Agenda

- Trends and observations
- "Best-in-Class" Responses
- Improve Performance
- Metrics
- Potential of MES
- Closing Remarks
# Industry Challenges and Drivers

- **Pressure on margins**
  - requiring cost reductions
- **Extended complexity**
  - making it more difficult to integrate systems and to align with business
- **Rapid changes in demand**
  - during the current economic turbulence
- **Greater eco-system**
  - across geographies, logistics and portfolios
- **Optimize performance and revenues**
  - across the entire value chain
- **Stricter regulation**
  - financial reporting to environmental controls

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# Future Manufacturing Ecosystem

- **How to manage your supply chain ecosystem**
- **How to optimize your plants and align with the supply chain demands**
Supply Chain and Manufacturing Challenges

- Reduce product stock-outs
- Remove supply chain inefficiencies
- Lower inventory to reduce costs
- Reduce transportation and order management costs
- Reduce order fulfillment lifecycle (cash-to-cash cycle time)
- Management of inventory replenishment process
- Retail & regulatory mandates
- Track-and-trace applications force supply chain optimization

Global Manufacturing Environment

- Large increase in product variants by region and season
- Much shorter new product development and time-to-volume (TTV) cycle times
- Increasing and wide demand forecast error
- Diverse global regulatory and customer compliance requirements
- Competition → continuous cost reduction
- More dynamic supply networks
  - Ex. Japan, energy cost, credit rating, ...
### It is about Process Capabilities

<table>
<thead>
<tr>
<th>Process</th>
<th>Best-in-Class</th>
<th>Average</th>
<th>Laggards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardize processes across the enterprise for optimizing manufacturing operations</td>
<td>64%</td>
<td>37%</td>
<td>30%</td>
</tr>
<tr>
<td>Standardize measurements of KPIs across enterprise</td>
<td>68%</td>
<td>58%</td>
<td>51%</td>
</tr>
<tr>
<td>Standardize processes for response to adverse events</td>
<td>64%</td>
<td>51%</td>
<td>19%</td>
</tr>
</tbody>
</table>

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### Best-in-Class Focus on Perfect Order and New Product Introduction

<table>
<thead>
<tr>
<th>Definition of Maturity Class</th>
<th>Mean Class Performance</th>
</tr>
</thead>
</table>
| **Best-in-Class: Top 20% of aggregate performance scorers** | - 94% Success with New Product Introductions  
- 89% OEE  
- 94% On Time and Complete Shipments  
- +6% Operating Margin vs. Corporate Plan |
| **Industry Average: Middle 50% of aggregate performance scorers** | - 78% Success with New Product Introductions  
- 82% OEE  
- 90% On Time and Complete Shipments  
- +2% Operating Margin vs. Corporate Plan |
| **Laggard: Bottom 30% of aggregate performance scorers** | - 49% Success with New Product Introductions  
- 74% OEE  
- 86% On Time and Complete Shipments  
- -3% Operating Margin vs. Corporate Plan |

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Manufacturing Operations Contribution

- Right product
- Right quality
- Right place
- Right time
- Right profit margin

Importance of Perfect Order Performance
- 15% less inventory
- 17% stronger perfect order fulfillment
- 35% shorter cash-to-cash cycle times
- 1/10 of the stockouts of their peers

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Prerequisite: Convergence of All Resources

MES Project is NOT an IT Project

"Bridging the Gap"?!
Business Alignment: Step By Step Approach

A business driven, aligned approach:
MES is Primary Continuous Improvement Enabler

MES/MOM Business Drivers and KPIs

Increase
• Throughput
• Product quality
• Yield
• Rework efficiency
• Equipment utilization
• Material utilization
• Energy utilization
• Line uptime
• Plant communication
• Market response
• Regulatory compliance

Decrease
• Inventory
• Regulatory costs
• Waste
• Time-to-volume
• Cycle time
• Changeover time
• Maintenance costs
• TCO for systems
MES/MOM Opportunities

Value of Benefits

Larger benefits from Continuous Improvement: MES/MOM is a prerequisite to achieve this level.

Reduce operating costs
Increase volume and/or margins at same cost
Increase market share and/or pursue new markets

Average payback 12 Months on 1X Benefits

Faster NPI cycle: shorten TTM for innovation
MOM marketed as a competitive tool
Customer audit requirements: traceability and genealogy

Supplies collaboration
Supply chain visibility
Platform for continuous improvement

Lower WIP and FGI
Reduce waste/scrap/materials
Reduce rework
Reduce maintenance costs
Reduce indirect labor costs

Shorten cycle/flow time
Improve quality
Reduce process & product variability
Reduce cost of regulatory compliance

Project payback ranges 6 to 24 months

Source: Gartner

Metrics Matter!

- MESA Metrics Research
- Correlating Plant and Business performance
- Metrics 2007 - 2009
- Comparison with 143 participants and 'peers'.
- Main topics
  - Business metrics (14)
  - Operational metrics (26)
  - Data capturing
  - Feedback to 'originators'
  - Information technology
Business Gains despite Economy

Business metrics most frequently improved by 1% or more

<table>
<thead>
<tr>
<th>Metric</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor cost per unit</td>
<td>9% 41% 17% 23% 15%</td>
</tr>
<tr>
<td>Net operating profit</td>
<td>11% 36% 10% 23% 12%</td>
</tr>
<tr>
<td>EBITDA</td>
<td>10% 20% 14% 29% 10%</td>
</tr>
<tr>
<td>Customer fill rate/on-time delivery</td>
<td>13% 35% 24% 27% 15%</td>
</tr>
<tr>
<td>Productivity in revenue per employee</td>
<td>7% 39% 13% 24% 10%</td>
</tr>
</tbody>
</table>

Business Movers versus Others

"Business Movers":
- EBITDA improved over 10%*
  or
- Net Operating Profit improved over 10%*
  or
- Have improved more than 1% on at least 10 of 14 business metrics*

- 50 participants (35%) of the 143 participants are business movers
  - in all industries
  - in all regions
  - small and big

* average annual improvement over last 3 years
Business movers improve more in operations

- **Business Movers improved more on the vast majority of the operations metrics.**

![Chart showing portion reporting over 10% improvement on operational KPIs]

- Business Movers: better and faster control

- **Business Movers have more effective links between business and operational metrics: better control.**

- **Business Movers provide feedback on operational metrics to those who manage the concerning operations more rapidly.**

![Chart showing very effective links between operational and business metrics]

![Chart showing how rapidly are operational metrics showed to those managing the operations measured]
Automated Data Collection

- Business Movers are collecting their metrics data fully or partially automated more often.

Use of IT and Business Metrics Improvement

- Companies who use 75% of the information systems listed (significant IT use) are more likely to improve on most business metrics with 10% or more.

Portion reporting over 10% improvement on business KPI’s

- Return on (Net) Assets (ROA/RONA)
- Economic value /economic profit
- Average unit contribution margin
- Market share (key markets)
- EBITDA
- Revenue from new products

Limited IT Use vs. Significant IT Use
Metrics that Matter Revisited - Summary

• Characteristics of Business Movers:
  – Direct relations (link) between business and operational metrics
  – Rapid feedback of operational metrics to those who ‘make the difference’ (shop floor and management)

• Supported by:
  – Automatic capture of data for metrics
  – Appropriate IT to provide reliable and consistent feedback frequently and quickly

• Top performers all have at least these characteristics!
  – To become a top performer, a company needs significant improvement on the mentioned characteristics and support them.
  – To stay in top quartile ranking, these characteristics must continuously be maintained and improved.

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### MES Benefits (examples)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Improvement</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Tech</td>
<td>Data quality &amp; product costing</td>
<td>+ 3% turnover, exchange accurate operational information between level 3 and 4.</td>
</tr>
<tr>
<td>Beer brewery</td>
<td>Stock reduction</td>
<td>15-20% (ongoing) reductions, through implementation of MES, LIMS and WMS.</td>
</tr>
<tr>
<td>Performance-and-life science materials</td>
<td>IT Service cost reduction</td>
<td>30% less IT service cost worldwide, by outsourcing of the Manufacturing/IT.</td>
</tr>
<tr>
<td>Metal</td>
<td>Improved productivity &amp; reduced WIP</td>
<td>Productivity up 9%, WIP down 15% through implementation of MES and integration with planning.</td>
</tr>
<tr>
<td>Feed</td>
<td>Lower (production) costs and capacity increase (→ Postpone investments)</td>
<td>+ 2% improvement, + 5% improved capacity, through implementation of standardized MES in all sites.</td>
</tr>
<tr>
<td>Metal</td>
<td>Material efficiency</td>
<td>Improved with 6% reduction of wrong shipments and improved accuracy.</td>
</tr>
<tr>
<td></td>
<td>Delivery performance</td>
<td></td>
</tr>
<tr>
<td>Food &amp; Beverage</td>
<td>Efficiency improvement &amp; OEE improvement</td>
<td>+ 8% improved efficiency due to less stops, + 10% OEE improvement, implementation of MES.</td>
</tr>
<tr>
<td>CPG (Cleaning agents)</td>
<td>Production throughput time</td>
<td>45% improvement in production throughput time, by implementing MES.</td>
</tr>
<tr>
<td>High Tech</td>
<td>Accurate as-built and as-maintained information and improved tracking and tracing</td>
<td>Improve product quality and significant lower warranty costs, through right tracking and tracing information via MES.</td>
</tr>
</tbody>
</table>

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### Multi Site Roll-Out

- **Overview of available standard MES products**
  - Manufacturers
  - Vendors
  - CGI (formerly Logica)
- **Published annually since 2000, 14th edition**
- **69 vendors with 73 products**
- **MESA and CGI website**

![Graph showing average cost and throughput time reduction](image)

**Significant reduction of cost and throughput time of deployment in Nth site compared to 1st site**

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**Snoeij - MES Business Benefits**
**OPC and MES Day 2013, Tampere (FIN)**
Multi-Site Roll-Out: Prerequisites for reduction of cost and throughput time*

- **Standardization** of the manufacturing operation processes is a prerequisite, according to 50% of responding vendors.

- Equally important is proper **governance** in which corporate and local objectives and interests are well aligned, with clear roles and responsibilities, ensuring commitment from top management to the shopfloor.
  - Closely related is **change management**, focusing at the intended improvement, continuously monitoring the progress.

- Multi-site deployment should be part of an integral **continuous improvement** program, in which best practices are identified and shared across the enterprise (20% of vendors).

- A standardized template based solution comprising configurable building blocks that includes all required functionality, but can be configured to specific needs in each site. This aspect is mentioned by one fifth of the responding vendors.

* Only half of the vendors responded with ‘best practices’

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Closing Remarks

• The demand of the market is more dynamic than ever before!
• Best-in-class: Successful perfect order delivery and new product introduction by standardization!
• MES projects are NOT just IT projects.
• MES projects deliver cost reduction (and more ...) when applied step-by-step as part of a continuous improvement program.
• MES is a prerequisite, an enabler ...
  ... but people make the difference!

Any Questions?

• Then ask now!

Or later:
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