Forward-looking manufacturers understand the need to take the lead in digital transformation as the key to smarter ways of doing business. Digital technology transforms plant operations with connectivity and interoperability for data collection, information visibility and smart decision making to improve profitability and maximise return on capital. New levels of digital collaboration across people and systems drive higher operational efficiency, quality and agility to maintain a competitive edge in today’s dynamic markets.

Today’s Industry 4.0 landscape requires adopting a smart factory approach to capitalise on big data and new manufacturing technologies.

This ebook highlights the key pillars that support a manufacturing plant in its move into a Smart Factory.
WHAT DOES IT TAKE TO BE A SMART FACTORY?
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The Smart Factory journey is an evolution of the operational excellence continuous improvement journey, fueled by the evolving technologies such as cloud computing, IOT, artificial intelligence and augmented reality, and the related digital transformation of manufacturing operations, quality, energy, asset and safety management.

In essence, a Smart Factory is a manufacturing plant that is equipped with interconnected smart assets and systems for running efficient, secure and reliable production processes with continuous optimisation and flexible adaption to changing conditions in real time. A Smart Factory is integrated with the supply chain or supply network within and/or outside of the organisation.

To transform a manufacturing plant into a Smart Factory, an organisation first needs to understand what are their strategic business priorities and build upon a digital infrastructure that offers the ability to evolve and grow along with changing business conditions and factory transformation needs.

The Smart Factory approach offers three key pillars:

- Smart Monitoring and Control
- Smart Operations and Optimisation
- Smart Asset Management

These pillars address the most critical business needs and clearly map to the value chain of the organisation by connecting all devices and assets for data collection, monitoring and proactive response, to efficiently manage the operational activities in context of the manufacturing process state or asset condition, and by optimising the performance of plants with information visibility, advanced analytics and digital collaboration across people and system.
SMART FACTORY APPROACH
The imperatives to enabling the Smart Factory reside in connecting disparate production systems. The journey begins with conceptual designing covering all aspects of operations including asset management, process management and energy management.

A Smart Factory seeks continuous improvements to optimise manufacturing efficiency by:

- Ensuring the management, execution and documentation of production operations is streamlined for better process performance and built into a model-driven approach that can be redeployed across multiple sites.
- Collecting and consolidating logged data automatically, and ensuring the data is stored securely.
- Enhancing the processes and operations around the data collection system and providing a consolidated performance view through structured analytics – from the plant floor to the CXOs.
- Integrating energy management into the overall business performance, enabling companies to identify critical energy efficiency gaps and electrical performance issues through improved operational visibility.
KEY PROPELLERS TO POWER THE SMART FACTORY
Key propellers to power the Smart Factory

**Smart Monitoring and Control**
Platform to connect any data source, making it possible to visualise, monitor and control operations, from single installation to enterprise-wide capability.
- HMI, Supervisory and Control
- Industrial Information Management
- Real-time Optimisation

**Smart Operations and Optimisation**
Maximises operational efficiency by standardising processes across the enterprise to improve performance, regulatory compliance and collaboration.
- Batch and Hybrid Process Operations Management
- Workflow Management
- Energy Sustainability

**Smart Asset Management**
Leverages enterprise data capture, cloud, augmented reality and analysis, coupled with executable actions to enable optimum maintenance and improved profitability in relation to plant assets.
- Asset Performance Strategy
- Asset Information Management
- Asset Analysis
- Asset Maintenance
Key propellers to power the Smart Factory

Smart Monitoring and Control

The smart manufacturing enterprise is made up of smart machines, plants and operations. It is of paramount importance to have a common platform to connect different technologies, enabling data integration and process modeling capabilities. Tighter integration allows organisations to be more efficient and profitable, thanks to greater flexibility and responsiveness to volatile market conditions.

A Smart Factory is able to connect, collect, store and harness data, placing valuable insights to support operational decisions.

HMI and Supervisory
Take immediate corrective operational actions, supported by advanced visualisation on everything from enterprise systems to small footprint embedded devices.

Store and Harness
Capture and store high-fidelity data to unlock trapped potential for operational improvements, from single-node to multi-site facility.

Cloud Analytics
Empower real-time visualisation of process and performance information in a secured and managed cloud environment, from operators to executive managers.
Key propellers to power the Smart Factory

Smart Operations and Optimisation

Production management involves application of planning, organising, directing and controlling to the production process operations management solutions provide the backbone for optimised operations, including manufacturing execution, reporting and analysis, information management, mobile workforce enablement and enterprise application integration.

A Smart Factory is able to achieve maximum operational performance and flexibility, while staying compliant in a regulated environment.

Manufacturing Execution

Measure equipment performance and KPIs, manage and execute production rules for both manual as well as automated operations, resulting in increased productivity, reduced unplanned downtime and shortened time-to-decision.

Manufacturing Agility

Simplify management of product formulations and ensure repeatable success across batch operations, resulting in consistent quality and faster new product introduction.

Collaboration and Sustainability

Drive higher levels of collaboration across workforce and systems, and automation of electronic workflow with detailed execution records for tracking. Reduce environmental footprint with minimised waste and efficient energy management.

Smart Factory Overview  Smart Factory Approach  Key Propellers for Smart Factory  Smart Factory - The Road Ahead
Key propellers to power the Smart Factory

Smart Asset Management
Leverage enterprise data capture, cloud, augmented reality, virtual reality and analysis to act before costly failures occur and proactively perform maintenance on assets to reduce unscheduled downtime, increase reliability and improve safety.

A Smart Factory is able to maximise value throughout the entire asset lifecycle.

Asset Strategy
Understand the value of an asset, the business risk associated with each asset’s potential failure, and the costs to approximately maintain that asset. Clear insights into consequences, results and benefits help organisations prioritise actions related to assets.

Asset Analysis
Apply the right analytics mix to maximise economic return on asset investments. Comprehensive analytics enable organisations to identify gaps in maintenance framework and to make informed decisions.

Asset Maintenance
Empower the workforce with new technologies such as augmented reality and virtual reality, to help organisations resolve maintenance and operations problems faster, accelerate time to repair and keep assets running properly.
SMART FACTORY - THE ROAD AHEAD
Conclusion

As organisations gear up to digitally transform manufacturing plants into Smart Factories, it is necessary to first evaluate the state of the business and establish a clear transformation roadmap in line with a company’s business strategy and priorities. The road ahead can be best guided by 3 cornerstones:

1) Connect and integrate all components, consolidate real-time and historical data into industrial intelligence for transparency and actionable insights to keep processes and assets under control, and optimise efficiency of operations. This is achieved through **Smart Monitoring and Control**.

2) Identify and digitally capture best practices for a consistent approach to operational processes, performance metrics, continuous improvement, regulatory compliance, and greater agility across the business. This is achieved through **Smart Operations and Optimisation**.

3) Improve asset performance in areas such as safety, availability, reliability, compliance, and costs to maximise return on capital investments throughout the entire asset lifecycle. This is achieved through **Smart Asset Management**.

With the right plan in place, the transformation journey into a Smart Factory will not be tomorrow’s future, but today’s reality.
About AVEVA

AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational life cycle of capital-intensive industries. The company’s engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.

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SMART FACTORY

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