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1. Sigma Group

1.1 Company Profile

Brief History

Sigma Electric is a global leader in manufacture of ferrous and non-ferrous castings, precision machined components and sub-assemblies. Sigma has established long-term partnerships with its global customers, working closely to help them meet the challenges of a highly competitive business environment.



Sigma Electric is a 100 % Export Oriented Organization. Set up 30 years ago. HQ at Garner, NC, US. There are over 5000 team members worldwide. Sigma has a majority shareholding from Argand Partners, USA.

Product Range

Sigma supplies to global leaders in market segments such as electrical, lighting, industrial, power tools, process instrumentation, appliances, telecom, aerospace, defence, marine, power, agricultural, food and Medical, Military, LED lightings.

Locations

Twelve world class manufacturing facilities at Pune, Jaipur, Mexico, USA for aluminum, zinc, bronze, copper, wide range alloys, iron & steel products.

Plants

Manufacturing capacity is 50,000 MT/annum with world-class manufacturing equipment tool room and design /engineering capabilities. Plants operate on Lean manufacturing system, certified for ISO 9001, ISO 14001, ISO 45001, AS9100, ITAR certifications.

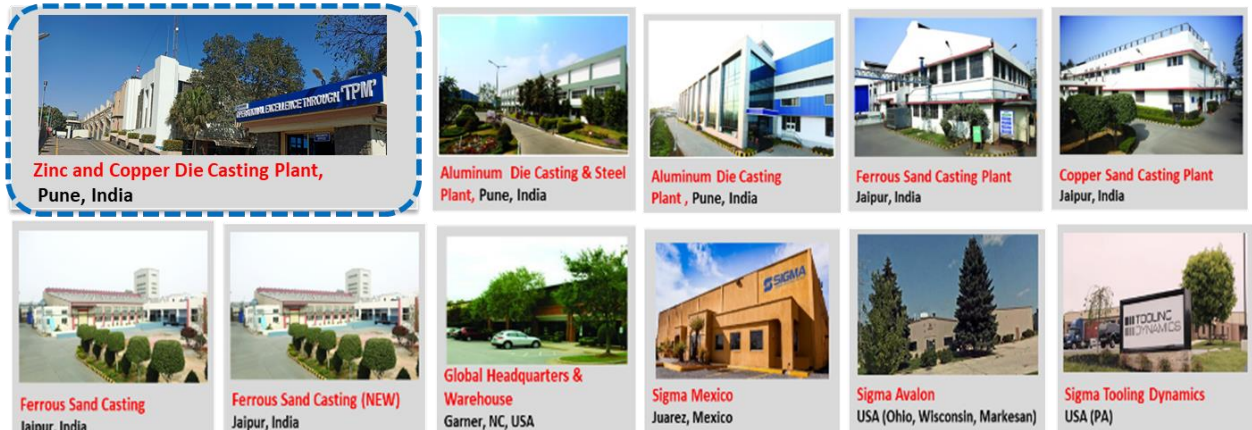
Global Supply Chain

Warehouse, sales, customer service and tech teams are at Garner, NC, USA.

1.2 Outline of the Group



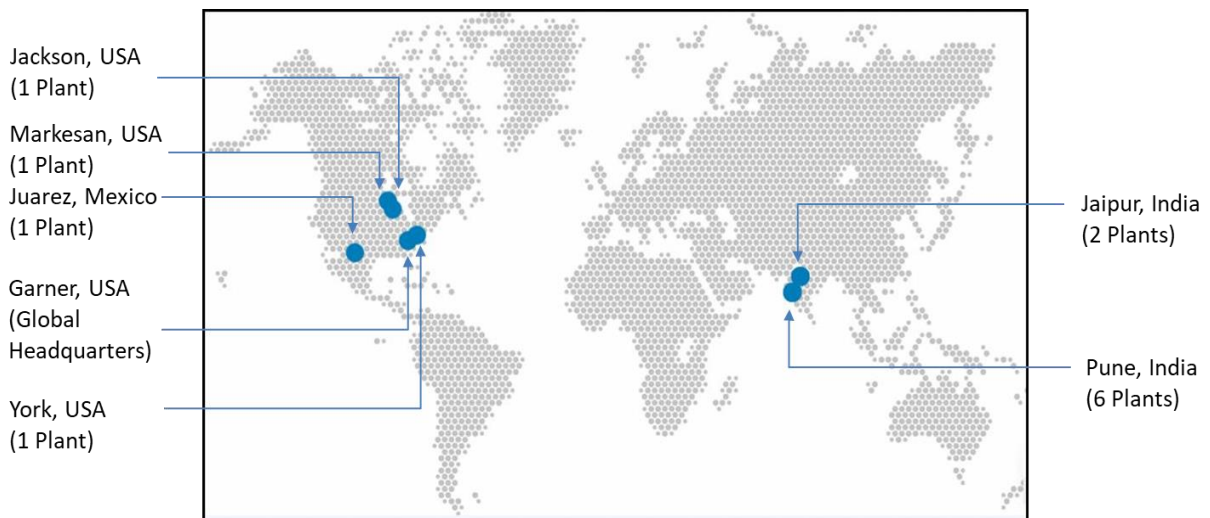
Sigma Electric is a global leader in the manufacture of machined cast metal parts and assemblies for the electrical, utility, home appliances, telecom, industrial and instrumentation markets.



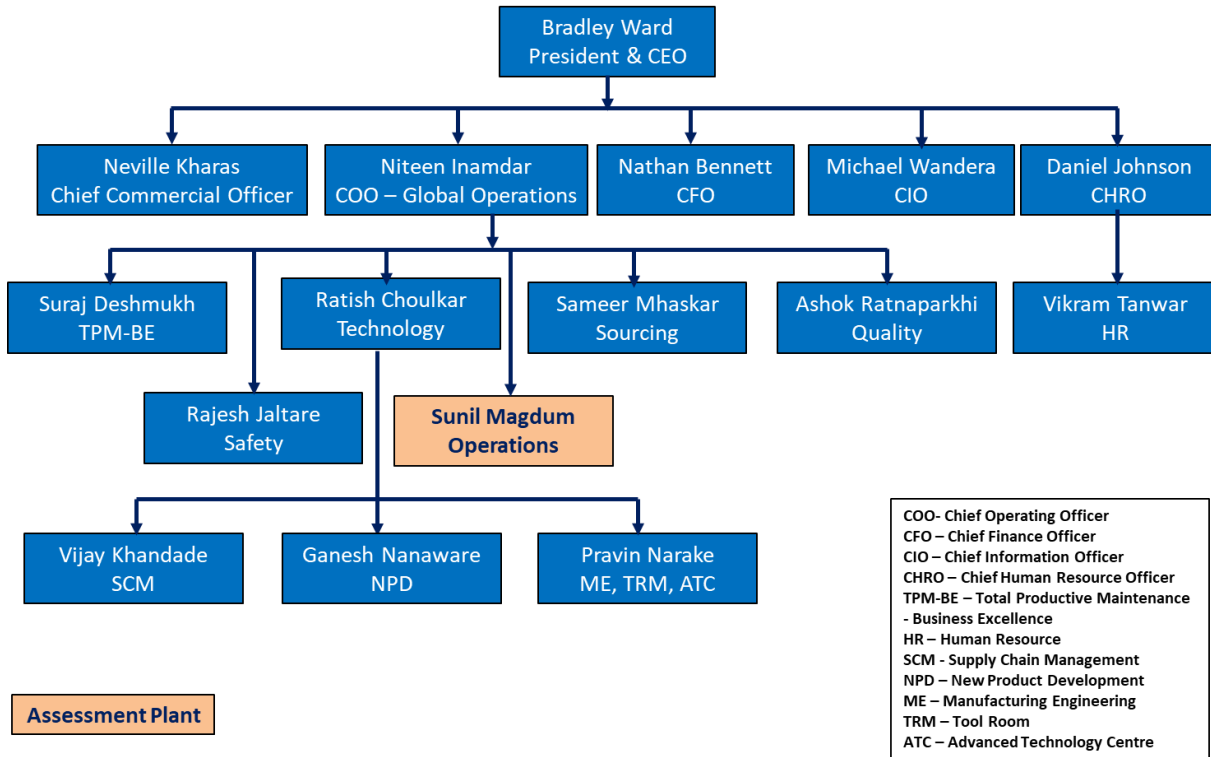
Plant Certification - ISO 9001, 14001 & 45001 Standards
Production Capacity = 50,000 MT / Annum

1.3 Global Footprint

Sigma group is having total 12 manufacturing facilities throughout the world. Out of which 6 manufacturing plants are located in Pune, 2 plants in Jaipur and 4 plants are in US and Mexico.



1.4 Organization Chart – Group Level

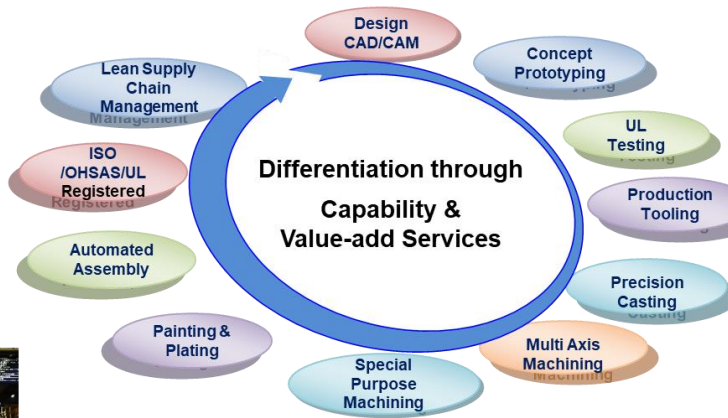
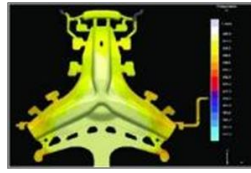


1.5 Core Values

Company’s Core values are mentioned below.

- **Integrity**
 - Ethical, moral and legal at all times
 - Safe at all times
 - Deliver on Promises (Reliable, Dependable, Responsive)
- **Solve Problems**
 - Challenge the status Quo / Break Industry Paradigms
 - “One Sigma” Integrations / Synergies
 - Engineered Solution
- **Focused**
 - Sense of Urgency / Prioritization (on Time / Every Time)
 - P&L Understanding / Imperative (Business Development / Cost Reduction)
 - Efficiency (One Sigma, TPM-Lean Manufacturing)
 - Business Rhythm (Constantly Review and Manage the Business)
- **Improve and Leap:**
 - Continuous Improvement – All Locations / All Levels
 - Purposeful Innovations
 - New Products / Technologies that anticipate needs

1.6 Manufacturing and Engineering Capabilities



All Operations are In-House
"One Stop Shop"



1.7 Global Partners

These are our key customers.



Added 5000+ New products with 20+ New Customers over last 3 years

2. About Sigma Unit – I

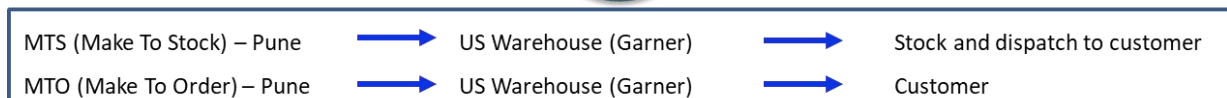
2.1 Outline of the Unit



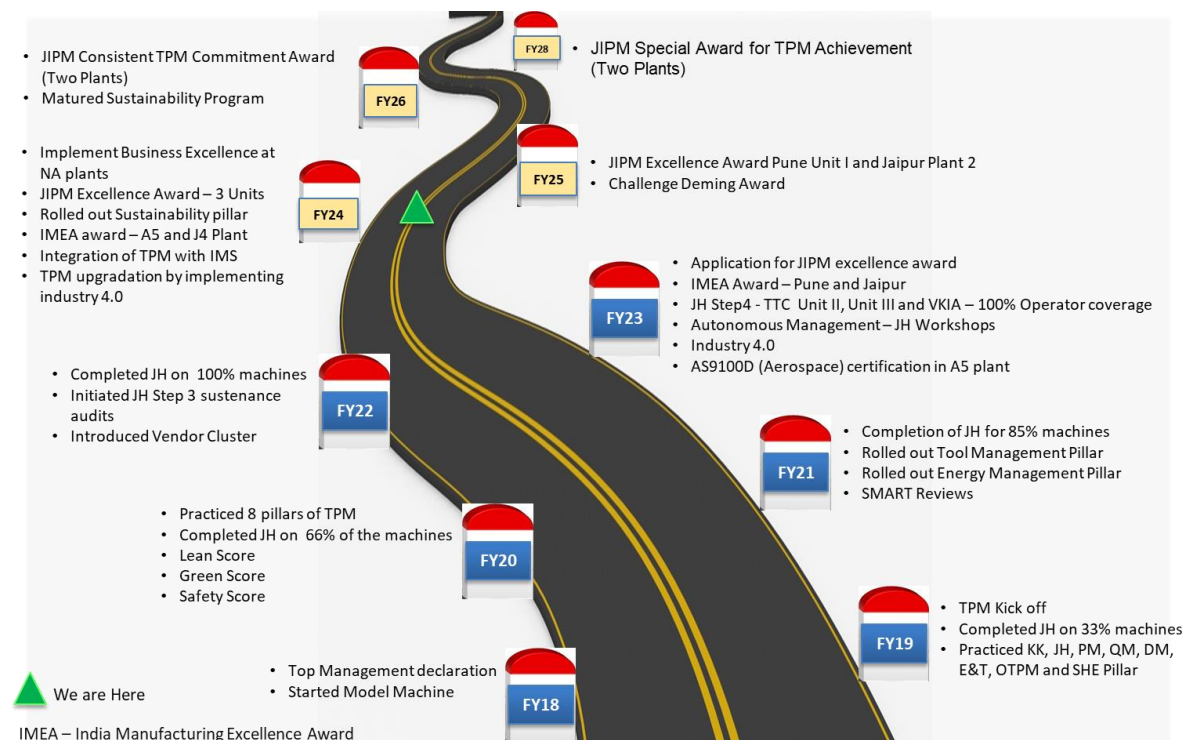
Plant	Zinc and Copper Die-Casting Plant
Product Range	Metallic Electrical Fittings and accessories parts for industrial, house hold applications and process equipment's
Plant Area	127501 Sq. Ft.
Installed Capacity (FY23)	11220 MT / Annum
Alloys	Zinc and Copper Alloys
Total Employees (FY23)	1170 Nos
Equipment (FY23)	12 Gravity Die Casting Machine, 25 Hot Chamber Die Casting ranging from 12 Tons to 250 Tons, 5 Furnace In-house Spectro, Precision Machining CNC and VMC, SPMs and Utility

2.2 Business Model

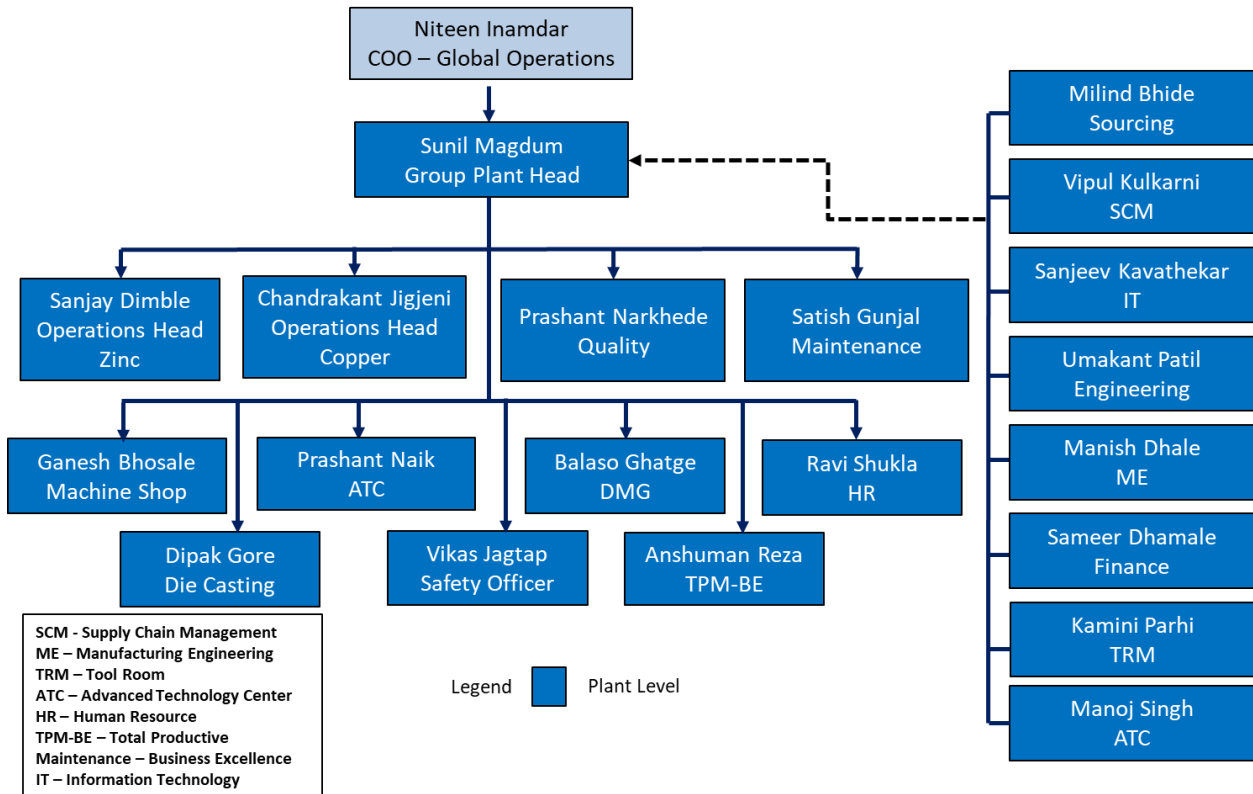
Business model shown below



2.3 Milestones – Sigma Group



2.4 Organization Chart - Unit - I



2.5 Product Portfolio

Product Range - Electrical, Lighting and House Hold Appliances

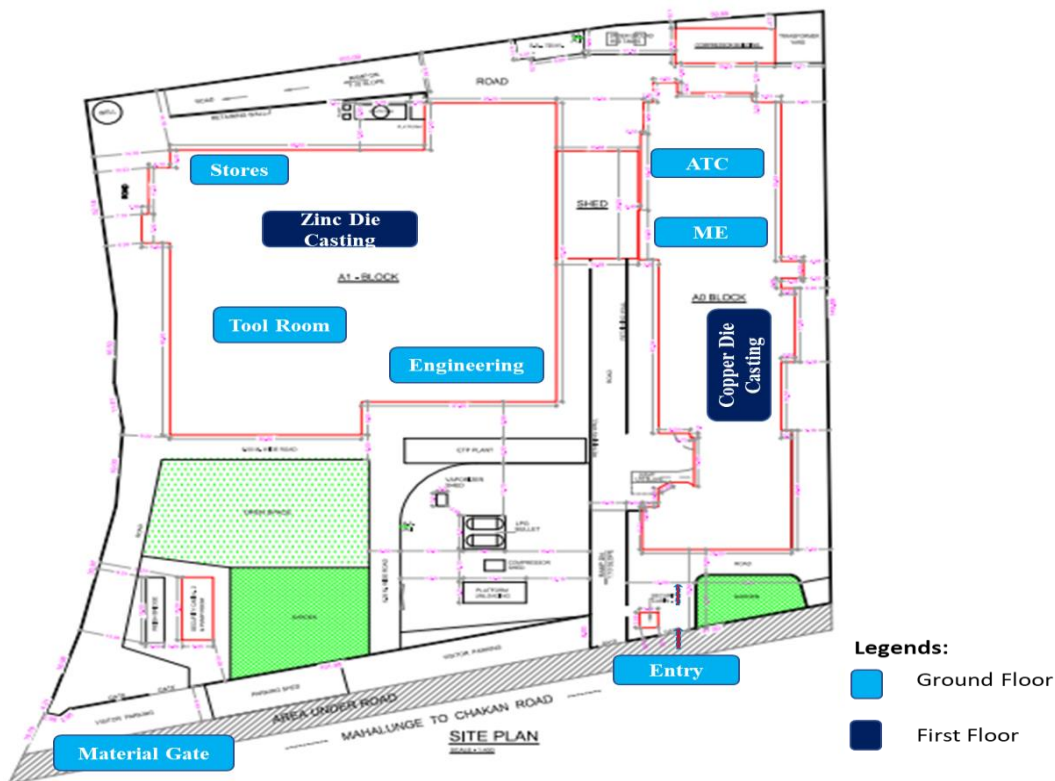


2.6 Key Customers

These are our key customers.



2.7.1 Unit Layout



2.7.2 Staffing Structure

Category wise manpower distribution as follows

Category	Unit	Employee Count
Staff	Nos.	212
Associates	Nos.	138
Assistant Engineer - Line	Nos.	72
Technician	Nos	31
DET	Nos	344
Contract Operator	Nos	373
Total No. of Employees	Nos	1170

2.8.1 Major Equipment

Following is equipment classification

#	Area	Equipment Quantity	Equipment Classification			
			S	A	B	C
1	Furnace	5	2	3	0	0
2	Die Casting	41	2	38	1	0
3	Machine Shop	254	12	136	82	24
4	Assembly	0	0	0	0	0
5	DMG	18	0	9	8	1
6	Utility	85	6	39	34	6
	Total Equipment	403	22	225	125	31

2.8.2 Manufacturing Process Flow

Following is process flow for zinc product

• **Process Flow:**



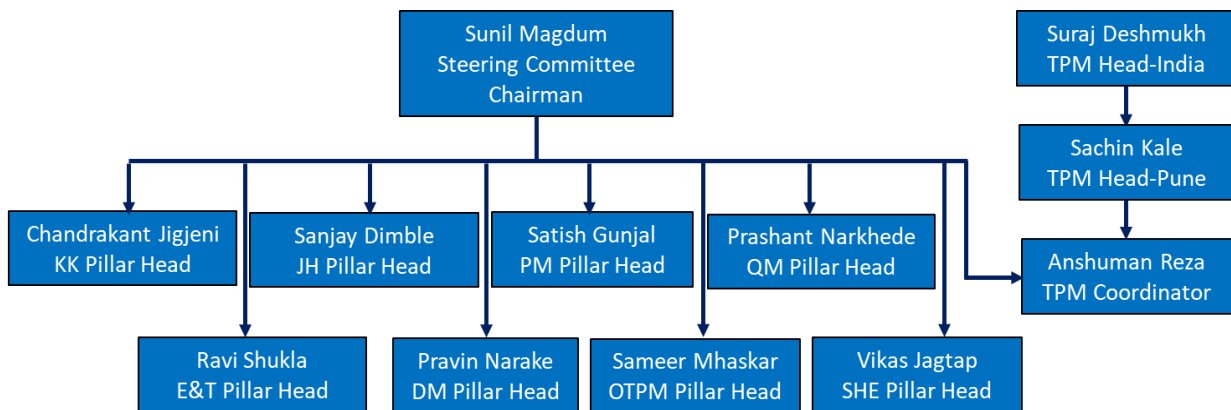
• **Machines:**



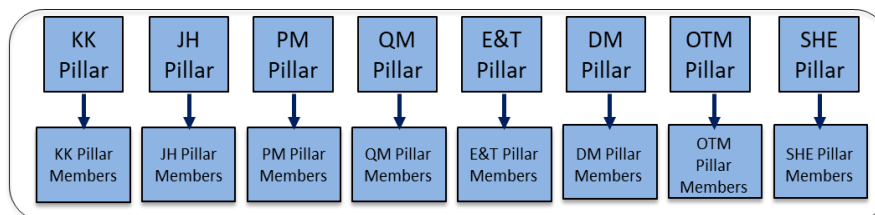
• **Product Flow:**



2.9 TPM Organization Structure



Pillar Committee Structure



3. Milestone on the Journey of Manufacturing Excellence

3.1 Need of TPM

To improve business and overcome challenges below, management decided to implement TPM as a Business Tool.

Key Challenges:

- High Customer complaints
- High In-house rejection
- Segregation cost at Garner, US warehouse
- High COPQ
- Safety - number of injuries
- Less OEE
- Delivery compliance
- Scope for improvement in the culture – Low employee engagement

3.2 Embracing TPM for Manufacturing Excellence



Our company Vision is to ‘Transform SIGMA as the Centre of Excellence through unleashing the passion and ingenuity in our people, building capabilities, using innovative technology and business processes, and consistently delivering value exceeding stakeholder expectations; thereby be the most preferred destination for investment’.

In line with our vision, we have felt the strong need of TPM as it will help us to achieve zero BAD. Develop employee capability, this will result in increased productivity, improved customer satisfaction and make profitable organization’.

The below details represents the reason we embraced TPM to achieve operational excellence.

3.3 TPM Policy

To implement TPM management established TPM Policy.

Vision Mission Statement	TPM Policy
<p>Vision:</p> <p>To be our customer's partner of choice and a company that is great to do business with; a company that is trusted more than any other to continually improve and innovate products and services that solve their most pressing power connection needs. We will also be a great place to work, offering employees and environment of fulfillment and satisfaction.</p> <p>Mission:</p> <p>Sigma engineered solution's mission is to provide on time, on spec parts and superior service that help solve power connection needs. Our focused, customer centric approach will continually deliver purposeful solutions that meet and exceed customer expectations.</p>	<div style="text-align: center;">  <p>TPM Policy</p> </div> <p>We, at Sigma Electric Manufacturing Corporation Private Limited, aim to be the most preferred global supplier of machined casting components to our customers globally. We will achieve this by designing, manufacturing and supplying innovative products of highest quality standards by implementing Operational Excellence "Total Productive Maintenance" (TPM) in our supply chain and adopting 0/100 philosophy.</p> <p>We are committed for the highest level of Operational Excellence and thereby customer delight by targeting at,</p> <ul style="list-style-type: none"> • Zero Accident • Zero Breakdown • Zero Customer Complaint • Zero Defects <p>This will be achieved by-</p> <ul style="list-style-type: none"> ➢ Creating a culture through strong commitment at all levels ➢ Enhance capabilities of employee at all levels across organization ➢ Total employee involvement ➢ Achieving Product, People and Process excellence ➢ Integrating other improvement initiatives like ISO, Lean, 6 Sigma and others initiative into the TPM <p>Sigma adopts TPM as a main prime driver to achieve Operational Excellence.</p> <div style="text-align: right;">  Niteen Inamdar EVP & COO (Global Operations - SIGMA Castings) </div> <p>Rev: 03 Date: 1st July 2023</p>

3.4 Integration of all Tools and Methodologies in TPM

Linkage of KMI KPI and KAI established for all parameters. Sample mentioned below

KMI	KPI	KAI	Pillar
EBITA improvement	<ul style="list-style-type: none"> • Reduce Material Costs 	<ul style="list-style-type: none"> • Alternate material. Alternate source , negotiations • VA –VE projects – Zero based working • Kaizen on losses / wastes • Labor productivity/ Automation/ Ind. 4.0 Projects 	KK, DM
	<ul style="list-style-type: none"> • Reduce Conversion Cost 	<ul style="list-style-type: none"> • CIP Projects • R&M reduction Projects • Energy cost reduction projects 	KK, PM, OTPM

3.5 Evolution of Operator

We have achieved a major leap in the mindset of our machine operators and maintenance staff. This table represents the status of their mindset before and after introduction of TPM.

#	Before introduction of TPM	After introduction of TPM
A	Machine Operators	
1	Machine operators are mainly responsible for production	Machine operators are assigned responsibility of minor maintenance of machines
2	“I produce and You Maintain” attitude of operators	“I do, I check and I Maintain” attitude of operators—My Machine Concept
3	No formal checklist for machine maintenance basic parameters	Use of Checklist covering C-L-I-T-A
4	Only escalating when machine is dysfunctional	Knowledge of machine functioning
5	Reporting of Breakdowns	- Identification and understanding of abnormalities. Participation in repair work during Maintenance Mindset change for zero breakdown
B	Maintenance Staff	
1	Focus on immediate repair for fixing the problems	Focus on preventive actions
2	Frequency and coverage of advanced maintenance techniques was less	More use and coverage of advance maintenance techniques – Vibration and Current Monitoring (CBM)
3	Tendency to get replacement of old machines	Focus on increasing life of old machines
4	Limited use of root cause analysis approach	Insistence on using Why- Why analysis Initiated use of Phenomena Mechanism analysis for chronic problems

4. Results and Benefits Achieved

4.1 Key Performance Indices – Results

Category	Index	Unit	BM (TPM Started) FY18	Actual Status YTD FY24	Target FY24
S	Number of work-related accidents requiring days off work	Cases/Year	0	0	0
S	Number of work-related accidents not requiring days off work	Cases/Year	194	0	0
P	Productivity for main products (Manpower Productivity)- Zinc Products	Kgs / Man / Month	1123	1361.36	1399
P	Productivity for main products (Manpower Productivity)- Copper Products	Kgs / Man / Month	468	561	660
P	OEE (or Overall Plant Efficiency) – Zinc Products	%	82.8	89.42	92.13
P	Availability	%	97.2	98.6	99
P	Performance Rate	%	87.1	91.7	94
P	Quality Products Rate	%	97.8	98.9	99
P	OEE (or Overall Plant Efficiency) – Copper Products	%	79.3	88.8	89.35
P	Availability	%	90.5	95.1	95
P	Performance Rate	%	92	95	95
P	Quality Products Rate	%	95.2	98.3	99
P	Number of breakdowns	Nos. / Month	235	108	117
P	MTBF	Hour	1106	1678	1526

Category	Index	Unit	BM (TPM Started) FY18	Actual Status YTD FY24	Target FY24
P	MTTR	Minutes	64	46	40
Q	Number of customer complaints	Number / Year	52	2	0
Q	In-line defect rate (scrap)	%	2.54	1.53	1.73
Q	In-line defect rate (rework)	%	2.74	1.47	1.20
C	Cost index (Conversion Cost)- Zinc Products	\$ / Kg	0.67	0.52	0.51
C	Cost index (Conversion Cost)- Copper Products	\$ / Kg	1.52	1.18	1.11
D	Production Lead time	Days	0.92	0.55	0.45
D	Delivery Performance	%	90	97	98
S	Frequency rate	Number of occupational accidents with leave for 1 000 000 worked hours	0	0	0
M	Number of Employee Suggestions Implemented	Numbers / Year	1045	5275	8017

4.2 Intangible Benefits

Understanding TPM in right spirit & practicing it day-to-day over six years has brought significant changes in work culture, system orientation, analytical approach & flexibility.

Work Culture

- Sense of ownership of equipment / process i.e. ‘I Operate, I Control, I Maintain’
- People started focusing on theme base kaizen implementation & participated more in external as well as internal competition.
- People started believing the possibility of Zero Customer Complaints, Zero In process defects, Zero breakdowns and Accident.
- People have started thinking deeply in their areas / section to improve from existing condition to next level.
- People now work as per the Flexibility of requirement and does not resist to any changes
- Sustenance of Improvements done by the operators

System Orientation

- TPM is part of ISO / TS
- Management objective are well linked to plant objective, department Objective and then to Cell Objectives so focusing cell working in more meaning full and system way.
- Neat and Clean working environment can be seen
- Well defined system for maintenance spare management, Quality monitoring and Production monitoring.

Analytical Approach

- Continuous Improvement / Focus on prevention of losses by searching the abnormalities, root cause analysis and Kaizen Implementation.

Flexibility

- Flexibility in manufacturing due to Multi-skilled operator
- Production Output as per the Customer Pull

4.3 Recognitions in External Competitions

Sample National level awards mentioned below

#	Year	Award Category	Award
1	FY20	CII Best Circle Competition 2019	Winner – Best JH Circle
2	FY21	QCFI- Pune Chapter Jidoka and Poka Yoke Competition	Gold Award
3	FY21	CII National Maintenance Circle Competition 2021	Winner – Autonomous Maintenance
4	FY22	CII - 8th National POKA-YOKE Competition	Platinum Award
5	FY22	3rd CII National Low Cost Automation Circle Competition	Winner – First Prize Award
6	FY22	50th QCFI Mini-Convention	Gold Award
7	FY23	CII National Level 16th Circle Competition Apr 2022	Platinum Award
8	FY24	46th CII National Kaizen Competition- Breakthrough	Platinum Award
9	FY24	16th CII 3M National Level Competition - Muda and Muri Category	Gold Award
10	FY24	16th CII International Kaizen Competitiveness and Cluster Summit - 3M	Platinum Award

Total Awards of Sigma Unit - I – 29 Nos. and Sigma India – 126 Nos. (Last 5 Years)



5. Way Ahead

#	Expectation of	Expectation	Future Plan
01	Customer	<ul style="list-style-type: none"> • YOY Cost reduction • New Products productionised with minimum development time • Achieve & sustain new quality, delivery criteria on continuous basis 	<ul style="list-style-type: none"> • Focused approach for VA –VE • Strengthen Manufacturing Engineering Capability to assimilate new technology • Extend TPM methodology to suppliers in phased manner
02	Management/ Shareholders	<ul style="list-style-type: none"> • Improve profit margin • Add new products & customer • Positive cash flow 	<ul style="list-style-type: none"> • Fixed & variable cost control by adopting TPM deeply & widely • Diversify in new product category • Inventory reduction
03	Employee	<ul style="list-style-type: none"> • Learning & career growth • Safe & Healthy working environment 	<ul style="list-style-type: none"> • Continuous upgradation of employee knowledge & skill across all the level through IDP (Individual Development Plan)