



Manufacturing Operations Management

The Next Generation of Manufacturing Systems

January 2008





Executive Summary

The Manufacturing Execution System (MES) has outlived its original definition. Faced with dynamic market changes and competitive threats, manufacturers are broadening their focus from execution within a single facility / factory to manufacturing operations management across the supply network. As a result, Best-in-Class manufacturers are turning to technology solutions that manage operations across maintenance, production, quality, and inventory management, with the goal being to improve material utilization, asset utilization, and continuous improvement team effectiveness. This will ultimately help manufacturers to reduce manufacturing costs and improve the response to demand variability.

Best-in-Class Performance

The value of manufacturing operations management is tied to the results attributed to its use. In the following analysis, Aberdeen uses three KPIs to identify Best-in-Class performance in manufacturing operations management. Across these metrics Best-in-Class manufacturers averaged the following performances:

- 97% On Time Delivery (OTD)
- 89% Overall Equipment Effectiveness (OEE)
- 97% raw material utilization

This performance, when compared to Industry Average firms, accounts for a 5% increase in OTD, an 11% increase in OEE, and an 11% increase in raw material utilization. Clearly, the Best-in-Class are enjoying significantly lower manufacturing costs, coupled with better customer service. The key to this benchmark study is in determining just how the Best-in-Class are achieving these results.

Competitive Maturity Assessment

Aberdeen's survey analysis shows that the firms enjoying Best-in-Class performance shared several common characteristics:

- Best-in-Class manufacturers are twice as likely as other manufacturers to use automated data collection in conjunction with data historians and manufacturing analytics.
- Best-in-Class manufacturers are over four-times more likely than other manufacturers to standardize KPI measurement, optimization, and exception handling across the enterprise.
- Best-in-Class manufacturers are more than 2.5-times more likely than other manufacturers to link operational metrics with financials and provide real-time role based visibility to decision makers.
- Compared to the Industry Average, Best-in-Class manufacturers are 50% more likely to use Plant Floor Automation (PFA), 17% more

Research Benchmark

Aberdeen's Research Benchmarks provide an indepth and comprehensive look into process, procedure, methodologies, and technologies with best practice identification and actionable recommendations



likely to use Quality Management Systems (QMS), 114% more likely to use Manufacturing Intelligence (MI), 55% more likely to use Advanced Planning and Scheduling (APS), and 56% more likely to use Lean manufacturing.

Required Actions

The Scope of MOM has expanded beyond traditional MES, requiring the following actions for manufacturers to achieve Best-in-Class performance:

- Appoint an executive steering committee to define the strategy around manufacturing solutions investments, Best-in-Class manufacturers are 50% more likely than laggards to have done this. Furthermore, these executive steering committees give the responsibility of defining manufacturing solutions requirements to the manufacturing line of business leadership, while giving joint responsibility to both Manufacturing and IT for the deployment of manufacturing solutions.
- Plant floor automation and automated data collection are key capabilities that serve as the building blocks for expanding and investing in manufacturing operations. Best-in-Class manufacturers are two-times as likely as laggards to automate data collection from production process. Invest in these capabilities.
- Establish event based real time interoperability to connect all of the necessary business processes under the MOM umbrella quality, maintenance, production, and inventory. This provides manufacturers a common solution platform to standardize processes and exchange information across the enterprise.





Table of Contents

Executive Summary2
Best-in-Class Performance2
Competitive Maturity Assessment2
Required Actions3
Chapter One: Benchmarking the Best-in-Class
Reducing Costs in the Face of Demand Uncertainty5
The Maturity Class Framework6
The Best-in-Class PACE Model7
Top Strategies7
Chapter Two: Benchmarking Requirements for Success
Competitive Assessment9
Standardizing Processes9
Knowledge Management
Implementing and Managing Manufacturing Solutions
Gaining Visibility into Your Manufacturing Operations
Chapter Three: Required Actions
Laggard Steps to Success
Industry Average Steps to Success
Best-in-Class Steps to Success
Appendix A: Research Methodology
Appendix B: Related Aberdeen Research
Figures
Figure 1: Top Market Pressures5
Figure 2: Top Performers Earn Best-in-Class Status
Figure 3: Strategic Actions
Figure 4: Technology Enablers
Figure 5: Technology Interoperability
Tables
Table I: The Best-in-Class PACE Framework7
Table 2: The Competitive Framework - Process
Table 3: The Competitive Framework - Knowledge Management
Table 4: The Competitive Framework - Organization
Table 5: The Competitive Framework - Performance Management
Table 6: The Competitive Framework - Technology
Table 7: The PACE Framework Key
Table 8: The Competitive Framework Key
Table 9: The Relationship Between PACE and Competitive Framework18



Chapter One: Benchmarking the Best-in-Class

Traditionally, manufacturing systems capabilities were built and configured to address specific departmental needs. This often resulted in an inefficient use of internal resources as well as an increased cost of ownership. Commonly termed "islands of automation," information had to be rationalized from disparate systems across organizational boundaries and company boundaries. In today's global manufacturing environment the challenges companies face are significantly different than what they did decades ago. This benchmark report will focus on the capabilities companies are pursuing to bolster manufacturing efficiency by shifting focus from single site or single functional technologies to enterprise applications that offer capabilities allowing them to manage global operations in a dynamic market place.

Reducing Costs in the Face of Demand Uncertainty

The top two market pressures driving manufacturers to focus on manufacturing operations management is the need to reduce manufacturing costs and inaccurate demand forecasts (Figure I).



Figure I: Top Market Pressures

Source: Aberdeen Group, January 2008

The relationship between these two pressures is interesting; both clearly touch on overlapping and interrelated aspects of Manufacturing Operations Management (MOM). Manufacturing costs are associated with all the aspects of manufacturing operations: maintenance, production, quality, and inventory management. One of the ways to reduce these costs is to optimize the amount of capacity and inventory buffers used. Another way to reduce these costs is to improve the efficiency of production or quality operations.

Fast Facts

Best-in-Class enterprises significantly out perform their competition in all three KPIs. These manufacturers enjoy:

- $\sqrt{97\%}$ On Time Delivery (OTD)
- √ 89% Overall Equipment Effectiveness (OEE)
- $\sqrt{97\%}$ raw material yield

Aberdeen Group

The conflict occurs when manufacturers face increasingly inaccurate demand forecasts; as the amount of uncertainty increases so do the optimal levels for capacity and inventory. In such a situation, manufacturers must both optimize demand uncertainty buffers and improve operational efficiencies; otherwise costs could spiral out of control. To better understand how exactly manufacturers reduce costs, often in the face of increasing forecast inaccuracies, the analysis will continue by first identifying which manufacturers are actually performing at the highest levels.

The Maturity Class Framework

Aberdeen uses three key performance criteria to distinguish the Best-in-Class from Industry Average and Laggard organizations. These are:

- On Time Delivery (OTD). Percentage of products delivered on time as compared to total original commitment
- **Overall Equipment Effectiveness (OEE).** Measured in percent as availability * performance * quality
- **Raw Material Yield.** Measured as a percentage of the total material: raw material used for finished goods / total materials used

Respondents were divided among three categories based on their aggregate performances in these three metrics: the top 20% of performers (Best-in-Class), the middle 50% (Industry Average), and the bottom 30% of performers (Laggards). Figure 2 displays the aggregated performance of Best-in-Class, Industry Average, and Laggard organizations.

"Our marketing department forecasts volume and they have been historically off. Manufacturing is expected to reduce cost by 10% year over year. The focus of the company is on implementing lean in all areas but it is most critical in manufacturing to meet our cost savings goals against inaccurate forecasts."

> ~ Mitch Elkis, Site Leader Lithia Springs



Figure 2: Top Performers Earn Best-in-Class Status

Source: Aberdeen Group, January 2008

Best-in-Class manufacturers realize higher performance results both in customer metrics by delivering 97% of products promised on time as well as internal plant metrics, by effectively utilizing assets (89% OEE) and raw material (97% raw material yield). Which, when compared to Industry Average firms, accounts for a 5% increase in OTD, an 11% increase in OEE,



and an 11% increase in raw material utilization. Clearly, the Best-in-Class are enjoying significantly lower manufacturing costs coupled with better customer service. The key to this benchmark study is in determining just how the Best-in-Class are achieving these results.

The Best-in-Class PACE Model

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

Pressures	Actions	Capabilities	Enablers
 Need to reduce manufacturing costs Inaccurate forecast demands 	 Implement continuous improvement programs Optimize asset utilization Increase visibility across manufacturing networks 	 Measurement of operational Key Performance Indicators (KPIs) is standardized across the enterprise Executive steering committee is responsible for manufacturing solutions investment strategy Manufacturing and IT are responsible for the deployment of manufacturing solutions Operational metrics are linked with financial metrics KPI are displayed in real time to role based decision makers Asset and raw material optimization uses real time data 	 Plant Floor Automation (PFA) and automated data collection Maintenance management Manufacturing Intelligence (MI) Quality management Lean manufacturing

Table I: The Best-in-Class PACE Framework

Source: Aberdeen Group, January 2008

Top Strategies

The top strategic action, being taken by more than two thirds of all manufacturers, is to implement continuous improvement teams. Manufacturers are implementing continuous improvement teams with the goal of reducing overall manufacturing costs and positioning these teams for success in several ways. Thirty-nine percent (39%) of manufacturers are attempting to provide visibility into manufacturing operations and 40% are attempting to optimize the utilization of manufacturing assets; either way, it is important that continuous improvement teams are given purpose and the tools needed to succeed.



Figure 3: Strategic Actions



Source: Aberdeen Group, January 2008

Manufacturers of all performance levels face the same market pressures and are responding with the same strategic actions. When compared, there is no significant difference between the market pressures faced by the Best-in-Class, Industry Average, or Laggard manufacturers. Similarly, there is no significant difference in the strategic actions these different categories of manufacturers are taking. However Best-in-Class manufacturers realize improved performance as compared to Industry Average and Laggard manufacturers (Figure 2). In the next chapter, Aberdeen will link specific business capabilities and technology enablers to Best-in-Class performance and identify how the above strategic actions can be assured success.

Aberdeen Insights — Strategy

Reducing manufacturing costs has been a top pressure across many Aberdeen manufacturing benchmark reports. In <u>Lean Scheduling and</u> <u>Execution</u> it was the number one pressure with 71% of manufacturers focusing on it. It was also one of the top pressures in the <u>Cost of Quality</u>, <u>Enterprise Asset Management</u>, and <u>Demand Driven Manufacturing</u>, with 55%, 73%, and 44% of manufacturers in each of these respective benchmarks focusing on reducing cost s.

Given that each of the above reports analyzes some aspect of manufacturing operations management, it is of no surprise then that 63% of manufacturers from this study are focusing on reducing manufacturing costs and that it is the number one pressure. Moving forward, it can be expected that a galvanizing force behind connecting the disparate aspects of manufacturing operations management will be the need to reduce costs across the interdependent aspects of manufacturing operations. "By leveraging the flexibility of enterprise-MES, it was easy to customize individual plant conditions while at the same time retain global best practices. This means that we have the best of both worlds – standardization of procedures that are proven to be successful, yet also the freedom to adapt these best practices when appropriate."

> ~Hangmin Cho Manager Info Team SI FLEX



Chapter Two: Benchmarking Requirements for Success

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** (corporate focus and collaboration of manufacturing and IT for technology decisions); (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.

Standardizing Processes

To efficiently manage manufacturing operations, it is critical to standardize business processes across the enterprise. One area that clearly differentiates Best-in-Class performance is the standardization of optimization processes across the enterprise (Table 2). Best-in-Class manufacturers are more than three-times as likely as Laggards to standardize asset and material optimization procedures across the enterprise.

Table 2: The Competitive Framework - Process

	Best-in-Class	Average	Laggards
	Exception handling processes and procedures are standardized across the manufacturing operations		
	53%	34%	29%
Process	Measurement of operational Key Performance Indicators (KPI) is standardized across the enterprise		
	67%	47%	35%
	Optimization processes are standardized across the enterprise		
	41%	19%	13%

Source: Aberdeen Group, January 2008

Best-in-Class manufacturers are also 91% more likely to standardize the measurement of key performance indicators across the enterprise. This ensures that KPI are calculated in the same way from plant to plant and decision maker to decision maker, giving senior executives the ability to equitably compare performance across the enterprise. Finally, Best-in-Class

Fast Facts

Best-in-Class manufacturers are more likely than Laggards to adopt the following solutions for manufacturing operations management:

- 3-times more likely to adopt Manufacturing Intelligence (MI)
- $\sqrt{2}$ -times more likely to adopt Lean manufacturing solution
- √ 35% more likely to adopt Quality Management Solution (QMS)



manufacturers are almost 50% more likely to standardize exception handling across the enterprise. This allows Best-in-Class manufacturers to then optimize work-flows and ensure best responses are taken in the face of what could be indecisiveness and costly mistakes when attempting to respond to non-conformances.

Knowledge Management

Collaboration across multiple functional groups such as maintenance, operations, engineering, and information technology is the major theme underlying Best-in-Class performance in regards to knowledge management. Results from the survey analysis indicate that Best-in-Class manufacturers are more likely than other manufacturers to include cross-functional teams as key components of shift review as well as production team meetings (Table 3).

The other capability that differentiates Best-in-Class performance is automating data collection from manufacturing operations. Best-in-Class are not only more likely to automate data collection, but they are also managing this data in a central data warehouse application so that operations data is easily accessible by different functional groups. This is an area that needs attention from Laggard manufacturers, as only 35% of the manufacturers in this performance category have invested in this capability (Table 3.)

Table 3: The Competitive Framework - Knowledge Management

	Best-in-Class	Average	Laggards	
	Shift change review meetings include operations, maintenance, IT and other relevant departments			
	57%	47%	36%	
	Production operations review meetings include operations, maintenance, and IT			
Knowledge	72%	70%	55%	
Management	Data collection from production processes is aut			
	51%	43%	25%	
	Manufacturing data is maintained and managed in a data warehouse application			
	63%	52%	35%	

Source: Aberdeen Group, January 2008

Implementing and Managing Manufacturing Solutions

In regards to the organizational architecture of Best-in-Class manufacturers, collaboration is again the theme. Best-in Class manufacturers are 50% more likely than Laggards to appoint an executive steering committee to define the strategy around manufacturing solutions investments. When it comes to defining requirements for the solution, these executive steering committees recognize the value of involving experts with knowledge in the challenges and shortcomings of manufacturing operations. Consequently, Best-in-Class



manufacturers are more likely to give the responsibility of defining manufacturing solutions requirements to the manufacturing line of business, while giving joint responsibility to both manufacturing and IT for the deployment of manufacturing solutions.



	Best-in-Class	Average	Laggards	
	Executive Steering committee is responsible for manufacturing solutions investment strategy			
	66%	46%	43%	
Organization	Manufacturing is rea manufacturing solut	g requirements of		
	59%	57%	45%	
	IT and manufacturing are jointly responsible for manufacturing solutions deployment			
	47%	35%	32%	

Source: Aberdeen Group, January 2008

Gaining Visibility into Your Manufacturing Operations

While Best-in-Class manufacturers have automated data collection, that alone is not sufficient to realize higher manufacturing performance. Having data is important, but it is also necessary to act on that data and use it to drive efficiency across manufacturing operations.

Table 5: The Competitive Framework - PerformanceManagement

	Best-in-Class	Average	Laggards	
	Operational metrics are linked with financial metrics			
	71%	48%	18%	
	Analytics system us	ed to mine data for o	decision making	
Performance	46%	26%	١5%	
Management	KPIs are displayed in real time and are role based for optimal decision making			
	44%	28%	13%	
	Production optimization is conducted in real-time			
	43%	30%	۱6%	

Source: Aberdeen Group, January 2008

The findings in the above table are telling. Best-in-Class manufacturers are more likely to be connecting to the plant floor level and automating data collection. They are connecting this data to historians, using manufacturing analytics to enable root cause analysis while at the same time providing visibility to decision makers with real time role based dashboards and



monitoring exception handling. Furthermore, Best-in-Class manufacturers are contextualizing operational metrics with financial metrics and optimizing production with this real-time data. This is a significant differentiator, with the Best-in-Class being three-times more likely than Laggards to optimize production in real-time, perhaps also contributing to how the Best-in-Class are able realize 97% raw material yield (Chapter One Best-in-Class Performance).

Aberdeen Insight — Performance Management

While Best-in-Class manufacturers are more likely than others to adopt many of the above capabilities; it is important to note that the adoption of these capabilities in a vacuum does not necessarily have the greatest impact on performance. The key is in simultaneously using multiple capabilities to achieve Best-in-Class performance.

Best-in-Class manufacturers are found twice as likely as other manufacturers to use automated data collection in conjunction with data historians and manufacturing analytics. These manufacturers are also over four-times as likely as other manufacturers to standardize KPI measurement, optimization, and exception handling across the enterprise.

Finally Best-in-Class manufacturers are over 2.5-times as likely as other manufacturers to link operational metrics with financials and provide realtime role based visibility to decision makers. Manufacturers in the Industry Average and Laggard performance category should use these capabilities in conjunction with each other to improve visibility across manufacturing operations, resulting in the success of strategic actions.

Technology

Manufacturing operations management has been evolving to supersede the original definition of Manufacturing Execution Systems (MES). While prior Aberdeen research have shown that Best-in-Class manufacturers are more likely to use MES, this new benchmark report illustrates that Best-in-Class manufacturing companies are also more likely to implement additional capabilities such as Quality Management Systems (QMS), Lean, Manufacturing Intelligence (MI), and Advanced Planning and Scheduling (APS) among others, as central components to an overall Manufacturing Operations Management (MOM) solution.

Table 6: The Competitive Framework - Technology

	Best-in-Class	Average	Laggards
	Share of manufacturers currently using technology:		
	■ PFA: 39%	■ PFA: 26%	■ PFA: 22%
Technology	■ MI: 30%	■ MI: 14%	■ MI: 11%
reennoidgy	■ QMS: 74%	■ QMS: 63%	■ QMS: 55%
	■ APS: 45%	■ APS: 29%	■ APS: 28%
	■ Lean Mfg: 50%	■ Lean Mfg: 32%	■ Lean Mfg: 26%

Source: Aberdeen Group, January 2008



Beyond the use of broad technology categories such as QMS, Lean manufacturing, MI or APS, there are specific features and functionalities that can be delivered by many of the solutions that are specifically correlated to Best-in-Class performance. Best-in-Class manufacturers are utilizing the tools listed in Figure 4 to assist with the process, knowledge management and performance management capabilities discussed before.



Figure 4: Technology Enablers

Source: Aberdeen Group, January 2008

Dashboards, master data management, supplier scorecards and NC / CAPA capabilities are core to improving visibility, decision making, root cause analysis and the overall efficiency of manufacturing operations. Best-in-Class manufacturers have also adopted raw material optimization and maintenance management capabilities to optimally utilize raw materials and assets across the enterprise. This will reduce raw material inventory and maintenance costs, allowing manufacturers to reduce overall manufacturing costs while also maintaining customer service levels.

Technology Interoperability

As complexity in the manufacturing environment has increased over the last decade, the needs of manufacturers have expanded beyond the original definition of MES. MES now encompasses capabilities such as maintenance, production, quality, and inventory management. While Best-in-Class manufacturers are more likely than other manufacturers to adopt the above capabilities, these manufacturers are also investing in creating real-time interoperability across these solutions. This allows manufacturers to eliminate the traditional approach of managing silo-ed departments and business processes, providing a common solution platform to standardize processes and exchange information across the enterprise





Figure 5: Technology Interoperability

Source: Aberdeen Group, January 2008

Aberdeen Case Study

he Woodbridge Group is a leader in automotive urethane technologies and is a specialist in Just-in-Time assembly and sequencing systems. With facilities distributed globally, Woodbridge has 63 facilities in 58 cities and 21 countries; however, one of these facilities is of particular interest. In 2001, a green-field facility was opened that is now the de facto standard for managing manufacturing operations across the enterprise.

Since 2001, this facility has maintained a Defects per Million Opportunities (DPMO), in the single digits and has nearly a negligible Cost of Quality (COQ). Additionally, this facility maintains a Finished Goods Inventory (FGI) that is consistently limited at 30 minutes to an hour of production, with virtually all FGI in transit at any given time. Furthermore the facility is a top performer in audits and maintains complete compliance with ISO, TS-16949, and OSHA.

Plant Manager Scott Wolbers attributes these successes, in a large degree, to their deployment of technology across many aspects of manufacturing operations. With a Bill of Materials (BOM) at 1200 parts, a takt time of 76 seconds, an order to delivery time of 240 minutes, and a single piece flow mode of manufacturing, the base for managing these operations is their MES platform.

From this platform, work orders based on actual customer demands are released and managed through out the manufacturing process. At each stage of manufacturing, work orders are electronically disseminated, and verified complete, materials are scanned in and recorded for traceability, along with process data such as torques and asset statuses. In addition to these core manufacturing processes, from the same platform, CAPAs are initiated and root-cause analysis is performed, WIP flow is optimized, fluctuations in demand can be seen and responded to, compliance and traceability is ensured, and finally all of this data can be rolled up to management through visualization capabilities.

The next step for the Woodbridge Group is extending this platform across the enterprise in a standardized way. Such an approach has yielded tremendous results already, is even leveraged as a competitive differentiator when earning business from key customers, and is beginning to take hold in other facilities.



Chapter Three: Required Actions

Whether a company is trying to move its performance in Manufacturing Operations Management 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 the manufacturing solutions investment strategy, delegate the definition of solution requirements to the manufacturing line of business, while giving joint responsibility to IT and manufacturing for deploying these solutions.
- When defining the requirements for manufacturing solutions, remember the ultimate goal of reducing overall manufacturing costs. Furthermore, this reduction should be accomplished by enabling continuous improvement teams, providing visibility across operations, and optimizing asset and raw material utilization.
- Standardize production optimization, KPI measurement, and exception handling processes across the enterprise. Best-in-Class manufacturers are found more likely to standardize all the above processes than other manufacturers. This is critical to gaining the full benefits of further investment in enterprise wide manufacturing operations management solutions.

Industry Average Steps to Success

- PFA and automated data collection are key capabilities that serve as the building blocks for expanding and investing in manufacturing operations. Best-in-Class manufacturers are two-times more likely to invest in this capability than Laggard manufacturers. Invest in these capabilities.
- Adopt a technology platform capable of connecting all aspects of manufacturing operations management. This will enable manufacturers to leverage the platform for standardizing processes, implementing key capabilities, and ultimately interoperating across the enterprise. All of which are key for achieving Best-in-Class performance.
- Provide visibility to decision makers with real time role based dashboards. Best-in-Class manufacturers are three-times more likely to invest in this capability than Laggard manufacturers.
- Invest in manufacturing intelligence (MI) and analytics capabilities to improve decision making and visibility into manufacturing operations. The adoption rate of MI solution is still very low (30%

Fast Facts

To achieve Best in Class status manufacturers must:

- Automate data collection and use it as actionable intelligence
- $\sqrt{\rm Align}$ operational data with financial metrics
- Appoint executive steering committee to define manufacturing solutions investment strategy
- Adopt technology to automate quality, execution, planning and scheduling, visibility and maintenance aspects of manufacturing operation.
- ✓ Establish real time interoperability among plant floor and enterprise level technology solutions



BIC and 14% Industry Average). Manufacturers that have not yet adopted this capability should do so to gain early competitive advantage.

Best-in-Class Steps to Success

- Choose the additional technology capabilities that are integrated through a common solution platform and support all aspects of manufacturing operations: maintenance, production, quality, and inventory management. While Best-in-Class manufacturers are more likely than others to invest separately in each of the technologies supporting Manufacturing Operations Management; there are still Best-in-Class manufacturers that have not yet adopted technology solutions spanning the entire MOM space.
- Establish event based real time interoperability among plant floor and enterprise level technology solutions. This enables manufacturers to seamlessly connect all of the necessary business processes under the MOM umbrella – quality, maintenance, production, and inventory to achieve operational excellence.

Aberdeen Insights — Summary

Managing manufacturing operations in today's global and competitive market environment is a challenge. Manufacturers are continually faced with the pressure to reduce costs, while at the same time it is extremely difficult to forecast demand accurately. To address these interrelated pressures, manufacturers are investing resources in optimizing assets and raw materials across the enterprise, while at the same time enabling continuous improvement teams with tools and focus needed to succeed.

To support these strategic actions, Best-in-Class manufacturers are investing in capabilities that span across maintenance, production, quality, and inventory management. These manufacturers are more likely to have adopted solutions in these categories and are also more likely to connect the solutions by creating real time interoperability across these disparate systems.

As the research shows, Best-in-Class manufacturers are enjoying, on average, 5% more OTD deliveries, a 11% higher OEE, , and have an 11% higher utilization of raw materials. Manufacturers looking to perform at such levels should disregard the need for specific technology categories, focus on capabilities shown to enable elevated performance, invest in developing a common platform that spans across the key areas of manufacturing operations management, and truly achieve operational excellence.



"We have implemented an enterprise system to provide a completely unified solution for manufacturing and logistics across 30 of our European manufacturing and distribution sites. With our solution we have enforced manufacturing consistency and best practices across our operations. We now have real-time visibility into manufacturing, order and logistics status from anywhere in the company."

> ~Hans Cordes, CEO, Saint-Gobain Sekurit



Appendix A: Research Methodology

Between December 2007 and January 2008, Aberdeen examined the use, the experiences, and the intentions of more than 240 enterprises across different industry verticals regarding their manufacturing operations management

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

Responding enterprises included the following:

- Job title / function: The research sample included respondents with the following job titles: Manager (35%); Senior Management (31%); Director (19%); Consultant (8%); Staff (5%) and other (2%).
- Industry: The research sample included respondents from Industrial Equipment Manufacturing (20%); Automotive (17%); Metals (13%); Consumer Goods (10%); High-Technology (12%) Food and Beverage (9%) and Aerospace and Defense (9%).
- Geography: The majority of respondents (64%) were from North America. Remaining respondents were from the Europe (16%), Asia / Pacific region (12%), South America (4%) Middle East, Africa (4%).
- Company size: Eighteen percent (18%) of respondents were from large enterprises (annual revenues above US \$1 billion); 42% were from midsize enterprises (annual revenues between \$50 million and \$1 billion); and 40% of respondents were from small businesses (annual revenues of \$50 million or less).
- Headcount: Thirty percent (30%) of respondents were from large enterprises (headcount greater than 1,000 employees); 56% were from midsize enterprises (headcount between 100 and 999 employees); and 14% of respondents were from small businesses (headcount between 1 and 99 employees).

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 pressures driving their focus on manufacturing operations management
- √ The structure and effectiveness of existing technology implementations
- Top technology enablers adopted to facilitate manufacturing operations management
- The benefits, if any, that have been derived from technology adoption and integration

The study is aimed to identify emerging best practices for manufacturing operations management across the industry, and to provide a framework by which readers could assess their own capabilities



Table 7: The PACE Framework Key

Overview

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:

Pressures — external forces that impact an organization's market position, competitiveness, or business operations (e.g., economic, political and regulatory, technology, changing customer preferences, competitive)

Actions — 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)

Capabilities — the business process competencies required to execute corporate strategy (e.g., skilled people, brand, market positioning, viable products / services, ecosystem partners, financing)

Enablers — 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)

Source: Aberdeen Group, January 2008

Table 8: The Competitive Framework Key

Overview		
The Aberdeen Competitive Framework defines enterprises as falling into one of the following three levels of practices and performance: Best-in-Class (20%) — Practices that are the best currently being employed and are significantly superior to the Industry Average, and result in the top industry performance. Industry Average (50%) — Practices that represent the average or norm, and result in average industry performance. Laggards (30%) — Practices that are significantly behind the average of the industry, and result in below average performance.	s: scope of process standardization? effectiveness of this process? s your company currently optimize this particular process? ibility do you have into key data to manage this process? vel of automation have you used How is this automation integrated do you measure? How frequently? mance?	

Source: Aberdeen Group, January 2008

Table 9: The Relationship Between PACE and Competitive Framework

PACE and the Competitive Framework – How They Interact

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.

Source: Aberdeen Group, January 2008



Appendix B: Related Aberdeen Research

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

- <u>Compliance and Traceability in Manufacturing</u>; December 2007
- Demand Driven Manufacturing; November 2007
- <u>The Cost of Quality Benchmarking Enterprise Quality Management</u>; July 2007
- <u>Manufacturing IQ: Taking Manufacturing Intelligence to the</u> <u>Enterprise;</u> July 2007
- Benchmarking Enterprise Asset Management; June 2007
- Lean Scheduling and Execution; May 2007

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