Smart Manufacturing in F&B
Gaining competitive advantages through manufacturing operations management software
Andreas Ganz, Thomas Pung, IAPI HI

Note: Content is more important than the Format
Presenter introduction: Andreas Ganz

>18 years serving industrial automation customers

Title: Global Product Line Manager Smart Manufacturing

Background: Master Degree in Electrical Engineering and Economic Science
> 18 years experience in International Industrial Consulting in Glass, Chemical, O&G, FnB, Pharma, Electrification
Languages: DE, EN, RU
Presenter introduction: Thomas Pung
20 years serving industrial customers

Title: Head of MES Sales Europe
Baden-Dättwil, Switzerland

Background: Master Degree Computer Science – Economics
> 15 years experience in MES Consulting and Sales
Domain Competencies in Chemical, FnB, Pharma,
Robotics, Electrification, Semiconductors a.m.
Languages: DE, EN, FR, SP, Thai
Gaining competitive advantages through MOM software

Agenda

- Smart Manufacturing addressing the current F&B needs (15 min)
- Manufacturing Operations Management Software (20 min)
- Experiences out of customer’s interactions (5 min)
- Q&A (10 min)
### ABB in Food & Beverage – From Farm to Table

#### End-to-End-Approach

<table>
<thead>
<tr>
<th>F&amp;B Value Chain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agri / Aqua Cultural</strong></td>
</tr>
<tr>
<td>Production of farming inputs, such as seeds, fertilizers, animal feed, nutrients and farming equipment</td>
</tr>
</tbody>
</table>
### Market trends in Food & Beverage

**Digital becomes Reality**

<table>
<thead>
<tr>
<th>Market trends</th>
<th>Production challenges</th>
<th>Manufacturing drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing demographics</td>
<td>- <strong>Product quality and consistency</strong></td>
<td>- Focusing on plant monitoring and diagnostics</td>
</tr>
<tr>
<td>Regulatory requirements</td>
<td>- <strong>Food safety</strong>, contamination free, hygiene</td>
<td>- Optimizing line speed and minimizing breakdowns for increased operational efficiency</td>
</tr>
<tr>
<td>Food safety focus</td>
<td>- <strong>Traceability</strong></td>
<td>- Process complexity management</td>
</tr>
<tr>
<td>Product diversification</td>
<td>- <strong>Production reliability</strong></td>
<td>- Convenient sourcing, preference for less number of suppliers</td>
</tr>
<tr>
<td>Increased sustainability focus</td>
<td>- <strong>Production speed and efficiency</strong></td>
<td>- Requiring flexible manufacturing and packaging solutions</td>
</tr>
<tr>
<td>Way of buying</td>
<td>- <strong>Product variation</strong></td>
<td>- Energy and water efficiency improvements</td>
</tr>
<tr>
<td></td>
<td>- <strong>Production flexibility</strong></td>
<td>- Social responsibility when using the resources</td>
</tr>
<tr>
<td></td>
<td>- Resource efficiency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Recyclable package</td>
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</tr>
<tr>
<td></td>
<td>- Sustainable manufacturing</td>
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</tbody>
</table>
Digital market trends

Digital Evolution

1. Enterprise-level
2. Site-level
3. Process-level
4. System-level
5. Field-level

Automation pyramid

Real-time critical

*CPS-based Automation Automatization

TARGET to be a Smart Manufacturer

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	Slide 7

Source: VDI/VDE, CPS, 2013
* CPS: Cyber Physical System
Digital Transformation in Smart Manufacturing

Main technological drivers - MES is the most critical part
ABB Ability™ overview

ABB holistic portfolio

- Services & collaboration platform
- Plant / enterprise solutions
- Automation systems
- Devices and sensors

[Diagram showing the integration of ABB Ability™ cloud with 3rd Party Cloud, Mobile Solutions, and other services.]

- Collaborative Operations Center COC
- ABB Ability™ Manufacturing Operations Management (MOM)
- ABB Ability™ System 800xA or 3rd party
- (ABB Ability™) Devices or 3rd party

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**ABB Ability™ Manufacturing Operations Management**

Comprehensive, scalable and modular suite

- **ERP / Business Systems**
  - Process Intelligence
  - Manufacturing Execution
  - Production Intelligence
  - Production Optimization
  - Connectivity
  - Data Storage
  - Common Services
  - User Experience
  - Reporting

- **Shop Floor / PLC/SCADA/DCS**

- **Process Intelligence**
  - Dashboard
  - Trends & Events
  - Excel Analyze

- **Production Intelligence**
  - OEE
  - Energy monitor
  - Batch View
  - Batch Investigate

- **Manufacturing Execution**
  - Production order management
  - Material management
  - Warehouse management
  - Quality management
  - Labor management
  - Equipment maintenance management
  - Enterprise integration
  - Production optimization
  - APC
Holistic Digital Approach driven by ABB

Example: Customer individual way forward

Customer Value

- Reduction of “Excel”-Hours
- Role-based and fact-driven Reporting
- Plausibility Checks
- Paperless & Zero Error Production
- Comply with regulations
- Process Optimization by visual management
- Assessment saving potential
- Process Improvement by view, filter and trigger
- Intuitive User Experience
- Process Simplification
- Managing Production
- Increase Usability
- Easier Change Management & New Product Intro
- EBR Standardization (S88)
- Batch Monitoring & Tracking
- Continuous Improvement
- Work Instructions
- Production Management
- R-/Cobots / AGVs
- Optimization etc. ...
- Robot vs. Cobot: real interaction
- Teachable → AI
- Improvement Precision and Quality

Shop Floor Integration for all production relevant machines/equipment for transparency and standardization

Minimization of Down-Times

Maintenance efficiency (TPM)

Improve Productivity

Plausibility Checks

Paperless & Zero Error Production

Comply with regulations

Process Optimization by visual management

Assessment saving potential

Process Improvement by view, filter and trigger

Intuitive User Experience

EBR Standardization (S88)

Batch Monitoring & Tracking

Continuous Improvement

Work Instructions

Production Management

R-/Cobots / AGVs

Optimization etc. ...

ABB Ability MOM/DIAS & Edgenius

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Gaining competitive advantages through MOM software

Agenda

- Smart Manufacturing addressing the current F&B needs
- **Manufacturing Operations Management Software**
- Experiences out of customer’s interactions
- Q&A
ABB in Digital

Uniquely qualified

Information
- $400 bn installed base
- 125 year history
- Context

Technology
- Electrical
- Material
- Mechanical
- Digital

Know-how
- Industry
- Geography
- Automation
- Process
ABB’s main customer segments
Sharing cross-industries best practices and added-values

Process industries
- Oil & Gas
- Refining & chemicals
- Mining & metals
- Food & Beverage
- Pharma*
- Power generation & water
- Pulp & Paper
- Speciality chemicals
- Discrete Manufacturing
- Printing
MES Sales Approach – The BIG Picture

Current and Future Demands – Important Digitalization Topics
ABB has a comprehensive portfolio in all 4 key digital building blocks

Sense – Analyze – Act - Collaborate

- **Sense**
  - Increased availability of Data, Connectivity & Computational Power

- **Act**
  - Improved Control System, Automation Hardware

- **Analyze**
  - Advanced Analytics proliferation across all operations areas

- **Collaborate**
  - Integration & Collaboration across Systems, Plants, Machine-Human Collaboration
<table>
<thead>
<tr>
<th><strong>What our partners are asking for</strong></th>
<th>Enabling smart operations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smart, Simple and Intuitive Software</strong></td>
<td>Simplify solution deployments through ease of configuration. Enable savings and capturing benefits faster.</td>
</tr>
<tr>
<td><strong>Rapid Implementation</strong></td>
<td></td>
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<tr>
<td><strong>Mobility Devices &amp; Cloud Computing</strong></td>
<td>Access information from anywhere from any device. Support for mobile devices.</td>
</tr>
<tr>
<td><strong>Visualization &amp; Intelligence</strong></td>
<td>“three clicks to success.” Dashboard and reporting capabilities.</td>
</tr>
<tr>
<td><strong>Predictive Analytics, &amp; Machine Learning</strong></td>
<td>Analyze data from different sources and provide insight which respond quickly to</td>
</tr>
</tbody>
</table>
# ABB Ability MOM – An unique approach

<table>
<thead>
<tr>
<th>Brain</th>
<th>Culture</th>
<th>Lean</th>
<th>Magic Button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary: Data Consolidation Connectors and Interfaces (Legacy Systems)</td>
<td>User Acceptance Daily Improvement: A &amp; A Comparaison by all levels Traceability Fact based and driven</td>
<td>Reduce Waste – paperless, manual data entries, intuitive, fast adaption &amp; integration (new assets, new people, new devices) Standardization Permanent improvement</td>
<td>Small to All: Push the Button -&gt; the right information at the right place for the right role – IN REAL TIME</td>
</tr>
<tr>
<td>MES controls the legacy MES directs processes, Business systems and devices MES will drive, direct and control all changes – by dynamic workflow</td>
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Digital Solutions for the F&B Industry

Addressing all of your pain points

CUSTOMER VALUE DRIVERS

1. Collaborative operations
2. Data collection & analytics
3. Product traceability
4. Quality management
5. Cyber security
6. Energy optimization
7. Emission monitoring
8. Digital maintenance planning
9. Inspection
10. Condition monitoring
11. Asset health
12. Predictive maintenance
13. Lifecycle assessment
14. Simulation / virtual commissioning
15. Virtual training (tba)
16. VR / AR (tba)
17. Paperless operations / HMI
18. Alarm management
19. Remote assistance
20. DCS / MES
21. Performance optimization
22. Back-up management
23. Advanced robotics applications
24. Warehouse & material management

ABB SOLUTION CLUSTERS

- TOTAL VALUE
  - Minimize energy cons.: electr., water, heat, air, steam
  - Minimize emissions
  - Maximize sustainability of resources and energy
  - Maximize yield
  - Maximize capacity
  - Maximize operating time
  - Maximize speed
  - Minimize idle time
  - Minimize lifecycle costs
  - Minimize material consumption

- Digital Engineering, Analytics
  - Robotics
  - Drives
  - Motors & Generators
  - Control Technologies
  - Measurement & Analytics
  - Industry Automation

- Automation
  - Protection & Connection
  - Distribution Solutions
  - Transformers

- Electrification
  - LV/MV
  - Grid Integration
  - Grid Automation
  - High voltage Products

- Cash Flow & Profitability Improvement
  - New Business Models
## Evaluation Starting Point: System Impacts

<table>
<thead>
<tr>
<th><strong>COSTS MES</strong></th>
<th><strong>BENEFITS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dedicated MES and Intelligence Modules</td>
<td>• Breaking down Strategic Initiatives into visions and gains:</td>
</tr>
<tr>
<td>• Dedicated Engineering Services</td>
<td>• Lean Manufacturing</td>
</tr>
<tr>
<td>• Dedicated and reliable Life Cycle Management</td>
<td>• Quality and Regulatory Compliance</td>
</tr>
<tr>
<td>⇒ <strong>Leading to new generation of production</strong></td>
<td>• Product Life Cycle Management</td>
</tr>
<tr>
<td>⇒ By implementation of dedicated phases</td>
<td>• Real Time Enterprise</td>
</tr>
<tr>
<td>⇒ Lowering project risks</td>
<td>• Asset Performance Management</td>
</tr>
<tr>
<td>⇒ Increasing project success</td>
<td>• To Business Objectives</td>
</tr>
<tr>
<td></td>
<td>• Customer Focused Service Management</td>
</tr>
<tr>
<td></td>
<td>• Financial and Performance Focus</td>
</tr>
<tr>
<td></td>
<td>• Product Focus</td>
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<td></td>
<td>• Compliance Focus</td>
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<tr>
<td></td>
<td>• Supply Focus</td>
</tr>
<tr>
<td></td>
<td>• Asset Reliability</td>
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</tbody>
</table>
The MES Impact – Hitting end-users financial KPI’s

<table>
<thead>
<tr>
<th>COSTS MES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ABB MOM Licenses</td>
<td>• Reduction of the production cycle time (%)</td>
</tr>
<tr>
<td>• ERP Connectivity</td>
<td>• Reducing the number of errors when executing orders (%)</td>
</tr>
<tr>
<td>• Production Order Management</td>
<td>• Reduction of preparation time (%)</td>
</tr>
<tr>
<td>• Quality Management</td>
<td>• Reduce production planning time (%)</td>
</tr>
<tr>
<td>• Downtime Management</td>
<td>• Reduction of lead time (%)</td>
</tr>
<tr>
<td>• Electronic Work Instructions</td>
<td>• Reduction in the number of outstanding orders (%)</td>
</tr>
<tr>
<td>• Material Management</td>
<td>• Reduction in the number of material movements (%)</td>
</tr>
<tr>
<td>• Equipment / Maintenance Management</td>
<td>• Reduction of paperwork between shifts (%)</td>
</tr>
<tr>
<td>• Plus Engineering Services</td>
<td>• Reduction and elimination of manual data entry (%)</td>
</tr>
<tr>
<td>• Assessment (URS, FDS, TS)</td>
<td>• Reduction of waste and marriage (%)</td>
</tr>
<tr>
<td>• Implementation (V-Model, Agile)</td>
<td>• Reduction of inconsistencies in process requirements (%)</td>
</tr>
<tr>
<td>• Testing (IAT, FAT, SAT)</td>
<td>• Increase in productivity (useful use of equipment) (%)</td>
</tr>
<tr>
<td>• Plus Life Cycle Management</td>
<td>• Decrease in work in process (%)</td>
</tr>
<tr>
<td>• SW Maintenance Fee (15% annually)</td>
<td>• Reduction of stocks of raw materials and finished product (%)</td>
</tr>
<tr>
<td>• Service Level Agreement</td>
<td>• Reduced operational and other costs (%)</td>
</tr>
</tbody>
</table>
### ABB Ability™ for Manufacturing

#### Modular Platform

**Manufacturing execution management system (MES)**

Provides full visibility into manufacturing processes enabling you to reduce cost, better manage the capacity of your assets and realize tremendous improvements in the whole supply chain efficiency. It consists of the following modules:

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downtime Mgmt.</td>
<td>Real-time downtime information: real-time tracking of equipment downtime, interruptions information &amp; causes, non-productive activities tracking.</td>
</tr>
<tr>
<td>Maintenance Mgmt.</td>
<td>Plan, create &amp; execute equipment maintenance tasks based on observations or planned preventive maintenance. Offers instructions, checklists.</td>
</tr>
<tr>
<td>Quality Mgmt. Module</td>
<td>Integrated quality management, including quality parameters management, manual or automatic data collection, product test certificates.</td>
</tr>
<tr>
<td>Paperless Manufacturing</td>
<td>ABB Electronic Batch Record (EBR) solution collects &amp; visualizes data from manual entries, DCS / PLC / ERP, bar code scans, integrates label printing.</td>
</tr>
<tr>
<td>Warehouse Mgmt.</td>
<td>Insights to drive inventory turns improvements and inventory reduction: mgmt. of material storage locations and levels, material movement within warehouses, etc.</td>
</tr>
<tr>
<td>Labor Mgmt.</td>
<td>Insight into manpower cost during production, real time or manual offline labor data collecting, time spent on specific tasks or products, ERP integration.</td>
</tr>
<tr>
<td>Energy &amp; Emission Mgmt.</td>
<td>Planning &amp; scheduling tools to help optimize energy use &amp; supply, energy balance mgmt. tools to help get the best energy price, energy related reporting tools.</td>
</tr>
</tbody>
</table>
Conclusion

Summing: **Embracing Technology will ensure Survival**
For most food and beverage organizations, there’s an existing mentality that integrating technology into business is complicated and invasive, but avoiding technology will only make it harder to compete in the future.

Adding technology to the shop floor is only as complicated as the company makes it. Start by rolling out simple things, phase-wise, so employees can become familiar with the system. Once that becomes a natural part of your operation, more can be added and customized to increase your efficiency.
Gaining competitive advantages through MOM software

Agenda

- Smart Manufacturing addressing the current F&B needs
- Manufacturing Operations Management Software
- Experiences out of customer's interactions
- Q&A
Food and beverage plant continuously improves performance
Flexible and efficient production with MES solution since 2010

Wander AG, Neuenegg, Switzerland:
- Producing drinks, snacks and special food for athletes
- 175 intermediate & end products from 500 raw materials.
- Brand portfolio; Ovomaltine, Twinings, Caotina and Isostar

<table>
<thead>
<tr>
<th>Customer needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>High degree of automation, modernize and streamline production process and improve efficiency, flexibility and capacity to meet increased demand.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamless integration with ERP (MFG-PRO), control system (ABB 800xA), automatic guided vehicles, barcode scanners, printers, and scales along the production flow. Comprehensive MES with production order management, warehouse management and material consumption, goods receipt, bulk handling (filling, discharge, wet and dry cleaning etc.), weigh &amp; dispense, quality control and reporting.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully automated, paperless production with reduced amount of manual work and on-the-job support for operators by providing process values and instructions. Full traceability on batch and lot level throughout the whole production process.</td>
</tr>
</tbody>
</table>
ABB smart factory in Lenzburg (Switzerland)

Fully connected and automized production lines

**Semiconductor factory**

- Full vertical and horizontal integration with ABB MES
- Automation of all production processes with robots and automation equipment
- Automation of all logistic processes with AGVs and Robots
- Operator independent production through automated tooling of equipment (increased equipment utilization)
- Centralized production

Full end-to-end smart manufacturing program, from wafer to finished semiconductor module incl. electrical testing
**Achieved benefits**

- Significant increase of productivity as well as throughput
- Instant reaction to changing customer demands
- Increased reproducibility and quality
- Full product, process and material data traceability (vertical integration)
- Significant lead time & WIP reduction
- Significant inventory reduction
- Significant yield gain
Gaining competitive advantages through MOM software

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Questions

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