



Manufacturing Intelligence – The path forward

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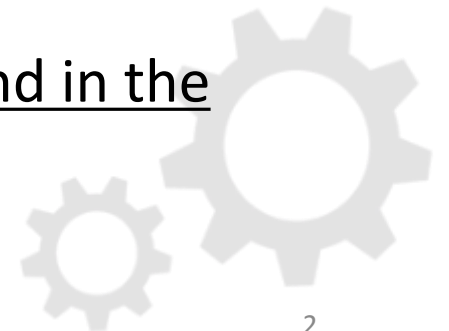
Smart Manufacturing



Smart Manufacturing are systems that are “fully-integrated, collaborative manufacturing systems that respond in real time to meet changing demands and conditions in the factory, in the supply network, and in customer needs.” National Institute of Standards and Technology (NIST)

“Smart Manufacturing: Ability to solve existing and future problems via an open infrastructure that allows solutions to be implemented at the speed of business while creating advantaged value.” SMLC

“Smart Manufacturing: “Real-time data and technology when, where and in the forms that are needed by people and machines.” CMTC





Smart Manufacturing: Where do we come from?

- Isolated systems and machines
- Low & High Automation together. Automation & technology justification
- Limited connectivity
- Smart machines – Automation as foundation for integration
- Horizontal & Vertical integration. Connectivity throughout the entire enterprise: Information Technology (IT) & Operational Technology (OT)
- IIoT – Complete integration: IT-OT- MES – ERP - Manufacturing Data bases, etc.

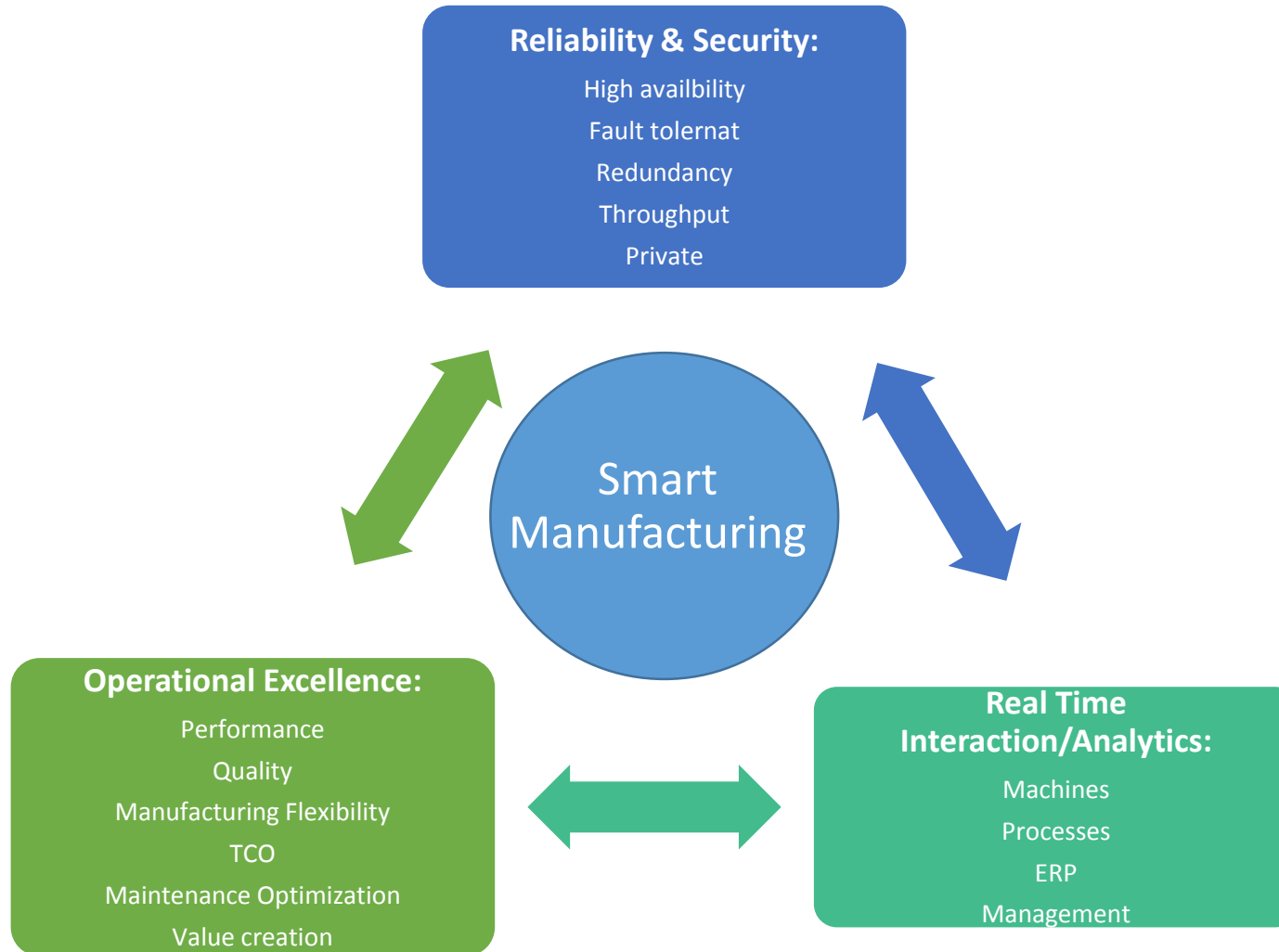
Smart Manufacturing:

- “Collecting, analyzing and present data in a more useful and accurate form to meet production, quality, safety and regulatory requirements and targets while ensuring manufacturing continuity throughout the manufacturing operations management. Thus , efficiently delivering the right information to the right people at the right time.”



Smart Manufacturing: The path Forward

Foundation Requirements





The 4 Enablers of Smart Manufacturing

Data Generation & Collection



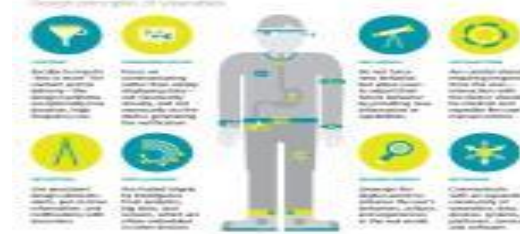
- Smart sensors
- IoT
- Historian
- PackML
- Wireless Networks
- Mobile devices
- Cloud

Integration / Connectivity



- Devices / Machines / Processes – Vertical & Horizontal
- Common network architecture
- Security

Advance Human Machine Interface



- Smart devices/Wearables
- Providing the right information to the right people at the right time
- Augmented reality

Advanced Analytics



- Artificial Intelligence
- Smart Machines
- Data analysis & Visualization
- Process Optimization
- Configuration Management

SMART MANUFACTURING



Initiation & Planning

- Identify areas of opportunity / Assessment
- Understand prerequisites, survey the site needs
- Determine the Business needs and justification
- Succinct design and Planning: network infrastructure topology, connectivity, security, etc.
- Investment justification & validation
- Create a solid strategy that fits your current and future business needs

Operational Excellence / Smart Manufacturing



Execution

- Hardware / software Solution selection and installation
- Implement physical and logical network infrastructure
- Set communication channels and support structure
- Industrial Applications deployments, commissioning
- Data collection and analysis
- Deliver the right information to the right people at the right time (IIoT technology and mobile devices)
- Take corrective actions and promote continuous improvement
- Measure and report results. (IIoT technology and mobile devices)

The path forward: Getting your manufacturing facility ready.

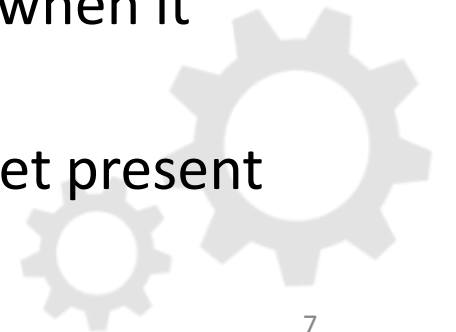
1. Start creating a common automation architecture that meets your company guidelines and security requirements
2. Start using equipment with data & self diagnostic capabilities.
3. Achieve Horizontal and vertical integration – Systems and Software (PLCs, Networks, Data bases, ERP, etc.)
4. Obtain real time data capture and management
5. Consider the cloud to manage and process data analytics. Thus eliminating the need to purchase and maintain a large IT infrastructure.
6. Use data analytics and visualization– Any time Anywhere
7. Invest in digital automation
8. Know your targets to achieve operational excellence / Value creation: Performance, Quality, Manufacturing flexibility, TCO, Maintenance optimization -Asset Intensity, Performance and Efficiency, etc.



Smart Manufacturing: The Path Forward Summary



- Soon digital automation and IIoT will not be a competitive advantage but a necessity to compete in the ever challenging and demanding market environment
- Degree of automation and integration is a key enabler for smart manufacturing
- Move forward but be pragmatic about your integration strategy.
- Take advantage of what you already have; Data historian, integration, etc.
- Remember there is no one-size-fits-all solution when it comes to IIoT
- Develop a solid strategy according to your market present and future needs
- Execution





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