

# Manufacturing Today

DECISIVE TOOL FOR MANUFACTURING EXCELLENCE

# INDIA PLUGGED

IN FOR AN  
ELECTRIFYING  
FUTURE

RECENT POLICY REFORMS ACCELERATING  
THE GROWTH OF EV SECTOR AS INDIA  
CHASES THE GOAL OF BECOMING NET-  
ZERO BY 2070 PLEDGED AT COP26

- PREDICTIVE MAINTENANCE
- AUTOMOTIVE



# MINIMISING DOWNTIME

HOW IOT IS TRANSFORMING THE MANUFACTURING PROCESSES BY IMPROVING PREDICTIVE MAINTENANCE

BY SYED AMEEN KADER

**WHILE THE BENEFITS OF DIGITAL** technologies are immense, it is in the area of predictive maintenance that manufacturers can derive the significant impact.

With the use of sensors and data analysis, companies can spot patterns in equipment condition and performance – an important knowledge that helps accurately predict when a failure might occur. Manufacturers understand how important such foresight is as it eliminates unplanned downtime, delivering substantial productivity benefits.

“Failures and downtime happen regularly in perhaps

every kind of manufacturing environment. Everyone on the shop floor or the top floor understands how exasperating a machine breakdown can be,” says **Sacheen Patil**, Vice President & Global Head - IoT & Embedded Practice CoE at YASH Technologies.

Citing industry studies, he points out that unplanned downtime costs manufacturers an estimated \$50 billion.

“So it is vital to access machine data to predict potential failures of specific machines or whole manufacturing lines. Any unexpected failure causes significant production losses, which can be overcome

1. The Internet of Things (IoT) is changing the landscape of how businesses gather and analyze data across nearly every industry and sector, including manufacturing.



by monitoring real-time machine data and proactively scheduling maintenance activities," says Patil, adding that this would also prevent the machine's life from deteriorating.

He says many manufacturers are implementing solutions via IoT (Internet of things) with data from various sensors coming onto the remote monitoring platform for analysis. "This is then used to make maintenance decisions (and actions), preventing machine failure."

Oil-free compressor manufacturer ELGi Equipments, for instance, invests in technologically advanced CNC machines driven by servo motors and servo systems to deliver high-quality products and gain high productivity and uptime at its manufacturing plants. "These machines must be operated and maintained in the right condition to retain accuracy, speed, and quality to ensure capital efficiency," says **Balaji Radhakrishnan**, Vice President – Maintenance, Elgi Equipments Limited.

He underlines that unplanned disruptions in these machines due to downtime and quality issues significantly affect production, impacting customer promised delivery commitments. "Hence, there was a need to leverage technology to study the performance and condition of critical parts, which enabled us to proactively manage their maintenance process, resulting in the highest uptime, performance, and zero unplanned downtime."

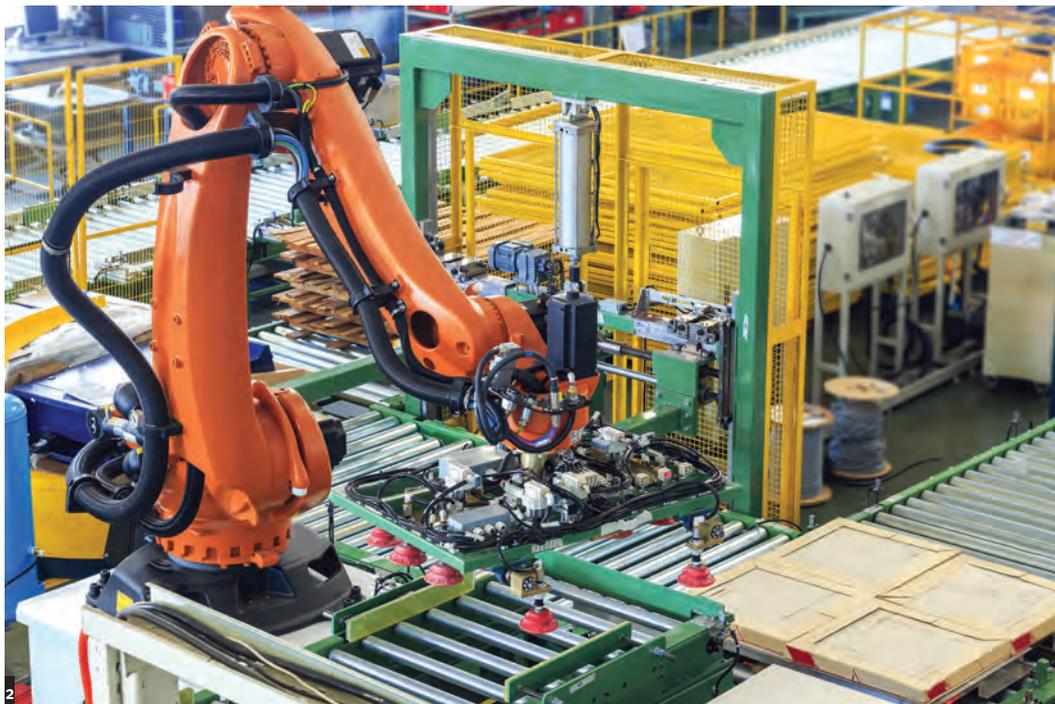
Elgi uses solutions like machine collision sensors which allow them to detect collisions or sudden overloads due to abnormal process parameters. "We



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"Predictive maintenance has a huge range of use cases across industries like oil and gas, manufacturing, aircraft maintenance and more."  
**— Praveen Arora**,  
 Vice President –  
 Internet of Things, Tata  
 Communications



2. In manufacturing, the IoT connects assets to processes, systems and people.



"By accessing and analyzing data, manufacturers can identify trends and patterns in the data and predict the failures."  
 — **Shailesh Sharma**, Director Manufacturing – India and SEA for SKF India

3. When referring to an intelligent asset or piece of equipment, by enabling these assets with IoT sensors and cognitive capabilities, they can sense, communicate, and self-diagnose issues in order to optimize performance and reduce downtime.

have been able to fix ranges for the process conditions and monitor changes online."

Radhakrishnan explains the sensors pick up variations and trigger the automatic machine interlock system to put the machine on safe standby mode. "This helps us to analyze and implement corrective actions," he said.

These sensors have helped them identify operator errors, train them to follow systems, and update the process parameters.

Tata Communications says there is an increase in the importance of digitising supply chains as enterprises are realising the dynamics of industry 4.0.

"Today shop floors are going through a complete makeover and more so a digital one where they are looking at new age technologies to scale their business. Predictive maintenance has a huge range of use cases across industries like oil and gas, manufacturing, aircraft maintenance and more,"

**Praveen Arora**, Vice President – Internet of Things, Tata Communications.

AI-based predictive maintenance can boost availability by up to 20% while reducing inspection costs by 25% and annual maintenance fees by up to 10%, he says citing a McKinsey report.

Tata Communications India IoT solutions enable real time asset tracking, data driven demand forecasting, reduce human intervention and improve operational efficiency.

Further, the company says its solutions enable connected devices to operate with low battery consumption and minimal infrastructural setup due to LoRaWAN® technology. "These solutions can also be easily integrated to any existing industrial environments and help enterprises grade devices that can withstand harsh industrial environments," it adds.

**Shailesh Sharma**, Director Manufacturing – India

and SEA for SKF India points out that one of the biggest parts of OEE loss is machine downtime, which is generally of corrective maintenance. "This loss is extremely critical in process industries because loss of production is significant."

By detecting issues well before they occur, he says production processes can be optimized and OEE can be significantly improved. "By accessing and analyzing data, manufacturers can identify trends and patterns in the data and predict the failures. These predictions provide valuable & real-time insights which lead to better-informed decisions and thereby avoid any stoppages," says Sharma.

According to him, predicting a machine failure in advance not only eliminates unwanted production loss but also significantly improves equipment availability, R&M cost, Inventory cost, employee morale. "Given the several advantages, it's imperative for manufacturers to have access to data to make our manufacturing cost-competitive and provide a competitive edge to our business."

**TECHNOLOGY TRENDS**

According to Tata Communications, one of the key trends noticed in shop floor automation is Digital Twin, which is the virtual representation of the lifecycle of an object and is majorly used to streamline factory operations. It helps in understanding the condition of the asset and enables data driven decision making process.

Whereas, in Remote assessments, says Arora, the machine's status is broadcasted live to the support agent and the machine can be accessed remotely. This proved beneficial mainly during the 'social distancing norm' and the lockdown period.

He says asset tracking is another trend which helps manufacturers by providing alerts of unauthorized movement, remote monitoring of inventory and even real time tracking in the event of a possible theft.

"Artificial Intelligence will play a significant role in enhancing human capabilities and skills and thereby increase efficiency. Artificial intelligence will continue to do what it does best – interpret data via advanced algorithms and in a much shorter time," adds Arora.

The rise of the smart factory is helping enterprises achieve a complete connected network inside and outside the organisation.

Thermography techniques is also another trend that is picking up momentum, says Arora, as it is enabling better and easier maintenance of equipment. For e.g. it can sense 'heat' as an indicator to predict faults. "This enhances worker's safety in a way and also reliability of the equipment."

Some of the latest technologies implemented by Elgi Equipments include IoT-enabled energy management system and low-cost automation with





predictive maintenance system.

“We have implemented an IoT-enabled energy management system in our state-of-the-art manufacturing plant at Kinathukadavu. IoT-enabled machines, all connected and sharing data seamlessly, were deployed to analyze the captured data using advanced statistical tools, identify energy-saving opportunities, improve systems, and conserve energy,” says Radhakrishnan.

Their plant operations have managed to achieve over 24% energy efficiency with the implementation of IoT-enabled energy management systems, resulting in power reductions of around 1.02 megawatts per year and significant savings in annual power spending.

“We continuously monitor the machine design parameters by introducing the vibration sensors, humidity sensors, temperature sensors, voltage measuring sensors, and emission measuring sensors that are connected with mini PLC,” he says.

SKF India uses various digital technologies in their factory premises to drive Maintenance 4.0 which has various dimensions such as REP [Rotating Equipment Performance] concept, Maintenance Cockpit, SKF GoPlant, etc.

Under SKF’s REP model, Sharma says they have installed more than 90 vibration sensors on critical spindles and motors to monitor the health of critical rotating equipment. The sensors feed a massive amount of data through SKF’s own IMx panels to the central analytics platform, which automatically detects anomalies in real-time and sends alerts.

“Real-time alerts ensure that we take proactive steps for equipment uptime. This guarantees the product quality is uncompromised because of prolonged high spindle vibrations. Real-time alerts help in scheduling of procurement of spare parts and

thereby controlling maintenance inventory,” he says.

Maintenance Cockpit is another web-based digital tool that SKF uses to visualize key parameters such as machine status, TBM [Time Based Maintenance] & CBM [Condition Based Maintenance] basis alerts generated from IoT sensors installed on the machines.

Whereas SKF GoPlant is an asset inspection & data collection solution that uses a mobile device for field operations. “It is a web browser-based solution for administration and reporting and is very useful for autonomous maintenance. SKF GoPlant enhances operator rounds & boosts productivity,” explains Sharma.

#### TECHNOLOGY INTEGRATION

For smooth IoT integration, Patil of YASH Technologies says one needs to understand the machine connectivity and compatibility with the IoT platform with the user requirement to provide the desired data/analysis, which provides a seamless implementation of the Internet of things.

“Also, Sensor data and machine learning models are making it possible to extract more value from large volumes of disorganized data quickly. PdM tools keep upgrading existing maintenance systems by using AI to ensure that the mission-critical assets are running at peak performance,” he adds.

Arora of Tata Communications points out that one of the major challenges manufacturers faced was siloed data. “The absence of protocols for interoperating with connected devices across IoT platforms is a significant obstacle encountered by manufacturers who want to implement IoT in their processes.”

Additionally, he says the massive data generated by IoT devices make organisations prone to cyber threats. ■



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4. The fourth wave, Industry 4.0, has begun to emerge. This will be the era of cognitive manufacturing – where IoT sensors, big data, predictive analytics, and robotics will forge the future of manufacturing operations.