Manufacturing Operations Transformation

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Executive summary

From optimizing asset performance to raising productivity to elevating output quality, there are countless reasons to pursue Manufacturing Operations Transformation (MOT). It is the continuation (or beginning) of transformation activities that align manufacturing IT systems across the business to provide both operational and business improvements.

Improvement requires changing processes, systems and the education of people. Changing processes and systems often requires replacing paper-based information management and legacy systems with software which provides automation and enforces the processes in line with the improvement targets. For multi-site enterprises such transformational approach is directly connected with the standardization of technology and applications for consistent reporting, analysis and standardization of processes to unlock maximum value.

Manufacturing Operations Transformation is a process taken in steps and aligned with shifting business transformation needs. It requires a manufacturing IT and digitization platform which allows for incremental application functionality and to keep the cost of manufacturing IT low to provide a continuous return on investment. The value and return on your MOT investment consists of improved operational performance, optimal regulatory compliance, transparency across your supply chain and increased plant to enterprise interoperability.

Introduction

Before talking about Manufacturing Operations Transformation, it's important to put it in context with the broader business transformation.

Back in the nineties there was an influx in ERP implementations, and companies invested in rolling out SAP or other ERP systems to standardize their business processes. Those companies are now leveraging previous technology investments to redefine how they run their businesses through global transformation initiatives. These initiatives are meant to give businesses the agility they need in their operating processes to be able to adapt to fast changing market and competitive forces. A recent KPMG survey showed that 93% of US based multinational corporations are either currently initiating transformation or have already implemented it, and these are major investments often running into the $100M range.[1]

Business transformation is closely connected to the digital transformation happening everywhere which is changing both B2B and B2C relationships and related expectations in user experience and services. But with all that, business transformation, like ERP implementations before, gets stopped at the gates of the plant, which is where the businesses' primary value creation occurs.

What is "Manufacturing Operations Transformation" (MOT)?

We can think of Manufacturing Operations Transformation as a maturity model for manufacturing operations. All industrial manufacturing companies have started their transformation journey with plant and machine automation and the gains of productivity and process repeatability that brings.

Plant equipment automation minimizes the amount of manual operations and maximizes the physical throughput. To further improve the utilization of equipment, plant operations have matured into using IT and software applications as the basis for improvement strategies such as replacing paper-based work instructions and data collection in plant operations.

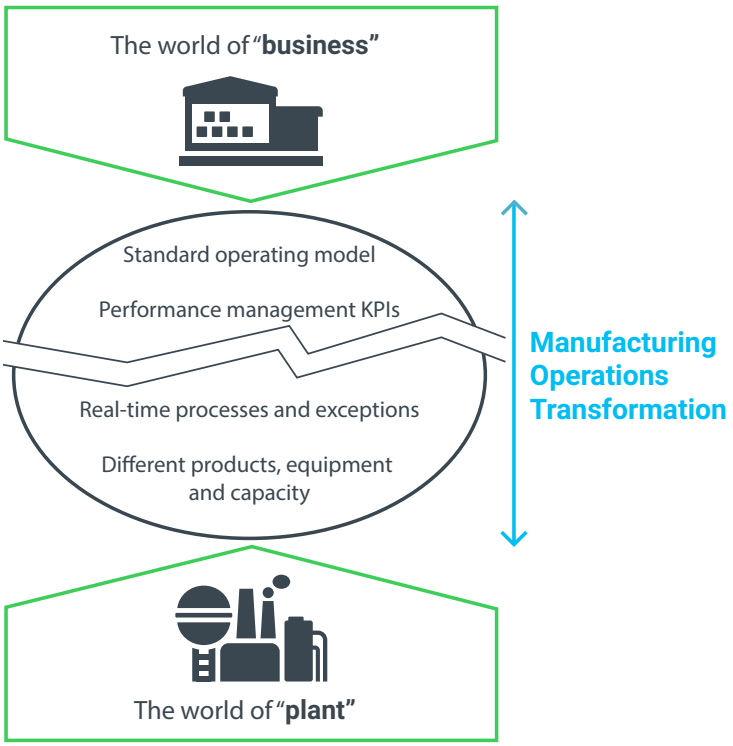
First generation software and information technology (IT) adoption

The use of software and IT, such as manufacturing execution systems (MES) have proven to provide more than increased operational efficiency through core application functionality. Historical data and electronic records offer additional payback opportunities by providing optimization insights and facilitation of continuous improvement. Visibility of operational execution and inventory status based on automatic data exchange with enterprise systems in near real-time enables better decision making and collaboration between plant and enterprise functions.

The return (ROI) on these plant MES investments has been and continues to be based on improvements to operational efficiency and quality, both directly impacting bottom line results.

+ **Improve operations** – increased asset performance and plant throughput, higher people efficiency, faster product changeover
+ **Safeguard quality** – enforcement of product and process specifications, reduced waste and rework, detailed traceability, indications and management of nonconformance, effective recalls

Manufacturing Operations Management (MOM) and supporting Manufacturing Execution System (MES) software have made great strides in bringing order, but unless they are easy to use and model the real-world dynamics of the plant, they may not be used to their fullest potential. Manufacturing Operations Transformation (MOT) is the continuation (or beginning) of transformation activities that aligns these manufacturing IT systems across the business to provide both operational and business improvements.



According to McKinsey,[2] digital manufacturing technologies will transform every link in the manufacturing value chain, from research and development, supply chain, and factory operations to marketing, sales, and service. Digital connectivity among designers, managers, workers, consumers, and physical industrial assets will unlock enormous value and change the manufacturing landscape forever.

Drivers of digital transformation in manufacturing:

+ Technological advances in big data and predictive analytics, business process management, mobile applications, and augmented reality are enabling manufacturers to empower operators and decision makers to make sense of operational data.
+ Newer technologies like cloud, IOT and IIOT, smart devices and additive manufacturing (such as 3D printing) are driving digital transformation changes in the manufacturing sector.

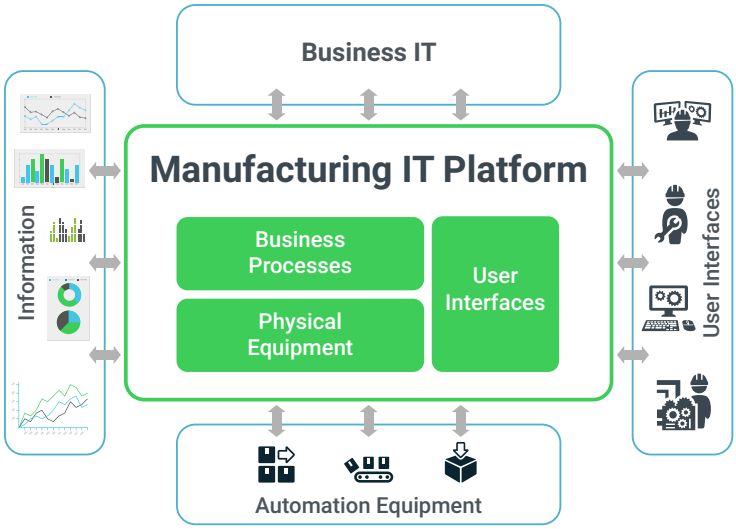
Plants have fallen behind in digitization of business processes

Plant operations are traditionally set up as multiple functional domains operated by separate teams and with separate systems for inventory, production, quality and maintenance activities (using the ISA 95 segmentation of operational activities in manufacturing).[3] Software to manage operations in these domains exists on the plant and enterprise level but collaboration across these functional domains, knowledge and experience are still required for operating and maintaining plant systems. But many companies continue to rely on more familiar personal or manual approaches that are not as efficient. Such approaches are too inconsistent and isolated, and when analyzed prove to be inefficient. Collaboration is also challenging with traditional methods, and when the experts retire or change jobs their expertise goes with them.

People and system collaboration go digital with Business Process Management technology

A key factor for future manufacturing operations improvements is the effective collaboration of people and systems in a digital, automated and integrated fashion. The element that can bring these together in industrial operations is Business Process Management (BPM) technology integrated with a manufacturing IT platform to connect with plant floor processes, people, data and systems.

Digitization of operational processes using a business process management system (BPMS) can be used to capture best practices as electronic workflows, connect assets and systems and establish systematic people and system collaboration. It can orchestrate processes across functional domains (horizontal integration) and offers integration with business functions (vertical integration). Consistency and automation of workflows with electronic records of execution data and details preserves the investment in existing plant assets while offering significant operational efficiency improvement potentials.

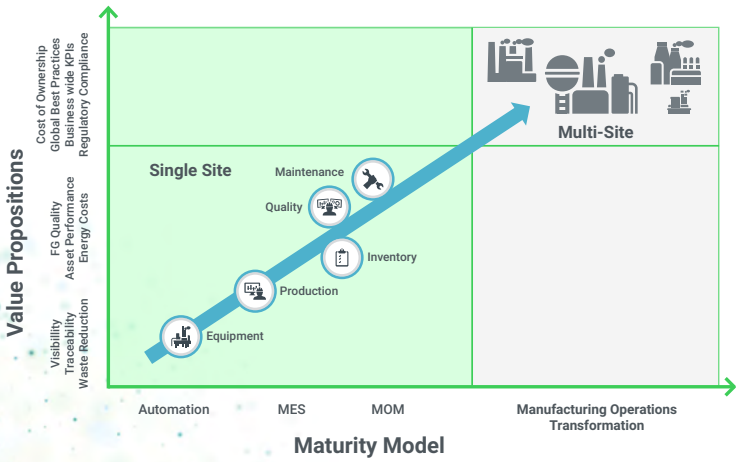


Multi-site Manufacturing Operations Transformation

Many manufacturing businesses have grown by mergers and acquisitions, becoming large national, multinational or global organizations. These companies are now equipped with multiple production plants across regions for producing the same, similar or variations of products. These plants often represent very heterogeneous plant system landscapes and varying practices for similar operational activities and business targets.

These multi-site enterprises are changing to a broader transformative view of manufacturing to make use of new significant ROI opportunities that are unique on a business-wide basis.

+ Business-wide scorecards and consistent KPIs for transparency in cost, capacity and inventory across the enterprise
+ Operational excellence, lean and continuous improvement cultures that need to share best practices
+ A consistent, documented approach to regulatory compliance to minimize risks
+ A connected enterprise, visualization and accessibility of information, to increase business agility and the ability to innovate faster
+ Reduced cost of ownership while reducing the number of applications across the business to facilitate standardization in IT and operations



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Standardization of processes, KPIs and plant interfaces across a multi-site business

The primary enabler of an effective multi-site Manufacturing Operations Transformation is the enterprise-wide standardization of operational processes, enabled through the standardization of information technologies. Such IT harmonization is the foundation to digitally model, integrate, execute, and govern operational processes and related data and information flow consistently across multiple plants. Standardization of operational processes is possible with the following components:

+ ***An open engineering and runtime platform,*** hardened for industrial use, leveraging Business Process Management capabilities and designed for enabling integration of business, manufacturing operations and production processes and data.
+ ***A broad suite of industrial applications*** scaling from rapid ROI equipment performance optimization to full manufacturing operations management functionality.
+ ***A reusable operations process modeling approach,*** which standardizes all operations, simplifies deployment of processes to equipment and people

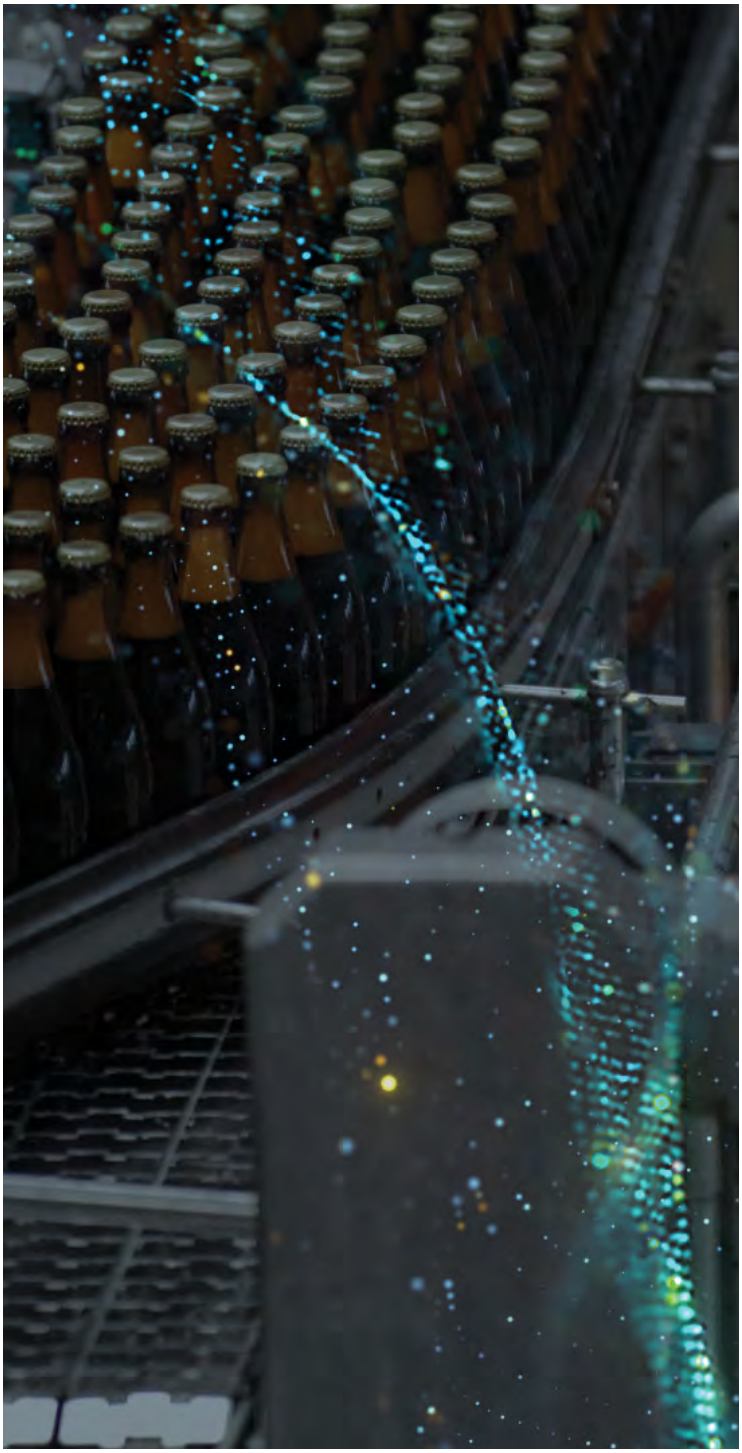
Ensuring consistency across varied plants

The physical attributes and even the level of automation of manufacturing plants in an enterprise may vary, but what standardization strives for is a common way of monitoring and measuring operational efficiency for decision support and interacting with each manufacturing location for process execution.

The role of a manufacturing IT platform is to provide adaptability to local plant nuances and a plant model which applications can use to blend human and automated activity in the execution of standardized processes and business rules. The platform adapts reusable components to individual local physical equipment and automation, while maintaining the data and information models of the processes and flow of data to other applications and towards the enterprise.

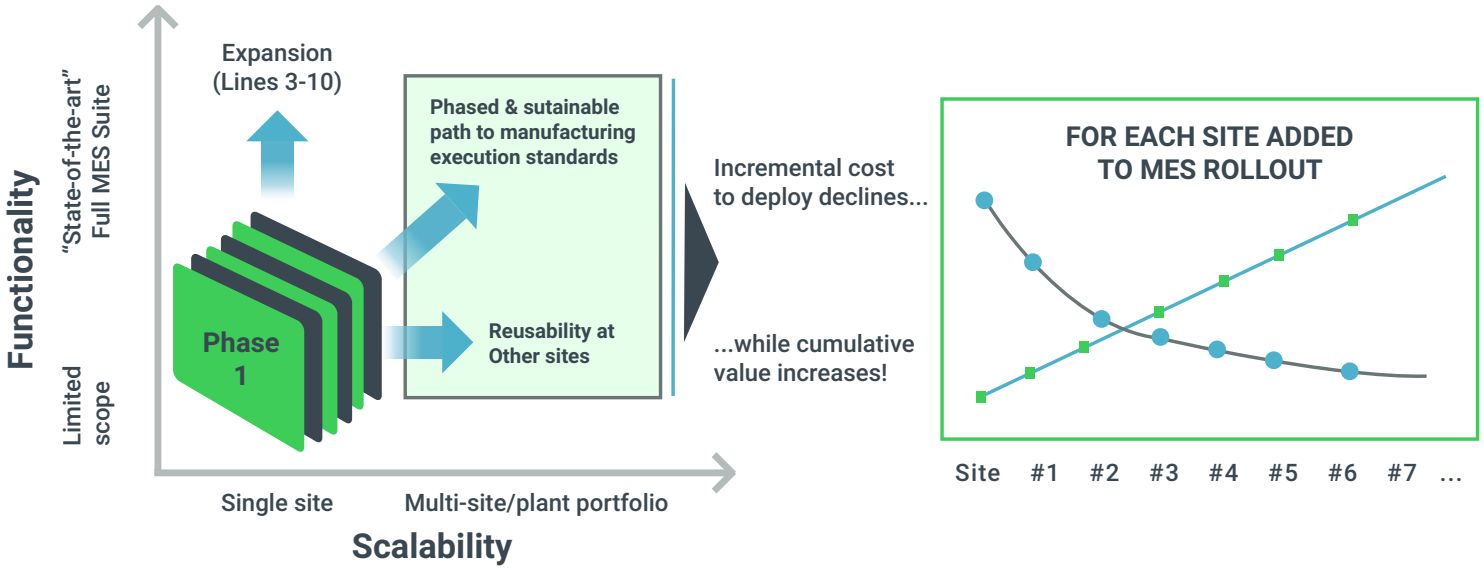
The configurable, model-driven approach to processes and related user interfaces enables reusability of captured knowledge and enforces best practices as corporate standards which can be quickly implemented for each plant connected through the manufacturing IT platform.

This ultimately enables manufacturing industries to make operational improvements and transform operations consistently across multiple sites, with adaptability to the site specific nuances through the abstraction in a digital plant information model provided by the platform.



How to get started on your Manufacturing Operations Transformation journey

Such multi-site digital and operational transformation needs to happen in a phased approach as an incremental functional strategy with orientation on priorities in business strategies



There are several factors you should consider when choosing a partner in your MOT journey. First, you need a trusted solution; finding a provider that offers industry leading technology and domain expertise will improve deployment time and help you get started with limited business disruption. This is a journey, so you want to find a company that will provide services to support your transformation. Connectivity is also key – your solution should have built-in connectivity to plant floor devices and automation equipment. It is vital to ensure the tool has an easy to use interface for a process based approach to manufacturing operations applications functionality. If you are a global manufacturing organization, finding a supplier with global program management, support, and a system integrator network is a must.

To read more about Wonderware and our specific approach to Multi-Site Manufacturing Operations Management, our Manufacturing IT Platform and MOM applications portfolio as well as purpose built industry solutions, please visit wonderware.com.[4]

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