 %

Payback Period : within 3 Years

Break Even Point : 49.96

A. GENERAL INFORMATION

4.1. INTRODUCTION

The overhead transmission line equipments hardware equipments comprises of Cross arms, cross bars, Isolators, & air break switches, Lightning arrestors (Hard ware with Arcing fitting), earth wire accessories, Electric power connectors, Line traps, Metal fittings, Transmission line spacers / dampers, tension fitting, suspension fitting, Tension set, and Others miscellaneous items like jumpers, Armor rods, clamps, substation clamps and connectors.

All the above items comprises various parts, every parts manufactured by Forging & machining, Structural Fabrication and Aluminium die casting & machining, Forging is a cost-effective way to produce net shape components. Iron forging is the process of heating iron block in the form of rod, round, [small ingot/billets] and then hammering or pressing them into the desired shapes.

Though tremendous advancements in metal casting industry have taken place in recent years, By proper selection of a casting technique with careful foundry and metallurgical controls, castings of high quality are being commercially manufactured. Amongst a large number of foundry techniques one is low and high pressure die-casting. It has been developed and industrially employed to produce castings of near-net shape components. The near net shape cast parts are famous for their fine details, good surface conditions, complex shapes and economy. Under the present scenario of Industrial development, Metal casting has moved from an art and craft industry to the industry based on science and technology. The pressure die casting manufacturing processes have been systematically developed so that structure may be controlled and quality may be assured. Die casting provides the foundry man with one of the fastest means of producing castings with a much higher degree of accuracy than that normally obtained by conventional sand casting. In fact, this method is unexcelled for mass production work as numerous castings can be produced very rapidly at low cost. The castings can be made to very close tolerances and with a fine surface finish.

Pressure die casting in aluminium alloy offers means for very rapid production of engineering and other related components even or intricate design. The technique has obvious advantages when a component is required in large quantities. However, for engineering components such as those required for aeronautic space, defence and automotive applications, mechanical properties and durability are of primary importance. It is therefore essential that the best features of design should be employed and optimum casting technique with minimum cost be adopted. Pressure die cast products are used in the form of components of various electrical, electronic, mechanical instruments and appliances used in domestic as well as industrial fields.

4.2 MARKET POTENTIAL

The popularity of Transmission line materials have huge market potential due to growth in Energy demand. Industrial developments and real estate development increases the requirement of these products. In other way, increase in export market also improve the potential of these products manufacturing.

The industry has facility to develop pressure die cast aluminium alloy components, this area the industry may serve automobile sectors Defence, Telephone industry, Automobile components and fittings, Electrical appliances, Electronic components, Builders hardware fittings and electrical machinery manufacturers.

The die cast rises from the following advantages it offers as compared to other methods of castings:

High Productivity

Good as cast surface finish and appearance.

Compact casting–sound strength.

Do not require further machining.

Can be cast within close dimensional tolerance.

Very thin section can be cast with ease.

Metal wastage in the casting is low.

Rejection due to casting defects is low.

The Primary Market is expected to continue as the leading market in the transmission line hardware materials and, with the trend of demand growth, to cater to the requirement of more and more new industries coming up in the above areas of consumption. The replacement market is also likely to expand with more marketability of new products. There are very few units in the small scale sector producing pressure die cast components. Hence there is good scope for setting up this industry.

Forged parts vary in size, shape and sophistication. There are many small forged steel components of close tolerance and precision used in commercial airplanes, space shuttle, automotive and automotive machines. The Industries that tend to be the largest buyers of forgings include: aerospace, defence and automotive. Throughout the 1980s and 1990s, the forging industry underwent a declining trend due to over capacity and competition from world markets. Between 1995 and 2000, this industry had a fairly good time, some units showing increasing trends in production and sales.

The forging components and parts are superior to those manufactured by any other metal process. That is why forgings are used when reliability, light weight, high strength and human safety are prime considering factors. The steel forgings become indispensable in many applications. Therefore, there is a good scope for steel forging units.

The fabrication of steel products requires everywhere; this is an added advantage to this industry for product diversification and to cater service to all types' requirements.

4.3. BASIS AND PRESUMPTIONS:

- a) The basis for calculation of production capacity is normally on single shift basis on 75 % efficiency on single shift basis of 8 hours' duration considering 25 working days in a month and a total of 300 working days in a year.
- b) The capacity utilization during the first year and second year of operations the capacity utilization is 60 % and 80 % respectively. The unit is expected to achieve full capacity utilization from the third year onward.

- c) The salaries and wages, cost of raw materials, utilities, rents, etc. are based on the prevailing rates in the state/neighboring states.. These cost factors are likely to vary with time to time.
- d) Interest on term loan and working capital loan has been taken at the rate of 15% on an average prevailing at the time of preparation of the report. However, this rate may vary depending on the policy of the financial institutions / agencies from time to time.
- e) The cost of machinery and equipments as indicated in this project is refer to particular make and the prices are approximate, those prevailing at the time of the time of preparation of this report.
- f) The Profit, rate of return and breakeven point in this project has been calculated on the 80% capacity utilization basis.
- g) Nonrefundable deposits, project preparation costs etc. Whenever needed may be considered pre-operative expenses.
- h) It is proposed to setup this unit in a rented building of 300 Sq. m built up area.
- i) The margin money recommended in 25 % of the working capital requirement at an average. However, the percentage of margin money may vary as per bank's discretion.
- j) Payback period of the Project: After the initial gestation period of one and half years it will require approximately 5 years to pay back the loans.

4.4 IMPLEMENTATION SCHEDULE:

Project implementation will take a period of 6 months from the date of approval of the scheme. Break-up of time required in each activity is shown below

Collection of information, market survey and Preparation of project documents.	1 st month
Clearance from different promotional Agencies	2 nd month
Financial arrangement, arranging margin money	2 nd - 3 rd month
Construction/ Alternations of Shed/building	3 rd - 4 th month
Electrification, Purchase of machinery and equipment	4 th month
Installation of machinery, Trial Production	5 th month
Receipt of raw materials, recruitment of man power	6 th month
Marketing, legal License and Commercial Production	7 th month onwards.

4.5. PROCESS OF MANUFACTURE

As discussed earlier the product manufacturing has three distinct process of manufacturing namely 1. Aluminium die casting, 2. Forging, 3 Structural fabrications. And finally assembling and testing for each and every product as per Standards.

Aluminium die casting: The die casting process forces molten aluminum into a steel die (mold) under pressure. This manufacturing technique is normally used for high-volume production. Precisely formed aluminum parts requiring a minimum of machining and finishing can be produced through this casting method.

One of the most significant benefits of aluminum die casting is that it creates lighter parts with more surface finishing options than other die cast alloys. Moreover, cast aluminum is versatile, corrosion resistant; it retains high dimensional stability with thin walls.

High-pressure die casting is a process wherein molten metal is forced, under pressure, into a sealed mould cavity. It is held in place by a powerful compressive power (true die installed in hydraulics machine) until the metal solidifies.

Forging: Process of Manufacture As per the customer's specifications, steel rods of different sizes are cut to the required length for forging in power shearing machine/hacksaw machine. The cut pieces are heated in the heating furnace to forging temperature. The hot pieces removed from the furnaces are forged in the power hammers/presses using forging dies. The forged components are then trimmed in the trimming press/ trimming hammer to get the exact size of the component. After inspection, the components are shot blasted and cleaned/fettled in the fettling shop. The good components without any defects are dispatched as per customer requirements.

Structural fabrication: The cross bars, cross arms, channels etc. are covered under this process. These products are first cut into the dimensional requirement, then the pieces are to be welded by argon welding machine. The holes are punched by Power Press. This creates more accurate dimensions than drilling.

The clamps requires cutting then bending and welding process.

Arcing horn pipes are bended by fixtures and ball head is welded by argon welding machine for more strength and good finish.

All Products are galvanised to the requirement.

Assembling: This process doesn't require any mechanism, since it is simple bolt and nut connection with split clamps. The fitting is to be finally assembled in the transmission line hence the assembly is made with free hand or with less tightness using tools.

Testing: As per the electricity department / NTPC / Power Grid requirements, the manufacturers requires tensile testing machine, vernier caliper, micrometer, gauges, conductivity meter, torque wrench at the production premises for routine test (100% testing)

4. 6. QUALITY CONTROL AND STANDARDS

The quality of the component is supposed to be good near net shape with high production, resulting into, low cost and conforming to standard specifications as laid down by Bureau of Indian Standard IS 11804 :1986 code of Practice for Manufacture of Aluminium Alloy Pressure Die Castings.

Alloys suitable for pressure die casting and their chemical composition are given below. Alloys 4420 or LM-24M, 4520 or LM-2M, 4600 or LM-20M are widely used alloys for general engineering work and are suitable for Pressure die- casting. These alloys have excellent fluidity good corrosion resistance, medium strength and can be cast in intricate shapes. The die cast component should be free from blowholes and Pinholes porosity, shrinkage, cold shut etc. They should be free from dimensional inaccuracies. No patching or welding shall be allowed to cancel or rectify any defects.

Similarly raw materials for Steel parts are to be met with the standard specification (Is number) made in the Indian and International standard. This was discussed in earlier chapter.

4.7. PRODUCTION CAPACITY

Production capacity -	Steel	:	60 MT per month.
-	Aluminium	:	10 MT per month

The capacity utilization is 80% considered for the calculation of Profit

Estimated production capacity -	Steel	:	48 MT per month.
-	Aluminium	:	8 MT per month

4.8. MOTIVE POWER :

The total connected load requirement is approximately 60 kW (power). This includes the electricity to machineries, Light & Fans and the test equipments,

Electrical resistance furnace for melting Light scrap of Aluminium requires approx.. 600-625 kWh/ton, in this project we are using 10 Ton per month. Hence the energy consumption for furnace is 6250 kWh/month.

Light & Fans, test equipments and other machineries with 20 kW load considered as operated for 8 hours per day approx. for 25 working days in a month requires (30 kW x 8 hour x 25 days) 4000 kWh/month. (Since all machineries are not in continuous operation – 60%)

Total power requirement = 6,250 + 6,000 = 12,250 kWh /month

Electricity charges for power consumption @ Rs. 9 per unit = 12,250 x 9 = Rs. 1,10,250

Fixed Tariff for connected load 60 kW @ Rs.250 = 60 x 250 = Rs. 15,000

Total Electricity charges = Rs. 1,10,250 + 15,000 = 1,25,250 say Rs. 1,25,000

* The power tariff varies between every state, In calculation test equipments are considered for max. 8 hour operation, similarly by adopting energy conservation method there is scope for reducing the electricity charges. As per calculated value Rs. 1,25,000 /- per month is considered in this project as Electricity charges.

4.9. POLLUTION CONTROL

The fabrication and die casting area does not create extensive pollution hazard. But keeping in view of the health of the working personal, workshop should be well ventilated, properly lighted and fitted with exhaust fans.

Forging area has a share in the present environmental degradation. So it requires NOC from Pollution Control Board of the State. The pollution control machinery and equipment costs are too exorbitant for the small units. Forging industry depending on the character of the production, is a great source of heat, noxious gases, dust and noise. It also produces a large quantity of wastes such as irreclaimable ashes and scales. All these elements have individual contributory effect on the environment degradation and causes unhealthy and unsafe conditions within the unit. These aspects play a significant role in reducing the proportions of pollutants and thereby reduce the magnitude of environmental degradation.

In order to control pollution, various legislation and acts have been passed but as per information available, no minimum national standards have been devised for the Forging Units. There are mainly two methods for control of pollution in a small industrial unit:

- By exploring the meteorological and topographical conditions.
- By using various equipment for cleaning and dispersion of forging emissions.

For a small unit, the exploitation of natural draughts and climatic conditions are the best and cheapest methods for dispersion of chimney emissions. Use of equipment like gas scrubbers, ventilation fans, washers, etc. require considerable capital investment and also running expenses. On the other hand, use of high stack chimney and operating the unit at a time of favorable natural draught through chimney, helps to successfully disperse the dust and gases emitted from the unit at zero or negligible cost. Proper treatment and handling of the raw material also reduces the emission contents, particularly dust. Use of simple measures like removal of dust from the furnace charge, use of oil of proper strength with appropriate air blast will also help to a great extent.

Adopting simple methods like increased chimney height for the furnace, allowing proper space beyond the furnace stack and by providing a fall-out area for the dust, ash etc., within the factory premises itself may be considered.

Use of sophisticated pollution control measures are neither feasible nor viable for small units.

4.10. ENERGY CONSERVATION

It has become essential these days that the energy conservation efforts are strengthened substantially to reduce the cost of production. The potential for conservation however, is much large in the forging industry and hence all efforts need to be made to realise it to the extent possible.

The energy efficiency can be achieved by considering the following:

- i. Reduction in heating cycles.
- ii. Energy efficient gas fuelled burners for furnaces.
- iii. Fuel/combustion system optimization.
- iv. Advanced cogeneration/waste heat utilization system.
- v. Induction heating system with re-shapeable coil.
- vi. Electrification with energy saving motors and lights
- vii. Periodic energy conservation audits

The energy audit is an integral part of energy conservation project and is the key to a systematic approach for achieving greater conservation of energy.

Fuel economy shall be achieved by operating the furnace at the desired temperature, reducing heat losses from openings, minimising wall losses and waste heat recovery.

Burner also plays very important role in improving efficiency, hence selection of good quality burners is required for better conservation of oil fuel.

C. FINANCIAL ASPECTS

4.11 FIXED CAPITAL

A. Land & Building: Rent @ Rs. 50,000 Per Month

Land and Buildup area including workshop, office, stores etc. Total covered area 300 to 400 sq.mt on rent with sufficient open space for storing of raw materials and creating greeneries for pollution abatement. Industrial Building from industrial estate with sufficient open space for storing of raw materials and creating greeneries for pollution abatement is taken on Rent @ Rs. 50,000 Per Month.

B. Machinery and Equipment :

Plant & Machinery				
Sl.	Description	Rate	Qty	Amount
1	Horizontal cold chamber pressure die casting machine with control panel of 60T capacity and 7.5 HP Motor	15,00,000	1	15,00,000
2	Electrical resistance furnace for melting aluminium, 100 KG Capacity	3,00,000	1	3,00,000
3	Normalising furnace electrically operated 1500 mm×600mm	5,00,000	1	5,00,000
4	Shearing Machine	16,00,000	1	16,00,000
5	Pneumatic power hammer capacity 500 kg with 30 HP motor and accessories	10,00,000	1	10,00,000
6	Centre lathe heavy duty with 3 HP motor and accessories 12" centre height and 6 feet length	6,50,000	1	6,50,000
7	High speed shaping machine 630 mm 3 HP motor -	8,00,000	1	8,00,000
8	Double ended pedestal Grinder 2 HP motor capacity 8" dia	30,000	2	60,000
9	Pillar type drill machine 1" cap, 1 HP motor	70,000	2	1,40,000
10	Oil fired pre-heating furnace with oil burners and matching capacity blowers, oil preheaters, oil service tank valves, strainers and pipe lines along with other accessories etc.	5,00,000	1	5,00,000
11	Arc Welding machine	1,00,000	1	1,00,000
12	Argon gas welding set	1,00,000	1	1,00,000
Sub total				72,50,000

Sl.	Description	Rate	Qty	Amount
Contd. From prev. page.....Total				72,50,000
13	Shot blasting chambers with 7.5 HP motor	7,00,000	1	7,00,000
14	Trimming power press 60 ton cap with 5 HP motor and accessories	3,00,000	1	3,00,000
15	Power hacksaw with 1 HP motor	2,00,000	2	2,00,000
16	Diesel Generation set 125 KW Cap.with standard accessories	5,00,000	1	5,00,000
87,50Total				89,50,000
<u>Tools & Equipment</u>				
Sl.	Description	Rate	Qty	Amount
1	Vice, Tools, Dies and Fixtures	2,00,000	L.S	2,00,000
2	Cost of moulds and fixture	5,00,000	L.S	5,00,000
3	Platform type weighing machine 500 kg cap.	25,000	1	25,000
4	Rockwell hardness tester	1,00,000	1	1,00,000
5	Tensile testing Machine	5,00,000	1	5,00,000
6	Testing Equipments Laboratory comprising : chemical testing and measuring instruments such as vernier, micrometer and gauges.	3,00,000	L.S	3,00,000
Total				16,25,000
<u>Furniture</u>				
Sl.	Description	Rate	Qty	Amount
1	Office furniture, Computers, etc.	LS	2,00,000	2,00,000
2	Working Table	LS	1,00,000	1,00,000
Total				3,00,000
<u>Pre-Operational Expenses</u>				
Sl.	Description	Rate	Qty	Amount
1	legal expenses, establishment, travelling, start-up expenses consultancy fee,	1,50,000	LS	1,50,000
2	Advertisement & Publicity	50,000	LS	50,000
3	Electrification @ 10% of M/c	89,500	LS	89,500
Total				2,89,000

Total Fixed Capital Requirement :

Land & Building	:	Nil
Machinery & Equipment	:	89,50,000
Tools	:	16,25,000
Furniture	:	3,00,000
Preoperative expenses	:	2,89,500
TOTAL	:	1,11,64,500

4.12 WORKING CAPITAL PER MONTH :

i) Raw materials per Month :

Sl.	Description	Amount	Qty	Total
1	Aluminium alloys 8 MT ingots. (in kg)	150	8,000	12,00,000
2	Forging quality steel ingots/ rod conforming to customers specifications - 48 MT	40	48,000	19,20,000
3	Lubricating oil, cotton waste, packing material	--	LS	20,000
4	Split pins, Bolt & Nut	---	LS	10,000
5	Rubber gasket	---	LS	10,000
6	For Welding & other Misc. items	---	LS	20,000
				31,80,000

ii). Salary Expenses Per Month

	Designation	Salary Per Staff	Nos.	Total
1	Manager cum Production In charge	35,000	1	35,000
2	Sales / marketing executive	25,000	2	50,000
3	Supervisor cum lab In charge	25,000	1	25,000
4	Store keeper cum Accountant	20,000	1	20,000
5	Clerk cum typist	15,000	1	15,000
6	Technician / Skilled worker	20,000	10	2,00,000
7	Semi-skilled workers / helpers	15,000	10	1,50,000
8	Watchman / Office Assistant	12,000	4	48,000
Total of above				5,43,000
Perquisite (Staff welfare @ 15% = 81,450)				82,000
Total				6,25,000

iii). Utilities

Sl.	Description	Amount
1	Water - Drinking	10,000
2	Electricity	1,25,000
3	Internet Connectivity / Telephone / web publicity	10,000
4	Consumable Stores like Fluxes, Degasser, Lubricants dies etc.	1,00,000
5	Transport & Misc. Expenses	50,000
Total		2,95,000

iv). Other contingent expenses Per Month :

Sl.	Description		Amount
1	Office Monthly Rent	As per agreement	50,000
2	Repair maintenance	L.S	50,000
3	Insurance	L.S	15,000
4	Misc.	L.S	5,000
Total			1,20,000

Total recurring Expenditure per month

(i) Raw materials	:	31,80,000
(ii) Salary Expenses	:	6,25,000
(iii) Utilities Expenses	:	2,95,000
(iv) Other contingent Expenses	:	1,20,000

Recurring Expenditure Per Month : Rs. 42,20,000

Recurring Expenditure for 45 Days : (42,20,000 x 1.5) = Rs. 63,30,000

Total Capital Investment :

Total Capital Investment		
1	Fixed Capital	1,11,64,500
2	Recurring Expenditure for 45 Days	63,30,000
	Total	1,74,94,500

4.13 FINANCIAL ANALYSIS

a. Cost of Production Per Annum :

Cost of Production Per Annum		
1	Total recurring expenses	5,06,40,000
2	Depreciation of machinery and equipment @ 10%	8,95,000
3	Depreciation of Tools @ 25%	4,06,250
4	Depreciation of Furniture @ 20%	60,000
5	Interest on Capital Investment @ 15 % for 1,74,94,500	16,24,075
	Total	5,36,25,325

b. Turnover Per Month

S.No.	Products	Sales value	Qty / month	Amount
1.	Aluminium alloy Pressure Die casted components (8 MT raw material)	2,70,000	7.9 MT	21,33,000
2.	Aluminium alloy scrap @ Approx. 1%	80,000	0.1 MT	8,000
3.	Steel forgings (48 MT raw material)	70,000	43 MT	30,10,000
4.	By sale of steel scrap @ 10 %	20,000	5 MT	1,00,000
Total of the above				52,51,000
Expenditure for galvanizing at ancillary unit @ Rs.1800 per M.T				(-) 77,400
Turn over				51,73,600

Annual Turnover (per annum) (Rs.)

$$= \text{Turn over per month} \times 12 = \text{Rs. } 51,73,600 \times 12 = \text{Rs. } 6,20,83,200 \text{ /-}$$

c. Profit Per Annum before taxes.

$$= \text{Turn over Per annum} - \text{Cost of Production per annum}$$

$$= \text{Rs. } 6,20,83,200 - 5,36,25,325 = \text{Rs. } 84,57,875 \text{ /-}$$

d. Net Profit ratio :

$$\text{Net profit ratio} = \frac{\text{Profit per annum} \times 100}{\text{Sales per annum}} = \frac{84,57,875 \times 100}{6,20,83,200} = 13.62 \%$$

e. Rate of return :

$$\text{Rate of return} = \frac{\text{Profit per annum} \times 100}{\text{Total Capital investment}} = \frac{84,57,875 \times 100}{1,74,94,500} = 48.34 \%$$

f. Break Even Point :

Fixed cost per annum :

	Description	Amount Rs.
1.	Rent @ 50,000 /- Per month	6,00,000
2.	Depreciation of machinery and equipment @ 10%	8,95,000
3.	Depreciation of Tools @ 25%	4,06,250
4.	Depreciation of Furniture @ 20%	60,000
5.	Interest on Capital Investment @ 15 % for 1,74,94,500	16,24,075
6.	Insurance per annum	1,80,000
7.	40% of salary and wages	30,00,000
8.	40% of other expenses & Utilities excluding rent and insurance	16,80,000
	Total Fixed cost	84,45,325

$$\text{Break even point} = \frac{\text{Fixed Cost per annum} \times 100}{\text{Fixed cost per annum} + \text{profit per annum}}$$

$$= \frac{84,45,325 \times 100}{84,45,325 + 84,57,875} = \frac{84,45,325 \times 100}{1,69,03,200} = 49.96 \%$$

4.14 ADDRESSES OF MACHINERY & EQUIPMENT SUPPLIERS / MANUFACTURERS:

Forging and H.T. Furnaces

- (i) M/s. Wesman Engg. Co. P. Ltd. 7 - Ganesh Chandra Avenue, Kolkata - 700 013.
- (ii) M/s. Wester Works Engg. Ltd. 5-D, Valcan Insurance Building, Veer Nariman Point, Mumbai - 400 020.

Testing Machinery and Equipments

- (i) M/s. Fuel Instrument and Engg. P. Ltd. Ichalkaranji, Maharashtra.
- (ii) M/s. Inspection Instruments Corporation 7 - Sheriff Dovji Street, Zakaria Building, Mumbai - 400 003.

Name of Oil Supplier

- (i) M/s. Indian Oil Corporation Indian Oil Bhawan, New Delhi - 110 001.
- (ii) M/s. Hindustan Petroleum Ltd. UCO Bank Building, Parliament Street, New Delhi.

Aluminium Die casting

- (i) M/s. Rapid Flow India Private Limited , 6/2, Mathura Rd, opp. Badkal Mor Metro Station, Industrial Area, Sector 20, Faridabad, Haryana 121002.
- (ii) M/s. B S Jagdev And Sons, 6555, Street Number 5 Back side gill market, New Janta Nagar Ludhiana, Punjab 141003,
- (iii) M/s. Indinox Solus Building, Shop No.8 Ground Floor, Ghodbunder Road, Hiranandani, Thane West, Thane-400615, Maharashtra, India.
- (iv) M/s. Phoenix Industries Limited , Udyog Bhavan, Sonawala Road, Goregaon East, Mumbai-400063, Maharashtra.

4.15 NAME AND ADDRESS OF THE RAW MATERIAL SUPPLIERS.

- a) M/S. Hindustan Aluminium Co. United commercial Bank Building, Parliament street, New Delhi-110001
- b) M/S. Indian Aluminium Co, Bank building , Parliament street, New Delhi-110001
- c) NSIC Ltd,
- d) TANSIDCO, Tamil nadu
- e) Local market.

4.16 Details of Test facilities available in India :

Type Test facilities are available at Central Power research institute, Bangalore and Electrical Research and Development Association, Vadodara. Partial test facilities are available at MSME Testing Centre, Chennai and other Private laboratories

Chapter 5 SCHEMES AND CONSULTANCY SERVICES

The Office of the Development Commissioner (DC), Micro Small and Medium Enterprises (MSME) is an attached office of the Ministry of Micro, Small and Medium Enterprises (MSME) and is the apex body to formulate policies for MSME, advise & co-coordinating with State Government/PSUs, and monitoring the implementation of policies and schemes for the development and promotion of the MSME Sector.

The Enterprises comes under MSME must have Udyam registration to avail the benefits of MSME Schemes and other benefits. The MSMEs are basically of two types based on nature of activity like manufacturing goods from its raw materials and another is services to the existing goods to continue to its fitness and make it fit to use. An enterprise shall be classified as a micro, small or medium enterprise by satisfying limits on investment and Turn over.

Classification of Enterprises	Investment limit in plant & machinery / equipment	Actual / Anticipated Turn over in the previous Financial Year
Micro	Not exceeding Rs 1 Crore	Not exceeding Rs 5 Crore
Small	Not exceeding Rs 10 Crores	Not exceeding Rs 50 Crores
Medium	Not exceeding Rs 10 Crores	Not exceeding Rs 250 Crores

O/o DC MSME has already implemented free digitisation process and made it simple for the entrepreneurs for applying MSME Schemes, benefits and other related activities through DC MSME web portal and champions portal. The entrepreneur has liberty to fill the data through on line and get them registered on free of cost:

5.1 Existing scheme available and their details

UDYAM REGISTRATION : Udyam Registration is field by any Micro, Small and Medium Enterprise in the country for availing the benefits specifically available to MSMEs as and when declared by any such Authority under MSME Development Act, 2006.

MSME units who intends to establish a micro, small or medium enterprise may file Udyam Registration online in the Udyam Registration portal (<https://udyamregistration.gov.in>), based on self-declaration with no requirement to upload documents, papers, certificates or proof.

The details to be filled in application are Aadhar No, PAN Number, GST Number, Plant location, No of employees and products manufactured, Bank details. During registration the OTP will be communicated to Aadhar based mobile number for verification.

After registration, MSME enterprise assigned a permanent identity number to be known as - Udyam Registration Number. An e-certificate, namely, - Udyam Registration Certificate shall be issued to E-mail on completion of the registration process. The same can be down loaded from website after due verification.

MSME schemes are to provide credit and Financial assistance to New Entrepreneurs, Enhancing skill development, enhancing infrastructure through common facility mode, up gradation & improvement in their production and Marketing support as follows.

5.2 Credit and Financial Assistance for New Entrepreneurs / MSMEs :

To facilitate the entrepreneur by providing credit support, training to manage the establishment, various procedures involved in commencement of production and marketing support by the following schemes :

- a. Prime Minister's Employment Generation Programme (PMEGP)
- b. Entrepreneurship and Skill Development Programme (ESDP/ EAP/MDP)
- c. Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE)
- d. Public Procurement Policy

a. Prime Minister's Employment Generation Programme (PMEGP)

Description: The scheme aims to generate employment opportunities in rural as well as urban areas of the country through setting up of new self-employment ventures /projects/micro enterprises. Another objective is to provide continuous and sustainable employment to all segments of traditional and prospective artisans and rural/urban unemployed youths in the country, so as to help and to arrest migration of rural youths to urban areas. Third objective is to increase the wage earning capacity of artisans and contribute to increase in the growth rate of rural and urban employment.

The scheme is implemented by Khadi and Village Industries Commission (KVIC), as the nodal agency at the National level. At the State level, the scheme is implemented through State KVIC Directorates, State Khadi and Village Industries Boards (KVIBs) and District Industries Centres (DICs) and Banks. Only new projects are considered for sanction under PMEGP.

Nature of Assistance: The maximum cost of the project/unit is: Rs. 25 Lakhs in case of manufacturing sector and Rs. 10 Lakhs in case of business/service sector. Subsidy under PMEGP (% of project cost): General category 15%(Urban), 25%(Rural); Special Category (including SC / ST / OBC / Minorities / Women, Ex-servicemen, Physically handicapped, NER, Hilly areas, etc.): 25% (Urban), 35% (Rural).

Who can apply: Any individual, above 18 years of age can apply (For project costing above 10 lakh in manufacturing and 5 lakh in service sector. He should have passed at least VIII standard). Self Help Groups, Institutions registered under Societies Registration Act 1860; Production Co-operative Societies and Charitable Trusts are also eligible.

How to apply: Only online application is accepted. The beneficiaries can submit their application online at <https://www.kviconline.gov.in/pmegpeportal/pmegphome/index.jsp>.

New initiative: Second dose of assistance up to Rs. 1.00 crore to existing and better performing PMEGP/ MUDRA units for up grading with subsidy of 15% (20% in hilly/NER).

b. Entrepreneurship and Skill Development Programme (ESDP / EAP)

Description: The objective of the programme is to motivate young person's representing different sections of the society including SC/ST/ Women, Physically Handicapped, Ex-servicemen and below poverty line (BPL) persons to consider self-employment or entrepreneurship as one of the career options. The ultimate objective is to promote new enterprises, capacity building of existing MSMEs and inculcating entrepreneurial culture in the country.

Nature of Assistance: Assistance provided for Industrial Motivational Campaign (IMC), Entrepreneurship Awareness Programmes (2 week) and Entrepreneurship-cum-skill Development Programmes (6 weeks), Management Development Programmes.

Intended Beneficiary: Youths representing different sections of the society including SC/ST/Women, Physically Handicapped, Ex-servicemen and Below Poverty Line(BPL) persons and Existing MSMEs.

How to apply: ESDP Programmes are implemented through MSME-DIs/TCs.

c. Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE)

Description: Ministry of Micro, Small and Medium Enterprises and Small Industries Development Bank of India (SIDBI) jointly established a Trust named Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) in order to implement Credit Guarantee Scheme for Micro and Small Enterprises (MSEs). The corpus of CGTMSE is contributed by Government of India and SIDBI.

Nature of Assistance: Collateral free loan up to a limit of ₹ 200 lakh.

Who can apply: New as well as existing Micro & Small Enterprises.

How to apply: MSE meeting the eligibility criteria may approach eligible Banks / Financial Institutions/ Regional Rural Banks/NBFCs.

d. Public Procurement Policy

The MSME are eligible to get the benefits under "Public Procurement Policy for Micro & Small Enterprises (MSEs) Order 2012" as notified by the Government of India, Ministry of Micro Small & Medium Enterprises, New Delhi vide Gazette Notification dated 23.03.2012.

The Institute organizes / participate Vendor Development Programmes (National and State Level) for Government Departments/ PSUs / Railways /Defence / LSUs with objective of bringing Micro and Small units and Govt. Departments and PSUs on common platform for business promotion of MSEs.

5.3 Infrastructure Support to MSMEs

For existing MSMEs, may not have high end machineries for enhancing their productivity level or they are unable to compete their product with international market. The following schemes are to develop on joint venture as well as to improve the employment opportunities and socio economic development.

- e. Scheme of Fund for Regeneration of Traditional Industries (SFURTI)
- f. MSE Cluster Development Programme (MSE-CDP)

e. Scheme of Fund for Regeneration of Traditional Industries (SFURTI)

Description: The main objectives of the scheme are to organize the traditional industries and artisans into clusters in order to make them competitive and provide support for their long-term sustainability.

Nature of Assistance: The scheme would cover three types of interventions: 'Soft Interventions', 'Hard Interventions' and 'Thematic Interventions'.

The project outlay for various clusters:

Regular Clusters (up to 500 artisans) – Rs. 2.50 Crore per Cluster;

Major Cluster (more than 500 artisans) – Rs. 5.00 Crore per Cluster;

Soft Interventions: 10% of hard interventions with maximum ceiling of ₹ 25.00 lakhs ;

Hard Interventions: As per project requirement. The financial assistance provided for any specific project shall be subject to a maximum of Rs. 5 crore. Who can apply: Non-Government Organizations (NGOs), Institutions of the Central and State Governments and Semi-Government institutions, field functionaries of State and Central Govt., Panchayati Raj institutions (PRIs), etc. with suitable expertise to undertake cluster development. (ii) Private Sector participation is also encouraged for the implementation of cluster projects. Corporate entities can also take up projects directly by forming cluster-specific SPVs.(iii) Corporate and Corporate Social Responsibility (CSR) foundations with expertise in cluster development are encouraged to participate as Implementing Agencies. In case where a private sector entity is the IA, it shall contribute at least 50% of the total project cost excluding the cost of land.

How to apply: The eligible agency/ organization has to submit the proposal to any of the other designated Nodal Agencies under the scheme (as mentioned in the guidelines and as appointed from time to time) for onward submission to Scheme Steering Committee for approval.

f. Micro & Small Enterprises Cluster Development Programme (MSE-CDP)

Description: The scheme supports financial assistance for establishment of Common Facility Centres (CFCs) for Testing, Training Centres, R&D, Effluent Treatment, Raw Material Depot, Complementing Production Processes etc. and to create/upgrade infrastructural facilities in the new/existing industrial areas/clusters of MSEs such as Flatted Factory Complex, power distribution network, water, telecommunication, drainage and pollution

control facilities, roads, banks, raw materials, storage and marketing outlets, common service facilities and technological backup services for MSEs in the new/existing industrial estates/areas.

Nature of Assistance:

(i) Common Facility Centres (CFC): The GoI grant will be restricted to 70% of the cost of Project of maximum Rs. 20.00 Crore. GoI grant will be 90% for CFCs in North-East & Hilly States, Island territories, Aspirational Districts/ LWE affected Districts, Clusters with more than 50% (a) Micro/Village, (b) Women owned, (c) SC/ ST units. The cost of Project includes cost of Land (Subject to maximum of 25% of Project Cost).

(ii) Infrastructure Development: GoI grant will be restricted to 60% of the cost of project (Rs. 10.00 Crore for Industrial Estate & Rs. 15.00 Crore for Flatted Factory Complex). GoI grant will be 80% for Projects in North-East & Hilly States, Island territories, Aspirational Districts/ LWE affected Districts industrial areas/estates/Flatted Factory Complex with more than 50% a: micro/village or b: women owned or c: SC/ST units.

Who can apply: Group of Industries (Cluster), Industrial Associations/ Consortia.

How to apply: Online applications can be filled at <https://cluster.dcmsme.gov.in>. Hard copy of applications need to be sent through State Governments or their Autonomous Bodies or field institutes of the Ministry of MSME i.e., MSME- DIs. The proposals are to be approved by the Steering Committee of MSE-CDP.

Website: <http://www.dcmsme.gov.in/MSE-CDProg.htm>

5.4 Technology Up gradation and Competitiveness Scheme for MSMEs

Existing MSMEs shall improve their production quality and make them global competitive by availing the following schemes. These schemes shall be availed by individual MSMEs.

- g. Credit Linked Capital Subsidy Scheme for Technology Up gradation (CLCSS)
- h. Design Clinic Scheme
- i. Lean Manufacturing Competitiveness Scheme (LMCS)
- j. Digital MSME Scheme
- k. Financial Support to MSMEs in ZED Certification Scheme
- l. Support for Entrepreneurial and Managerial Development of MSMEs through Incubators
- m. Building Awareness on Intellectual Property Rights (IPRs)
- n. Tool Rooms & MSME Technology Centres

g. Credit Linked Capital Subsidy Scheme for Technology Up gradation (CLCSS)

Description: The objective of CLCSS is to facilitate technology to MSEs through institutional finance for induction of well-established and proven technologies in the specific sub-sector/products approved under the scheme.

Nature of Assistance: Upfront subsidy of 15% on institutional Credit up to Rs. 1.0 Crore (i.e. subsidy cap of Rs. 15.00 lakh) for identified sectors/ subsectors/ technologies.

Who can apply: Any Micro and Small Enterprises (MSEs) unit.

How to apply: Candidates meeting the eligibility criteria may approach 11 nodal Banks / Agencies. These are SIDBI, NABARD, SBI, BoB, PNB, BOI, TIIC, Andhra Bank, Corporation Bank, Canara Bank and Indian Bank.

h. Design Clinic Scheme

Description: The objective of Design Clinic Scheme is to enhance industry understanding and application to design and innovation, and to promote design as a value adding activity and integrate it into mainstream business and industrial process of MSMEs; bring the industrial design fraternity closer to the MSME Sector; increase the awareness of the value of design and establish design learning in the MSME, and increase the competitiveness of local products and services. Activities under the scheme include (i) Design Awareness Seminars/Workshops (ii) Professional Design Projects (iii) Student Design Projects (iv) Orientation programmes.

Nature of Assistance: There is a provision of financial assistance of Rs. 15 Lakh (Gol: Units:75%:25 %) for individual or up to 3 Micro units and 25 Lakh (Gol: Units:75%:25%) for more than 3 Micro units. For Small & Medium units, it is Rs. 25 lakh (Gol: Units: 60%:40%) for individual or up to 3 Units and Rs. 40 Lakh (Gol: Units:60%:40%) for more than 3 Units.

Who can apply: All Udyog Aadhaar Memorandum (UAM) registered manufacturing Micro, Small and Medium Enterprises (MSMEs) profitable entity in last three years are eligible to take the benefit of scheme.

How to apply: The MSME can submit their application to NID, Ahmedabad, and IISC Bengaluru who have been nominated as IA.

i. Lean Manufacturing Competitiveness Scheme (LMCS)

Description: The Lean Manufacturing Competitiveness Scheme (LMCS) is a business initiative to enhance Competitiveness of the manufacturing sector, imbibing a culture of continuous improvement inculcating good management system resulted through increase in overall productivity. The objective of the scheme is to enhance the manufacturing competitiveness in MSMEs through the application of various Lean Techniques by reducing waste, increase productivity, imbibing a culture of continuous improvements etc. **Nature of Assistance:** Provision of financial assistance to MSMEs up to Rs 36 Lakhs (maximum) per mini cluster of 10 units for a period of 18 months or till completion (Gol: Units:80:20, Rs. 28.8 Lakhs: Rs. 7.2 Lakhs).

Who can apply: All registered Micro, Small and Medium Enterprises (MSMEs) having valid Udyog Aadhaar memorandum and engaged in manufacturing activities are eligible to avail the benefit of LMCS.

How to apply: Office of DC (MSME), Ministry of MSME is implementing this scheme through MSMEDIs/TCs/Central Govt./State Govt. and its Institutions.

j. Digital MSME Scheme

Description: The main objective of the scheme is to make MSMEs digitally empowered and motivate them to adopt ICT tools and applications in their production & business processes to improve their competitiveness in national & international markets. Activities under the scheme include (i) Development of e-platform (India Enterprise Portal), (ii) Development of Software/Apps for MSMEs and uploading on portal etc. (iii) Digital Empowerment through Enterprise Facilitation Centre (EFC), and (iv) Assistance for IT infrastructure to various Implementing Agencies (IA).

Nature of Assistance: (i) Development of India Enterprise Portal for disseminating information on various IT based services for MSMEs. (ii) IT Infrastructure for Enterprise Facilitation Centre and Implementing Agencies.

How to apply: The MSMEs can contact the National Monitoring & Implementing Unit (NMIU)/Implementing Agency (IA) for availing the benefit of the scheme.

k. Financial Support to MSMEs in ZED Certification Scheme

Description: The objectives of the scheme include inculcating Zero Defect & Zero Effect practices in manufacturing processes, ensure continuous improvement supporting the Make in India initiative. The scheme envisages promotion of Zero Defect and Zero Effect (ZED) manufacturing amongst MSMEs so as to Promote adaptation of Quality tools/systems and Energy Efficient manufacturing, Encourage MSMEs to constantly upgrade their quality standards in products and processes, to drive manufacturing with adoption of Zero Defect production processes and without impacting the environment. Nature of Assistance: The subsidy provided by the Government of India for Micro, Small & Medium Enterprises will be 80%, 60% and 50% respectively.

Who can apply: All MSMEs registered under MSME Act, 2006 as amended from time to time and also to MSMEs which are included as per executive orders issued by AS & DC (MSME) in consistent with MSME Act from time to time.

How to apply: The ZED Certification Scheme is a 4-step process: Step 1 : Register free on the online portal of ZED (www.zed.org.in) using the following link: http://assessment.zed.org.in/Assessment/Assessment_BeforeLogin.aspx, using the valid (Indian) mobile number and email address. Step 2: Online self-assessment on the ZED parameters followed by Desktop Assessment. Step 3: Site-assessment, if selected on the basis of Desktop Assessment. Step 4: Consultancy: after desktop assessment, MSMEs will

have the option to avail the service of an authorized ZED consultant for gap-analysis and handholding.

I. Support for Entrepreneurial & Managerial Development of MSMEs through Incubators

Description: The objective of the scheme is to promote & support untapped creativity of individual and to promote adoption of latest technologies in manufacturing as well as knowledge based innovative MSMEs (ventures) that seek the validation of their ideas at the proof of concept level.

Nature of Assistance: Financial assistance up to 15 lakh for developing/ nurturing the ideas. Up to Rs. 1.00 crore for procurement and installation of plant and machines in Business Incubator. Up to Rs. 1.00 Crore as seed capital support to appropriate Incubates in the form of soft loan, interest free loan, equity participation, grant or combination of this etc. for setting up of Startups.

Who can apply: Technical colleges, Universities Colleges other professional Colleges/ Institutes, R&D institutes, NGO involved in relevant activities etc., EFCs of DC (MSME), MSME-DIs/TCs /DICs or any institute/organization of Central/State Govt. may apply to register as Host Institute. Students/ MSMEs can apply to the registered Host Institute for developing and nurturing the ideas.

How to apply: Students/Entrepreneurs/MSME will apply to National Monitoring & Implementing Units (NMIU) through Implementing Agency (IA) on MIS portal for availing the benefit of the schemes.

m. Building Awareness on Intellectual Property Rights (IPRs)

Description: Building Awareness on Intellectual Property Rights (IPRs) for the MSME is administered with the objective to enhance awareness of MSMEs about Intellectual Property Rights (IPRs) and to take measure for the protecting their ideas and business strategies. These objectives are fulfilled through various activities under the scheme like awareness programmes/Seminars, workshops, Reimbursement for registration of IP, International Co-operation & setting-up IP facilitation centre across the country.

Nature of Assistance: Reimbursement for Patent /GI Registration/Trademarks, for setting up of IP Facilitation Centers, interactive Seminars /Workshops/Exhibitions and Awareness Programmes.

Who can apply: MSME units having valid Udyog Aadhar Memorandum (UAM). These initiatives are being implemented through various eligible implementing agencies prescribed in the scheme guidelines.

How to apply: Online application can be filled at www.my.msme.gov.in

n. Tool Rooms & MSME Technology Centres

Description: The Technology Centres (TCs) facilitate an integrated development of MSMEs by providing quality Tool, Industry ready manpower, consultancy in tooling & related areas and processes & Products development in product group like Foundry & Forging, Electronics, Electrical Measuring Instruments, Fragrance & Flavour, Glass, Sport Goods and Footwear designing. These TCs are providing these services across the country. **Nature of Assistance:** i) To provide access of MSMEs to tooling facilities for enhancement of their efficiency. (ii) Process & Product development in relevant sector. (iii) Consultancy and Job works in relevant Sector and (iv) Skill Development.

Who can apply: i) Units desirous of availing tooling and dies facilities and consultancy services. (ii) The eligibility for training programmes includes from school dropout to M.Tech level.

How to apply: Online application for training can be filled at respective Technology Centres' website or in person at Technology Centre. For tooling and consultancy services, the relevant Technology Centres may be visited.

5.5. Procurement and Marketing Support to MSMEs

Procurement and Marketing Support (PMS) Scheme for marketing the products of Micro and Small Enterprises (MSEs) either in domestic as well as international markets.

o. Procurement and Marketing Support (PMS) Scheme

Description: PMS Scheme has been revamped to enhance the marketability of products and services in the MSME sector. The objective is to promote new market access initiatives, create awareness and educate the MSMEs about various marketing relevant topics and development of marketability.

Nature of Assistance: Assistance available for following scheme components (A) Participation of Individual MSEs in domestic trade fairs/exhibition across the country (B) Organizing/ Participation in trade fairs/exhibitions (Regional/ National/International) by the Ministry/ Office of DC (MSME)/Government organizations (C) Capacity building of MSMEs in modern packaging technique (D) Development of Marketing Hats (E) International/National Workshops/ Seminars (F) Vendor Development Programmes: State Level Vendor Development Programmes (SLVDP) and National Level Vendor Development Programme (NLVDP) (G) Awareness Programmes. Who can apply: Individual Manufacturing/ Service MSE.

How to apply: Eligible MSEs may submit their application online at <https://my.msme.gov.in> or system in place.

To support MSME units, 32 MSME Development institutes providing technical consultancy services and Export promotion consultancy.

Under Export Promotion activity, Export Facilitation Cell is functioning for hand hold support to the entrepreneur such as trainings in Export Marketing, Export Procedure and Documentation and Export Management are provided to MSME Units. The export-worthy units are also motivated to participate in international trade fairs and apply for different awards to bring their achievements in limelight.

5.6 Special Schemes

In addition to the above, Special schemes are also in operation for promoting Existing and Aspiring SC/ST Entrepreneurs through National SC-ST Hub.

For providing Marketing Support and to achieve 4% Public Procurement target from SC-ST entrepreneurs, by enhancement of competitiveness and marketability of the products, Vendor Development Programmes Organizing Workshops/Seminars/Awareness Campaigns organized exclusively for SC / ST Entrepreneurs. Facilitating SC/ST Entrepreneurs to participating in tenders by mentoring support. Under Single Point Registration Scheme, Issue of the Tender Sets free of cost Exemption from payment of Earnest Money Deposit (EMD).

Credit Support / Reimbursement schemes (for SC/ST Entrepreneurs):

Scheme	Activity
Bank Loan Processing Reimbursement Scheme	Reimbursement on Bank loan processing charges paid by SC/ST MSEs in availing business loans
Bank Guarantee Charges Reimbursement Scheme	Reimbursement on Performance Bank guarantee charges paid by SC/ST MSEs for participation in tenders of Central/State Govt. and PSEs
Special Credit Linked Capital Subsidy Scheme	Financial support to upgrade their plant & machinery with state-of-the-art technology
Export Promotion Council Membership Reimbursement Scheme	Reimbursement on membership fees charged by Export Promotion Councils (EPCs)
Testing Fee Reimbursement Scheme	Reimbursement on Testing fee, for availing testing services from NABL accredited laboratories & license or certification fee from BIS, in a financial year.
Short-Term Training Program Fee Reimbursement Scheme	Reimbursement of course fees for training programs from top 50 management institutes identified by Ministry of Human Resource Development under the National Institute Ranking Framework(NIRF).

Special Scheme for North East & Sikkim

Promotion of MSMEs in NER and Sikkim - "Technology and Enterprise, Resource Center" for the benefit of Existing entrepreneurs and Aspiring Entrepreneurs.

- Establishment & Up-gradation of Mini Technology Centers.

- Development of New & Existing Industrial Estates
- Capacity Building of Officers engaged in promotion of MSMEs in NER & Sikkim.

For the benefit of Entrepreneur, at DC MSME website, MSME Schemes, Innovations, and other e- books published, entrepreneurs may go through the book for further guidance.

<http://dcmsme.gov.in/eBook.aspx>

5.7. Proposed schemes (if existing is not suitable for this product)

- Promote modernization of MSMEs through interest subvention scheme or reducing the interest rates for the MSME loan.
- Incorporate all capital goods sub-sectors under Credit Linked Capital Subsidy Scheme.
- Up gradation of existing cluster under MSE-CDP for diversification and promotion of existing technology by adding up their facility subject to the total max. grand.
- Include employment generation as a criterion for MSMEs to get qualified for various initiatives and schemes.

5.8 CONSULTANCY SERVICES

Details of Agencies who can provide guidance:

For Technical detail and capacity building of MSMEs, the GOI has formulated /adopted policies and schemes such as MSMED Act, 2006, CPPP for MSEs. MSE-CDP scheme, PMS, CLCSS, Promotion of New Technology Centres under TCSP Scheme , etc., entrepreneur may contact any one of M/o MSME field office, which is spread over India through a network of 32 MSME Development Institutes (every state), 27 Branch. MSME Development Institutes, 4 MSME Testing Centre (Chennai, Delhi, Mumbai and Kolkata), 7 MSME Testing Stations and 18 MSME-Technology Development Centre.

For further detailed information and office address please watch

LIST OF FACILITIES & PROJECTS : <http://www.dcmsme.gov.in/ebook/MSME-for-web-05032021.pdf>

Schemes : <http://www.dcmsme.gov.in/ebook/eBook%20of%20Schemes%20for%20MSMEs.pdf>

To improve the product quality, testing and design related information, the entrepreneur may contact any one of the following institutes.

Central Power Research Institute
Mechanical Engineering Division (MED), (A Govt. of India Society, Ministry of Power)
Post Box No.8066, Prof. Sir. C.V.Raman Road, Sadashiva nagar Post Office,
Bangalore – 560 080

Electrical Research and Development Association
ERDA Road, GIDC, Makarpura, Vadodara - 390 010 Gujarat, India.
Tel.: +91 265 3043129-3043131, 3043133, 2642942, 2642964, 2642377ERDA

Bureau of Indian Standards,
CSIR Madras Complex, Tharamani, Chennai, Tamil Nadu 600113

National Power Training Institute,
NPTI Complex, Sector-33, Faridabad, www.npti.gov.in

CSIR-National Physical Laboratory,
Dr. K. S. Krishnan Road, New Delhi 110 012, www.nplindia.org

Chapter 6 Conclusion:

This Project is prepared from the sample survey made from 7 MSME units available at Chennai and the details available on Government websites and social media.

It is evident that there is good scope for entrepreneurship and further growth by diversification of products

The bankable project report is prepared for manufacturing the items except bolt and nuts from the factory. However, the same can be achieved from the existing machines by minor modification and adding dies & fixtures while achieving 100% capacity utilisation.

If the entrepreneur need to start with micro level, It is advised to start with the fabrication at their unit, by procuring sub-assemblies of die casting and forging items from outside and finishing at the unit. This will help in and maintaining the quality and confidence to the customer. For this the entrepreneur may avail PMEGP Loan to stat the unit (with reduced investment), after successful completion of the loan, the entrepreneur avail 2nd PMEGP loan for establishing balancing facility.

Chapter 7 Bibliography:

Cluster DPR - Electrical Line material Cluster, paramakudi, ramanathapuram District.

TNEB Engineering hand Book, Tamil nadu

Manufacturer of overhead transmission line materials : <https://www.utilex.com/full-tension-assembly/double-tension-string-assembly-for-acsr-linx/>

Technical Guide / Procedures : MSME Testing centre, Chennai.

DC – MSME Website : <http://dcmsme.gov.in/Default.aspx>

Annexure - A

State wise total number of MSMEs (data from Udyam Registration)

Page 1 of 3

	5 digits NIC code	24320				25910				25920				Total MSME Units
	Product / Process	Casting of non-ferrous metals				Forging, pressing, stamping and roll-forming of metal; powder metallurgy				Machining; treatment and coating of metals				
Sl.No.	State	Micro	Small	Medium	Total	Micro	Small	Medium	Total	Micro	Small	Medium	Total	
1.	ANDHRA PRADESH	19	7	2	28	17	2	2	21	54	4	2	60	218
2.	ARUNACHAL PRADESH	0	0	0	0	0	0	0	0	0	0	0	0	0
3.	ASSAM	4	1	0	5	2	4	0	6	11	7	1	19	60
4.	BIHAR	34	0	0	34	9	1	0	10	15	0	0	15	118
5.	CHHATTISGARH	27	6	1	34	19	6	0	25	28	4	1	33	184
6.	GOA	3	0	0	3	5	5	1	11	9	10	0	19	66
7.	GUJARAT	619	145	15	779	318	133	16	467	441	62	6	509	3510
8.	HARYANA	120	52	5	177	135	90	13	238	157	59	3	219	1268
9.	HIMACHAL PRADESH	3	3	5	11	6	4	2	12	9	4	2	15	76
10.	JHARKHAND	35	3	3	41	34	12	5	51	46	8	2	56	296
11.	KARNATAKA	90	31	14	135	180	62	11	253	265	60	8	333	1442
12.	KERALA	22	3	4	29	30	13	2	45	48	10	2	60	268
13.	MADHYA PRADESH	62	6	1	69	72	18	10	100	106	16	3	125	588
14.	MAHARASHTRA	473	129	29	631	821	260	70	1151	1332	240	38	1610	6784
15.	MANIPUR	1	0	0	1	1	0	0	1	0	0	0	0	4
16.	MEGHALAYA	0	0	1	1	0	0	0	0	0	0	0	0	2
17.	MIZORAM	2	0	0	2	0	1	0	1	0	0	0	0	6
18.	NAGALAND	0	0	0	0	0	0	0	1	0	0	0	0	1
19.	ODISHA	20	2	0	22	13	4	0	17	33	6	1	40	158
20.	PUNJAB	62	14	10	86	172	82	25	279	111	32	10	153	1036
21.	RAJASTHAN	126	15	4	145	67	26	4	97	91	16	7	114	712
22.	SIKKIM	0	0	0	0	0	0	0	0	0	0	0	0	0
23.	TAMIL NADU	279	67	10	356	493	134	17	644	636	104	11	751	3502
24.	TELANGANA	48	20	6	74	91	39	4	134	145	31	2	178	772
25.	TRIPURA	1	0	0	1	0	0	0	0	0	0	0	0	2
26.	UTTAR PRADESH	337	40	6	383	124	48	8	180	159	46	6	211	1548
27.	UTTARAKHAND	15	6	4	25	15	10	0	25	21	7	0	28	156
28.	WEST BENGAL	80	24	9	113	84	43	15	142	86	31	7	124	758
29.	ANDAMAN AND NICOBAR ISLANDS	0	0	0	0	0	0	0	0	6	0	0	6	12
30.	CHANDIGARH	2	1	0	3	4	1	0	5	11	1	0	12	40
31.	DADAR AND NAGAR HAVELI	1	1	2	4	1	0	0	1	0	1	1	2	14
32.	DAMAN AND DIU	0	1	0	1	0	0	0	0	3	1	0	4	10
33.	DELHI	93	37	5	135	75	29	13	117	86	30	3	119	742
34.	JAMMU AND KASHMIR	7	0	1	8	7	1	0	8	14	3	0	17	66
35.	LADAKH	0	0	0	0	0	0	0	0	1	0	0	1	2
36.	LAKSHADWEEP	0	0	0	0	0	0	0	0	0	0	0	0	0
37.	PUDUCHERRY	5	2	0	7	7	0	1	8	6	2	0	8	46
	TOTAL	2590	616	137	3343	2802	1028	219	4049	3930	795	116	4841	24467

State wise total number of MSMEs (data from Udyam Registration)

	5 digits NIC code	25112				25119				TOTAL
	Product / Process	Manufacture of metal frameworks or skeletons for construction and parts thereof ((towers, masts, trusses, bridges etc.))				Manufacture of other structural metal products				
Sl.No.	State	Micro	Small	Medium	Total	Micro	Small	Medium	Total	
1.	ANDHRA PRADESH	42	7	2	51	155	30	3	188	478
2.	ARUNACHAL PRADESH	2	1	0	3	2	1	0	3	12
3.	ASSAM	24	9	0	33	42	9	1	52	170
4.	BIHAR	33	3	0	36	65	3	3	71	214
5.	CHHATTISGARH	32	10	4	46	81	27	9	117	326
6.	GOA	6	0	0	6	33	2	0	35	82
7.	GUJARAT	88	27	5	120	503	103	16	622	1484
8.	HARYANA	59	22	2	83	210	104	16	330	826
9.	HIMACHAL PRADESH	4	0	0	4	27	6	0	33	74
10.	JHARKHAND	42	4	3	49	103	16	3	122	342
11.	KARNATAKA	110	17	2	129	375	64	10	449	1156
12.	KERALA	80	8	0	88	128	19	7	154	484
13.	MADHYA PRADESH	76	13	3	92	224	45	7	276	736
14.	MAHARASHTRA	362	64	17	443	1523	289	56	1868	4622
15.	MANIPUR	3	1	0	4	7	0	0	7	22
16.	MEGHALAYA	0	0	1	1	2	0	0	2	6
17.	MIZORAM	0	0	0	0	2	0	0	2	4
18.	NAGALAND	0	0	0	0	1	0	0	1	2
19.	ODISHA	60	11	1	72	143	22	2	167	478
20.	PUNJAB	28	14	3	45	145	46	5	196	482
21.	RAJASTHAN	78	17	2	97	268	53	8	329	852
22.	SIKKIM	0	0	0	0	1	0	0	1	2
23.	TAMIL NADU	263	53	1	317	990	192	20	1202	3038
24.	TELANGANA	62	23	3	88	261	82	8	351	878
25.	TRIPURA	0	0	0	0	1	0	0	1	2
26.	UTTAR PRADESH	111	25	5	141	370	85	11	466	1214
27.	UTTARAKHAND	11	4	0	15	44	12	1	57	144
28.	WEST BENGAL	73	23	9	105	237	84	24	345	900
29.	ANDAMAN AND NICOBAR ISLANDS	6	0	0	6	5	1	0	6	24
30.	CHANDIGARH	2	1	0	3	6	6	0	12	30
31.	DADAR AND NAGAR HAVELI	0	1	0	1	5	3	0	8	18
32.	DAMAN AND DIU	0	1	0	1	2	1	0	3	8
33.	DELHI	053	27	12	92	188	63	17	268	720
34.	JAMMU AND KASHMIR	114	21	0	135	74	12	0	86	442
35.	LADAKH	24	0	0	24	11	0	0	11	70
36.	LAKSHADWEEP	0	0	0	0	0	0	0	0	0
37.	PUDUCHERRY	4	0	0	4	18	1	1	20	48
	TOTAL	1852	407	75	2334	6252	1381	228	7861	20390

State wise total number of MSMEs (data from Udyam Registration)

	5 digits NIC code	35107				35109				42202				TOTAL
	Product / Process	Transmission of electric energy				Collection and distribution of electric energy to households, industrial, commercial and other users n.e.c.				Construction/erection and maintenance of power, telecommunication and transmission lines) Under Udyam Registration				
Sl.No.	State	Micro	Small	Medium	Total	Micro	Small	Medium	Total	Micro	Small	Medium	Total	
1.	ANDHRA PRADESH	4	0	0	4	24	3	0	27	50	10	2	62	186
2.	ARUNACHAL PRADESH	3	0	0	3	2	0	0	2	7	0	1	8	26
3.	ASSAM	7	3	2	12	38	3	1	42	31	13	2	46	200
4.	BIHAR	17	0	0	17	36	0	0	36	46	6	0	52	210
5.	CHHATTISGARH	5	1	0	6	10	1	0	11	31	12	1	44	122
6.	GOA	1	0	0	1	3	0	0	3	1	0	0	1	10
7.	GUJARAT	122	11	0	133	92	7	1	100	111	30	7	148	762
8.	HARYANA	19	3	0	22	28	6	0	34	62	17	3	82	276
9.	HIMACHAL PRADESH	6	0	0	6	8	1	0	9	14	2	0	16	62
10.	JHARKHAND	36	5	0	41	47	2	0	49	86	8	0	94	368
11.	KARNATAKA	22	3	0	25	62	4	2	68	63	15	4	82	350
12.	KERALA	4	2	0	6	18	2	0	20	37	6	1	44	140
13.	MADHYA PRADESH	23	6	2	31	34	3	1	38	95	21	1	117	372
14.	MAHARASHTRA	102	12	3	117	297	17	0	314	292	52	6	350	1562
15.	MANIPUR	0	0	0	0	3	0	0	3	7	0	0	7	20
16.	MEGHALAYA	0	0	0	0	0	0	0	0	0	0	0	0	0
17.	MIZORAM	0	0	0	0	0	0	0	0	0	0	0	0	0
18.	NAGALAND	1	0	0	1	1	0	0	1	2	0	0	2	8
19.	ODISHA	31	7	0	38	28	3	0	31	80	19	2	101	340
20.	PUNJAB	6	0	0	6	16	1	0	17	12	2	1	15	76
21.	RAJASTHAN	34	4	2	40	87	5	1	93	116	16	11	143	552
22.	SIKKIM	0	0	0	0	0	0	0	0	3	1	0	4	8
23.	TAMIL NADU	78	8	1	87	129	9	6	144	191	22	4	217	896
24.	TELANGANA	17	5	1	23	38	10	5	53	89	24	9	122	396
25.	TRIPURA	0	0	0	0	2	0	0	2	1	0	0	1	6
26.	UTTAR PRADESH	67	16	2	85	104	6	0	110	186	43	6	235	860
27.	UTTARAKHAND	4	0	0	4	14	0	1	15	10	3	0	13	64
28.	WEST BENGAL	23	2	1	26	40	1	0	41	60	18	4	82	298
29.	ANDAMAN AND NICOBAR ISLANDS	0	0	0	0	1	0	0	1	1	1	0	2	6
30.	CHANDIGARH	1	0	0	1	1	1	0	2	5	0	1	6	18
31.	DADAR AND NAGAR HAVELI	0	0	0	0	0	0	0	0	0	0	0	0	0
32.	DAMAN AND DIU	0	0	0	0	0	0	0	0	0	0	0	0	0
33.	DELHI	25	7	1	33	48	18	4	70	65	25	7	97	400
34.	JAMMU AND KASHMIR	11	0	0	11	14	0	0	14	35	5	1	41	132
35.	LADAKH	0	0	0	0	2	0	0	2	1	0	0	1	6
36.	LAKSHADWEEP	0	0	0	0	0	0	0	0	0	0	0	0	0
37.	PUDUCHERRY	0	0	0	0	2	0	0	2	1	0	0	1	6
	TOTAL	669	95	15	779	1229	103	22	1354	1791	371	74	2236	8738