Enabling Smart Manufacturing through MOM software
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Digitalization Initiatives
We’re all saying essentially the same thing

- The Prime Minister's Industry 4.0 Taskforce
- Made in China 2025
- Plattform Industrie 4.0
- Industrial Internet Consortium
- Made Smarter Review
- Smart Nation
- Alliance Industrie du Futur
- Robot Revolution Initiative
- Piano Industria 4.0
The vision for Smart Manufacturing

Smart machines
Smart products
Smart logistics

Open, integrated and communicative systems
The vision for Smart Manufacturing

Smart machines
Smart products
Smart logistics

DIGITAL ENTERPRISE
Leverage on collaboration to create synergies…

“Coming together is a beginning…”

“…Keeping together is progress”

“… Working together is success”

Henry Ford
The barriers to next frontier manufacturing

- Inefficient production data sharing
- Ineffective closed loop
- Single-purpose, inflexible, linear process
- Ineffective transformation of raw data into actionable information
- Fragmented digital infrastructure
What if....

Customer Desire  ➔  Design and Engineering  ➔  Manufacturing Engineering  ➔  Production  ➔  Service

SMART TECHNOLOGIES

- Smart cross-departments integration
- Software
- Machine OEMs
- Materials
- Start-ups

MANUFACTURING ENGINEERING

- Planning
- Process Definition
- Engineering
- IT

PRODUCTION

- IT
- Automation
- Production Systems
- Logistics
- Operators

Smart Operations Orchestration

Smart Data Contextualization

Effective Closed Loops

- Smart Connection to Cloud

- Single, linear
- Coupled logistics and production

- Fragmented digital infrastructure

- Ineffective closed loop

- Change in mindset

- Single-purpose, inflexible, linear process
Manufacturing digitalization
The widening gap in digital productivity

The top 5% of companies are dominating the economy by exploiting digital competencies.

The Best Versus the Rest: The Global Productivity Slowdown, Divergence Across Firms And The Role of Public Policy, OECD Productivity Working Papers

Source: It Pays To Be Smart, July 2017, MIT Technology Review

Source: The future of productivity report, 2015, OECD
Shifting the Digital Twin from virtual to reality

Digital Twin Product
- Virtual product
- Specification
- Verification

Digital Twin Production
- Virtual production
- Commissioning
- Validation

Real production
- Automation

Manufacturing Operations Management
- Totally Integrated Automation
Enriching the Digital Twin through Smart Manufacturing

Smart orchestration of manufacturing operations
MOM as the digital brain of manufacturing operations

Manufacturing Operations Management
Smart Manufacturing

People
Tools
Process

MOM
Continuous improvement with the Digital Twin

Collaboration platform: Teamcenter

Insights from performance with MindSphere

Virtual product
Verification
Specification
Virtual production
Validation
Commissioning
Real production
Automation
Ideal delivery
Real product

Continuous improvement
The MOM evolution towards Smart Manufacturing

1. Stand-alone MES
   - '90s

2. Monolithic MOM
   - '00s

3. Digital Enterprise & Industry 4.0
   - Today

   MOM for Smart Manufacturing
The role of MOM for Smart Manufacturing

Smart integration with PLM
Smooth design and engineering transfer

Virtual product

Virtual production

Smart orchestration of manufacturing and quality operations

MOM
People
Tools
Process

Smart data contextualization with manufacturing information

Real product

Contextualized Data

Closed Loop Processes for continuous and proactive improvements
Transforming virtual production into efficiently orchestrated operations

Take control of production schedules, execution and quality by orchestrating the complete operations.
Closing the loop with contextualized data from the shop floor

Import BOM-BOP, generate EWIs, improve product design and engineering through feedback from mfgt. operations
Ensuring quality excellence of the next-generation product

Evaluate the product quality during execution to feed information back to the design and engineering departments.
Gaining visibility into production data and insights via manufacturing intelligence technologies on MindSphere

Impact production KPIs with actionable insights gained from analysis of real time operational data.
Supporting digital transformation in the different industries

- Aerospace & Defense
- Automotive
- Electronics
- Semiconductors
- HE – Special Machinery
- F&B / CPG
- Chemicals
- Pharma
- Medical Devices
Ford F-150 XL

4,147,200 build configurations

Source: consumerguide.com
Addressing production complexity

Flexible production concepts with Automated Guided Vehicles (AGVs)
Standardized and open system package

Complete automation, communication, and functional safety
<table>
<thead>
<tr>
<th>Flexible production concepts</th>
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<tbody>
<tr>
<td><strong>Shorter commissioning and ramp-up times</strong></td>
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<tr>
<td><strong>Economic manufacturing of different car models</strong></td>
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<td><strong>Easy scalability of production capacity</strong></td>
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The essential role of MOM for digital industries
Leveraging on the innovative and industry-specific MOM portfolio

Innovative technologies

Clear mapping of product to industry segment

Consolidated platform

CAMSTAR
SIMATIC IT

Preactor

QMS Professional

Manufacturing Intelligence

MES

APS

QMS

EMI
Smart Manufacturing
An enterprise strategy – not only a matter of technology

Driven by inspired executives, realized by experts

Think big – Start focused – Scale fast

Re-think financial and strategic targets

Enabled by innovative partners
Digitalization is no longer the future. It is already here today...

...and we are implementing it alongside our customers and partners.
Thank you for your attention!