Smart Manufacturing and its opportunity

Why we are not moving faster
What are the opportunities in Big data, AI and Simulation
IOT or MOM or both
How does this work all together?

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Where Manufacturing meets IT.
What If...

• People are transforming double speed then today!
• By arriving in the morning see what the main focus should be !!
• Teams are dynamic getting to gether and solve things!
• Having full visibility on the plant / SC any time and see results!!
• Smart products are becoming smart systems and are tight integrated in the Supply Chain
“The intelligent, real time orchestration and optimization of business, physical and digital processes within factories and across the entire value chain.”

MESA Smart Manufacturing working group
Industry Challenges for the Next Decade

- Complexity
- Connectivity and Security
- Cyclicity
- Agility
Why are we not moving faster?

28%

Where digital transformation programs are concerned, the **TOP 28% OF COMPANIES ARE REAPING REWARDS** in terms of business benefit and speed of program impact, or have made progress that’s delivering tangible value.

Source: LNS Research
Smart Manufacturing

- Intelligence
- Processes
- Orchestration
- Optimization
Intelligence
Analogy with driving a car

Today

Production in progress
Productivity (OEE) [D; D-1; D-7]
Traceability
Performance Analysis [D-7]

D=Day

+ List of Waiting Production orders
- Hazards expected
  Missing raw material
  Preventive Maintenance

Production in progress
Productivity (OEE) [D; D-1; D-7]
Traceability
Performance Analysis [D-7]

D=Day
Passive information system
Analogy with driving a new car

Using the windshield to enhance driver’s intelligence

Production in progress
Productivity (OEE) [D; D-1; D-7]
Traceability
Performance Analysis [D-7]

+ Sequence of production activities updated in real Time (Start time / end time)
+ Expected hazards
  A raw material will be missing in one hour
  Predictive Maintenance in conflict

D=Day
Active information system

Large screens with information to help driving the next hours
Local decisions by automated systems

• Starts with auto-id part
  – presenting themselves to the line...
  – maybe dropped off by automated material handling...

• Line can configure itself.
  – Loads the right program...
  – Loads the right components...
  – Connect to the right colors...

• Auto status, count, order, pack...
• Detect issues and notify people that a special issue needs attention at a specific spot in the factory.
• Inspect to validate physical against the digital definition
Processes
Process Digitalization

- Rethinking processes
  - People
  - Equipment
  - Production
  - Quality
  - Maintenance
  - Inventory
  - Supplier relations
  - Customer relations
Create a simple story and identify Value to add

- Decrease COGS
- Increase Asset Utilization
- Reduce Days in Inventory

- Performance Management
- Associate Management / HSE
- Maintenance Management
- Work Instruction
- Order Management
- Quality Management
How do you utilize technology for improvement methods?

WE CARE ABOUT TRADITIONAL IMPROVEMENT METHODS...
Percentage of companies that are fully implemented:

- **45%** Shift Meetings
- **41%** Standardized Work
- **38%** 5 Whys
- **36%** SPC / Quality Metrics
- **34%** 5S
- **31%** Production Leveling
- **30%** Continuous Flow

- **29%** Kaizen
- **28%** Kanban
- **27%** Value Stream Mapping
- **27%** Plan Do Check Act
- **22%** Takt Time
- **22%** TPM / OEE
- **19%** Gemba
- **19%** DMAIC
- **18%** Poka Yoke
- **15%** Andon
- **14%** SMED
# Integrated Interoperability

<table>
<thead>
<tr>
<th>Smart Suppliers</th>
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<tbody>
<tr>
<td>Smart Logistic</td>
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<tr>
<td>Smart Production</td>
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<tr>
<td>Smart Maintenance</td>
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<tr>
<td>Smart Quality</td>
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<tr>
<td>Smart Distribution</td>
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</tbody>
</table>

## Smart Factory
Orchestration
Planning as a collaboration tool
Planning as a collaboration tool

Illustration: production vs quality

- pH measurement
- Teneur sucre

Laboratory Task list
Updated at 18/05/19 11:54

- 12h00 EMB2 analyse pH prélèvement PO 2543670
- 12h00 EMB5 analyse pH prélèvement PO 2543661
- 12h05 EMB1 analyse pH prélèvement PO 2543615
- 12h27 EMB5 contrôle Teneur sucre PO 2543661
- 13h42 EMB4 contrôle Teneur sucre PO 2543701
- 13h54 EMB1 contrôle Teneur sucre PO 2543615
- 13h59 EMB3 contrôle Teneur sucre PO 2543618
- 15h38 EMB1 analyse pH prélèvement PO 2543715
- 16h48 EMB2 contrôle Teneur sucre PO 2543670
The Product Value Chain extends into Suppliers and Customers
Over 50% of communication with suppliers is unstructured

- Have you told your supplier about the new revision?
- Have you got the new revision of the component?
- Make sure that parts are inspected this way, okay?
- Make sure you don’t subcontract that component, it is ITAR protected.
- Did your supplier make design change? Why didn’t you tell me about that? You did? I have no record about it.

Source: OAGi ppt, 2014
Introducing of a realtime communication channel between actors of the supplychain based on standard ERP, MES, B2MML, and EDI.
Optimization
Reducing time for New Products Introduction

- Create digital twins
- Process simulation
- Capacity simulation
- Schedule simulation
Application Enabling Platform (AEP)

- High Performance Computing
- AI / Generative Design
- Adoptive Manufacturing
- Real Time Simulation
- Industrial IOT
Increasing accuracy of real time environment using IIOT

- IIOT devices to connect new type of sensors
- Combination with current information
  - Reduce the time for problem detection
  - Anticipation of hazards
  - Enabler for new business models
Current

L3
Production Execution (MES / MOM)

L2
Process Monitoring (HMI-SCADA)

L1
Process Sensing, Manipulating (PLC)

L4
Business Systems (ERP, SCM, PLM)
Governance & planning

IIOT

Connectivity
AI / Analytics
Application Enablement
Assets Performance
Process Performance
Hybrid Edge/Cloud

Break-Thru Solutions

• Roles based experience
• Real-time operational visibility
• Predictive / Prescriptive
• Mobile & augmented
• Flexibility through rapid application enablement

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How do you accelerate?

- You gathering a lot of information!
- Do you understand dependencies and patterns?
- How do you utilize AI?
- What is the use case which brings the most value?
- Are you setting the vision and been brave enough?
Improving efficiency using Artificial Intelligence

A huge amount of data is available already

Manufacturing already generates more data than any other sector

Total = 7,430 Petabytes

<table>
<thead>
<tr>
<th>Sector</th>
<th>Annual new data stored by sector, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petabytes</td>
<td>Total = 7,430 Petabytes</td>
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<tr>
<td>Manufacturing</td>
<td>24.3%</td>
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<tr>
<td>Construction</td>
<td>87</td>
</tr>
</tbody>
</table>

Discrete manufacturing = 1,072
Process manufacturing = 740

SOURCE: IDC, McKinsey Global Institute analysis
HOW DO PEOPLE DO ADVANCED ANALYTICS TODAY?

- Bring on team of data scientists, a data architect and IT.
- Execute an expensive data science project
- Do it again (and again)!

WHAT IS A BETTER WAY TO LEVERAGE ADVANCED ANALYTICS?

- Simplified data cleaning
- Access to multiple model engines
- User support toolsets (software guidance)
- Fast data ingestion
- Large data management
- Smart data context/ID
- User driven presentation
- Multi-layered security

Improving efficiency using Artificial Intelligence
5 sensors of Human

- Taste – digitalize?
- Smell – not always
- Touch – can be digitalized
- Hear - slow
- See – extreme fast
Solution with IOT Platform

REST API to all data in your factory

IOT Plattform

MES / MOM
Quality
Energy
Use this conference

• Be Brave and believe!
• Define min 3 use cases with value
• How to use AI
• Think how you can enable your team to transform faster
• Enable them to be smart Operator
• Align your improvements methods with your digital journey – using digital technology!!
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SIG Benelux November 15th in Amsterdam

SIG Germany January 28th in Aachen @ E4TC
Join MESA for your journey to Smart manufacturing!

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