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THE SOUTHERN INDIA ENGINEERING MANUFACTURERS' ASSOCIATION

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*Exclusive Interactive session with the Honourable Minister for Energy Resources & Law **Sri. CTR Nirmal Kumar**: On 7th July 2026*

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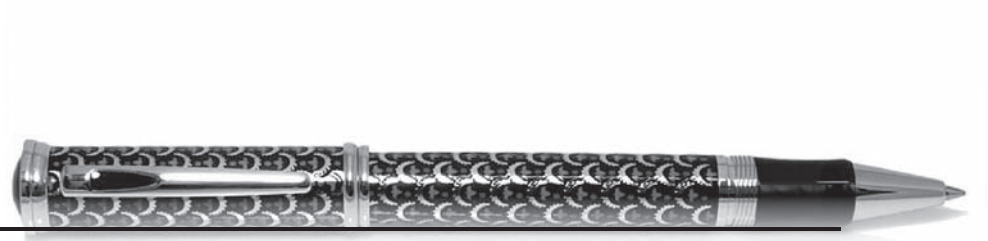
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## From the President's Desk

Dear Members,

It gives me great pleasure to present this edition of the **SIEMA Magazine**, which captures the significant initiatives and achievements of our Association over the past few months. This publication reflects SIEMA's continued commitment to promoting technological excellence, strengthening industry collaboration, and representing the interests of the engineering manufacturing sector.

The Indian pump and engineering industry is witnessing rapid transformation, driven by technological innovation, digitalisation, sustainability, and the increasing demand for globally competitive products. While these developments present exciting opportunities, they also call upon us to continuously upgrade our capabilities, embrace new technologies, and remain responsive to changing market dynamics.

One of the noteworthy developments featured in this issue is the successful completion of the **Submersible Slurry Pump Project at Si'Tarc** under the Ministry of Heavy Industries' Capital Goods Scheme. This achievement is a significant milestone for the Indian pump industry and demonstrates the strength of indigenous research and development. Such initiatives reinforce our nation's vision of self-reliance while enhancing the technological capabilities and global competitiveness of Indian manufacturers.

Recognising that technology extends beyond manufacturing processes, SIEMA, in association with COINDIA, organised a **Workshop on Cyber Security for MSMEs**, where industry experts from Deloitte shared valuable insights on cyber risks, regulatory compliance, and best practices for safeguarding digital assets. As industries become increasingly connected, cyber security has become an essential component of business resilience, and we remain committed to creating awareness among our members on this critical subject.

To better understand the financial challenges faced by MSMEs, SIEMA, jointly with ICCIC, facilitated a **Focused Group Discussion with officials from the Reserve Bank of India.** The interaction provided members with an opportunity to voice their concerns regarding credit availability, banking procedures, and policy-related issues. Such engagements enable us to effectively represent the industry's concerns before policymakers and financial institutions.

In our continued efforts to support member industries in improving procurement efficiency and cost competitiveness, SIEMA also organised an interaction with the **Birla Pivot** team on smart sourcing solutions. The programme introduced members to modern digital procurement platforms, transparent pricing mechanisms, flexible financing options, and real-time supply chain visibility—tools that can contribute significantly to operational efficiency in today's competitive environment.

Advocacy continues to remain one of SIEMA's foremost priorities. During the period, the Association submitted a detailed representation to the **Hon'ble Chief Minister of Tamil Nadu, Thiru C. Joseph Vijay**, highlighting the challenges confronting the pump industry and recommending measures for its sustained growth and development. We remain confident that constructive dialogue with both the Central and State Governments will contribute to a more conducive environment for industrial development.

These initiatives reaffirm SIEMA's role as not merely an industry association but as a proactive partner in the growth and progress of its members. Whether through technology development, knowledge-sharing programmes, policy advocacy, or collaborative engagement with government and industry stakeholders, our objective remains to create lasting value for every member organisation.

I sincerely thank our Office Bearers, Managing Committee Members, member industries, sponsors, and all our partners for their continued support and active participation. Your encouragement and involvement inspire us to undertake meaningful initiatives that strengthen our Association and benefit the engineering community as a whole.

As we move forward, let us continue to embrace innovation, strengthen collaboration, and work together to position the Indian pump and engineering industry as a global leader in quality, technology, and sustainable manufacturing.

I wish all our members continued success, good health, and prosperity.

**With warm regards,**



**Mithun Ramdas**
President
The Southern India Engineering Manufacturers' Association (SIEMA)

# Mission & Vision

***To enable our members to compete globally with their products and services***

- ***To extend support to our member industries to prosper***
- ***To offer up-to-date technical support to members***
- ***To train and enable members to meet the global challenges in technology and competitiveness***
- ***To develop techno-commercial co-operation with international enterprises***
- ***To promote programmes for enhancing the quality of life of all stake-holders***
- ***To represent members on common issues with the policy makers.***


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***The opinions and views expressed in this magazine are those of the respective authors.***

# *In this issue*


SIEMA Activities Corner 5

The Future of Indian Manufacturing Opportunities for MSMEs in the Era of Industry 4.0 6

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# SIEMA Activities Corner

## SUB COMMITTEE REPORTS

### Technical Committee Meeting:

#### Slurry Pump Project:

*The *" Augmentation of Existing Centre of Excellence for Pumps – Development of Submersible Slurry Pump", funded by the **Department of Heavy Industries (DHI), Government of India*, has been successfully completed.*

*The *Apex Committee Meeting* for project closure was held on *10 June 2026*, during which the successful completion of the project, along with the achievement of the approved objectives, scope, and deliverables, was formally reviewed and acknowledged by the Committee.*

### Technical Committee Meeting (30 May 2026):

*The meeting, originally scheduled for 29 May 2026, was postponed due to insufficient participation and was subsequently held online on 30 May 2026. Ongoing technical activities, project updates, and future action plans were reviewed.*

- *Discussion with BEE Officials on Energy Efficient Motors (10 June 2026): SIEMA organized an interactive session with Bureau of Energy Efficiency (BEE) officials to discuss energy-efficient motor regulations, testing and certification requirements, implementation challenges, and industry feedback.*
- *30th BIS MED 20 Sectional Committee Meeting – Pumps (19 June 2026): Members participated in the BIS MED 20 meeting to review ongoing pump standardization activities, discuss revisions to existing standards, consider stakeholder comments, and deliberate on future standard development initiatives.*

*These meetings strengthened coordination between industry, SIEMA, BEE, and BIS, provided valuable regulatory and technical updates, and supported the continued advancement of energy-efficient pumps, motors, and national standardization activities.*

### Subjects relating to Central & State Governments

#### *Online Meeting of GST Grievances Committee : On 25th June 2026*

*A meeting of the GST Central Grievances Committee was convened to discuss various GST-related issues affecting industries. SIEMA represented the Pump & Motor Industry at the meeting.*

*On behalf of SIEMA, President **Mr. Mithun Ramdas** highlighted the challenges faced by the unorganised sector of the pump industry under the existing GST structure. He strongly emphasized the need to **reduce the GST rate on pumps to 5%**, stating that such a reduction would enhance the competitiveness of the industry, support MSMEs and the unorganised sector, and promote greater affordability and market growth.*

*SIEMA reiterated its commitment to continuously represent the interests of the Pump & Motor Industry before the Government and other statutory authorities on key policy matters.*

### Raw Material Discussion with BIRLA PIVOT Team: 1st July 2026

#### *Presentation by Birla Pivot – Powering Smart Sourcing for Indian Business*

*A presentation by the Birla Pivot team on "**Powering Smart Sourcing for Indian Business**" was organised for SIEMA members. The session highlighted how digital procurement solutions can help industries streamline sourcing processes, improve transparency, and enhance operational efficiency.*

*The key topics covered during the presentation included:*

- *Digital Procurement Platform*
- *Real-time updates*
- *Competitive and transparent pricing*
- *Flexible financing options*
- *Real-time delivery tracking*

*The presentation received an encouraging response from the members, with around 20 members participating in the programme. The participants appreciated the platform's features and provided positive feedback on its potential to simplify procurement and strengthen supply chain management.*

*As a follow-up to the programme, the Birla Pivot team shared a requirement template to capture the raw material needs of participating industries. The format was subsequently circulated to all members who attended the session, enabling them to communicate their procurement requirements for further assistance.*



TECHNICAL ARTICLE

# The Future of Indian Manufacturing Opportunities for MSMEs in the Era of Industry 4.0

## Why Manufacturing Matters and the Emergence of Industry 4.0.

### The Dawn of the Fourth Industrial Revolution

*"Manufacturing is the engine of economic growth, innovation, and national prosperity. Nations that build strong manufacturing ecosystems build strong economies."*

## Introduction

Throughout history, manufacturing has been the cornerstone of civilization's progress. Every industrial revolution has transformed not only the way goods are produced but also the way societies function, economies grow, and nations prosper. From the invention of the steam engine in the eighteenth century to today's intelligent, interconnected factories, manufacturing has continuously evolved to meet the changing needs of the world.

India's manufacturing journey has been remarkable. From traditional cottage industries and small workshops to globally recognized engineering enterprises, the country has steadily built a diverse industrial base. Today, India manufactures everything from precision machine tools and industrial pumps to automobiles, aerospace components, pharmaceuticals, electronics, and renewable energy equipment. This transformation has been driven by the ingenuity, resilience, and entrepreneurial spirit of millions of manufacturers, particularly Micro, Small and Medium Enterprises (MSMEs).

As India aspires to become a developed nation by 2047, manufacturing is expected to play an even more significant role in achieving sustained economic growth, creating employment, boosting exports, and strengthening technological capabilities. The Government's vision of positioning India as a global manufacturing hub has gained momentum through initiatives such as Make in India, Digital India, Skill India, and various MSME support programmes. Yet, achieving this vision requires more than increased production—it demands a fundamental transformation in the way manufacturing is carried out.

That transformation is already underway. Around the world, a new industrial revolution-popularly known as Industry 4.0-is redefining manufacturing. Intelligent machines communicate with each other, production systems analyse data in real time, robots work alongside skilled technicians, and artificial intelligence supports decision-making across the factory floor. Manufacturing is becoming smarter, faster, more flexible, and increasingly sustainable.

For Indian MSMEs, this is not merely another technological trend. It is a once-in-a-generation opportunity to reinvent themselves, improve productivity, reduce costs, enhance quality, and compete confidently in global markets.

## The Evolution of Manufacturing

The story of manufacturing is one of continuous innovation.

The ***First Industrial Revolution***, which began in Britain during the late eighteenth

century, introduced mechanization through steam power. Manual production gradually gave way to machines, enabling industries such as textiles and iron to expand at unprecedented rates.

The ***Second Industrial Revolution*** emerged in the late nineteenth century with the widespread use of electricity. Assembly lines, pioneered by manufacturers such as Henry Ford, transformed production into an efficient, large-scale operation. Products that were once considered luxuries became affordable to ordinary consumers.

The ***Third Industrial Revolution***, beginning in the latter half of the twentieth century, introduced electronics, computers, and automation into factories. Computer Numerical Control (CNC) machines, programmable logic controllers (PLCs), and industrial robots significantly improved precision, consistency, and productivity. Indian engineering industries, including those in Coimbatore, rapidly embraced these technologies and established themselves as reliable suppliers to domestic and international markets.

Today, the world has entered the Fourth Industrial Revolution. Unlike previous revolutions that focused primarily on machines or automation, Industry 4.0 integrates digital technologies, intelligent software, real-time communication, and advanced analytics into every stage of manufacturing. Machines no longer function in isolation—they are connected, capable of exchanging information, learning from data, and supporting autonomous decision-making.

This convergence of physical and digital systems is fundamentally changing how factories operate and how businesses create value.

## India's Manufacturing Landscape

India's manufacturing sector has grown into one of the largest in the world, producing an extensive range of products across engineering, automotive, textiles, chemicals, pharmaceuticals, electronics, defence, and renewable energy. The sector is not only a major contributor to the national economy but also an important source of employment and innovation.

Among the various segments of manufacturing, engineering industries occupy a position of strategic importance. The manufacture of pumps, motors, valves, compressors, castings, machine tools, electrical equipment, and industrial machinery supports nearly every other sector-from agriculture and infrastructure to energy, water management, oil and gas, and process industries.

Few regions exemplify this industrial strength better than Coimbatore. Often referred to as the Pump City of India, the city has evolved into one of the country's most vibrant engineering clusters. Thousands of enterprises-ranging from family-owned workshops to globally recognized manufacturers-have built a reputation for quality, innovation, and entrepreneurship. Their products are supplied across India and exported to numerous countries, contributing significantly to the nation's industrial growth.

The success of clusters such as Coimbatore demonstrates an important truth: India's manufacturing strength lies not only in large corporations but also in its dynamic network of MSMEs.

## MSMEs: The Backbone of Indian Manufacturing

The significance of MSMEs extends far beyond their size. Collectively, they form the foundation of India's industrial ecosystem by supplying components, sub-assemblies, finished products, and specialized engineering services to large industries.

One of the greatest strengths of MSMEs is their adaptability. Unlike larger organizations that often require lengthy decision-making processes, MSMEs can respond quickly to changing customer requirements, adopt innovative manufacturing practices, and

develop customized products for niche markets.

Engineering MSMEs, in particular, have consistently demonstrated remarkable capabilities in precision manufacturing, product development, and export competitiveness. Many began as modest machine shops but have evolved into technologically advanced enterprises serving customers across the globe.

However, global competition is becoming increasingly intense. Customers now expect shorter delivery times, complete product traceability, zero-defect quality, environmental compliance, and competitive pricing. Traditional manufacturing methods alone are no longer sufficient to meet these expectations.

To remain competitive, MSMEs must embrace digital transformation-not as an option, but as a strategic imperative.

## A New Manufacturing Paradigm

The concept of Industry 4.0 is often associated with sophisticated robots and advanced artificial intelligence. While these technologies are important, the true essence of Industry 4.0 lies in connectivity, intelligence, and informed decision-making.

Imagine a factory where every machine continuously reports its operating status, energy consumption, and maintenance requirements. Production managers receive instant updates on order progress through digital dashboards. Inventory levels are automatically synchronized with procurement systems. Quality inspections generate real-time reports, and customers can trace the manufacturing history of every product through a unique serial number.

Such factories are no longer futuristic concepts-they are becoming the new standard in manufacturing.

Importantly, this transformation is not reserved for multinational corporations. Advances in cloud computing, affordable sensors, enterprise software, and digital communication have made many Industry 4.0 technologies accessible even to small and medium-sized enterprises.

Digital transformation is therefore not about replacing people with machines. It is about enabling people to make better decisions, reducing repetitive tasks, preventing errors, and allowing organizations to operate with greater agility and confidence.

## The Need for Change

Manufacturing today operates in an environment shaped by rapid technological change, fluctuating raw material prices, evolving customer expectations, geopolitical uncertainties, and increasing emphasis on sustainability.

The disruptions witnessed in global supply chains over recent years have highlighted the importance of resilience and operational flexibility. Companies that had invested in digital systems were better equipped to monitor inventories, adjust production schedules, collaborate remotely, and respond quickly to changing market conditions.

For Indian MSMEs, the message is clear. Future competitiveness will depend not only on engineering expertise but also on digital capability. Enterprises that combine traditional manufacturing excellence with modern technologies will be better positioned to serve both domestic and international markets.

The Fourth Industrial Revolution is not about abandoning proven manufacturing practices. It is about enhancing them through intelligence, connectivity, and continuous improvement.

In the chapters that follow, we will explore how technologies such as Artificial Intelligence, the Internet of Things, cloud computing, robotics, and Enterprise Resource Planning are reshaping manufacturing. More importantly, we will examine how Indian MSMEs-particularly those in the engineering sector-can harness these technologies to build globally competitive, sustainable, and future-ready enterprises.

# Industry 4.0: The Technologies Reshaping Manufacturing

## The technologies behind smart manufacturing.

*"Technology has never replaced human ingenuity; it has amplified it. The factories of the future will be those where people and technology work together to create greater value."*

The Fourth Industrial Revolution is often described as the fusion of the physical, digital, and intelligent worlds. While this definition captures its essence, it can also make Industry 4.0 seem complex or intimidating, especially for small and medium-sized manufacturers.

For many MSMEs, the phrase Industry 4.0 conjures images of fully automated factories, humanoid robots, and massive investments that appear beyond their reach. In reality, Industry 4.0 is not a single technology, nor is it an all-or-nothing proposition. It is a collection of digital tools and intelligent systems that can be adopted gradually, depending on the needs, size, and resources of an enterprise.

A small engineering company that digitizes its inventory, installs sensors on critical machines, and implements an ERP system has already begun its Industry 4.0 journey. The transformation is evolutionary rather than revolutionary.

What distinguishes Industry 4.0 from previous phases of industrial development is the ability of machines, software, and people to communicate seamlessly, analyse information in real time, and make informed decisions based on data rather than assumptions.

### The Digital Nervous System of a Smart Factory

Imagine walking into a modern manufacturing facility.

Machines are operating with remarkable precision. Large digital displays show production targets, machine utilization, quality metrics, and delivery schedules. Sensors continuously monitor vibration, temperature, power consumption, and production output. Supervisors receive alerts on their tablets if a machine begins to show signs of abnormal performance. Inventory levels are updated automatically, purchase orders are generated when stock reaches predefined levels, and customers can track the status of their orders in real time.

This is not science fiction. It is the everyday reality of a smart factory.

Just as the human body relies on the nervous system to transmit information between the brain and different organs, a smart factory relies on a digital network that connects machines, production lines, warehouses, quality systems, and management. Information flows continuously across the organization, enabling faster decisions, better coordination, and improved operational efficiency.

The technologies that enable this transformation are interconnected. Each contributes to a larger ecosystem in which manufacturing becomes more intelligent, responsive, and resilient.

### Internet of Things (IoT): Giving Machines a Voice

At the heart of Industry 4.0 lies the Internet of Things (IoT). Simply put, IoT enables machines and equipment to communicate by collecting and sharing data through connected sensors.

Traditionally, factory managers relied on manual inspections to assess machine

performance. Today, sensors installed on equipment can continuously measure parameters such as temperature, vibration, pressure, speed, energy consumption, and operating hours. This information is transmitted instantly to monitoring systems, where it can be analysed for trends and anomalies.

Consider a pump manufacturing unit. A machining centre operating beyond its normal vibration limits may indicate bearing wear or spindle imbalance. Instead of waiting for the machine to fail unexpectedly, the maintenance team receives an early warning and schedules repairs during planned downtime. This approach, known as predictive maintenance, reduces costly breakdowns, improves machine availability, and extends equipment life.

Similarly, motor manufacturers can monitor winding temperatures, test-bench performance, and energy usage, ensuring greater consistency and reliability throughout the production process.

By enabling machines to "speak," IoT transforms maintenance from a reactive activity into a proactive strategy.

## Artificial Intelligence: Turning Data into Decisions

- Data by itself has limited value. The true advantage comes from interpreting that data intelligently.
- This is where Artificial Intelligence (AI) plays a transformative role.
- AI systems analyse large volumes of production data, identify patterns, detect anomalies, and recommend actions that improve manufacturing performance. Unlike conventional software that follows predefined instructions, AI continuously learns from historical data and becomes increasingly accurate over time.
- In manufacturing, AI applications are rapidly expanding.
- Quality inspection systems equipped with AI-powered cameras can identify minute defects that may be difficult for the human eye to detect. Surface imperfections, dimensional deviations, and assembly errors can be recognised within seconds, improving product quality while reducing inspection time.
- Production planners can use AI to forecast demand more accurately, optimize production schedules, and balance workloads across multiple machines. Inventory managers can predict material requirements based on historical consumption patterns, seasonal demand, and customer orders.
- Rather than replacing human expertise, AI strengthens it by enabling faster and more informed decisions.

## Cloud Computing: Manufacturing Without Boundaries

Until recently, manufacturing data was stored on individual computers or local servers within factories. Accessing this information often required physical presence and significant investment in IT infrastructure.

Cloud computing has fundamentally changed this model.

Today, production data, inventory records, quality reports, purchase orders, and financial information can be securely stored on cloud platforms and accessed from anywhere with appropriate authorization.

For MSMEs, cloud-based solutions offer significant advantages. They reduce capital expenditure on hardware, simplify software updates, improve collaboration across multiple locations, and enhance business continuity.

A company director travelling overseas can review production performance, approve purchase orders, or monitor inventory levels from a laptop or smartphone. Factory managers, sales teams, suppliers, and customers can collaborate more effectively through shared digital platforms.

Cloud technology has democratized access to sophisticated business systems, making digital transformation affordable even for smaller enterprises.

## Big Data Analytics: Discovering Opportunities Hidden in Information

- Modern factories generate vast amounts of data every day. Every machine cycle, inspection report, maintenance activity, customer order, and energy reading contributes to a growing repository of operational information.
- Without proper analysis, much of this data remains underutilized.
- Big Data Analytics converts raw information into actionable insights. Manufacturers can identify recurring production bottlenecks, monitor quality trends, optimize machine utilization, reduce material wastage, and improve overall operational efficiency.
- For instance, an engineering company may discover through data analysis that rejection rates increase during a particular production shift or when a specific raw material batch is used. Identifying such patterns enables corrective action before problems escalate.
- Data-driven decision-making replaces assumptions with evidence, leading to greater consistency and improved profitability.

## Robotics and Automation:Enhancing Precision and Productivity

Automation has been part of manufacturing for several decades. What distinguishes today's robotic systems is their intelligence, flexibility, and ability to collaborate with human workers.

Modern robots are capable of performing repetitive, hazardous, or highly precise tasks with exceptional consistency. In engineering industries, robots are increasingly used for welding, painting, material handling, assembly, packaging, and inspection.

Collaborative robots, commonly known as cobots, are designed to work safely alongside people. Instead of replacing employees, they assist them by handling physically demanding or repetitive operations, allowing workers to focus on activities that require judgement, creativity, and problem-solving.

For MSMEs facing labour shortages or increasing quality expectations, cobots represent an attractive and scalable solution.

## Digital Twins: Experimenting Without Risk

- One of the most exciting developments in Industry 4.0 is the concept of the Digital Twin.
- A digital twin is a virtual model of a physical machine, production line, or even an entire factory. It mirrors the behaviour of its real-world counterpart by continuously receiving operational data.
- Engineers can simulate changes, evaluate production scenarios, and identify potential issues before implementing modifications on the shop floor.
- For example, before redesigning a pump assembly line, manufacturers can test different layouts digitally to determine which configuration delivers the highest productivity with minimal disruption.
- Digital twins reduce experimentation costs, improve planning accuracy, and accelerate innovation.

## Cybersecurity: Protecting the Digital Factory

- As manufacturing systems become increasingly connected, cybersecurity assumes critical importance.
- Factories today exchange information with suppliers, customers, logistics providers, financial institutions, and cloud platforms. Every digital connection creates potential vulnerabilities if not properly protected.

- Cybersecurity is therefore no longer the exclusive responsibility of IT departments. It is a business imperative.
- Strong passwords, multi-factor authentication, regular software updates, secure networks, employee awareness, and data backup procedures form the first line of defence against cyber threats.
- A digitally connected factory must also be a digitally secure factory.

## Smart Technologies for Every MSME

- One of the greatest misconceptions about Industry 4.0 is that it is only for large corporations with unlimited budgets.
- In reality, digital transformation can begin with simple, practical steps.
- A barcode-based inventory system, a cloud-based ERP, machine monitoring sensors, digital maintenance schedules, electronic quality records, or energy-monitoring devices are all valuable components of Industry 4.0.
- The objective is not to adopt every technology simultaneously but to identify solutions that address specific business challenges.
- Every successful digital transformation begins with a single improvement.

## The Human Element

Despite rapid technological advancement, people remain the most valuable asset in manufacturing.

Technology provides information. People provide judgement.

Machines can detect patterns, but engineers interpret their significance. Software can recommend production schedules, but managers align them with customer priorities. Robots can execute repetitive tasks, but innovation, leadership, and strategic thinking remain uniquely human capabilities.

Industry 4.0 is therefore best understood as a partnership between intelligent technologies and skilled professionals. The factories that will lead the future are not those with the greatest number of robots, but those that successfully integrate technology with human expertise, continuous learning, and a culture of innovation.

In the next part of this feature, we shall explore how Indian MSMEs-particularly those in the engineering sector-can translate these technologies into tangible business outcomes. From ERP implementation and digital quality systems to predictive maintenance, export competitiveness, and real-life examples from the pump, motor, valve, and foundry industries, we will examine how Industry 4.0 can become a practical roadmap for sustainable growth rather than an abstract technological concept.



**"Success is not final, failure is not fatal: it is the courage to continue that counts."**

Winston Churchill

# From Vision to Reality: How Industry 4.0 is Transforming Indian MSMEs

## How MSMEs can translate these technologies into practical business benefits.

*"The greatest competitive advantage in manufacturing today is not merely owning better machines-it is making better decisions. Industry 4.0 empowers enterprises to do exactly that."*

The discussion surrounding Industry 4.0 often centres on advanced technologies-artificial intelligence, robotics, cloud computing, and the Internet of Things. Yet, for an entrepreneur managing a small or medium-sized engineering enterprise, a more practical question arises:

### "How do these technologies improve my business?"

The answer lies not in technology alone, but in the measurable business outcomes it delivers.

Industry 4.0 is not about replacing conventional manufacturing practices with expensive automation. Rather, it is about making every aspect of manufacturing more intelligent, connected, efficient, and customer-focused. Whether it is a pump manufacturer in Coimbatore, a valve producer in Rajkot, a motor manufacturer in Faridabad, or a foundry in Belagavi, the objective remains the same-to produce better products at lower cost, in less time, with greater consistency.

The transformation begins with a simple realization: every manufacturing activity generates information, and every piece of information has the potential to improve performance.

### Beyond Machines: Building an Intelligent Enterprise

Many factories have invested in CNC machines, modern testing equipment, automated assembly lines, and precision measuring instruments. These investments have undoubtedly improved manufacturing capabilities. However, in many enterprises, these machines continue to operate as isolated islands of automation.

Production data is recorded manually.

Inventory is maintained in spreadsheets.

Purchase decisions depend largely on experience.

Maintenance is carried out only after a breakdown occurs.

Departments work efficiently within themselves but remain disconnected from one another.

Industry 4.0 bridges these gaps by integrating people, machines, materials, and information into a unified digital ecosystem. The result is not simply a smarter machine but a smarter enterprise.

A production manager instantly knows whether customer orders are on schedule. The purchase department can view real-time inventory before placing an order. The finance department understands production costs as they occur. Senior management can evaluate factory performance using live dashboards instead of waiting for monthly reports.

In such an environment, decisions become proactive rather than reactive.

### ERP: The Digital Backbone of Modern Manufacturing

Every smart factory requires a central nervous system. In manufacturing, that role is performed by an Enterprise Resource Planning (ERP) system.

An ERP integrates all business functions into a single platform. Instead of maintaining separate records for sales, inventory, production, procurement, quality, finance, and dispatch, every department works with the same real-time information.

Consider a typical customer order for an industrial pump.

The sales team enters the order into the ERP system. Immediately, production planning verifies machine availability and schedules manufacturing. The procurement module checks raw material stocks and automatically generates purchase requirements for shortages. The stores department reserves available inventory, while quality assurance prepares inspection plans. As production progresses, every stage—from machining and assembly to testing and dispatch—is digitally recorded.

By the time the pump reaches the customer, the organization possesses complete traceability of every component used, every operation performed, every inspection carried out, and every test conducted.

Such transparency was once considered a luxury. Today, it is becoming a necessity, particularly for companies supplying to international markets.

## Digital Transformation on the Shop Floor

The shop floor is where Industry 4.0 delivers its most visible benefits.

Imagine a machining centre producing impellers for centrifugal pumps. Traditionally, supervisors would inspect production periodically, while operators maintained handwritten records. Machine stoppages, tool wear, or quality deviations might only become evident after significant delays.

Now consider the same operation in a digitally connected factory.

Sensors continuously monitor spindle speed, vibration, cutting temperature, and cycle time. Production dashboards display machine performance in real time. If cycle times begin to increase or abnormal vibrations are detected, maintenance teams receive automatic alerts. Tool replacement is scheduled before quality is affected.

Similarly, in a motor manufacturing unit, winding parameters, insulation resistance values, and routine test results can be digitally recorded and linked to each motor's serial number. If a customer reports an issue months later, engineers can instantly retrieve the complete manufacturing history of that product.

This level of traceability not only improves quality but also strengthens customer confidence.

## Predictive Maintenance: Preventing Problems Before They Occur

For decades, maintenance has largely followed one of two approaches: repair equipment after it fails or service it at fixed intervals regardless of its condition.

Industry 4.0 introduces a more efficient alternative-predictive maintenance.

By analysing machine data such as vibration, temperature, lubrication quality, and electrical current, software can identify early signs of equipment deterioration. Maintenance is then scheduled precisely when required.

The benefits are significant:

- Reduced unplanned downtime.
- Lower maintenance costs.
- Extended machine life.
- Improved production planning.
- Higher equipment availability.

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department. Industry 4.0 shifts this philosophy toward preventing defects rather than merely detecting them.

- Vision systems equipped with AI can identify machining defects, casting imperfections, incorrect assemblies, or dimensional variations within seconds. Statistical process control continuously monitors production trends and alerts operators before products move outside acceptable tolerances.
- Digital inspection records eliminate paperwork while ensuring complete traceability.
- For exporters, such systems enhance credibility by demonstrating compliance with international quality standards.
- The result is improved First Pass Yield, reduced rework, lower rejection rates, and enhanced customer satisfaction.

## Smart Inventory: Every Component Accounted For

- Inventory represents one of the largest investments for manufacturing enterprises.
- Excess inventory locks up working capital.
- Insufficient inventory disrupts production.
- Industry 4.0 enables intelligent inventory management through ERP integration, barcode technology, RFID systems, and demand forecasting.
- Warehouse personnel can instantly determine stock availability, storage location, batch information, and consumption history. Materials are replenished automatically based on predefined minimum levels, reducing both shortages and excess stock.
- For pump and motor manufacturers handling hundreds or even thousands of components-from castings and shafts to bearings, fasteners, seals, and electrical parts-digital inventory management offers substantial operational advantages.

## A Practical Example: The Digital Journey of an MSME

- Consider a medium-sized pump manufacturer employing around 150 people.
- Five years ago, the company relied on manual production registers, spreadsheets for inventory, and paper-based quality records. Customer complaints regarding delayed deliveries and inconsistent documentation were increasing. Machine breakdowns frequently disrupted production schedules.
- Rather than investing immediately in expensive automation, the management adopted a phased digital transformation strategy.
- In the first year, the company implemented an ERP system covering sales, procurement, inventory, and finance.
- The following year, barcode systems were introduced for warehouse operations.
- Next came digital production planning and machine monitoring.
- Later, quality inspection records were computerized, followed by predictive maintenance for critical CNC machines.
- Within a few years, the results were remarkable:
- Production planning became more accurate.
- Inventory carrying costs declined significantly.
- Machine downtime was reduced.
- On-time deliveries improved.
- Quality complaints decreased.
- Decision-making became faster because management had access to real-time business information.
- Most importantly, the organization developed a culture of continuous improvement rather than reactive problem-solving.
- This example illustrates an important lesson.
- Digital transformation is rarely achieved

through one large investment. It is the cumulative result of many carefully planned improvements.

## The Economics of Industry 4.0

- One of the most persistent misconceptions among MSMEs is that digital transformation is prohibitively expensive.
- While advanced automation certainly involves investment, many Industry 4.0 initiatives offer attractive returns with relatively modest expenditure.
- Cloud-based ERP systems eliminate the need for expensive servers.
- IoT sensors are increasingly affordable.
- Energy-monitoring systems help reduce electricity costs.
- Digital maintenance schedules improve machine utilization.
- Electronic documentation reduces administrative effort.
- The return on investment is measured not only through financial savings but also through higher productivity, improved customer satisfaction, enhanced quality, and stronger competitiveness.
- Perhaps the greatest benefit is better decision-making. In manufacturing, informed decisions often determine whether an enterprise grows steadily or struggles with recurring inefficiencies.

## The Human Side of Digital Transformation

- Technology alone does not transform organizations.
- People do.
- Many successful digital initiatives fail because employees perceive technology as a threat rather than an opportunity.
- Leaders must therefore communicate a clear message:
- Industry 4.0 is not about replacing people-it is about empowering them.
- Operators become problem-solvers instead of record keepers.
- Maintenance technicians become analysts who prevent failures rather than merely repairing them.
- Production managers make decisions using live data instead of assumptions.
- Employees who continuously learn new digital skills become invaluable assets in the modern factory.
- Ultimately, every successful smart factory remains a human enterprise enhanced by intelligent technology.

## The Competitive Advantage of Early Adoption

- History has consistently rewarded organizations that embrace change ahead of their competitors.
- Those that adopted electricity transformed manufacturing.
- Those that invested in automation achieved higher productivity.
- Today, those that adopt Industry 4.0 thoughtfully and strategically will shape the future of manufacturing.
- For Indian engineering MSMEs, digital transformation is no longer a question of "if."
- It is a question of "when" and "how effectively."
- The enterprises that begin their journey today-even with modest, carefully planned initiatives-will be better prepared to serve demanding customers, compete in international markets, and thrive in an increasingly digital industrial economy.
- In the next part of this feature, we shall examine the challenges that MSMEs encounter on this journey, the policy support available from the Government of India, the importance of sustainability and green manufacturing, and the skills required to build a future-ready workforce. These elements will determine not only the success of individual enterprises but also the future competitiveness of Indian manufacturing itself.

# Building Future-Ready Enterprises: Challenges, Sustainability, Skills and the Road to Competitiveness

**The challenges, the importance of skills, sustainability, government support, and the leadership role of industrial associations.**

*"The future does not belong to the largest manufacturers. It belongs to those who learn, adapt, innovate, and continuously improve."*

---

The journey towards Industry 4.0 is exciting, but it is not without challenges. For every success story of a digitally transformed factory, there are numerous enterprises that hesitate to take the first step. Some fear the cost of technology. Others are uncertain about the returns on investment. Many believe that digital transformation is meant only for large multinational corporations.

These concerns are understandable. Indian MSMEs operate in a highly competitive environment where margins are often thin, customer expectations are constantly rising, and market uncertainties have become the norm. Entrepreneurs must balance production schedules, labour availability, raw material prices, regulatory compliance, cash flow, and customer commitments-often simultaneously. In such circumstances, investing in new technologies may appear to be an additional burden rather than an opportunity.

Yet history teaches us an important lesson. Every major industrial transformation has initially been viewed with caution. The introduction of electricity, CNC machines, computers, and automation all faced resistance before becoming indispensable. Industry 4.0 is no different. The question is no longer whether digital transformation will happen, but how quickly enterprises can adapt to it.

## The Real Challenges Before MSMEs

Technology itself is rarely the greatest obstacle. More often, the barriers are organizational, financial, and cultural.

## Financial Constraints

The first concern for many MSMEs is affordability. Entrepreneurs often assume that adopting Industry 4.0 requires replacing every machine or investing heavily in robotics and automation.

Fortunately, this perception is changing.

Today, digital transformation can begin with relatively modest investments. Cloud-based ERP systems, machine monitoring devices, barcode solutions, energy management software, and digital maintenance systems are increasingly affordable and scalable. Rather than attempting a complete transformation overnight, enterprises can adopt technology in phases, spreading investments over time while realizing measurable benefits at each stage.

The focus should not be on the cost of technology alone, but on the cost of not adopting it. Production delays, excess inventory, quality issues, unplanned downtime, and lost business opportunities often cost far more than gradual digitalization.

## The Skills Gap

Technology is only as effective as the people who use it.

One of the most significant challenges facing Indian manufacturing today is the shortage of skilled personnel capable of working with advanced manufacturing technologies. Modern factories require

professionals who understand automation, data analytics, digital quality systems, robotics, predictive maintenance, and cybersecurity.

This challenge also presents an opportunity.

Engineering colleges, polytechnic institutions, Industrial Training Institutes (ITIs), research organizations, and industry associations can work together to develop programmes that equip young professionals with the skills demanded by modern manufacturing.

Equally important is the continuous upskilling of the existing workforce. Employees who have spent years operating conventional machines possess invaluable practical knowledge. With appropriate training, they can successfully adapt to digital systems and become key contributors to the transformation journey.

## Resistance to Change

Perhaps the most underestimated challenge is the human tendency to resist change.

Employees may worry that automation will replace jobs. Supervisors accustomed to traditional methods may hesitate to adopt digital workflows. Even senior management may be reluctant to alter systems that have functioned successfully for decades.

Successful organizations address this challenge through communication and participation. Employees should understand that digital technologies are intended to simplify work, improve safety, reduce repetitive tasks, and support better decision-making-not diminish the value of human expertise.

When people become partners in transformation rather than passive observers, resistance gradually gives way to enthusiasm.

## Government Initiatives: Creating an Enabling Ecosystem

- Recognizing the strategic importance of manufacturing, the Government of India has introduced several initiatives aimed at strengthening industrial competitiveness and supporting MSMEs in their modernization journey.
- Programmes such as Make in India, Digital India, Skill India, Startup India, and the MSME Competitive (Lean) Scheme encourage enterprises to adopt better manufacturing practices, improve productivity, and enhance quality standards.
- Technology Centres established under the Ministry of MSME provide access to advanced machinery, design facilities, testing infrastructure, and skill development programmes. Various credit support mechanisms and technology upgradation initiatives also help enterprises invest in modernization.
- For engineering MSMEs, these programmes represent valuable opportunities. However, awareness remains uneven. Many entrepreneurs are unaware of the full range of assistance available to them.
- This is where industrial associations assume a crucial role.

## The Role of Industrial Associations

Organizations such as SIEMA have long served as catalysts for industrial development by bringing together entrepreneurs, policymakers, researchers, and technology providers on a common platform.

In the era of Industry 4.0, their role becomes even more significant.

Associations can organize awareness seminars, technology exhibitions, factory visits, expert interactions, and hands-on workshops to demystify digital

manufacturing. They can facilitate collaborations between industry and academia, promote cluster-based digital initiatives, and represent the collective concerns of members before government agencies.

Perhaps most importantly, associations create an environment where enterprises learn from one another. When a member successfully implements ERP, energy monitoring, or predictive maintenance, that experience becomes a valuable source of inspiration for others.

Digital transformation becomes easier when knowledge is shared.

## Sustainability: The New Measure of Industrial Excellence

- Manufacturing excellence in the twenty-first century is no longer judged solely by productivity and profitability. Increasingly, it is measured by sustainability.
- Customers across the world expect manufacturers to demonstrate responsible environmental practices, efficient resource utilization, and reduced carbon emissions. Investors and financial institutions are also paying greater attention to Environmental, Social, and Governance (ESG) performance.
- For Indian MSMEs, sustainability should not be viewed merely as a compliance requirement. It is a powerful business opportunity.
- Industry 4.0 technologies support sustainability in multiple ways.
- Smart energy management systems identify opportunities to reduce electricity consumption. Predictive maintenance minimizes material wastage by preventing equipment failures. Digital process control improves resource utilization, while intelligent production planning reduces unnecessary inventory and transportation.
- Engineering industries have already made significant contributions in this direction. Manufacturers of energy-efficient motors, high-performance pumps, water management systems, and renewable energy equipment are playing an increasingly important role in India's transition towards a greener economy.
- The factory of the future will not only be intelligent; it will also be environmentally responsible.

## The Workforce of Tomorrow

- While technology often dominates discussions on Industry 4.0, the true foundation of future manufacturing remains people.
- Tomorrow's factory will require a workforce capable of combining engineering knowledge with digital literacy.
- Operators will monitor automated systems rather than merely operate machines.
- Maintenance engineers will analyse predictive data instead of responding only to breakdowns.
- Quality professionals will interpret digital inspection reports generated through artificial intelligence.
- Production managers will rely on live dashboards and advanced analytics to optimize operations.
- These changing responsibilities require a culture of lifelong learning.
- Organizations that encourage continuous training, cross-functional exposure, innovation, and employee participation will build a workforce capable of adapting to future technological advances.
- After all, technology evolves rapidly. The ability to learn continuously is what creates long-term competitiveness.

## Building a Culture of Innovation

Innovation is often associated with breakthrough inventions or large research laboratories. In reality, innovation frequently begins with small improvements implemented consistently over time.

- A redesigned workflow that reduces handling time.
- A digital dashboard that improves production visibility.
- An energy-saving initiative that lowers operating costs.
- A software tool that shortens delivery cycles.

Each of these represents innovation.

Indian MSMEs have always excelled at practical problem-solving. Their ability to innovate under constraints has earned them recognition in both domestic and international markets.

Industry 4.0 provides new tools, but the entrepreneurial mindset that drives innovation has always existed within India's manufacturing community.

## Looking Beyond Technology

Ultimately, Industry 4.0 is not about sensors, robots, or software.

It is about creating enterprises that are more resilient, more competitive, more sustainable, and more responsive to customer needs.

- Technology is merely the enabler.
- Leadership provides the vision.
- Employees create the value.
- Customers define success.

When these elements work together, digital transformation becomes a powerful engine of industrial growth.

As Indian manufacturing enters a new era of global opportunity, enterprises that embrace continuous learning, responsible manufacturing, technological innovation, and collaborative leadership will be best positioned to shape the future.

In the concluding part of this feature, we shall look beyond the factory gates and explore the future of Indian manufacturing itself. What will the engineering enterprise of 2047 look like? How can MSMEs become global champions? What role will innovation, exports, sustainability, and strategic partnerships play in achieving the vision of a developed India?

The answers to these questions will define not only the success of individual enterprises but also the industrial destiny of the nation.

### தொழில்துறையில் நேர மேலாண்மை

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# The Road Ahead: Engineering India's Manufacturing Renaissance

*"Every great industrial nation has been built by entrepreneurs who dared to embrace change. India's next chapter will be written by manufacturers who combine engineering excellence with digital intelligence, innovation, and sustainability."*

The history of manufacturing is, in many ways, the history of human progress. Every technological breakthrough-from the steam engine to electricity, from automation to computers-has reshaped industries, improved productivity, and elevated living standards. Each industrial revolution has challenged established ways of working while creating new opportunities for those prepared to adapt.

Today, India stands at another defining moment.

The convergence of digital technologies, advanced engineering, sustainable manufacturing, and global supply chain realignments presents an unprecedented opportunity for the country to strengthen its position as one of the world's leading manufacturing economies. The decisions made by Indian enterprises over the coming decade will determine whether India merely participates in this transformation or emerges as one of its principal architects.

For the nation's MSMEs, particularly those in the engineering sector, the future has never held greater promise.

## India's Moment in Global Manufacturing

The global manufacturing landscape is undergoing profound change. Companies across the world are diversifying their supply chains, seeking reliable partners capable of delivering quality products, competitive costs, technological competence, and operational resilience.

India possesses many of the attributes required to meet these expectations. It has a large and youthful workforce, a strong base of engineering talent, an expanding digital infrastructure, a vibrant entrepreneurial ecosystem, and one of the world's fastest-growing domestic markets. Decades of experience in sectors such as pumps, motors, valves, castings, machine tools, automotive components, textiles, pharmaceuticals, and precision engineering have created a solid industrial foundation.

Clusters like Coimbatore, Rajkot, Pune, Faridabad, Ludhiana, Belagavi, and Hosur have demonstrated that Indian MSMEs can compete successfully in global markets when they combine technical expertise with quality, reliability, and innovation.

However, global competitiveness will increasingly depend not only on manufacturing capability but also on digital capability. International customers now expect real-time communication, product traceability, quality documentation, sustainable practices, and faster response times. Enterprises that embrace digital transformation will be better positioned to meet these expectations.

## The Factory of 2047

Imagine walking into an engineering factory in the year 2047.

Production planning begins with artificial intelligence analysing customer demand, market trends, and raw material availability. Machines automatically adjust production schedules based on order priorities. Collaborative robots assist operators in assembly and material handling. Sensors monitor every critical process, ensuring consistent quality and optimal energy consumption.

Each product carries a digital identity that records its complete manufacturing history-from raw material procurement and machining operations to testing, packaging, and dispatch. Customers can access this information instantly, reinforcing confidence in quality and traceability.

Maintenance teams receive alerts before equipment failures occur. Renewable energy powers a significant portion of factory operations. Water is recycled, waste is minimized, and production systems continuously optimize resource utilization.

Employees work in technology-enabled environments where routine tasks are automated, allowing them to focus on innovation, problem-solving, and continuous improvement. Training is continuous, and digital tools enhance-not replace-human expertise.

This vision is not an unattainable dream. Around the world, many elements of this future are already taking shape. The challenge before Indian manufacturers is to adopt these innovations thoughtfully and adapt them to local needs.

## From Cost Competitiveness to Value Competitiveness

For many years, India's manufacturing advantage was primarily associated with competitive labour costs. While cost will always remain important, the future belongs to enterprises that create value rather than simply offer lower prices.

Value is created through innovation, consistent quality, reliable delivery, responsive customer service, sustainable manufacturing, and technological capability.

A customer purchasing an industrial pump today evaluates more than hydraulic performance. They may also consider energy efficiency, lifecycle cost, digital monitoring capabilities, service support, environmental compliance, and the manufacturer's ability to provide complete documentation.

Similarly, manufacturers of motors, valves, compressors, machine tools, and engineering components must increasingly differentiate themselves through design excellence, process capability, digital integration, and customer-centric solutions.

The transition from cost competitiveness to value competitiveness represents one of the most significant opportunities for Indian MSMEs.

## Innovation as a Way of Life

Innovation does not always emerge from large research laboratories or billion-dollar investments.

Many of the most meaningful innovations begin with a simple question:

"Can this be done better?"

An improved production layout that reduces material movement.

A digital dashboard that provides instant visibility into production performance.

A redesigned impeller that improves pump efficiency.

A predictive maintenance system that prevents costly downtime.

An employee's suggestion that reduces setup time by ten minutes.

These are innovations.

The culture of continuous improvement has long been one of the defining strengths of successful manufacturing organizations. Industry 4.0 provides powerful new tools, but innovation will continue to be driven by curious minds, collaborative teams, and visionary leadership.

## The Expanding Role of Engineering MSMEs

Engineering MSMEs are no longer merely suppliers of components or contract manufacturers. Increasingly, they are becoming partners in product development, technology integration, and innovation.

Many Indian MSMEs now design their own products, develop proprietary technologies, obtain international certifications, and export to demanding global markets. Their contributions extend beyond manufacturing to research, customization, after-sales support, and engineering services.

As India's manufacturing ecosystem evolves, MSMEs will play a pivotal role in strengthening domestic supply chains, reducing import dependence, supporting strategic sectors, and generating employment across urban and rural regions.

Their growth is therefore not only an economic necessity but also a national priority.

## Collaboration: The New Competitive Advantage

- No enterprise succeeds in isolation.
- The future of manufacturing will be built on collaboration among industry, academia, government, technology providers, financial institutions, and industrial associations.
- Engineering institutions can accelerate research and skill development.
- Technology companies can provide affordable digital solutions.
- Government agencies can create enabling policies and infrastructure.
- Industry associations can facilitate knowledge sharing, networking, and collective problem-solving.
- Such partnerships create innovation ecosystems that benefit enterprises of every size.
- For associations like SIEMA, this presents an opportunity to become catalysts for digital transformation by fostering dialogue, promoting best practices, encouraging technology adoption, and representing the aspirations of India's engineering community.

## Leadership in the Digital Age

- Every industrial revolution has demanded a new style of leadership.
- The leaders of tomorrow will not be defined solely by technical knowledge or financial acumen. They will be distinguished by their willingness to embrace change, encourage innovation, empower employees, and build organizations capable of continuous learning.
- Digital transformation begins not with software or machines, but with leadership.
- It requires the courage to question established practices, the humility to learn new approaches, and the vision to prepare today's enterprise for tomorrow's opportunities.

Above all, it requires recognizing that transformation is not a destination but an ongoing journey.

## A Call to India's Manufacturing Community

- India's engineering entrepreneurs have never shied away from challenges.
- They have built globally respected enterprises from modest beginnings, transformed family-owned workshops into export-oriented industries, and demonstrated extraordinary resilience during periods of economic uncertainty. Their ingenuity has powered irrigation systems, industries, infrastructure, energy projects, and countless manufacturing sectors across the country.
- Today, a new opportunity beckons.
- The Fourth Industrial Revolution is not asking Indian manufacturers to abandon their strengths. It is inviting them to build upon those strengths through digital technologies, sustainable practices, and continuous innovation.
- Every enterprise-regardless of its size-can begin this journey.

- The first step may be implementing an ERP system.
- The second may be digitizing quality records.
- The third may involve machine monitoring, predictive maintenance, or cloud-based collaboration.
- Each step strengthens competitiveness.
- Each improvement enhances resilience.
- Each innovation prepares the enterprise for the future.

## Conclusion

The story of Indian manufacturing has always been one of determination, enterprise, and progress.

From traditional workshops to advanced engineering industries, from domestic markets to global exports, the sector has consistently evolved to meet new challenges. Industry 4.0 represents the next chapter in this remarkable journey.

For MSMEs, the path ahead is both demanding and inspiring. Success will no longer depend solely on production capacity but on the ability to innovate, digitize, collaborate, and create sustainable value.

The future belongs to enterprises that are agile enough to embrace change, disciplined enough to pursue continuous improvement, and visionary enough to invest in people as much as technology.

As India advances towards the vision of Viksit Bharat 2047, the manufacturing sector will remain one of the principal drivers of national development. Within this sector, engineering MSMEs will continue to play a defining role by creating employment, strengthening supply chains, advancing technological capabilities, and showcasing Indian excellence on the global stage.

The Fourth Industrial Revolution is not merely transforming factories—it is reshaping the future of industry itself.

For Indian manufacturers, the message is clear:

**The future is not something to be awaited. It is something to be engineered.**

And the time to begin is now.

### நேர மேலாண்மையின் முக்கியத்துவம்

1. *இலக்குகளை எளிதில் அடைய உதவுகிறது*
   *சிறிய இலக்குகளாகப் பிரித்து திட்டமிட்டு செயல்பட்டால் பெரிய இலக்குகளையும் எளிதில் அடைய முடியும்.*
2. *மனஅழுத்தத்தைக் குறைக்கிறது*
   *வேலைகளை கடைசி நேரத்தில் செய்வதால் ஏற்படும் பதற்றம் குறைகிறது.*
3. *உற்பத்தித்திறனை அதிகரிக்கிறது*
   *ஒரே நேரத்தில் பல வேலைகளைச் செய்ய முயற்சிப்பதை விட ஒவ்வொரு பணியையும் திட்டமிட்டு செய்வது தரமான விளைவுகளைத் தருகிறது.*
4. *தன்னம்பிக்கையை வளர்க்கிறது*
   *திட்டமிட்ட பணிகள் சரியான நேரத்தில் முடிந்தால் தன்னம்பிக்கை அதிகரிக்கிறது.*
5. *வாழ்க்கையில் சமநிலையை ஏற்படுத்துகிறது*
   *வேலை, குடும்பம், உடல்நலம், பொழுதுபோக்கு ஆகிய அனைத்திற்கும் நேரம் ஒதுக்க முடிகிறது.*



# உணர்வுகளை நெறிப்படுத்துங்கள்



**சிந்தனைக் கவிஞர்**
**டாக்டர் கவிதாசன்**
இயக்குனர் மற்றும் தலைவர்,
மனிதவள மேம்பாட்டுத் துறை
ரூட்ஸ் நிறுவனங்கள், கோவை

முன்னேற வேண்டும் என்ற எண்ணமே ஒருவனை ஓயாமல் ஓட வைக்கிறது. ஆம்! ஓய்வின்றி உழைக்க வைக்கிறது. மேலும் தான் வாழும் காலத்தில் சமுதாயத்தின் அங்கீகாரத்தையும் நன்மதிப்பையும் பெற வேண்டும் என்ற உந்தல் ஒவ்வொருவருக்கும் இருக்கும் இயக்கும் சக்தியாகும். என்றாலும் மனதில் தோன்றும் எண்ணங்களைக் கூர்ந்து கண்காணித்து அவற்றை நெறிப்படுத்துவதிலும், அவ்வாறான எண்ணங்களின் வெளிப்பாடான உணர்வுகளையும் செம்மைப் படுத்துவதே வெற்றிக்கான முதன்மையான காரணியாகும். ஆம். எண்ணங்கள் ஒழுங்கானால் எல்லாம் ஒழுங்காகும். எல்லையில்லாத வெற்றிகள் நமதாகும்.

ஆகவே, ஒவ்வொருவரும், தனது எண்ணங்களின் மேல் கவனம் செலுத்த வேண்டும். அத்துடன் அத்தகைய எண்ணங்கள் செயலாகும் போதும் அதனால் ஏற்படும் விளைவுகளையும் எண்ணிப் பார்க்க வேண்டும்.

அதாவது எண்ணங்களை ஒழுங்குபடுத்திவிட்டால் வாழ்க்கையை ஒழுங்குபடுத்திவிடலாம். ஏனென்றால் எண்ணமே விதையாகிறது.

பொதுவாக மனிதர்கள் எளிதில் உணர்ச்சி வயப்படக்கூடியவர்களாக இருக்கிறார்கள். நமது எண்ணங்கள் தான் உணர்வுகளாக பின்னர் செயல்களாக வெளிப்படுகிறன. அதாவது இதை ஆங்கிலத்தில், Thought, Emotion and Action (TEA) குறிப்பிட விரும்புகிறேன்.

அதாவது உணர்வுகளின் வெளிப்பாடான செய்கைகளையும் கவனிக்கத் தொடங்க வேண்டும். அவ்வாறு செயல்களைச் செம்மைப் படுத்துவதன் முதற்படியாக உணர்வுகளைக் கவனித்து அவற்றின் போக்கையும் வெளிப்பாட்டையும் நன்னெறிப்படுத்திக் கொள்ள வேண்டும்.

கட்டுக் கடங்காத கோபம், வெறுப்பு, விருப்பு, முறையற்ற காமம், பொறாமை, விரோதம் போன்றவை உணர்ச்சியின் வெளிபாடாக மாறுவதைக் கவனித்து அவற்றை மனதிலிருந்து விலக்கி விட வேண்டும். அப்பொழுதுதான் மனம் தெளிவாகவும் மனதில் தோன்றும் எண்ணங்கள் வலிமை மிக்கதாகவும் அமையும்.

எண்ணம் வலிமையாக இருக்கும் போது, அதனை நற்செயலாக்கிக் கொள்ளும் சூழலும் ஒத்துழைப்பும் இயற்கையாகவே கிடைத்துவிடும் என்பதை எனது அனுபவத்தில் அறிந்துள்ளேன். இது கடினமான செயல்தான் என்றாலும் முடியாத காரியமில்லை! துணிந்து முயன்றால் நிச்சயம் முடியும். உணர்வுகளை மேலாண்மை செய்யும் கலையை ஒவ்வொருவரும் கற்றுக் கொள்ள வேண்டும். அதற்குக் கீழ்காணும் திறன்களில் கவனம் செலுத்திக் கற்க வேண்டும்.

1. முதலில் உங்களுடைய எண்ணத்தை கண்காணிக்க தொடங்க வேண்டும். உணர்ச்சிமனம் (Emotional Mind) மற்றும் அறிவு மனம் (Rational Mind) என்ற இரண்டு மன நிலைகளில் இருந்து நாம் இயங்குகின்றோம். என்றாலும் உணர்ச்சி மனத்தை அறிவு மனம் தனது கட்டுப்பாட்டில் வைத்திருக்குமாறு பார்த்துக் கொள்ள வேண்டும்.
2. சுய கட்டுப் பாட்டைக் கடைப்பிடிக்க வேண்டும் (Self control). சுய கட்டுப்பாட்டுடன் இருப்பது ஆரம்பத்தில் சற்று கடினமானதாகத் தான் இருக்கும் என்றாலும் அவ்வாறான சுயகட்டுப்பாடு ஒருவருக்கு வாழ்நாள் முழுவதும் எல்லா நன்மைகளைப் பெற்றுத் தரும்.
3. மற்றவர்களின் உணர்வுகளைப் புரிந்து கொண்டு, அவற்றிற்க்கு மதிப்பளிக்கும் விதமாக நடந்து கொள்வதுடன் அவர்களின் துயர் துடைக்கும் மனிதராகவும் மாற வேண்டும். மனித மருந்தாக (Human Medicine) வேண்டும்.
4. தன்னம்பிக்கையுடன் செயல்பட வேண்டும். சுயபட்சாதாபம் (Self pity) நம்பிக்கையின்மை, தாழ்வு மனப்பான்மை, கர்வம் (Ego) போன்றவற்றைத் தகர்த்தெரிந்துவிட்டு, பரந்தமனப்பான்மையுடனும் தன்மீது தளராத நம்பிக்கை கொண்டு செயல்களைத் தொடங்கி,

தொய்வின்றி முயன்று முடித்துக் காட்டும் துணிச்சலை வளர்த்துக் கொள்ள வேண்டும். அகந்தைக்கிடையே நடக்கும் போரில் தோற்பவரே வெற்றி பெறுவார் (In the battle of ego; loser is the real winner) என்பார்கள்.

5. சூழலையும் மனிதர்களையும் புரிந்து உணர்ந்து தேவை எனில் மாற்றியமைக்கவும், முடியாத நிலையில் அவற்றை ஏற்றுக் கொள்ளவும் தேவையான மனப்பக்குவத்தை உருவாக்கிக் கொள்ள வேண்டும்.

மேற்கண்டவாறு, உங்களுடைய உணர்வுகளை கையாண்டு, அவற்றை செம்மைப்படுத்தும் போது, எதையும் சாதிக்கும் ஆக்க சக்தியாக உங்களுடைய உள்ளுணர்வு மாறிவிடும்.

மேலும் தொழில், குடும்பம், சமுதாயம், சுயம் என நான்கு நிலைகளில் இயங்கும் நமது வாழ்க்கை வெற்றிகரமாக நடத்துவதற்கு, தொழில் ரீதியான செயல்பாடுகளில் அறிவு ரீதியான அணுகுமுறையும், குடும்ப உறவு மேலாண்மையில் உணர்வுரீதியான அணுகு முறையும், சமுதாயச் செயல்பாடுகளில் பண்பு ரீதியான அணுகுமுறையும், இம்மூன்றும் கலந்தவாறு சுய நிர்வாகம் இருக்க வேண்டும். இவ்வாறு சூழலுக்குத் தகுந்தவாறு அறிவையும், உணர்வையும் பண்பையும் கலந்து பயன்படுத்துவதே வெற்றிமேல் வெற்றி பெறுவதற்கான எளிய வழியாகும்.

**விழிப்பு நிலையை இழக்கும்போது உணர்வு பொங்கவிடும்**

**அறிவு நிலையின் கண்விழிப்பில் துயர் துடைக்கும் வழிபிறக்கும்.**

## நேர மேலாண்மை - வெற்றிக்கான பொன்னான திறவுகோல்

"காலம் பொன்னைவிட மேலானது" என்பது நம் முன்னோர்களின் ஆழ்ந்த அனுபவத்தின் வெளிப்பாடாகும். இழந்த செல்வத்தை மீண்டும் சம்பாதிக்கலாம்; இழந்த உடல்நலத்தை மீட்டெடுக்கலாம்; ஆனால் ஒருமுறை கடந்துபோன நேரத்தை எவராலும் திரும்பப் பெற முடியாது. மனிதனின் வாழ்வில் அனைவருக்கும் சமமாக வழங்கப்பட்டிருக்கும் ஒரே வளம் நேரம் மட்டுமே. ஒரு நாளில் 24 மணி நேரம் என்ற அளவு அனைவருக்கும் ஒன்றே. ஆனால் அந்த நேரத்தை எவ்வாறு பயன்படுத்துகிறோம் என்பதே ஒருவரின் வெற்றியையும் தோல்வியையும் தீர்மானிக்கிறது. எனவே, நேரத்தைத் திட்டமிட்டு, ஒழுங்காகப் பயன்படுத்தும் திறமையே நேர மேலாண்மை எனப்படுகிறது.

நேரம் என்பது வாழ்க்கையின் அடிப்படை முதலீடு. வாழ்க்கையில் நாம் செய்யும் ஒவ்வொரு செயலுக்கும் நேரமே மூலதனமாக அமைகிறது. உலகின் மிகப்பெரிய தொழிலதிபர்கள் முதல் சாதாரண தொழிலாளர்கள் வரை அனைவருக்கும் ஒரே அளவிலான நேரம்தான் கிடைக்கிறது. ஆனால் வெற்றியாளர்கள் அந்த நேரத்தை புத்திசாலித்தனமாகப் பயன்படுத்துகிறார்கள்.

ஒரு மாணவன் தனது படிப்பிற்காக நேரத்தை ஒதுக்கினால் சிறந்த மதிப்பெண்களைப் பெற முடியும். ஒரு விவசாயி சரியான பருவத்தில் விதை விதைத்தால் மட்டுமே நல்ல விளைச்சலைப் பெற முடியும். ஒரு தொழிலதிபர் சரியான நேரத்தில் முடிவெடுத்தால் மட்டுமே சந்தையில் வெற்றி பெற முடியும். இதனால் நேரத்தின் முக்கியத்துவம் எவ்வளவு உயர்ந்தது என்பதை உணரலாம்.

நேர மேலாண்மை என்பது வெறுமனே கடிகாரத்தைப் பார்த்து செயல்படுவது அல்ல. நமது இலக்குகளை அடைய வேண்டிய பணிகளை முன்னுரிமைப்படுத்தி, அவற்றை சரியான காலத்திற்குள் நிறைவேற்றும் திறமையாகும்.

நேர மேலாண்மை என்பது:

- திட்டமிடுதல்
- முன்னுரிமை நிர்ணயித்தல்
- தேவையற்ற செயல்களைத் தவிர்த்தல்
- ஒழுக்கத்துடன் செயல்படுதல்
- தொடர்ந்து சுய மதிப்பீடு செய்தல்

இவற்றின் ஒருங்கிணைந்த செயல்பாடாகும்.

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SRB M/c. - SIERRA, USA - 5 Lines
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Inches Size - Bore Dia 1.50inch to 5inch
Length 8000mm Max.

**Manufacturer of**

1. Precision cold rolled tubes Seamless & Welded
2. Precision Machined Tubular components
3. Stainless Steel Welded Tubes @ Own Tube Mill



Hydraulic Cylinder S/A's





Submersible Pump Parts





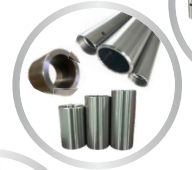
Farm Equipment Parts





Motor - Housing / Body / Yoke / Frame For Automotive and Non Automotive





Automotive - Heavy Vehicle Parts





Transformer Valves





Textile Machinery Parts



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Presentation by the Birla Pivot team on "**Powering Smart Sourcing for Indian Business**" was organised for SIEMA members. The session highlighted how digital procurement solutions can help industries streamline sourcing processes, improve transparency, and enhance operational efficiency.
On 1st July 2026

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DOUBLE FAST-ON



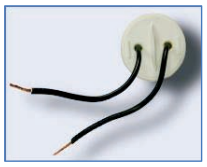
SINGLE FAST-ON



CABLE



BI-POLAR SLEEVE INSULATED



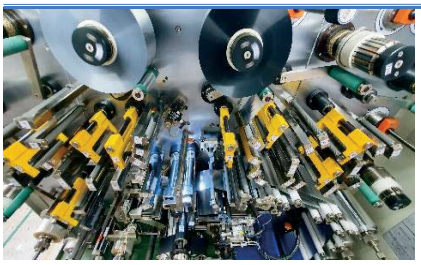
BIPOLAR



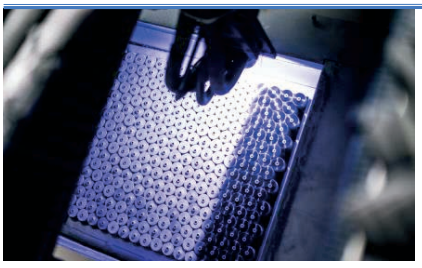
UNIPOLAR

| DESCRIPTION | DEFAULT PARAMETERS |
|---|---|
| DIELECTRIC | Metallized Polypropylene Film |
| DUTY FREQUENCY | 50 / 60 / 120 Hz |
| CLIMATIC CATEGORY | 40/85/56 |
| CAPACITANCE TOLERANCE | ±5 %, ±10 %, ±15 % |
| VOLTAGE TEST BETWEEN TERMINALS | 2.0 Times Rated Voltage (10 seconds) |
| VOLTAGE TEST BETWEEN TERMINAL AND CASE | 2.0 kV (2 seconds) |
| ANGLE OF LOSS Dv/dt – Tan Delta | ≤20 X 10-4 / 20 (V/µs) |
| CLASS OF SAFETY PROTECTION | P0, P1, P2 / S0, S1, S2, S3 |
| CLASS OF OPERATION | CLASS A / B / C / D |
| ENCAPSULATION | Dry Type – Bio-Degradable Polyurethane Resin |
| TESTED ACCORDING TO | IEC / BIS / UL STANDARDS |
| CERTIFIED | BIS, CE, RoHS |
| COMPLIANCE | REACH, UL 810 |

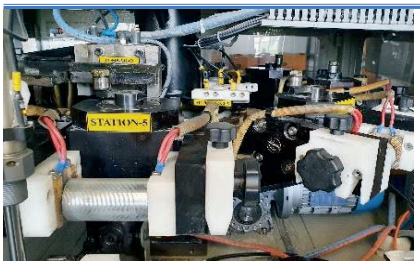
### INFRASTRUCTURE



AUTOMATED WINDING



ROBOTIC-SPRAY METALLISATION




AUTOMATED ROUTINE AND TYPE TESTERS



ROBOTIC ASSEMBLY OPERATIONS

**PRODUCT CERTIFICATIONS**

IS : 2993
CM/L – 6500052005

Central Power Research Institute
CPRI APPROVED

CE

RoHS 3 COMPLIANT EU 2015/863

REACH COMPLIANCE

**MANAGEMENT CERTIFICATIONS**

TÜV INDIA

- ISO 9001
- ISO 14001*
- ISO 45001*

**Products have been Routine, Type and Endurance Tested at CPRI- Central Power Research Institute – Bangalore for Conformity to Applicable standards and Design requirements.**

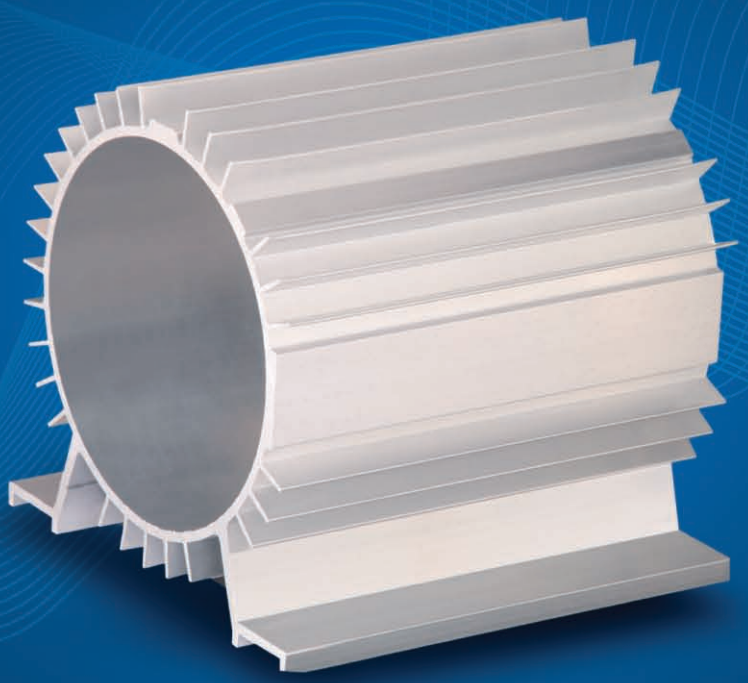

## B J ELECTRONICS PRIVATE LIMITED

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