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BEST PRACTICES IN MANUFACTURING OPERATIONS

An ICONICS Whitepaper

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Best Practices in Manufacturing Operations

An Aberdeen Group Research Prepared for ICONICS

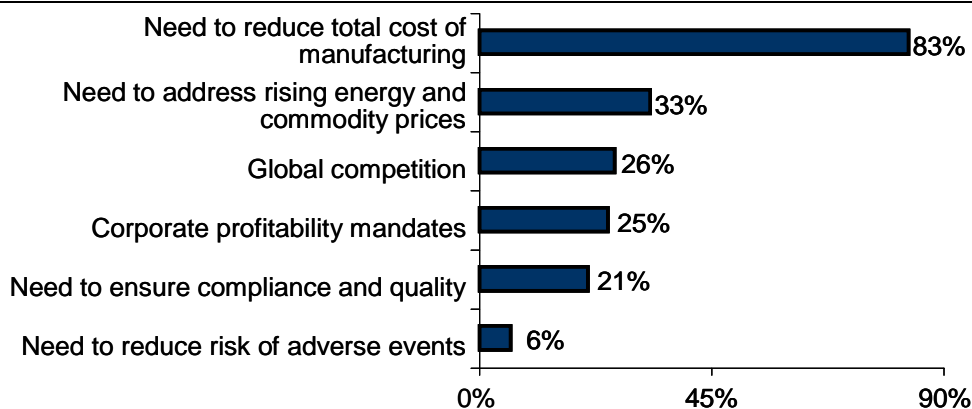
The Role of Industrial Automation Software and a Microsoft Platform on the Shop Floor

Executives face numerous challenges in effectively managing global manufacturing operations. 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 organizations are attempting to deliver real-time manufacturing data to decision makers as actionable intelligence in a role based way. This new research will show how the use of industrial automation software and a Microsoft platform, across many of the process industries, can provide the basis for this data delivery and the fostering of communication and collaboration across the organization.

Cost Cutting is Top of Mind

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

Figure 1: Pressures Driving Focus on Manufacturing Operations



Source: Aberdeen Group, August 2008

Analyst Insight

Aberdeen's Insights provide the analyst perspective of the research as drawn from an aggregated view of the research surveys, interviews, and data analysis

Fast Facts

Best-in-Class manufacturers are over twice as likely as the Industry Average to use Data Historians, HMI/SCADA and Manufacturing Intelligence (EMI)

Best-in-Class manufacturers are over 3 times as likely as the Laggards to use Data Historians, HMI/SCADA and Manufacturing Intelligence (EMI)

Best-in-Class manufacturers are slightly more likely than their competition to use Windows Vista and nearly twice as likely to use Windows Server 2008

Acronyms

HMI/SCADA: Human Machine Interface / Supervisory Control and Data Acquisition

EMI: Enterprise Manufacturing Intelligence

Given the current economic climate and the impact manufacturing operations has 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 gap between the first and second pressures and the sheer percentage of manufacturers focused on cost.

Collaborative Business Initiatives

In responding to cost cutting pressures, The Best-in-Class are looking towards the business processes in place. More specifically, the Best-in-Class are integrating manufacturing operations into business process that foster collaboration across the disparate functional groups of a manufacturer; groups that have traditionally lacked good communication and in some instances can even act in opposition to each other. Table 2 highlights a number of these business initiatives, all of which are much more likely to be leveraged by the Best-in-Class than Industry Average and Laggard manufacturers.

Table 2: Real-Time Business Initiative Interoperability

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

Definition of Maturity Class	Mean Class Performance
Best-in-Class: Top 20% of aggregate performance scorers	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 81% OEE 92% on-time and complete shipments 17 hours response time to non-conforming shipments
Laggard: Bottom 30% of aggregate performance scorers	<ul style="list-style-type: none"> 65% OEE 75% on-time and complete shipments 70 hours response time to non-conforming shipments

Source: Aberdeen Group, August 2008

The successful deployment of the above business initiatives can be quite a challenge. In fact, many of these initiatives are handicapped from the beginning by the walls that have been built between the functional groups these initiatives are targeted at. For Industry Average and Laggard manufacturers, it is particularly important to understand where to focus when attempting to build a solid foundation from which to launch one of these initiatives. To gain this understanding we will examine how the Best-in-Class are supporting these business initiatives.

Technology Enablers

It is incredibly challenging to implement the above business initiatives and reduce the cost of manufacturing without the use of technology and the Best-in-Class are leading the way in this regard as well. Imagine trying to alert decision makers outside of the manufacturing organization (perhaps product development or the supply chain) to an adverse event that has occurred on the shop floor only using manual processes. Without some form of automated data collection, integrated with visualization and analytical capabilities, which can deliver the appropriate contextualized data to the appropriate decision makers it can be overwhelming. The manual processes that would otherwise attempt to deliver these capabilities quickly become unwieldy and unreliable; more than likely yielding undesired results. In fact, many organizations still relying purely on manual processes for decision making can not even properly inform decision makers within manufacturing itself. Effectively communicating with interested parties outside of manufacturing would not even be a consideration.

To address these issues, the Best-in-Class are specifically more likely than the Industry Average and Laggards to use data historians for managing collected data, HMI/SCADA systems to automate data collection, control production processes, and provide visualization on the shop floor, and EMI for contextualizing and effectively delivering operational data to concerned parties. Furthermore, to deliver and manage these applications over 90% of the manufacturing industry, as a whole, uses Microsoft Operating Systems and Server technology on the shop-floor. However, the industry is not standing still with the shop-floor IT investments that have already been made and it is the Best-in-Class manufacturers leading the charge to leverage Microsoft's newest Operating System and Server technologies.

Table 4: Industrial Automation Software and Microsoft's Platform

	Best-in-Class	Average	Laggards
Technology Enablers	Data Historians – Currently Using		
	52%	29%	17%
	HMI/SCADA – Currently Using		
	65%	25%	20%
	Enterprise Manufacturing Intelligence – Currently Using		
	35%	14%	3%

Source: Aberdeen Group, August 2008

	Best-in-Class	Average	Laggards
Technology Enablers	Windows Vista – Currently Using		
	28%	24%	23%
	Window Server 2008 – Currently Using		
	21%	14%	4%

Source: Aberdeen Group, August 2008

Process Industry Perspectives

The above analysis is broadly applicable to any organization, regardless of vertical industry. There are, however, specific needs that depend upon the vertical industry a firm operates within; the following section will take a deeper look at select examples.

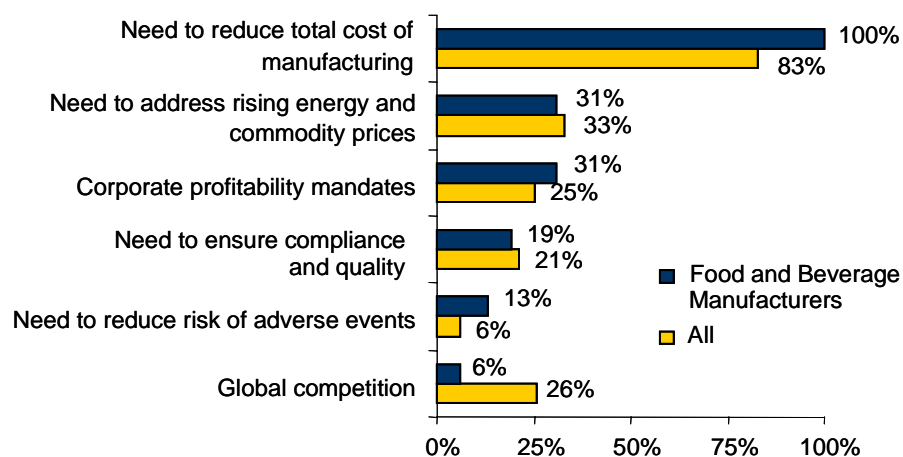
Oil, Gas and Alternative Energy

The Oil, Gas and Alternative Energy industries are all highly competitive and highly regulated but remain in line with the broad market regarding the market pressures driving focus on improving operational performance; with the number one pressure (at 70% of all participants in these verticals) being the need to reduce operational costs. In addressing the need to reduce operational costs the industry at large has been leveraging their recent record profits by investing heavily in both HMI/SCADA and EMI technologies. In fact, organizations in these industries are 71% more likely than the Industry Average to have already deployed EMI and are over twice as likely as the Industry Average to have deployed HMI/SCADA. Organizations in these industries that have not yet invested in these technologies should begin to seriously consider the adoption of such technologies or the gap between themselves and the market leaders could quickly become too great to cross.

Food and Beverage

The Food and Beverage industry is more focused than any other on reducing operational costs, of the over 20 respondents that were from the Food and Beverage industry, every single one selected reducing operational costs as a top pressure. There are, however, other issues that food and beverage manufacturers need to focus on but given the present market conditions these may not be garnering the needed attention. Issues likely quality, compliance, and risk, which should be at the top of the agenda for a FDA regulated Industry fell woefully low for these respondents.

Figure 2: Pressures Impacting Global Manufacturing Operations



Source: Aberdeen Group, September 2008

To improve focus, compliance, quality management, and risk management, should be built directly in to the business processes and technologies that are used to manage manufacturing operations. A critical component of this is in properly notifying the necessary decision-makers when an adverse event occurs on the shop floor. The Best-in-Class have already done this through deploying HMI/SCADA and EMI solutions, which are technologies that should also be considered by Food and Beverage manufacturers.

Pharmaceuticals

Pharmaceutical manufacturers are much more concerned with adhering to government regulations and maintaining compliance than manufacturers from other industries. In fact in a recent Aberdeen research project, [The Cost of Quality](#), pharmaceutical manufacturers were over 3 times more likely (43% vs. 12%) than other manufacturers to cite compliance as a top pressure impacting manufacturing operations. Consequently, when we examine the performance of pharmaceutical manufacturers, we see the industry outperforming the average in regards to compliance but underperforming in yield and on-time and complete shipments.

Table5: Pharmaceutical Manufacturers Performance

Market Segment	% Products in Compliance	Complete and On-Time Shipments	First Pass Yield
Best-in-Class:	99%	98%	98%
Pharma. Manufacturers	96%	92%	88%
Industry Average:	94%	89%	89%

Source: Aberdeen Group, August 2008

To help address these shortfalls in operational performance, manufacturers from

this industry not yet focused on Industrial Automation Software should begin to consider these technology enablers, which Best-in-Class manufacturers are already leveraging to improve performance.

Waste Water

Aberdeen's October benchmark report, *Operational Excellence in the Process Industries*, reveals that although organizations in the waste water industry are similar to others in regards to focus on reducing operational costs, they differ in having to also balance the pressure of reducing the environmental impact of operations. In fact, 40% of respondents from the waste water industry are being impacted by this pressure as compared to 8% of the overall population. To better quantify the current state of environmental impact and then begin the continuous improvement journey, executives in the waste water industry should begin to focus on automatically collecting affluence and energy process data and providing analytics and real-time information to these continuous improvement teams.

Case Study

Loudoun Water was incorporated in 1959 and currently provides drinking water and wastewater services to over 175,000 residences in Loudoun County Virginia. In February 2008, Loudoun Water began deploying the Windows Vista client operating system and upgrading its HMI/SCADA software to the Iconics GENESIS64 suite. Andy Krapf, Supervisor of Instrumentation and Controls at Loudoun Water states, "We deployed the Windows Vista operating system because we wanted to be ready for our software vendors as they produced the more powerful versions of their products that can leverage Windows Vista's 64-bit architecture."

Through these upgrades, Loudoun Water is able to use the 64-bit architecture of Windows Vista and the faster 64-bit architecture processors from AMD and Intel to improve the performance of the HMI/SCADA software. As a result of upgrading to the 64-bit architecture, tasks related to customizing the applications to match the industrial environment take less time. These tasks include 3-D modeling and laying out visual representations of pipes and flow systems. To date, Krapf has seen a reduction in customization time of 30 to 40 percent, when comparing Windows Vista and Genesis64 to Windows XP and Genesis32.

Looking forward, Loudoun Water is already exploring ways to use Windows Vista to enhance its IT environment beyond just improving HMI/SCADA performance. Krapf cites two examples: "We absolutely expect that the mobility features of Windows Vista, such as improved power management and easier access to wireless networks, will help our more mobile workforce."

Key Takeaways

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:

Appoint an executive steering committee to define corporate strategy for manufacturing solutions investments; incorporate feedback from line of business manufacturing and IT, Best-in-Class manufacturers are 38% more likely than the Industry Average to have executive sponsorship of such initiatives and are 70% more likely than the Industry Average to collaborate across manufacturing and IT.

Upgrading to the newest Microsoft Platform helps Best-in-Class manufacturers differentiate from the competition by leveraging the faster processing architecture and richer user experience and visualization capabilities. Best-in-Class manufacturers are 17% more likely than the Industry Average to have already upgraded to Microsoft Vista and 50% more likely to have already upgraded to Microsoft Windows Server 2008.

Invest in Data Historians, HMI/SCADA and Enterprise Manufacturing Intelligence (EMI) to improve decision making and visibility into manufacturing operations. Manufacturers that have not yet adopted these capabilities should do so to gain an early competitive advantage. Best-in-Class manufacturers are 79% more likely than the Industry Average to be using a data historian, the Best-in-Class are also 1.6 times as likely as the Industry Average to be using HMI/SCADA and 1.5 times as likely as the Industry Average to be using EMI.

Focus on supporting collaborative business initiatives with the above business capabilities and technology enablers. By enabling traditionally disparate groups to communicate and collaborate through role-based actionable intelligence, Best-in-Class manufacturers are able to manage their business in a more holistic way.

Related Research	
<i>Event Driven Manufacturing Intelligence</i> ; May 2008	<i>Global Manufacturing Operations Management</i> ; August 2008
<i>Operational Excellence in the Process Industries</i> ; October 2008	<i>Manufacturing Operations Management: The Next Generation of Manufacturing Systems</i> ; January 2008
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