GE VERNOVA

DIVERSE AND MIXED MANUFACTURING

Improve Efficiency Across Your Process and Discrete Operations

PRESSURE TO DO MORE IN MANUFACTURING

The manufacturing industry is always driving for more efficiency. According to a study by IDC, there is an opportunity of $4.5 trillion in economic value-add across the manufacturing value chain—$1.1 trillion in the factory itself.

To capitalize on this, manufacturers seek to address indicators of such inefficiency, including time-to-market being affected by just-in-time needs and pressure for reducing parts inventory, cost overruns, and machine downtime. Additional problems might include delays or bottlenecks in the rest of the organization because they can't keep up with factory improvements in cycle time and deficiency gaps in the standard languages for modeling production and manufacturing processes.

In today's manufacturing world, complexity is a significant challenge because it is not uncommon for enterprise organizations to be in more than one business. For example, GE Vernova is a large and diverse manufacturer, producing everything from wind turbines to grid solutions. Manufacturers need to find the capacity to produce what the market wants, when it wants it, and at increasingly higher quality—even when it means quickly changing lines and entire facilities over to new

products. Today, products can be conceived, developed, and sold over the Internet in a matter of weeks or days, meaning today's manufacturers are already competing on their ability to manufacture to order.

As a result, there is a movement underway in manufacturing that is profoundly changing the way products are manufactured. Mixed manufacturing environments are on the rise, with plants undertaking several types of manufacturing processes in one facility.
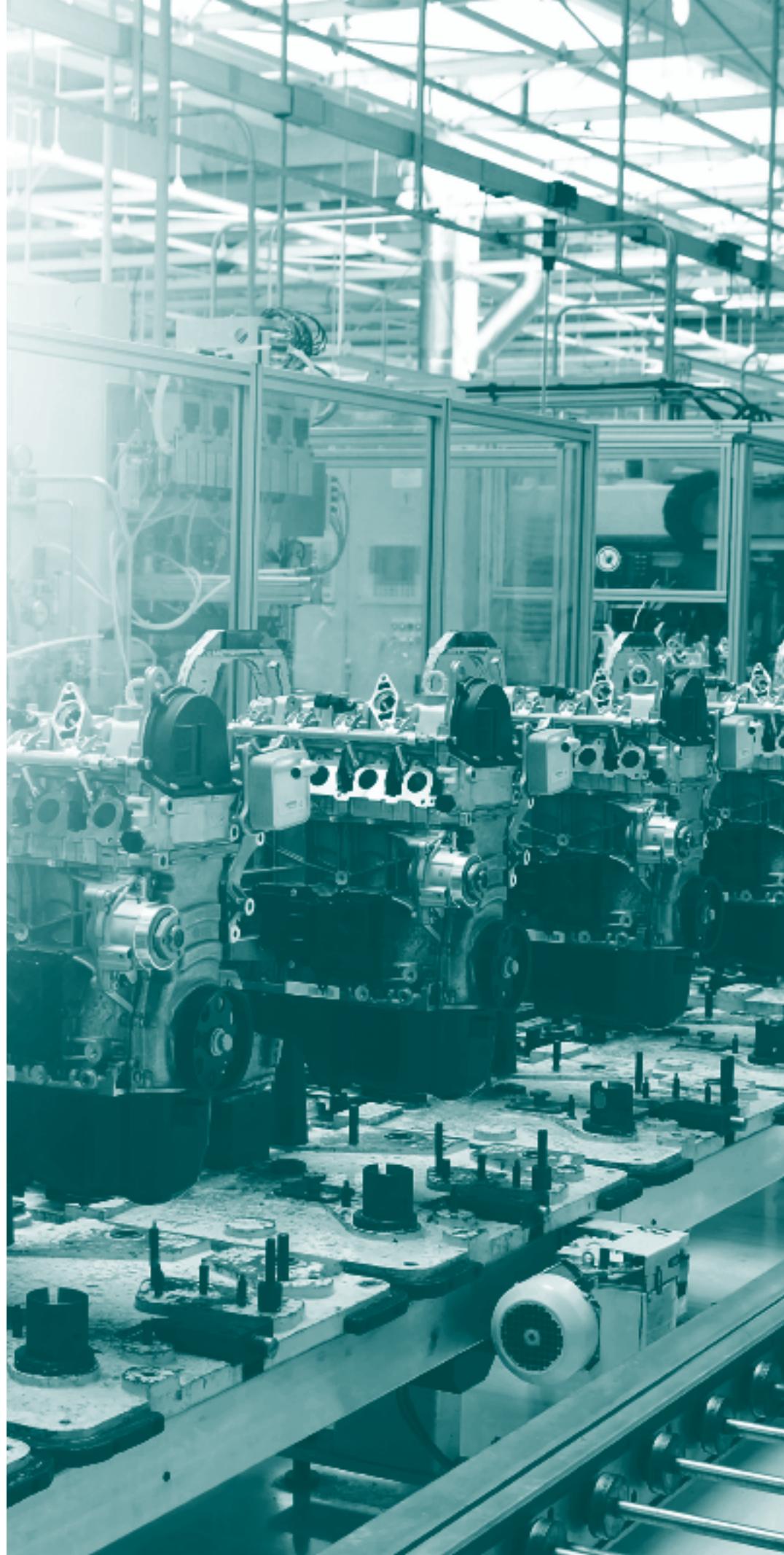
THE RISE OF MIXED MANUFACTURING

As defined, mixed manufacturing refers to plants that are undertaking several types of complex manufacturing processes within the same four walls. For example, manufacturers can be doing everything from mixing batches, cutting, and packaging all under one roof.

Certain industries have always had a combination of process and discrete manufacturing. However, today, as manufacturers are being asked to do more, there is a rise in mixed manufacturing within facilities. Furthermore, as companies undergo acquisitions and growth, a company might have one plant focused on discrete manufacturing and another on process. But, the company still needs to have commonality across those plants for enterprise visualization and optimization.

In particular, manufacturing software must meet the needs across all of a company's operations - whether process or discrete. Unfortunately, traditional Manufacturing Execution Systems (MES) have been tailored to meet the needs of specific industries rather than meet diverse manufacturing needs. Companies subsequently have several manufacturing solutions that are disconnected and creating islands of information. These hidden factories drive inefficiency, higher cost of maintenance, and lack the industrial data management needed for IoT-fueled optimization.

Unlike traditional MES software, Proficy Smart Factory from GE Vernova supports all manufacturing environments - whether process, discrete or mixed - providing one seamless MES across an entire business for greater efficiency and enterprise-wide optimization.

As an example, GE Vernova is leading the way in mixed manufacturing with its facility at Chakan in Pune that combines manufacturing for different businesses and a second in Canada.

A mixed factory has the capability to produce multiple, diverse products or individual products that require both process and discrete to manufacture such as batteries. Pune's factory connects digitally across three major areas of the value chain—product engineering, manufacturing, and supply chain operations—to integrate machine data and reduce downtime. The advanced manufacturing plant, which is located near Mumbai in western India, spans 67 acres and includes a 250,000 sq. ft. shop floor that manufactures a variety of products, and can switch to building other products for other industries. This means that GE Vernova can adjust its production in line with demand, using the same infrastructure and people in the facility. This helps cut costs, maintain economies of scale, and improve efficiencies.

IMPLICATIONS OF MIXED-MANUFACTURING FACTORIES

Performing different processes in one facility has implications on technology requirements. It is more streamlined to have one MES, SCADA and industrial data management solution for all machines and processes so that the staff only needs to learn one technology and only has to look in one place for process and performance data across the entire shop floor.

No matter what is being manufactured or what processes are required. Due to the varied production processes in a mixed-manufacturing facility, the technology should be able to handle both discrete and process. In the Pune facility mentioned earlier, operators weren't supported with a system to fully notate reasons for machine downtime and had no unified system to access technical information, record production, or view quality data. This was addressed in its transformation to a mixed-manufacturing facility.

Keeping the production in one facility means that the health of each machine is vitally important to the overall plant production of multiple different products. This drives the need to connect the machines into one visualization and employ more sophisticated approaches, like predictive maintenance to prevent downtime. Predictive maintenance gives maintenance teams the analytics tools to predict possible machine tool failures before they occur.

And a mixed-manufacturing company benefits from a holistic view into its production that allows engineers real-time visibility into machine data and manufacturing performance to allow them to optimize labor and machine run time.

Today, about 23% of manufacturing plants globally operate as smart factories, according to IDC's recent Manufacturing Insights Information Technology and Operational Technology Integration Survey. But IDC anticipates a drastic shift. 40% of manufacturers have already completed work to integrate information technology and operational technology, and 52% of manufacturers have an ongoing initiative to do so. Within five years, IDC says that more than half of manufacturers will have truly integrated their infrastructure in order to function as a smart factory. These are important building blocks to mixed factories.

HOW GE VERNOVA ACCELERATED PUNE'S DIGITAL TRANSFORMATION

After its transformation to a mixed-manufacturing factory, Pune is now serving different businesses and products for these businesses can all be built under its roof. Due to the implementation of GE Vernova solutions, the machines and computers within the Pune facility communicate in real time.

The transformation involved getting connected through Proficy Smart Factory, a manufacturing solution including Proficy Plant Applications, Proficy Historian, and CIMPLICITY HMI/SCADA. As an example, engineers connected sensors from 20 computer numeric control (CNC) machines to integrate the machine data and enable visualization of performance across machines on a single screen. This real-time visibility of machine performance enables a lean operation and the reduction of waste. A cross-functional team leverages technology to analyze data and create a plan to reduce machine downtime, enable operators to notate downtime, and allow operators to view 3D work instructions or record production and quality data.

Asset Performance Management is leveraged to monitor how Pune's assets are operating in real time. This helps operators diagnose the current health conditions of all critical subsystems of a machine and enables a framework of condition-based maintenance when that machine's tag data, in combination with the machine's maintenance history, is modeled using analytics. This allows them to diagnose health conditions, provide predictive maintenance recommendations and identify equipment issues before they occur.
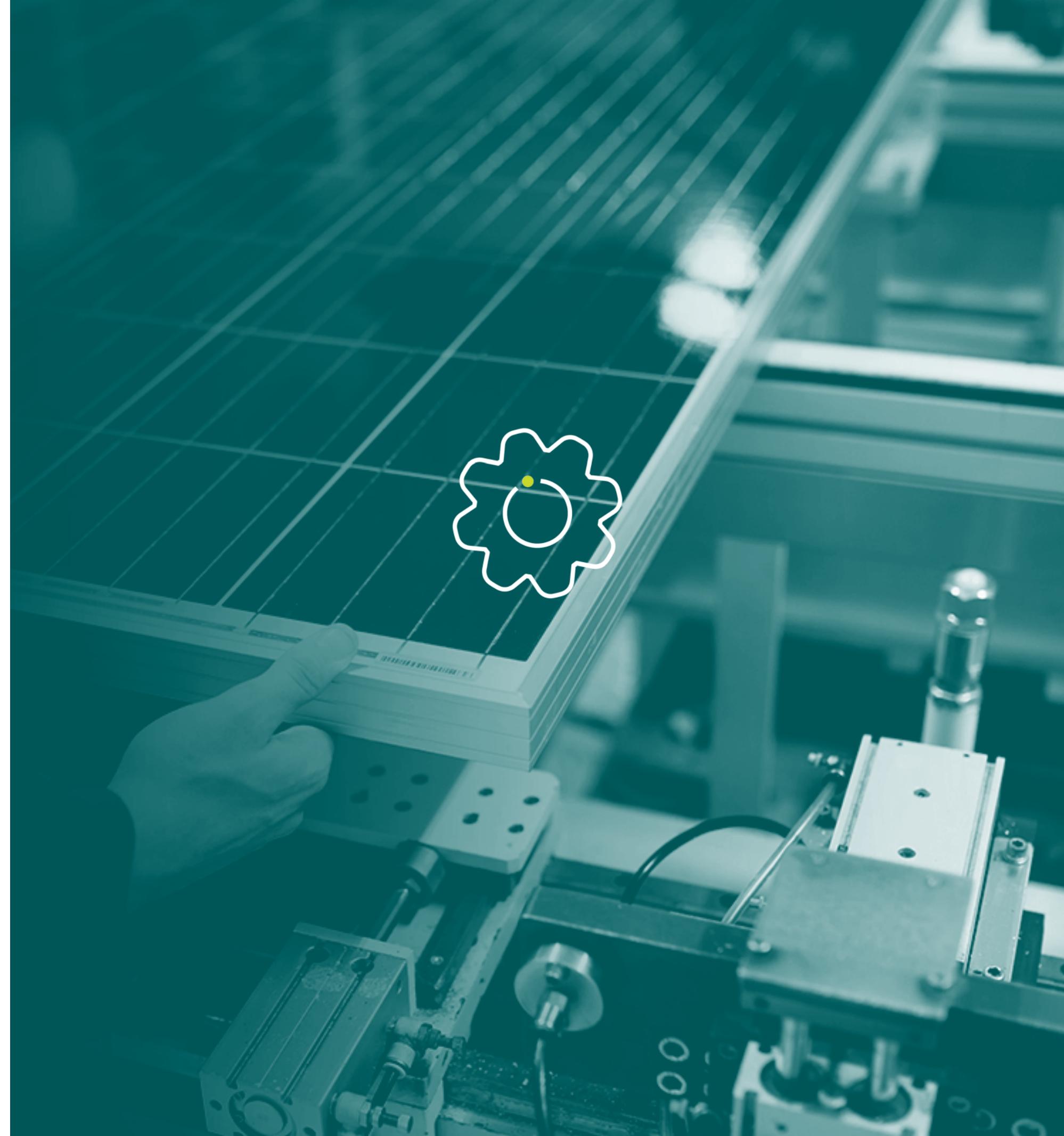
BRILLIANT RESULTS

As a result of getting connected, the Pune facility now has a single visualization of their integrated machine data as well as a machine downtime notation system for operators, and established a unified user interface to provide technical, production and quality data. This has driven significant gains in effectiveness for the Pune facility.

Pune has experienced $4 million in cost avoidance for three of their CNCs and a 45% to over 70% increase in overall equipment effectiveness (OEE) across their connected machines. Operating costs per hour are down significantly.

With over 20 machines connected across multiple critical processes and over 150 sensors being tracked real time, the Pune facility expects a return on investment within 1.2 years of implementation. In addition, they expect a cost savings of $170,000 in year one from improvements in both mean time between failures (MTBF) improvements and quality rejections due to breakdowns.

Today, the Pune facility is ready to undertake the next phase of its evolution. As part of this phase, the facility will integrate their ERP, PLM, and MES systems to pull in quality, labor, and supply chain data to provide visibility for labor hours, task time, and work in progress. These aspects of this phase will decrease maintenance costs with predictive analytics and leverage Proficy Platform for advanced analytics.

MIXED MANUFACTURING

PUNE INDIA
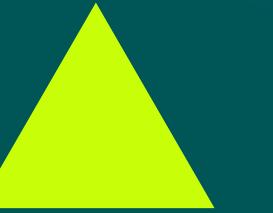
▲ 18% Equipment effectiveness

76% → 45% Operating cost per hour

+3 inventory turns

CAN YOU IMPROVE YOUR MIXED-MANUFACTURING OPERATIONS?

Consider these five questions when evaluating your mixed manufacturing environment.

- Are you managing more than one MES across your enterprise?
- Do you have real-time access to all of the manufacturing data required for optimization?
- Do you have hidden factories within your operations?
- How are you increasing efficiency across all of your production?
- How are you empowering teams for continuous improvement?

To learn more about how Proficy Smart Factory can help you manage mixed production complexity and improve manufacturing efficiencies, visit our Proficy Manufacturing Execution Systems page.

FIND OUT MORE

ABOUT GE VERNOVA'S PROFICY® SOFTWARE & SERVICES

GE Vernova's Proficy® Software & Services empowers teams, illuminating the path to a greener, more profitable future. Our proven industrial software accelerates innovation, enables connected workers, and operationalizes sustainability. We're driving measurable progress for over 20,000 diverse customers around the world.
The Proficy portfolio includes cloud-based and on-prem HMI/SCADA, MES, industrial data management, and analytics. Our software solves the toughest industrial challenges and is used in applications such as discrete, hybrid, and continuous manufacturing; utilities automation; metro transit; and much more. Proficy offers architecture flexibility including single machines, remote substations, and complex, distributed networks that span multiple factories and geographies.

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