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PLANT OPERATIONS TRANSFORMATION: THE NEXT WAVE OF MANUFACTURING

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Manufacturing companies today face challenges of ever increasing global competition, increased supply chain complexity and shifting patterns of customer demand, compelling them to become more agile, responsive and adaptive through new technologies and process and product innovation.

Plant operations stand at the centre of this strategic change, and are a critical lever for addressing the emerging business technology challenges.

Manufacturing plants need to collaborate seamlessly and efficiently with other facilities as well as supply chain and innovation partners.

However, many manufacturing operations are still largely disconnected, non-harmonized, non-standardized and run on legacy systems with limited appetite and budget to adopt new technologies. The situation calls for a comprehensive approach to transforming plant operations management to develop capabilities for sustainability and growth.

Challenges and opportunities

Manufacturers are faced with multiple challenges such as economic uncertainty, changing customer demographics, market volatility and complex supply chains.

There is increased competition to meet demand for more personalised products. Manufacturers need to bring customer intelligence to the production floor and drive real-time and predictive intelligence from disparate information

collected from supply chain and production processes.

This also presents opportunities for manufacturers to re-examine their operating models and apply new technologies that have emerged in the areas of social, mobile, analytics and cloud (SMAC) technologies and the Internet of Things (IoT).

For instance, mobile technologies are providing real-time access to business-critical information to empower and enable operational personnel to make faster decisions.

The rapidly changing mobile landscape of IP-addressable and IP-aware devices can enable manufacturers to capitalize on the intelligence gained from every interaction and transaction across the value chain.

The convergence of operational technologies on the plant floor with enterprise information systems, forming a single architecture, will help manufacturers improve the information flow between operations and the enterprise, thereby facilitating new operational efficiencies. Alignment between the two systems will allow process data to integrate with plant and enterprise analytics, and help manufacturers with event-based capabilities to respond to adverse events within the plant or supply chain.

Industry 4.0 and IoT

With the ongoing Industry 4.0 revolution, the boundaries between the physical and the virtual worlds will diminish, particularly as IP-addressable and IP-aware devices enable connected, smart factories. Availability of SMAC technologies will take manufacturing to the next level of agility and productivity.

Smart sensors with IoT platforms will generate enormous amount of data around products, people, processes and organizations — what we call "Code Halos."

Plant Code Halo could be harnessed by using big data analytics to obtain real-time predictive and actionable intelligence for the plant, thereby avoiding costly breakdowns and getting critical insights to improve batch yields.

Imperatives for manufacturing plants

With increased focus on agility, responsiveness and customised manufacturing, plant operations need to be



tightly integrated, predictive, lean, and agile and work collaboratively as a "one-plant" ecosystem.

Key capabilities include real-time and predictive analytics to improve visibility, pre-empt failure, enhance resource utilisation and achieve predictable performance. Other areas include reduction in manufacturing and innovation cycle time, and collaborative approaches to share best practices across the plant. These can result in higher customer satisfaction through right product delivery at the right time, optimised resources, reduced waste, and improved regulatory compliance.

Manufacturers are still struggling to integrate and harmonise plant operations with other functions and entities across the value stream. Inefficient utilisation of plant floor data is a barrier to capitalising on the power of new technologies. The lack of system integration between the plant and the enterprise results in a failure to derive maximum value from investments. Manufacturing companies also need to address low-levels of collaboration and non-standardised, non-integrated processes across the supply chain.

Other challenges include technology variance across plants, lack of a common IT programme at a corporate level, and resistance to change.

Transformation strategy

The key to addressing these challenges is harmonisation of operations management and operations technology to align plants with the enterprise. A successful transformation requires:

- Buy-in from all stakeholders within the organisation
- An approach to align plants with the enterprise vision and define a roadmap for the future state
- The ability to address current plant challenges and align with overall vision
- A credible partner to achieve overall transformation goals

Manufacturers need a transformation framework that can enable them to achieve an integrated enterprise by strategically aligning technology, processes, and people towards a common vision and goal. Its key components must include a maturity framework to assess the current state and define the transformation roadmap with strategic actions, along with technology services and agile methodology to transform the plant operations management in alignment with the transformation roadmap.

A maturity framework—meant to provide a systematic way to define maturity, along with a specific focus on plant operations management processes—can be used to align vision, key process indicators (KPIs) and process capabilities, as well as define the transformation roadmap.

Some of the key processes that the transformation framework must address include detailed scheduling, experiments and change management, production execution, inventory management, quality management, plant maintenance, energy and utility management, track and trace, quality management system (QMS) and compliance, plant performance, EHS, and so forth. The framework could define maturity across several levels,

from the initial level, at which plants are more reactive, to the top level, at which plants are agile and predictive. Progress toward the highest maturity level typically happens step-by-step, where at each level, certain capabilities generate tangible business benefits. Through progressively improved maturity, plants move toward more flexibility, responsiveness and predictive planning.

Strategic actions

The strategic actions that the transformation framework must address include:

- Simplify and standardise plant operations management processes: This is a key aspect of transformation, and since many plant operations processes span multiple departments, it is important that multiple stakeholders from various plants as well as corporate business/IT team are strategically aligned.
- Improve user experience: The user experience and interface needs to be personalised and responsive to the user's preference.
- Adopt new technology: New technologies in big data space, mobility and social media can elevate plant operational performance and help enterprises to analyse process data and gain insights to improve flexibility, responsiveness and quality.
- Integrate processes and enable plants with manufacturing SOA: Integrating processes will reduce the application footprint to achieve various manufacturing capabilities. A manufacturing service-oriented architecture can address specific needs of plant integration and improve agility and responsiveness.
- Enable remote operations management: This can help reduce overall TCO of maintaining operations.
- Improve collaboration and best practice utilisation: Integrated knowledge management and remote expert

support using screen-share and camera-share capabilities offer organisations ways to take collaboration from concept to reality.

Build predictive and real time operations intelligence: Harnessing plant product and machine Code Halos—and layering these with predictive intelligence—can help plants take proactive actions and improve customer satisfaction, efficiency, agility and responsiveness.

Acknowledging the need for a holistic approach and transformation of plant operations management is a critical first step in enabling this evolution. Manufacturers must align all stakeholders for the transformational programme, establish an understanding of the current state of operations and set goals for the desired state, and develop a project management office (PMO) and core team to manage the program.

Plants of the future

Plants of the future will be seamlessly integrated with the extended supply chain, operating with greater agility and efficiency.

Plants will work as a single ecosystem to fulfil customer requirements. Plant information will be available on the go and operations will be agile to adjust to adverse events within the supply chain. SMAC technologies will become an integral part of operations technologies, aiding predictive intelligence and driving proactive action. Everyone from plant managers to senior leaders will share information and access analytics to improve operational efficiencies. Transforming plant operations management is key to driving differentiation and rising up to the needs of tomorrow.

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