The Role of Real-Time Data in Improving Profits and Customer Satisfaction

Introduction

Recently The Aberdeen Group released their benchmark report *"Event Driven Manufacturing Intelligence – Creating Closed Loop Performance Management"*. The report ties specific business behaviors to manufacturing profitability. The knowledge that it captures is stuff you can act on; a clear-headed, fact-based correlation between actions you can take and outcomes that you can expect to see from those behaviors.

As a report sponsor, we at Hertzler Systems would like to offer additional guidance for understanding the report. As we parsed the data we found interesting insights that did not 'leap off the page' at first read. Specifically, we found that ready access to actionable real-time data is a key driver of Best-in-Class business performance. In discussing this with Matthew Littlefield, Senior Research Analyst with the Aberdeen Group and author of the benchmark report, he said, "As a general theme, we find Best-in-Class manufacturers are most significantly differentiated from their competition by the incorporation of real-time data into these processes."

We put extra work into analyzing the data because we had sponsored the report, but we wondered if the average, over-worked manufacturing leader would have the time to digest and assimilate the knowledge. That's why we wrote this guide.

Of course, as a sponsor, we also want to connect our products to the research findings. Therefore, throughout the paper you can expect that we'll share illustrations and examples from our customers to help draw those connections. We do this in the spirit of education rather than hard sell. If you see something that might be useful for your organization, we'll make it easy for you to contact us to dig deeper. Otherwise, please take the connections as part of our effort to make the research findings more real and more valuable to you.

The Aberdeen Framework

The Aberdeen Group uses a simple model for all of their research:

1. Define key measures of excellence.
2. Identify key drivers for process change.
3. Survey a population for their performance on those key metrics and behaviors that might drive performance.
4. Divide the population into three groups based on their aggregate performance on the key indicators. These categories are:
    a. Best-in-Class – Top 20% of aggregate performance scorers
    b. Industry Average – Middle 50% of aggregate performance scorers
    c. Laggard – Bottom 30% of aggregate performance scorers
5. Correlate the performance (Best-in-Class/Average/Laggard) with behavior.

Key measures of excellence – the Maturity Class Framework

The report identifies three Key Performance Criteria to determine the Maturity Class Framework:

1. On Time Deliver (OTD) – the percentage of products delivered on time as compared to total original commitment.
2. Overall Equipment Effectiveness (OEE) – measured in percentage by multiplying Availability times Performance times Quality.
3. Overall Yield - the percentage of the raw materials consumed during production, calculated as Actual Yield / Theoretical Yield.

(You can read more about this framework on Page 5 in the report.)

Here is the average score on each of the three metrics for each performance class:

	Mean Class Performance		
Key Metric	Best-in-Class	Average	Laggard
On Time Delivery	97%	92%	78%
Yield	98%	92%	76%
Overall Equipment Effectiveness	91%	82%	70%

Once the population was classified into the three categories (Best-in-Class, Average or Laggard), the analyst evaluated the average profit margin for the population in each class and validated that higher performance on the Key Metrics correlates to higher profit margin. The report points out that this data is remarkable because:

> This is the first benchmark produced by the manufacturing practice (Aberdeen Group Research analysts) showing a direct correlation between Best-in-Class operational performance across On Time Delivery, OEE and Yield metrics that enables significantly higher profitability. **In fact, the Best-in-Class enjoy over 33% higher operating margins than both Industry Average and Laggards.** (P12, EDMI).

So what is it that Best-in-Class performers do that generates a 33% higher margin than Average or Laggards? What behaviors drive this kind of performance benefit?

Fortunately the data can help us answer these questions.

Linking outcomes with behavior

The meat of the report is the data in the Competitive Framework table in Chapter Two:

	Best-in-Class	Average	Laggards
Process	Exception handling processes and procedures are standardized across manufacturing operations.		
	45%	41%	27%
	Escalation procedures for non-conformance events are standardized across the enterprise.		
	52%	44%	29%
	Measurement of operational Key Performance Indicators (KPIs) is standardized across the enterprise.		
	71%	52%	38%
	Production optimization uses real time data from production processes and responds to process deviations		
	50%	28%	22%
	Plant floor exceptions are monitored in real time		
	66%	38%	22%
	Production release and control leverages real time data		
	52%	29%	20%
Organization	Continuous Improvement teams leverage analytics and real time visibility into operations for improved performance		
	62%	31%	32%
	All levels of the organization have both role based visibility and defined responsibilities in the case of an adverse event.		
	36%	34%	23%
Knowledge	Data collection from manufacturing operations is automated.		
	41%	37%	24%
	Manufacturing data is maintained and managed in a data historian application.		
	61%	47%	40%
Technology	Percentage of manufacturers currently using technology:		
	• EAM: 39% • MES: 35% • QMS: 66% • APM: 29% • EMI: 19% • SPC: 55% • BI: 38%	• EAM: 20% • MES: 28% • QMS: 62% • APM: 15% • EMI: 12% • SPC: 51% • BI: 26%	• EAM: 20% • MES: 16% • QMS: 54% • APM: 6% • EMI: 6% • SPC: 40% • BI: 10%
Performance	Operational data and metrics are displayed in real-time		
	50%	33%	12%
	Operational metrics linked with financial metrics		
	53%	53%	33%
	Analytics are used to provide predictive insights		
	42%	33%	16%

Source: Aberdeen Group, May 2008

This table is the heart of the report, but we prefer to organize the data in a slightly different format. What we want to know is: What are the behaviors that differentiate Best-in-Class (BIC) performers from Average or Laggard performers?

To get to this knowledge, we divided the percentage of BIC performers who practice a specific behavior by the percentage of Average performers using the same behavior. This gives us the number of times more likely a BIC performer is to use specific behaviors. We call this measure 'Impact'. Then we sorted the data by Impact.

Here are the high impact behaviors comparing Average Performers to Best-in-Class Performers:

	Behavior	BIC	Average	Impact
Organization	Continuous Improvement Teams leverage analytics and real-time visibility into operations	62%	31%	**2.0**
Process	Production release and control leverages real-time data	52%	29%	**1.8**
Process	Production optimization uses real-time data from production processes and responds to process deviations	50%	28%	**1.8**
Process	Plant floor exceptions are monitored in real-time	66%	38%	**1.7**
Performance	Operational data and metrics displayed in real-time	50%	33%	**1.5**
Process	Measurement of operational KPIs are standardized across the enterprise	71%	52%	**1.4**
Knowledge	Manufacturing data is maintained and managed in a data historian	61%	47%	**1.3**
Performance	Analytics are used to provide predictive insights	42%	33%	**1.3**
Process	Standardized escalation procedures for nonconformance events	52%	44%	**1.2**
Knowledge	Data collection is automated	41%	37%	**1.1**
Process	Standardized Exception Handling Process	45%	41%	**1.1**
Organization	All levels of organization have role visibility and defined responsibilities in the adverse events	36%	34%	**1.1**
Performance	Operational Metrics linked to financial metrics	53%	53%	**1.0**

Real-time data dominates

A glance at the top four or five high impact differentiators between Average and Best-in-Class performers reveal a common theme: real-time data.

The top differentiator between Average and Best-in-Class performers is **Best-in-Class performers are twice as likely to have continuous improvement teams leverage analytics and real-time visibility into operations.**

Culture change happens when you change the way people use data. Culture change happens when you provide people with real-time data. Real-time data makes it much easier for continuous improvement teams to function effectively. Real-time data makes it much easier to sustain team activity. Real-time data makes the organization transparent so that everyone is accountable for his or her activities.

Here is how TJ Smith, Engineering Program Manager for Crown Audio put it in a recent interview with Evan Miller, President of Hertzler Systems:

> We've always tried to focus, but we've just never been able to get the resolution of knowing exactly where to focus and what the magnitude of problems were. In the past, you could see that THD failed more last week. If you wanted more information beyond that, it would have taken weeks. Then it would have been 'Oh, this is just from one test station. We didn't pull it from any of the others.' Having real-time data has definitely helped us focus our efforts.

Marty Slagle, Corporate Quality Engineer at Hormel, echoed these comments in a presentation at the Aberdeen Group's "Manufacturing in the 21st Century Executive Summit." She said:

> We experienced a shift in our culture and the way that we look at data. Because we had the data accessible to us, I was getting calls, [they were] asking questions that I was never asked before. Because they were able to see this data, they were able to see things and do things that we have never done before.

If you'd like to read more about the impact of real-time data on continuous improvement teams, please visit the Portfolio page at www.hertzler.com. In particular, you may be interested in our white papers "Leveraging Technology to Transform Culture" and "Freeing Six Sigma from the Data Shuffle".

Coming a close second are two more differentiators. Best-in-Class manufacturers are 1.8 times more likely than Average performers to:

- **Leverage real-time data for production release and control**
- **Use real-time data to optimize production and respond to process deviations**

Real-time data gives Best-in-Class manufacturers the ability to control and release product to shipping. This, in turn, accelerates the conversion of Work in Process (WIP) to inventory or receivables. If problems occur, real-time data makes real-time response possible. Real-time response has far-reaching implications for material control, inventory turns, cash, and customer satisfaction.

One Hertzler customer used real-time data to compress the cycle time for daily lot release by several hours. This dramatically increased inventory turns and cash.

The theme of using real-time data to optimize production and respond to process deviations shows up again in the fourth differentiator: **Plant floor exceptions are monitored in real-time.**

Whenever one Hertzler customer identified a plant floor exception, they quarantined and manually inspected 100% of finished goods produced since the last good inspection. They did this to comply with their customer's requirements.

Prior to implementing GainSeeker Suite, this customer performed all inspections manually. Because of the work load they could only inspect each line once per shift. This meant that any time they identified an exception they quarantined and manually inspected an entire shifts-worth of production. This created huge bottlenecks for inspection staff and tied up finished goods in WIP. GainSeeker Suite automated much of the data collection and alarming process so the manufacturer could increase inspection frequency by four times and identify exceptions within two hours. This reduced the inspection bottleneck and increased throughput to inventory, providing a significant, permanent boost to profitability.

The fifth differentiator is **Operational data and metrics displayed in real-time.** Hertzler Systems worked with Crown Audio on a project to display real-time performance metrics. The company projects these metrics onto enormous screens suspended above each line. (See photo on following page.) The metrics include First Pass Yield, Defect Levels and Efficiency. Every employee on every line can see these screens, and users with computer workstations can view the same display at their desktop.

Smith explained the benefit of having this data available:

> The real-time part of it has been cool… I've walked into several meetings and said 'As of five minutes ago, this week MFT first pass rate is 93%.' In the past I'd walk into a Cost and Quality meeting every week and I'd be reporting on week-old data. So inevitably, there would be questions on 'Do we have this fixed?' and the answer would be 'I think so.' Now we know.

Real-time display of Performance Metrics at Crown Audio

Slagle, back at Hormel Foods, said:

> We now have real-time data access. We know what's happening when it happens. Because we're connected wireless … that data is accessible for all the users who have Hertzler. They can see what is going on right when it happens.
>
> Along with that, we have a real-time notification system set up in our audit… Real-time notification was a great way to give our auditors a prompt: "Hey, you had something happen. Here's what you need to do." And then allow them to input a root cause and a corrective action to what they did to fix the problem.
>
> The root cause was great because it allowed our analysts to go back later. You know if we had a root cause of 'Scale was out of calibration' for seven checks in a row, then that would signal them that maybe something is going on that they needed to dig into further.

To watch a video of Slagle's presentation, please visit the Case Study section of Hertzler's web site.

Analyst's comments

Matthew Littlefield, Senior Research Analyst with the Aberdeen Group and author of the benchmark report, told us:

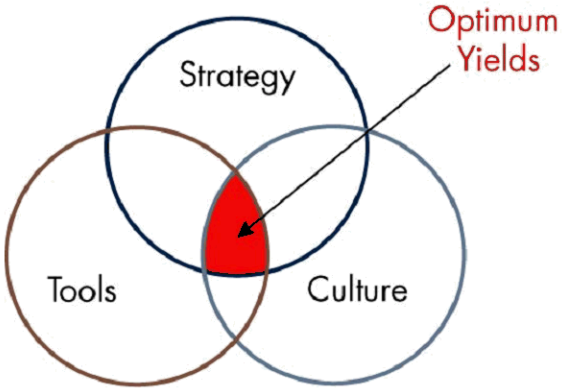
> Manufacturers attempting to improve both operational and corporate performance should first examine the overall structure of their business processes. As a general theme, we find Best-in-Class manufacturers are most significantly differentiated from their competition by the incorporation of real-time data into these processes.
>
> Specifically, Best-in-Class manufacturers are more than twice as likely as Laggard manufacturers to: monitor exceptions on the plant-floor in real-time, use real-time data in production optimization processes, and in using real-time data for production release and control.

To incorporate real-time data into business processes many of the Best-in-Class are looking towards technology. In fact, 55% of the Best-in-Class are currently using automated SPC software, which makes them 38% more likely than Laggard manufacturers to be doing so.

Required Actions

The Aberdeen benchmark report on "Event Driven Manufacturing Intelligence" concludes with recommendations for moving your organization to the next level of performance.

At Hertzler Systems we look at these recommendations through the filter of Strategy, Culture, and Tools. Our experience is that Optimum Yields leading to Best-in-Class performance result when all elements - Strategy, Culture, and Tools – overlap synergistically. Any one component lacking will alter alignment.



Proper Alignment of
Strategy / Culture / Tools

Unfortunately, in many organizations these three fundamental components are not in alignment. If any one element is out of place, it disturbs the others. For example, political infighting and turf wars can undermine a brilliant strategy.

Another very common situation occurs when Tools fail to align with Culture and Strategy. In this situation there may be a solid business strategy and a culture filled well-intentioned, hard-working people who want to do the right thing. However, when staff lack the tools (knowledge, data, and techniques) to improve performance their efforts will fall short of their potential. We believe this model is borne out in the Aberdeen research, and reinforces the importance of aligning the right Tools (including software) with Strategy and Culture.

Typical Alignment of
Strategy / Culture / Tools

Hertzler Systems' GainSeeker Suite is such a tool. Installing software without paying attention to supporting tools and knowledge, and without aligning it with Strategy and Culture, will not transform a business. But the right system with the right implementation strategy can have a powerful impact on your ability to move to Best-in-Class.

GainSeeker Suite is such a powerful tool for transforming a business because it addresses so many of the recommendations for Laggard and Average performers, and since it plays well with other systems it also supports Best-in-Class recommendations.

Laggard Steps to Success	
Recommendation	**How GainSeeker helps**
Automate data collection across manufacturing operations and incorporate this data into a historian to be used in enabling analytics.	GainSeeker provides powerful automated data capture capabilities into a robust data historian, with built in analytics. These analytics include real-time statistical analysis as well as powerful 'after the fact' automated drill down analysis to the root cause of process variation.
Establish standardized processes to handle and escalate exception across manufacturing operations.	GainSeeker provides tools to manage workflow for managing exceptions and escalation processes. The system will eventually support dedicated QMS systems.
Collect and display operational data in real-time and use analytics to understand the value of the data collected for effective decision-making.	GainSeeker seamlessly integrates real-time data with analytics so that users can use data for effective decision-making. This significantly increases the value of the data.

Average Steps to Success	
Recommendation	**How GainSeeker helps**
Provide visibility across production, inventory, assets and quality to decision makers with real-time role-based dashboards and automated workflows.	GainSeeker applies role-based dashboards that to any data type. These dashboards connect directly to the underlying data so that decision makers can see the big picture and get to the details as needed.
Invest in enterprise manufacturing intelligence (EMI) and statistical process control (SPC) capabilities to improve decision-making and visibility into manufacturing operations.	GainSeeker's roots are in Statistical Process Control, so effective deployment of GainSeeker can improve decision-making and visibility into manufacturing operations.
Provide continuous improvement teams with analytics and real-time visibility into operations for improved performance.	You can apply GainSeeker's analytics and real-time visibility tools to operations data. Furthermore anybody, including persons on continuous improvement teams, can use the tools.

Best-in-Class Steps to Success	
Recommendation	How GainSeeker helps
Choose technology capabilities that are integrated through a common solution platform and support all aspects of manufacturing operations	GainSeeker plays well with other applications and integrates readily to other system databases, across manufacturing operations.
Establish event-based, real-time interoperability among visualization and analytical technology solutions and other technology layers across both plant and enterprise levels.	Deploying GainSeeker provides the framework for event-based visualization and analytics. GainSeeker scales up and down the enterprise, and interoperates with other systems.

Conclusion

Best-in-Class manufacturers enjoy a 33% premium operating margin because of higher rates of On-time Delivery, Yield and Overall Equipment Effectiveness, compared to Average performers. The top drivers of these key metrics are due to the application of real-time data.

About Hertzler Systems

Hertzler Systems (www.hertzler.com) provides seamless, accurate data acquisition solutions that drive business transformation. The company provides the leading real-time data acquisition and analytics software, the GainSeeker Suite. This powerful and flexible system is best used by lean and progressive companies. GainSeeker Suite allows companies to connect with devices and other information systems, collecting data and alarming key personnel when problems arise; this technology allows organizations to analyze data for root cause problems, converting data into knowledge.

Hertzler Systems has been a leader in Statistical Process Control and Six Sigma for over twenty years, and includes a diverse customer base in service, transactional and manufacturing environments; clients include BAE Systems, Crown Audio, IDEX Corporation, McCormick & Company, Inc., Hormel Foods Corporation, Titlest & Footjoy, and TaylorMade-Adidas Golf Worldwide. The company's software and services enable clients to collect and analyze data; building a robust data infrastructure for making data-driven decisions. These capabilities help clients to reduce costs, cycle time and errors, and increase profitability.

For more case studies and white papers on the subject of real-time data, please visit the Portfolio section of our web site at www.hertzler.com (http://www.hertzler.com/php/portfolio/index.php.

To request a 30-minute no-obligation Gap Analysis of your real-time data readiness, please call 800-958-2709 or email info@hertzler.com.