DIGITAL MANUFACTURING

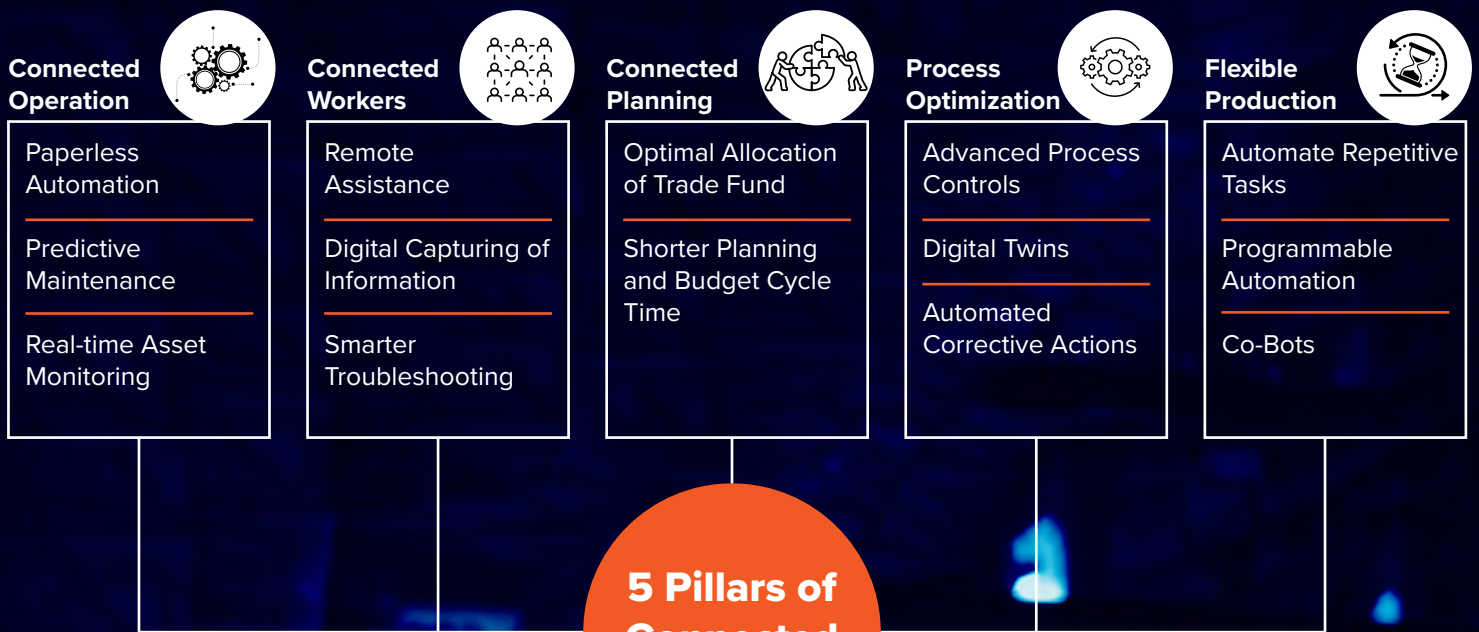## 5 PILLARS OF A CONNECTED FACTORY

INTRODUCTION

In the age of disruption, manufacturers need to constantly find innovative ways to overcome challenges like data sitting in silos, downtime (which could be prevented), rigid production and labor shortage issues. Companies need to listen to their operators and technicians and enable them to have a say in the day-to-day processes. Issues like being unable to find a product/part on the floor lead to unnecessary delays, miscommunication, and dissatisfaction among workers.

Current Industry 4.0 trends, including IoT, Cloud Computing, Digital Twin, and Artificial Intelligence technologies, all present a variety of options for organizations to create products without human interference. These modern developments are essential for bringing company agility and overcoming industrial problems in manufacturing. As per Gartner research, 80% of CEOs are raising their investments in digital technology to combat the present economic headwinds, such as inflation, skills shortage, and supply restrictions.

Downtime due to the breakdown of machines, inconsistent quality and inability to sense demand due to changes in external or internal factors are some of the other challenges that lead to productivity, operation efficiency and customer satisfaction issues.

The concept of the connected factory is a leap forward and is centered around the idea of aligning Operational Technology (OT), Engineering Technology (ET) and Information Technology (IT) to garner greater efficiencies and cost savings. Below are the five pillars of a connected factory that go beyond simple automation and optimization to a more enterprise-level strategy to realize the full potential of the latest technological advancements.

Connected Operation
- Paperless Automation
- Predictive Maintenance
- Real-time Asset Monitoring

Connected Workers
- Remote Assistance
- Digital Capturing of Information
- Smarter Troubleshooting

Connected Planning
- Optimal Allocation of Trade Fund
- Shorter Planning and Budget Cycle Time

Process Optimization
- Advanced Process Controls
- Digital Twins
- Automated Corrective Actions

Flexible Production
- Automate Repetitive Tasks
- Programmable Automation
- Co-Bots

5 Pillars of Connected Factory

CONNECTED OPERATIONS

Covid-19 led to disruptions in customer behavior and significantly increased the need for better real-time visibility and exchange of data across the supply chain from suppliers to manufacturing to logistics to customers and vice versa. This can enable the supply chain to be more responsive to customer demands.

As operations are getting connected, the amount of data generated throughout the value chain has exponentially increased. Connected operations have become crucial with Industry 4.0 adoption, leveraging digital technologies across the value chain. It delivers significant benefits such as faster time to market, better asset utilization, harnessing intelligent insights, equipment effectiveness and driving more innovative actions.

A connected supply chain can help business leaders in better cost-benefit analysis when making decisions to employ enterprise-level solutions, which are capex intensive vs. focused solutions to immediate challenges which might be less cost-intensive and realize the same benefits. Also, an integrated view of inventory data and upcoming deliveries from various warehouses can improve inter-warehouse collaboration to achieve faster customer deliveries.

CONNECTED WORKERS

Connected workers is one of the most important elements of a connected factory strategy. The aim is to enable the front-line workers & technicians with real-time information on mobile computing platforms, thus making the workflows paperless and seamless. This can help the operator monitor performance, complete the checklist to ensure the production line runs well, and troubleshoot any issues quicker. The process of capturing knowledge digitally to pass it on when experienced workers leave the organization has also become the need of the hour, especially in areas where skilled workers are hard to find.

Subject matter experts and technology experts can also help workers on the ground daily if they are connected using virtual/augmented reality tools. Also called augmented workers, they implement various digital technologies, applications, and tools keeping them connected to their equipment and to each other. By enabling operators to make data-driven decisions, enhance system-level procedures, and conveniently communicate their expertise with one another, connected workers can have instant access to an extensive, interactive knowledge base that consists of the latest standard operating procedures.

For high-value assets like expensive machines and equipment's conducting predictive maintenance in a more automated connected way can help businesses reduce the cost associated with failures and minimize downtime of critical equipment.

This enabling of workers also gives the management crucial insights into labor productivity, safety concerns, and resource utilization.

CONNECTED PLANNING

Disjointed & siloed approach towards trade planning, long planning & budgeting cycle times (mostly manual and Excel-based), and suboptimal resource/trade fund allocation has kept CPG & manufacturing leaders scratching their heads for not being able to make the best strategic and tactical decisions.

Since data for all departments sit in silos, there are challenges to planning that drive performance and execution. Disconnected planning greatly hinders the ability to assess the impact of a change across the value chain. Thus, integrated planning is the need of the hour for the manufacturing industry, especially as their operating models need to be relooked given the recovery from the pandemic.

Manufacturing leaders can make better decisions with objective, up-to-date market data with connected intelligent equipment and IT system. These relatively hyper-connected networks enable real-time inventory management, process revisions, and innovation to meet demand. Connected manufacturing links sales, distribution, supply, and financial planning that ensure all processes, products, and plants are well-connected, leading towards a more holistic production level.

A connected business forges a tighter link between supply and demand, saves time, develops new models, and speeds up the process of new product introductions in the market.

PROCESS OPTIMIZATION

Large manufacturing conglomerates can master their increasingly complex operations by deploying advanced process controls that can be implemented using data from the factory floor, machines, automation tools, etc.

On top of it, adding automation to your control systems can greatly enhance product quality and resource utilization. In addition, manufacturers will get fewer mistakes and more consistent results.

Utilizing energy is another significant cost to a large manufacturer, so automated process controls can help plant managers oversee electricity consumption by large equipment in real time and thus take corrective measures if required. Manufacturers also deploy digital twins to analyze proposed new processes, production line systems and layouts, and anticipate errors/loopholes in the process affording key personnel a more insightful picture before installation begins.

The objective of the entire process is to produce the greatest output with the highest levels of quality and automation, incurring the least number of losses possible. Process optimization undoubtedly increases overall plant productivity, enhances cost optimization, saves time for workers indulged in repetitive tasks, and improves compliance with government and industry standards.

Process plants can access real-time data by implementing IoT devices, improve quality and consistency with higher automation, create a virtual model of the plant by using Digital Twin with Machine Learning (ML), and analyze real-time data with process-based AL and ML tools.

With the growing demand for customization and faster demand fulfillment, automakers, for example, have deployed a just-in-sequence production strategy, which can greatly benefit from optimizing processes and ensuring that the right part or component reaches the production line and in the correct order.

FLEXIBLE PRODUCTION

It enables manufacturers to provide consumers with the specific products that they need in a flexible way that also reduces manual efforts in the process, thereby enabling the engineers to take on more advanced tasks that are more rewarding as well.

Programmable automation can make the production line more flexible as new programs can be entered into the equipment/machine to produce new products, making it easier to deal with design variations. Such a flexible production produces various parts with virtually no time lost for changeovers.

Covid-19 has pressured manufacturers to get the right labor and sometimes face labor shortages. With the ever-growing need to cater to the rapidly changing demand and innovative packaging, deploying collaborative robots (COBOTS) has become the need of the hour for large production companies, especially in areas of operations where the most return on investment can be realized. These robots can work collaboratively with their human counterpart on menial, repetitive tasks while the human operator solves more complex problems. For true industrial automation, the movement and operation of these bots must be in sync with the Material Requirement Planning (MRP) and actual demand. This means that the automation system must be able to respond quickly to changes in demand and adjust its production accordingly.

Machine flexibility can be a crucial negotiator to all the challenges mentioned above because it is not just constructed in the plant from the start. Still, it also manages the entire manufacturing process from end to end. One of the most significant qualities of machine flexibility is that it can adapt to the plant's current needs by producing new products or introducing a new component of a manufactured product. This broad capability of a flexible manufacturing system ultimately results in the highest levels of efficiency in production.

UNLOCK
BUSINESS VALUE

Unlocking the power of data by making data from different sources like warehouse and inventory management, manufacturing resource planning (MRP), manufacturing execution systems (MES), edge computing, etc., more accessible throughout the organization can help reduce the manufacturing cycle time from 10 to 20%.

Covid-19 has led to an even bigger need for manufacturers to be even more agile to external shocks through different geographies, and thus a connected supply chain is important to manage risk more effectively. One example of using predictive analytics is to better plan for production by tracking shipping containers and estimating adjusted supply lead times, given COVID-19 related delays.

Predictive Maintenance can help flag issues before equipment failure and assist technicians in taking corrective actions in a step-by-step manner, thereby increasing the longevity of machines and reducing costs. It is estimated that, on average predictive maintenance can reduce breakdowns by an average of 70% and maintenance costs by 25%.

Using low-code platforms, small manufacturers can adapt to smarter digital technologies with lower capital expenditure. This can help them spin up basic dashboard applications to monitor machine and worker productivity, train employees and control quality by identifying defects earlier in the process.

Collaborative bots can work in tandem with their human counterpart in a production line to reduce manual, repetitive tasks by almost 30%.

HOW CAN HAPPIEST MINDS HELP?

Below are some of the case studies where Happiest Minds has helped in making manufacturing more digital.

AI & RPA-based purchase order automation to reduce cycle time and cost – For a US-based leading beverage company processing about 500 RFQs per month requires approximately 120 hours of effort.

Fleet Management platform for real-time monitoring & alerts – For a US-based industrial products and application provider (Refrigeration and Food equipment domain).
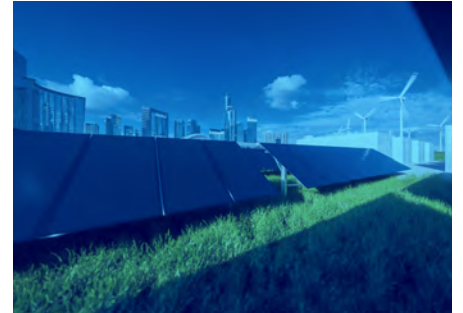
AI-based maintenance planning solution reducing planning and order creation time for one of the largest energy generation organizations in the US.

Happiest Minds addresses manufacturing issues with expertise in creating a platform-based approach to digital manufacturing. A platform that can serve as an integration point to various systems in the manufacturing operations and supply chain realms while possibly supporting and servicing end customers. With a strong understanding of the manufacturing ecosystem and deep technical expertise, we help our customers with:

Paperless Automation	**Predictive Maintenance & Scheduling**	**Quality Inspection & Batch Traceability**
Inbound & Outbound Logistics	**Smart Inventory Management**	**Security Operations Management**
Business Operations Management	**Persona Based Digital Experience**	**Real-time Asset Monitoring**

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Vidur Kaul is a Business Analyst-Presales team at Happiest Minds and has a total work experience of 7-8 years. He is an MBA & B.Tech graduate with experience in Business Analysis & Presales Solutions, Customer Success, and Product Management in IT services for Insurance, Investment Banking, eCommerce, and Market Research clients. He has a keen interest in Data & Analytics solutions and has worked on several Data Engineering & Data Science related projects. He is a creative person with a high idea orientation who believes in altruism.

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ABOUT
HAPPIEST MINDS

Happiest Minds Technologies Limited (NSE: HAPPSTMNDS), a Mindful IT Company, enables digital transformation for enterprises and technology providers by delivering seamless customer experiences, business efficiency and actionable insights. We do this by leveraging a spectrum of disruptive technologies such as: artificial intelligence, blockchain, cloud, digital process automation, internet of things, robotics/drones, security, virtual/augmented reality, etc. Positioned as 'Born Digital . Born Agile', our capabilities span digital solutions, infrastructure, product engineering and security. We deliver these services across industry sectors such as automotive, BFSI, consumer packaged goods, e-commerce, edutech, engineering R&D, hi-tech, manufacturing, retail and travel/transportation/hospitality.

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