Global Manufacturing Operations Management

August 2008
Executive Summary

Executives face numerous challenges in managing global manufacturing operations and successfully collaborating across internal groups and external partners. In today’s economic environment, the number one driving force behind focusing on manufacturing operations is to "reduce the total cost of manufacturing." Prior Aberdeen research has found that to accomplish this objective, many executives are attempting to synchronize manufacturing operations by deploying a common platform to manage maintenance, production, quality, and inventory. This new research will show how such a platform can provide the basis for managing not only manufacturing operations, but also quality and inventory across global supplier networks.

Best-in-Class Performance

Aberdeen uses three Key Performance Indicators (KPIs) to identify Best-in-Class performance, with the Best-in-Class averaging:

- 94% on-time and complete shipments
- 84% Overall Equipment Effectiveness (OEE)
- 9.9 hours response time to non-conforming shipments

Competitive Maturity Assessment

Aberdeen’s survey analysis shows that enterprises enjoying Best-in-Class performance differentiate themselves in many ways, including:

- Best-in-Class manufacturers are over 2.5-times as likely as Industry Average manufacturers to extend a Manufacturing Operations Management (MOM) platform across all manufacturing facilities
- Best-in-Class manufacturers are over four-times as likely as Laggard manufacturers to being using supplier quality management
- Best-in-Class manufacturers are over ten times as likely as Laggard manufacturers to be using manufacturing intelligence

Required Actions

To achieve and sustain Best-in-Class performance, companies must focus on improving manufacturing operations in the following ways:

- Provide real-time visibility and establish automated workflows across manufacturing operations and supplier networks to manage adverse events
- Leverage executive focus and collaboration across manufacturing, engineering, quality, and corporate IT to ensure the successful deployment of a manufacturing operations management platform extending across the global manufacturing network.

Research Benchmark

Aberdeen’s Research Benchmarks provide an in-depth and comprehensive look into process, procedure, methodologies, and technologies with best practice identification and actionable recommendations.

“We are heavily exposed to client pressure to contain costs and improve logistics excellence. In fact, our customers asked that we reduce prices by 6% while simultaneously delivering 10% improvements in productivity. To address these pressures we have implemented a platform with both a Manufacturing Execution System and a Warehouse Management System providing real-time visibility and control for global manufacturing operations management.”

~ Pascal Ober, Director of Competency Centers, Saint-Gobain Sekurit
Table of Contents

Executive Summary.......................................................................................................3
Best-in-Class Performance..................................................................................... 3
Competitive Maturity Assessment....................................................................... 3
Required Actions......................................................................................................3
Table of Contents .................................................................................................... 3
Table of Contents.................................................................................................... 4
Chapter One: Benchmarking the Best-in-Class .....................................................5
  Business Context .....................................................................................................5
  Cost Cutting is Top of Mind .................................................................................5
  The Maturity Class Framework............................................................................ 6
  The Best-in-Class PACE Model ............................................................................7
  Best-in-Class Strategies...........................................................................................7
Chapter Two: Benchmarking Requirements for Success ..................................10
  Competitive Assessment......................................................................................10
  Aligning Business Initiatives and Technology ................................................... 14
Chapter Three: Required Actions .........................................................................19
  Laggard Steps to Success......................................................................................19
  Industry Average Steps to Success ....................................................................19
  Best-in-Class Steps to Success ............................................................................20
Appendix A: Research Methodology.....................................................................21
Appendix B: Related Aberdeen Research............................................................23
Featured Underwriters..............................................................................................24

Figures

Figure 1: Pressures Driving Focus on Manufacturing Operations..................... 5
Figure 2: Best-in-Class Strategic Actions................................................................. 8
Figure 3: Real-Time Technology Interoperability ................................................15
Figure 4: Real-Time Visibility ....................................................................................16
Figure 5: Automated Workflows to Manage Adverse Events.......................... 16
Figure 6: Technology Enablers .................................................................................18

Tables

Table 1: Top Performers Earn Best-in-Class Status..............................................6
Table 2: The Best-in-Class PACE Framework .......................................................7
Table 3: The Competitive Framework ....................................................................10
Table 4: Real-Time Business Initiative Interoperability ......................................14
Table 5: The PACE Framework Key ....................................................................22
Table 6: The Competitive Framework Key ..........................................................22
Table 7: The Relationship Between PACE and the Competitive Framework ..22
Chapter One: Benchmarking the Best-in-Class

Business Context

Within global supplier networks, manufacturers can no longer be satisfied with a myopic view of operations. In today’s marketplace, the penalties for high operating costs, delivering products late to market, or delivering products with quality non-conformances are severe and can cripple an enterprise. Best-in-Class manufacturers are ahead of the curve in addressing these issues and are adopting a platform approach to managing manufacturing operations, supplier quality, and inventory flow. The challenge now facing those not yet performing at Best-in-Class levels is in maintaining current competitive positions and responding to the investments already made by the Best-in-Class.

Executive focus on manufacturing operations, collaboration between line of business manufacturing, engineering, quality, and corporate IT, and a platform approach to manufacturing operations, supplier quality, and inventory flow are all current trends in the manufacturing marketplace that Aberdeen correlates to Best-in-Class performance. The focus of this benchmark research will be on establishing both the operational and corporate benefits associated to the adoption of these business capabilities and technology enablers, with particular attention being paid to the use of real-time visibility, automated workflows, and real-time interoperability across adopted technologies.

Cost Cutting is Top of Mind

Before diving into the benefits, intricacies, and pitfalls associated with attempting to improve manufacturing operations at the enterprise level, it is of interest to establish why enterprises are undertaking such initiatives in the first place.

Figure 1: Pressures Driving Focus on Manufacturing Operations

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need to reduce total cost of manufacturing</td>
<td>83%</td>
</tr>
<tr>
<td>Rising energy and commodity prices</td>
<td>33%</td>
</tr>
<tr>
<td>Global competition</td>
<td>26%</td>
</tr>
<tr>
<td>Corporate profitability mandates</td>
<td>25%</td>
</tr>
<tr>
<td>Need to ensure compliance and quality</td>
<td>21%</td>
</tr>
<tr>
<td>Need to reduce risk of adverse events</td>
<td>6%</td>
</tr>
</tbody>
</table>

Source: Aberdeen Group, August 2008
Given the current economic climate and the impact manufacturing operations have on the bottom line, it is not surprising that the number one market pressure driving executives to focus on improving manufacturing operations is the need to reduce the total cost of manufacturing. The only surprise that may be found here is the amount of difference between the first and second pressures.

There are just very few manufacturers not being driven by cost concerns today. In fact, every survey Aberdeen conducts shows more manufacturers viewing cost reduction as a top driver of business decisions. When this same question was asked last quarter, reducing cost was also the number one pressure, but the gap between the first and second most prevalent pressure was not as great. Furthermore, only 77% of manufacturers had chosen reducing cost, as compared to 83% in this most recent study.

The Maturity Class Framework

In this study Aberdeen uses three key performance criteria to distinguish the Best-in-Class from Industry Average and Laggard organizations:

- **On-time and complete shipments.** Products delivered on time and complete as compared to total original commitment
- **OEE.** Composite metric accounting for availability, performance, and quality
- **Response time to non-conforming shipments.** Given that a non-conforming shipment has been made, the amount of time needed to locate and hold said product

Respondents were divided among three categories based on their aggregate performances in these three metrics. Table 1 displays the average performance of Best-in-Class, Industry Average, and Laggard organizations.

**Table 1: Top Performers Earn Best-in-Class Status**

<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 | ▪ 84% OEE  
▪ 95% on-time and complete shipments  
▪ 9.9 hours response time to non-conforming shipments |
| **Industry Average:** Middle 50% of aggregate performance scorers | ▪ 81% OEE  
▪ 92% on-time and complete shipments  
▪ 17 hours response time to non-conforming shipments |
| **Laggard:** Bottom 30% of aggregate performance scorers | ▪ 65% OEE  
▪ 75% on-time and complete shipments  
▪ 70 hours response time to non-conforming shipments |

Source: Aberdeen Group, August 2008
The Best-in-Class PACE Model

Reducing manufacturing costs across a global enterprise can be a daunting task. Table 2 summarizes some of the strategic actions, business process capabilities, and technology enablers Best-in-Class companies have implemented to address these market pressures.

Table 2: The Best-in-Class PACE Framework

<table>
<thead>
<tr>
<th>Pressures</th>
<th>Actions</th>
<th>Capabilities</th>
<th>Enablers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduce &quot;total cost of manufacturing&quot;</td>
<td>• Synchronize operational performance with corporate performance objectives</td>
<td>• Dynamically update business processes as best practices emerge</td>
<td>• Scheduling dispatch</td>
</tr>
<tr>
<td></td>
<td>• Holistically manage and optimize operations across the global manufacturing network</td>
<td>• Executive sponsorship for initiatives on improving manufacturing operations</td>
<td>• Traceability and genealogy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cross functional continuous improvement teams collaborate across geographies</td>
<td>• Dashboards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Line of business manufacturing, engineering, and corporate IT work collaboratively to implement technology supporting manufacturing operations</td>
<td>• Analytics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Operational metrics are linked with financial metrics</td>
<td>• Change control management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Scorecard for normalizing performance across operations</td>
<td>• Non-Conformances Corrective and Preventive Actions (NC / CAPA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Drill down in KPIs by geography, product line, mix, etc.</td>
<td>• Failure Mode and Effects Analysis (FMEA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• MOM platform extends across the entire global manufacturing network</td>
<td>• Statistical Process Control (SPC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Supplier quality management</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Real-time interoperability between the MOM platform and enterprise systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Real-time visibility across manufacturing operations and the global supplier network</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Automated workflows managing adverse events across manufacturing operations and the global supplier network</td>
</tr>
</tbody>
</table>

Source: Aberdeen Group, August 2008

Best-in-Class Strategies

In regards to global manufacturing operations, Aberdeen has found no significant correlation between the strategic actions an enterprise deploys and the likelihood an enterprise performs at the Best-in-Class level. Therefore, manufacturers from every performance category should spend more effort on ensuring the successful execution of a given strategy than the particular strategy deployed. However, that is not to say manufacturers should just choose a strategy without first considering the overall market conditions and competitive landscape. To assist in better understanding these considerations, several of the most common strategic actions being deployed will be discussed in more detail regarding the relevance of these strategies to global Manufacturing Operations Management (MOM).
Synchronizing corporate and operational performance can be of particular importance when managing operations that are distributed globally. Understanding the impact a line or facility has on overall corporate performance can be a significant competitive advantage. Similarly, understanding the impact that corporate decisions regarding new product introductions or facility expansions can have on manufacturing operations also offers significant benefits. Additional information on this subject is available in Aberdeen's May 2008 Benchmark Report, Event Driven Manufacturing Intelligence: Closed Loop Performance Management, which provides a deep dive analysis on the benefits and pitfalls of such a strategy.

Holistically managing and optimizing operations across globally distributed manufacturing facilities involves aligning corporate and operational objectives but encompasses much more. Understanding the implications differing cultures, regulations, local markets, and technical expertise can have on manufacturing operations also falls under the umbrella of this strategic action. Such differences can impact all areas of manufacturing operations. Supplier collaboration, the load balancing of factories to meet local versus global demand, break / fix versus preventive versus predictive approaches to maintenance, new product introduction and the role of quality are all examples of differences that can arise in approaches to managing global operations. In general, every globally distributed manufacturing enterprise will have these differences from site to site, this can not be avoided only managed, further highlighting the importance of a holistic approach to global manufacturing operations management.

In the next chapter, we will see what business capabilities and technology enablers Best-in-Class manufacturers are leveraging to ensure the success of these strategic actions.

“We consider manufacturing to be a competitive advantage through our global sourcing strategy. We focus our technology on product design in collaboration with manufacturing to hit our cost targets. We model our total supply chain costs in our evaluation. We use an integrated business management approach with each process step... product.... demand...supply.... integrated reconciliation .... and management business review, fully engaging each function in the assessment and decisions. We use SCOR metrics to monitor and improve performance. Furthermore, we fully engage our key suppliers in the evaluation of product design and material flow design.”

~ Vice President
Large Specialty Chemical Manufacturer
An emerging trend that has been seen now across multiple benchmark reports is that rising energy and commodity prices continue to gain more mindshare with manufacturing executives. Furthermore, those executives that indicated rising energy and commodity prices as one of the top market pressures impacting their manufacturing operations are considerably more likely to be Best-in-Class. However, almost none of these executives are implementing strategic actions that address the concern of rising energy and commodity prices.

As manufacturers struggle to deal with price increases in the basic inputs to the manufacturing process, it is critical for these manufacturers to start taking strategic actions that properly align business process and technology to address this now well documented issue.
Chapter Two: Benchmarking Requirements for Success

The way in which manufacturers implement the business processes designed to manage global manufacturing operations and support the strategic actions being taken is highly correlated to the achievement of Best-in-Class performance.

Competitive Assessment

Aberdeen analyzed the aggregated metrics of surveyed companies to determine whether their performance ranked as Best-in-Class, Industry Average, or Laggard. In addition to having common performance levels, each class also shared characteristics in five key categories: (1) **process** (the standardization and management of processes across the enterprise); (2) **organization** (continuous improvement teams and role-based visibility to all levels of organization); (3) **knowledge management** (automating data collection and using it as actionable intelligence); (4) **technology** (the software and capabilities that are crucial for achieving operational excellence); and (5) **performance management** (measuring the metrics and linking those metrics to financials). These characteristics serve as guidelines for best practices, and correlate directly with Best-in-Class performance across the key metrics.

Table 3: The Competitive Framework

<table>
<thead>
<tr>
<th></th>
<th>Best-in-Class</th>
<th>Average</th>
<th>Laggards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standardize processes for response to adverse events</td>
<td>64%</td>
<td>51%</td>
<td>19%</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 across the enterprise for optimizing manufacturing operations</td>
<td>64%</td>
<td>37%</td>
<td>30%</td>
</tr>
<tr>
<td>Organization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-functional continuous improvement teams collaborate across geographies</td>
<td>77%</td>
<td>54%</td>
<td>32%</td>
</tr>
<tr>
<td>Executive sponsorship for initiatives on improving manufacturing operations</td>
<td>90%</td>
<td>65%</td>
<td>54%</td>
</tr>
<tr>
<td>Line of business manufacturing, engineering, and corporate IT work collaboratively to implement technology supporting manufacturing operations</td>
<td>68%</td>
<td>40%</td>
<td>37%</td>
</tr>
</tbody>
</table>

Fast Facts

- Best-in-Class manufacturers are over 2.5-times as likely as Industry Average manufacturers to extend a MOM platform across all manufacturing facilities.
- Best-in-Class manufacturers are over four-times as likely as Laggard manufacturers to be using supplier quality management.
- Best-in-Class manufacturers are over 10-times as likely as Laggard manufacturers to be using manufacturing intelligence.
## Best-in-Class | Average | Laggards
---|---|---
### Knowledge
Automated data collection
73% | 47% | 35%
Adverse events are escalated to appropriate decision makers
74% | 58% | 36%
### Technology
Percentage of manufacturers currently using technology:
- **SCM** 59%  
- **PLM** 41%  
- **QMS** 73%  
- **MI** 35%  
- **MES** 45%  
- **HMI / SCADA** 65%  
- **Data Historian** 52%
- **SCM** 47%  
- **PLM** 23%  
- **QMS** 58%  
- **MI** 14%  
- **MES** 39%  
- **HMI / SCADA** 25%  
- **Data Historian** 29%
- **SCM** 36%  
- **PLM** 24%  
- **QMS** 49%  
- **MI** 3%  
- **MES** 19%  
- **HMI / SCADA** 20%  
- **Data Historian** 17%
MOM platform extending across all manufacturing facilities in the global manufacturing network
52% | 19% | 19%
### Performance
Real-time monitoring of adverse events
45% | 22% | 11%
Operational metrics are linked to financial metrics
90% | 68% | 46%
Energy consumption and cost used as KPI for decision making
50% | 27% | 11%
Score-carding used for normalizing performance across manufacturing sites
71% | 33% | 31%

Source: Aberdeen Group, August 2008

### Acronyms
- **HMI / SCADA** Human Machine Interface / Supervisory Control and Data Acquisition
- **MES** Manufacturing Execution Systems
- **MI** Manufacturing Intelligence
- **QMS** Quality Management Systems
- **PLM** Product Lifecycle Management
- **SCM** Supply Chain Management

“We can relate cost to specific issues for assessing productivity. More accurate figures translate into more accurate bids, making us more competitive.”

~Pascal Ober, Director of Competency Centers, Saint-Gobain Sekurit
case of a global manufacturer, that a plant in mainland Europe measures OEE or customer service in the same way as a plant in the Asia Pacific (APAC) region.

The final area of process standardization in manufacturing operations that is shown to differentiate Best-in-Class performance involves the way in which optimization is performed. Best-in-Class manufacturers are over twice as likely as Laggard manufacturers to standardize these processes, meaning when the Best-in-Class establish Work-in-Process (WIP) safety stock buffers or control limits on variability in critical supplier receipts, they are standardized across globally distributed sites. Clearly, there are performance benefits associated with standardizing processes and leveraging Standard Operating Procedures (SOPs) across a globally distributed enterprise; however, implementing SOPs can be a daunting challenge. The following analysis regarding knowledge management and organizational architecture will lend insight into how to ease the pain of standardization.

**Organization Architecture**

There is a close relationship between the processes Best-in-Class enterprises have established and how Best-in-Class organizations are architected. The Best-in-Class are more likely to ensure the success of continuous improvement teams in a globally distributed environment by enabling such teams to collaborate across geographies. Similarly, when Best-in-Class manufacturers are making decisions regarding technology deployment, collaboration is again a focus. In fact, two-thirds (68%) of Best-in-Class manufactures involve engineering, manufacturing line of business, quality, and corporate Information Technology (IT) in such decisions.

To complement this collaborative approach to both continuous improvement and technology deployment, Best-in-Class manufacturers rely on executive sponsorship of such initiatives to carry the enterprise on through to success. In many organizations, thinking about manufacturing operations outside of the context of a single plant is a very new idea. Similarly, thinking about manufacturing operations as a collaborative process that should involve open communication between engineering, quality, and corporate IT is also a new idea. As with all new ideas, resistance to change is a given; to help overcome such resistance, encouragement from above can often be necessary and is correlated to Best-in-Class performance.

**Knowledge Management**

Automating data collection and using collected data to appropriately escalate adverse events differentiates how the Best-in-Class approach knowledge management. By automating data collection and building escalation procedures into workflows, Best-in-Class manufacturers are helping to ensure that standardization and collaboration take place across the enterprise. When this approach is taken, there can be an effective alignment between the data and workflow level with how collaboration and standardization extends across the enterprise, ultimately elevating performance.

“With regards to metrics, what we’re seeing is a consistency in throughput. We are able to tell when problematic areas arise and by having it automated, we are able to take preventive action in order to maintain consistent operation.”

~ Harry Crigler, Distillery Operations Manager, Jim Beam
Case Study — SABMiller

SABMiller plc currently produces 26 million hectoliters (hl) of beer per annum and sells 14 million hl of other beverages through its soft drinks division, ABI; making SABMiller plc the second largest brewer in the world by volume today.

To improve global manufacturing operations, SABMiller has taken a platform approach, synchronizing all seven of their manufacturing facilities on a single platform, holistically managing operations. In deploying this platform there have been three major areas of focus: materials loss management, scheduling and efficiency, and quality assurance.

After the 24 month global manufacturing operations management implementation was complete, SAB Miller enjoyed the following benefits:

- Brewing material loss saw a 0.8% step change year-on-year contributing 1.5 million Euros to the bottom line
- Brewing factory efficiency improved by 3.8% year-on-year, freeing up 171,000 hl capacity per annum
- Overall Sigma saw an improvement of 0.08, meaning 19,000 less defects per million opportunities

Technology

There is a correlation between the technologies a manufacturer adopts, how the technologies are implemented, and achieving Best-in-Class performance. The technologies that correlate to Best-in-Class performance span the ISA-95 technology stack; starting at the data and controls layer, moving up through manufacturing operations, and ending with enterprise applications focused on interdependent functional areas including engineering and distribution. Furthermore, Best-in-Class manufacturers are over twice as likely as Industry Average and Laggard manufacturers to deploy the technology solutions managing manufacturing operations with a platform approach, servicing all manufacturing facilities within the global manufacturing network. Such a technology strategy clearly complements the standardization and collaboration initiatives also being undertaken by Best-in-Class organizations and upon further analysis will be shown to align with the overall business process initiatives being implemented.

Performance Management

Given the definition of Best-in-Class, effectively managing performance is a necessary requirement for achieving Best-in-Class status. Subsequently, it is also one of the most differentiating areas highlighted in Table 3. Interestingly, when all the capabilities associated with performance management are considered collectively, it can be seen that they are tightly aligned with the most prevalent strategic actions being taken in the marketplace today as well as with many of the other capabilities being implemented.
across process standardization, organizational architecture, and knowledge management. This leads to another interesting point; there are many strategies that can be deployed, as well as many business capabilities and technology enablers that can support these strategies. It is important to find alignment between these, and the next section will show how many Best-in-Class manufacturers are doing just that.

Aligning Business Initiatives and Technology

The above analysis on business capabilities and technology enablers highlights how Best-in-Class manufacturers differentiate from the competition. The analysis also shows some underlying themes regarding how Best-in-Class manufacturers approach global manufacturing operations, namely as a competitive advantage that is based on a collaborative approach, leveraging the expertise and cooperation of many traditionally disparate groups in a global manufacturing enterprise. Further analysis shows that there is in fact more than just a tacit connection between the aforementioned business capabilities and technology enablers.

Real-Time Interoperability across Business Initiatives

There are common and established business initiatives that correlate to Best-in-Class performance and leverage many of those capabilities highlighted above. Common business initiatives that are highly correlated to Best-in-Class performance are described in detail in Table 4, along with the adoption rates of these initiatives across the multiple performance categories.

Table 4: Real-Time Business Initiative Interoperability

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Best-in-Class</th>
<th>Average</th>
<th>Laggards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design for Manufacturability</strong></td>
<td>50%</td>
<td>36%</td>
<td>22%</td>
</tr>
<tr>
<td>- Design engineers have real time feedback from manufacturing operations allowing them to improve designs based on manufacturing performance.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Enterprise Quality Management</strong></td>
<td>73%</td>
<td>47%</td>
<td>30%</td>
</tr>
<tr>
<td>- Quality is viewed as a holistic process that is collaboratively addressed by procurement, engineering, manufacturing, quality, distribution, and customer management.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Demand Driven Manufacturing</strong></td>
<td>83%</td>
<td>51%</td>
<td>33%</td>
</tr>
<tr>
<td>- Customer demand is visible to manufacturing and drives operations, similarly procurement has visibility into manufacturing operations which drives supplier interaction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Track and Trace</strong></td>
<td>59%</td>
<td>36%</td>
<td>24%</td>
</tr>
<tr>
<td>- Design, Procurement, Manufacturing, Quality, and Distribution are integrated to create complete forward and backward traceability of products and processes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Aberdeen Group, August 2008

“Deploying a technology platform spanning across manufacturing operations and multiple facilities allows us to effectively measure rate of return by grading each machine’s contribution. It has greatly simplified the process of manufacturing orders, since supervisors and technicians no longer have to personally track each order. However, most importantly, customer service has benefited. Each operator sees production rules and product specifications on their screen, including details on packaging and shipping mode. This process improvement has enhanced accuracy, responsiveness, and on-time deliveries.”

~ Patrick Eygzier
Project Manager, Ugitech
Real-Time Interoperability across Technology

To support these business initiatives, Best-in-Class manufacturers are doing more than just leveraging the business capabilities highlighted in Tables 3. These manufacturers are also investing in real-time interoperability across the adopted technologies, creating real-time visibility and automated workflows to manage global manufacturing operations, and connect manufacturing operations to the supply chain. Finally, Best-in-Class manufacturers are also investing in specific technology enablers to further increase the effectiveness of adopted technologies.

Figure 3: Real-Time Technology Interoperability

When analyzing how manufacturers have connected the technologies adopted, there are specific points of real-time interoperability that are correlated to Best-in-Class performance. Specifically, Best-in-Class manufacturers are more likely to create real-time interoperability between both quality and manufacturing systems and other enterprise systems, including, those systems managing engineering, distribution, and financials. There is clearly a relationship between the integration points in Figure 3 and the business processes in Table 4. It is critical to have real-time interoperability between manufacturing systems and PLM if an enterprise is attempting to implement a business initiative around design for manufacturability. Similarly, it is critical to integrate manufacturing systems with ERP and SCM if an enterprise is attempting to implement either demand driven manufacturing or track and trace business initiatives. Finally, if an enterprise is attempting to implement a business initiative around
Enterprise Quality Management, it is important to leverage a quality system as a central hub interoperating between PLM, SCM, and ERP.

**Real-Time Visibility and Automated Workflows**

By taking a platform approach to global manufacturing operations and interoperating across this platform with other enterprise systems, Best-in-Class manufacturers have created real-time visibility and automated workflows to manage adverse events across both global manufacturing operations and the global supplier network (Figure 4 and Figure 5).

**Figure 4: Real-Time Visibility**

<table>
<thead>
<tr>
<th>Global Manufacturing Operations</th>
<th>Global Supply Network</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Best-in-Class</strong></td>
<td><strong>Industry Average</strong></td>
</tr>
<tr>
<td>Assets</td>
<td>73%</td>
</tr>
<tr>
<td>Production</td>
<td>96%</td>
</tr>
<tr>
<td>Quality</td>
<td>91%</td>
</tr>
<tr>
<td>Inventory</td>
<td>91%</td>
</tr>
<tr>
<td>Customer Demand</td>
<td>67%</td>
</tr>
<tr>
<td>Supplier Quality Performance</td>
<td>73%</td>
</tr>
<tr>
<td>Supplier Inventory Flow</td>
<td>52%</td>
</tr>
</tbody>
</table>

Source: Aberdeen Group, August 2008

Coupling real-time visibility and automated workflows is a powerful approach. In many cases, it provides the technology backbone allowing manufacturers to provide critical Best-in-Class differentiating business capabilities like role-based actionable intelligence to key decision makers and standardized responses to adverse events.

**Figure 5: Automated Workflows to Manage Adverse Events**

<table>
<thead>
<tr>
<th>Manufacturing Operations</th>
<th>Global Supply Network</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Best-in-Class</strong></td>
<td><strong>Industry Average</strong></td>
</tr>
<tr>
<td>Assets</td>
<td>48%</td>
</tr>
<tr>
<td>Production</td>
<td>86%</td>
</tr>
<tr>
<td>Quality</td>
<td>76%</td>
</tr>
<tr>
<td>Inventory</td>
<td>77%</td>
</tr>
<tr>
<td>Customer Demand</td>
<td>57%</td>
</tr>
<tr>
<td>Supplier Quality Performance</td>
<td>45%</td>
</tr>
<tr>
<td>Supplier Inventory Flow</td>
<td>48%</td>
</tr>
</tbody>
</table>

Source: Aberdeen Group, August 2008
Case Study — Saint-Gobain Sekurit

Saint-Gobain Sekurit is a Tier 1 automotive supplier with 13,700 employees, 1,300 ERP users, 7,000 MES users, 44 plants throughout Europe, and 1.8 Billion Euros per year in revenue. As with many tier 1 automotive suppliers, Saint-Gobain Sekurit is facing both pricing pressure and increasing productivity demands from suppliers. Pascal Ober, the Competence Centers Director at Saint-Gobain Sekurit states, “We are heavily exposed to client pressure to contain costs and improve logistics excellence. In fact, our customers asked that we reduce prices by 6% while simultaneously delivering 10% improvements in productivity.”

To address these pressures, Saint-Gobain has implemented a platform with both a Manufacturing Execution System (MES) and a Warehouse Management System (WMS) providing real-time visibility and control for manufacturing operations. Using this platform, Saint-Gobain Sekurit has achieved standardization on how product costs and KPIs are measured across 44 plants throughout Europe, identified areas where yields are best or time is lost; realized continuous improvement through best practices. For next steps, Saint-Gobain is now planning an extended world-wide rollout of this standardized system.

Technology Enablers

In addition to simply implementing an MES solution or a QMS solution, Best-in-Class manufacturers are building a solid base for such systems with HMI/SCADA and then leveraging their enterprise-wide platform approach to Manufacturing Operations Management for offering specific technology enablers. Figure 6 highlights those technology enablers that differentiate Best-in-Class performance. In general, these technology enablers span all aspects of manufacturing operations, including: maintenance, production, quality, and inventory, and also extend out beyond manufacturing operations to begin synchronizing manufacturing operations with the global supplier network.

Aberdeen Insights — Technology

Aligning technology with the capabilities needed to support today’s business initiatives is a defining characteristic of the Best-in-Class. To accomplish this, Best-in-Class manufacturers are more likely to take a platform approach to the technology solutions deployed across the manufacturing operations management layer. Furthermore, they are more likely to interoperate across this platform with other enterprise systems providing real-time visibility and automated work flows across both global manufacturing operations and the supplier network. Finally, this platform approach is being leveraged to deliver key technology enablers for the high level business initiatives on the manufacturing executive’s agenda, including: design for manufacturability, enterprise quality management, demand driven manufacturing, and track and trace.
network.

**Figure 6: Technology Enablers**

<table>
<thead>
<tr>
<th>Technology</th>
<th>Best-in-Class</th>
<th>Industry Average</th>
<th>Laggard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduling Dispatch</td>
<td>28%</td>
<td>44%</td>
<td>71%</td>
</tr>
<tr>
<td>Traceability and Genealogy</td>
<td>27%</td>
<td>48%</td>
<td>74%</td>
</tr>
<tr>
<td>Dashboards</td>
<td>27%</td>
<td>48%</td>
<td>65%</td>
</tr>
<tr>
<td>Analytics</td>
<td>13%</td>
<td>31%</td>
<td>61%</td>
</tr>
<tr>
<td>Change Control Management</td>
<td>13%</td>
<td>33%</td>
<td>62%</td>
</tr>
<tr>
<td>FMEA (Failure Mode and Effects Analysis)</td>
<td>22%</td>
<td>41%</td>
<td>60%</td>
</tr>
<tr>
<td>SPC (Statistical Process Control)</td>
<td>6%</td>
<td>40%</td>
<td>55%</td>
</tr>
<tr>
<td>Supplier Quality Management</td>
<td>15%</td>
<td>21%</td>
<td>67%</td>
</tr>
</tbody>
</table>

Source: Aberdeen Group, August 2008
Chapter Three: Required Actions

Whether a company is trying to move its performance in global manufacturing operations from Laggard to Industry Average, or Industry Average to Best-in-Class, the following actions will help spur the necessary performance improvements:

Laggard Steps to Success

- Appoint an executive steering committee to define corporate strategy for manufacturing solutions investments. This steering committee should focus on the value of collaboration, incorporating feedback and perspective from line of business manufacturing, engineering, quality, and corporate IT.

- Standardize production optimization, KPI measurement, and adverse event management processes across the enterprise. Best-in-Class manufacturers are more likely to standardize all of these processes than other manufacturers. This is critical to gaining the full benefits of further investment in enterprise wide manufacturing operations management solutions.

- Execution of strategy is more important than the specific strategy being followed. Focus on aligning business capabilities and technology enablers with the specific strategies being deployed. If your organization is trying to synchronize corporate and operational performance, adopt capabilities and technologies that will help link operational impact to financial impact through effective analytics. Or, if your organization is attempting to holistically manage global manufacturing operations focus on a platform approach to deploying the technologies that manage manufacturing operations.

Industry Average Steps to Success

- Do not overlook the value of plant floor automation. Data historians and HMI / SCADA are key technologies that serve as the building blocks for expanding and investing in a platform approach to global manufacturing operations management. Best-in-Class manufacturers are over three-times as likely as Laggard manufacturers to invest in these technologies.

- Leverage a collaborative approach between line of business manufacturing, engineering, quality, and corporate IT to begin standardizing multiple plants on a single global manufacturing operations management platform, holistically managing maintenance, production, quality, and inventory.

- At the functional or modular level, focus on deploying technology enablers that span the full suite of manufacturing operations management. Best-in-Class manufacturers differentiate by adopting real-time interoperability between disparate technologies to create real time visibility and automated workflows to manage both quality and inventory across suppliers and customers.

Fast Facts

- Standardize production optimization, KPI measurement, and adverse event management processes across the enterprise

- Leverage a collaborative approach between line of business manufacturing, engineering, quality, and corporate IT

- Focus on supporting global business initiatives with synergistic technology enablers

- Use real-time interoperability between disparate technologies to create real time visibility and automated workflows to manage both quality and inventory across suppliers and customers
scheduling and dispatch, and traceability and genealogy solutions to help manage production. They adopt SPC, FMEA, and change control management to help manage maintenance and quality. The Best-in-Class are also more likely to leverage dashboards, analytics, and supplier quality management to help synchronize global manufacturing operations with the supplier network.

**Best-in-Class Steps to Success**

- With an enterprise-wide manufacturing operations management platform in place, begin to interoperate in real-time across other enterprise applications such as PLM, SCM, and ERP. Use this interoperability to create real-time visibility and automated workflows to manage both quality and inventory across suppliers and customers.

- Focus on supporting global business initiatives such as design for manufacturability, enterprise quality management, demand driven manufacturing, or track and trace with synergistic technology enablers. Aim these technology investments at providing a platform that allows for traditionally disparate groups both internally and externally to successfully collaborate across global manufacturing operations.

- Focusing on rising energy and commodity prices differentiates Best-in-Class manufacturers. However, most have still not properly aligned the strategic actions being taken at the enterprise level with this pressure. The next step for Best-in-Class manufacturers is to start implementing strategies that align both business processes and technologies to enable sustainable manufacturing and effectively address rising energy costs.

---

### Aberdeen Insights — Summary

Executives face numerous challenges in effectively managing global manufacturing operations. Best-in-Class manufacturers are creating a collaborative enterprise through a platform approach to global manufacturing operations management, holistically managing maintenance, production, quality, and inventory.

This platform is being extended to help synchronize global manufacturing operations with the supply network, providing real-time visibility and automated workflows to more effectively manage adverse events across supplier quality, supplier inventories, and customer demand. Finally, the Best-in-Class are interoperating across technologies in such a way as to align with high level global business initiatives, including: design for manufacturability, enterprise quality management, demand driven manufacturing, or track and trace.
Appendix A: Research Methodology

Between July and August 2008, Aberdeen examined the use, the experiences, and the intentions of more than 175 enterprises in regards to their Global Manufacturing Operations.

Aberdeen supplemented this online survey effort with interviews with select survey respondents, gathering additional information on strategies, experiences, and results.

Responding enterprises included the following:

- **Job title / function:** CxO or President (20%); Vice-President (10%); Director (14%); Manager (36%), Staff (8%), Consultant (9%), and Other (3%).
- **Industry:** Industrial equipment manufacturing (14%); aerospace and defense (10%); automotive (10%); consumer packaged goods (10%); food and beverage (10%); metal and metal products (9%); high technology manufacturing (9%); and consumer durable goods (6%) among others.
- **Geography:** North America (67%); Asia-Pacific region (13%); and EMEA (15%) were all represented regions.
- **Company size:** Large enterprises (annual revenues above US$1 billion) – (25%); Midsize enterprises (annual revenues between $50 million and $1 billion) – (40%); Small businesses (annual revenues of $50 million or less) – (35%).

Solution providers recognized as sponsors were solicited after the fact and had no substantive influence on the direction of this report. Their sponsorship has made it possible for Aberdeen Group to make these findings available to readers at no charge.

### Study Focus

Responding manufacturing executives completed an online survey that included questions designed to determine the following:

- The degree to which Manufacturing Operations Management (MOM) is deployed in their global operations and the financial implications of the technology
- The structure and effectiveness of existing global MOM implementations
- The benefits, if any, that have been derived from global MOM initiatives

The study aimed to identify emerging best practices for global MOM usage across a broad set of industries, and to provide a framework by which readers could assess their own specific capabilities.
### Table 5: The PACE Framework Key

<table>
<thead>
<tr>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen applies a methodology to benchmark research that evaluates the business pressures, actions, capabilities, and enablers (PACE) that indicate corporate behavior in specific business processes. These terms are defined as follows:</td>
</tr>
<tr>
<td><strong>Pressures</strong> — external forces that impact an organization’s market position, competitiveness, or business operations (e.g., economic, political and regulatory, technology, changing customer preferences, competitive)</td>
</tr>
<tr>
<td><strong>Actions</strong> — the strategic approaches that an organization takes in response to industry pressures (e.g., align the corporate business model to leverage industry opportunities, such as product / service strategy, target markets, financial strategy, go-to-market, and sales strategy)</td>
</tr>
<tr>
<td><strong>Capabilities</strong> — the business process competencies required to execute corporate strategy (e.g., skilled people, brand, market positioning, viable products / services, ecosystem partners, financing)</td>
</tr>
<tr>
<td><strong>Enablers</strong> — the key functionality of technology solutions required to support the organization’s enabling business practices (e.g., development platform, applications, network connectivity, user interface, training and support, partner interfaces, data cleansing, and management)</td>
</tr>
</tbody>
</table>

Source: Aberdeen Group, August 2008

### Table 6: The Competitive Framework Key

<table>
<thead>
<tr>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Aberdeen Competitive Framework defines enterprises as falling into one of the following three levels of practices and performance:</td>
</tr>
<tr>
<td><strong>Best-in-Class (20%)</strong> — Practices that are the best currently being employed and are significantly superior to the Industry Average, and result in the top industry performance.</td>
</tr>
<tr>
<td><strong>Industry Average (50%)</strong> — Practices that represent the average or norm, and result in average industry performance.</td>
</tr>
<tr>
<td><strong>Laggards (30%)</strong> — Practices that are significantly behind the average of the industry, and result in below average performance.</td>
</tr>
</tbody>
</table>

In the following categories: |
| **Process** — What is the scope of process standardization? What is the efficiency and effectiveness of this process? |
| **Organization** — How is your company currently organized to manage and optimize this particular process? |
| **Knowledge** — What visibility do you have into key data and intelligence required to manage this process? |
| **Technology** — What level of automation have you used to support this process? How is this automation integrated and aligned? |
| **Performance** — What do you measure? How frequently? What’s your actual performance? |

Source: Aberdeen Group, August 2008

### Table 7: The Relationship Between PACE and the Competitive Framework

<table>
<thead>
<tr>
<th>PACE and the Competitive Framework – How They Interact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen research indicates that companies that identify the most influential pressures and take the most transformational and effective actions are most likely to achieve superior performance. The level of competitive performance that a company achieves is strongly determined by the PACE choices that they make and how well they execute those decisions.</td>
</tr>
</tbody>
</table>

Source: Aberdeen Group, August 2008
Appendix B:  
Related Aberdeen Research

Related Aberdeen research that forms a companion or reference to this report include:

- **Event Driven Manufacturing Intelligence: Closed Loop Performance Management**: May 2008
- **Manufacturing Operations Management: The Next Generation of Manufacturing Systems**: January 2008
- **Risk Mitigation in Manufacturing Operations**: March 2008
- **Compliance and Traceability in Manufacturing**: December 2007
- **Demand Driven Manufacturing**: November 2007
- **The Cost of Quality Benchmarking Enterprise Quality Management**: July 2007
- **Manufacturing IQ: Taking Manufacturing Intelligence to the Enterprise**: July 2007
- **Benchmarking Enterprise Asset Management**: June 2007
- **Lean Scheduling and Execution**: May 2007

Information on these and any other Aberdeen publications can be found at [www.Aberdeen.com](http://www.Aberdeen.com).

Authors: Matthew Littlefield, Sr. Research Analyst, Manufacturing, matthew.littlefield@aberdeen.com  
Mehul Shah, Research Analyst, Manufacturing, mehul.shah@aberdeen.com

Since 1988, Aberdeen’s research has been helping corporations worldwide become Best-in-Class. Having benchmarked the performance of more than 644,000 companies, Aberdeen is uniquely positioned to provide organizations with the facts that matter — the facts that enable companies to get ahead and drive results. That's why our research is relied on by more than 2.2 million readers in over 40 countries, 90% of the Fortune 1,000, and 93% of the Technology 500.

As a Harte-Hanks Company, Aberdeen plays a key role of putting content in context for the global direct and targeted marketing company. Aberdeen’s analytical and independent view of the “customer optimization” process of Harte-Hanks (Information – Opportunity – Insight – Engagement – Interaction) extends the client value and accentuates the strategic role Harte-Hanks brings to the market. For additional information, visit Aberdeen [http://www.aberdeen.com](http://www.aberdeen.com) or call (617) 723-7890, or to learn more about Harte-Hanks, call (800) 456-9748 or go to [http://www.harte-hanks.com](http://www.harte-hanks.com)

This document is the result of primary research performed by Aberdeen Group. Aberdeen Group's methodologies provide for objective fact-based research and represent the best analysis available at the time of publication. Unless otherwise noted, the entire contents of this publication are copyrighted by Aberdeen Group, Inc. and may not be reproduced, distributed, archived, or transmitted in any form or by any means without prior written consent by Aberdeen Group, Inc.
Featured Underwriters

This research report was made possible, in part, with the financial support of our underwriters. These individuals and organizations share Aberdeen’s vision of bringing fact based research to corporations worldwide at little or no cost. Underwriters have no editorial or research rights and the facts and analysis of this report remain an exclusive production and product of Aberdeen Group.

Wonderware is the market leader in real-time operations management software which includes HMI, SCADA, Production Management, MES, Performance Management, EMI, and integration with asset management, supply and demand chain and ERP applications. Wonderware has more than 500,000 active licenses in over 125,000 customer installations, and has customers in virtually every global industry — including Food & Beverage, Power, Water & Wastewater, Facilities, Transportation, Upstream Oil & Gas, Mining, Metals and other. Wonderware offers software solutions that tie together multiple fleets of plants and facilities, and enables new ways for customers, suppliers and producers to collaborate and produce more efficiently.

For additional information on Wonderware:

Wonderware
26561 Rancho Parkway South
Lake Forest, CA 92630
Tel: (949) 727-3200
info.northamerica@wonderware.com
www.wonderware.com