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ASSET PERFORMANCE MANAGEMENT: BLAZING A BETTER PATH TO OPERATIONAL EXCELLENCE

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Across every asset intensive industry, organizations are challenged to track, assess, and manage assets efficiently. Based on Aberdeen's Asset Performance Management / Facilities Management / Operational Risk Management benchmarking study, this report explores how Best-in-Class organizations deploy asset performance management (APM) and the performance boost they receive for doing so. As we enter the era of cloud and industrial Internet of Things, Best-in-Class organizations are better positioned to reap the transformative benefits of APM, including increased asset reliability and availability, reduced maintenance, and real-time visibility / access to asset information, intelligence, and insight.

Pressures Driving Manufacturers to Asset Performance Management

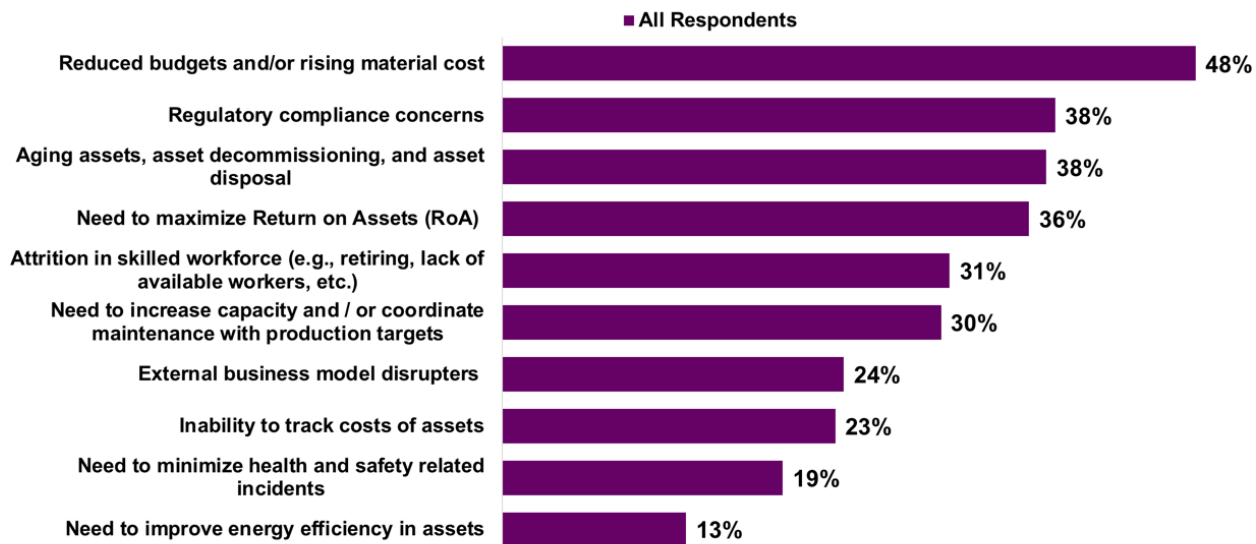
Top performing firms are driven by their need for operational efficiency. This phenomenon is perfectly illustrated by the simultaneous need for cost reduction in production and the need to drive revenue growth. To top it off, mass-produced, individually configured products must be delivered in an environment rife with last minute order changes, where time-to-market is at a premium. Driven by the need for operational efficiency and flawless execution, Best-in-Class firms are turning to asset performance management solutions.

Numerous pressures drive manufacturing organizations to specifically focus resources on asset management (Figure 1). These include regulatory compliance concerns, an aging asset base, and the pressing need to maximize return on assets (ROA) in the face of reduced budgets and rising material costs, regulatory compliance concerns, and an aging asset base.

Asset performance management (APM) enables intelligent asset strategies that balance three traditionally competing priorities — reducing cost, improving availability, and increasing reliability. APM encompasses the capabilities of data capture, integration, visualization, and analytics and ties them together for the explicit purpose of improving the reliability and availability of physical assets. APM includes condition monitoring, predictive forecasting, and reliability centered maintenance.

The emergence of the industrial Internet of Things, big data, and predictive analytics in manufacturing and asset intensive industrial sectors have driven widespread use of the term APM.

Figure 1: Top Pressures Driving Asset Management



% of Respondents n = 173, Source: Aberdeen 2017

These pressures exist in an increasingly challenging business environment. External business model disrupters are displacing manufacturing elements of the past. Employee attrition is a major issue: U.S. baby boom generation employees are now retiring at a rate of ten thousand a day. As always, asset maintenance remains critical, but it must not interfere with capacity expansion or production targets. Healthy assets are necessary to minimize health and safety issues and to improve energy efficiency in assets.

Defining the Best-in-Class

To identify best practices in APM for manufacturers, Aberdeen used three key performance indicators (KPIs) to distinguish the Best-in-Class from Industry Average and Laggard organizations: maintenance cost reduction, operating margin, and overall equipment effectiveness (OEE).

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). Table 1 summarizes the aggregate performance of Best-in-Class, Industry Average, and Laggard organizations.

The Aberdeen maturity class framework identifies three groups of survey respondents. The data determines overall company performance, based on self-reported performance across several key metrics. Each respondent falls into one of three categories:

- ▶ Best-in-Class: Top 20% of respondents based on performance
- ▶ Industry Average: Middle 50% of respondents based on performance
- ▶ Laggard: Bottom 30% of respondents based on performance

Sometimes we use a fourth category, All Others. This is a combination of Industry Average, and Laggard.

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

Definition of Maturity Class	Mean Class Performance
Best-in-Class: Top 20% of aggregate performance scorers	11% maintenance cost reduction, year-over-year 14% operating margin outperformance against plan 90% overall equipment effectiveness (OEE)
Industry Average: Middle 50% of aggregate performance scorers	5% maintenance cost reduction, year-over-year 6% operating margin outperformance against plan 84% overall equipment effectiveness (OEE)
Laggard: Bottom 30% of aggregate performance scorers	0% Maintenance Cost Reduction, year-over-year 4% operating margin outperformance against plan 70% overall equipment effectiveness (OEE)

Source: Aberdeen 2017

Best-in-Class manufacturers achieve superior results, garnering an 11% reduction in maintenance costs over the past year. They also realize higher performance results in financial metrics by outperforming operating margin plans by 14%. Finally, they do very well in internal plant metrics by effectively utilizing assets (90% overall equipment effectiveness or OEE).

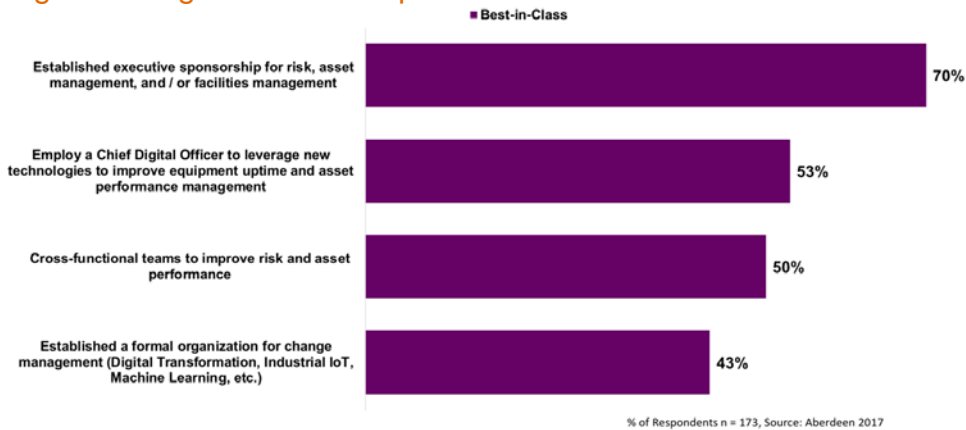
Looking at it another way, Best-in-Class firms do much better than Laggards, earning higher performance results in all three metrics by delivering over 11 times better year-over-year maintenance cost reduction, 3.5 times better operating margin outperformance against plan, and 29% better OEE. Clearly, the Best-in-Class are enjoying significantly better performance by deploying APM. However, the key to better understanding this benchmark report is to determine just how the Best-in-Class are achieving these results and the detailed outcomes they achieve.

How They Do It: Organizational and Business Capabilities

Best-in-Class organizations are acting quickly to gain a first mover advantage, by synchronizing asset performance with corporate performance objectives, and by deploying Internet of Things (IoT) and advanced analytics to ensure asset visibility and health.

It all starts with synchronizing asset management goals with corporate performance objectives. (Figure 2).

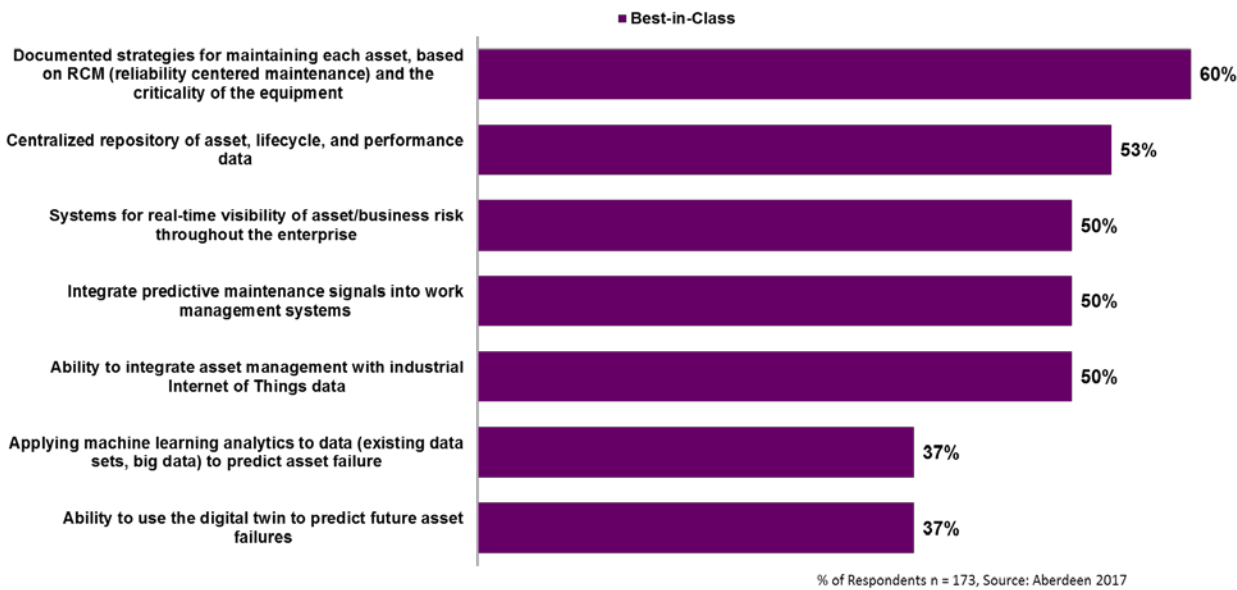
Figure 2: Organizational Capabilities of the Best-in-Class



The Best-in-Class begin by establishing executive sponsorship for their asset management goals. To improve asset visibility and decision making through analytics, leading manufacturers also employ a chief digital officer to leverage new technologies to improve equipment uptime and APM. Asset visibility should be organization wide, so Best-in-Class manufacturers set up cross-functional teams to improve risk and asset performance. Recognizing that it's not just about new technology, forward-thinking manufacturers also establish a formal organization for change management. In doing so, they smooth out possible bumps in the road to digital transformation, industrial IoT (IIoT), and harnessing of technologies such as machine learning.

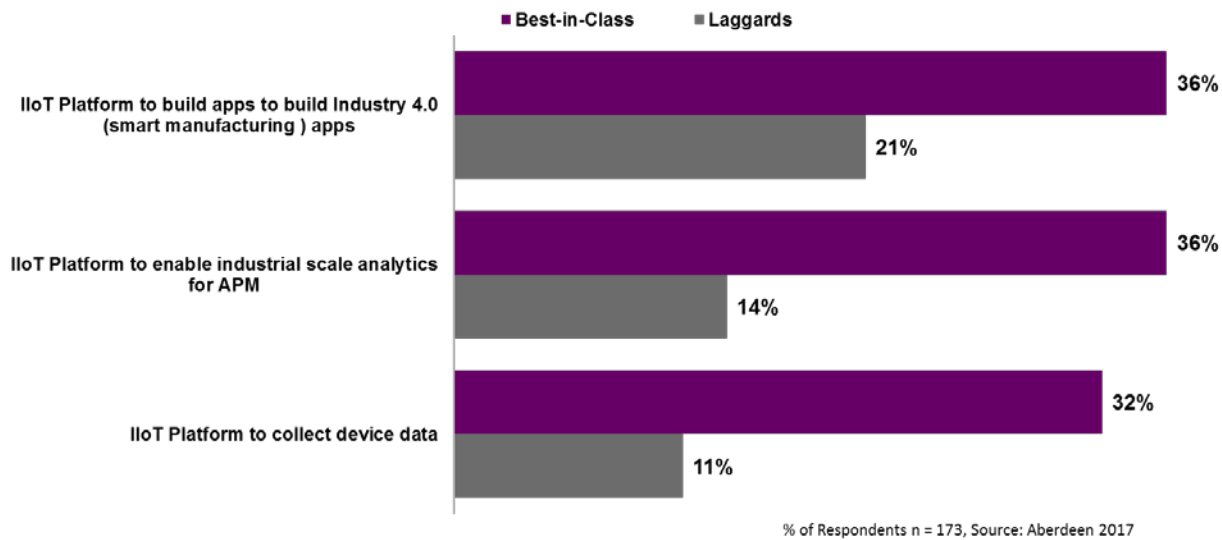
After ensuring the right organizational environment for success, the Best-in-Class provision the right business capabilities to achieve their goals, deploying IoT and advanced analytical capabilities to ensure asset visibility and health (Figure 3).

Figure 3: Business Capabilities of the Best-in-Class



- ▶ Higher equipment reliability and availability is key. Sixty percent of Best-in-Class firms have established documented strategies for maintaining each asset, based on reliability centered maintenance (RCM) and the criticality of the equipment. Across the board, 50% of manufacturers have established continuous improvement teams for condition based and reliability centered maintenance activities.
- ▶ A single source of truth is important to 53% of the Best-in-Class, which maintains a centralized repository of asset, lifecycle, and performance data. Fifty percent implement systems for real-time visibility of asset/business risk throughout the enterprise.
- ▶ New technologies must not stand alone if they are to positively impact asset availability and reliability. That's why half of the Best-in-Class already integrate predictive maintenance signals in everyday work management systems. In addition, integrating industrial IoT with asset management is already paying off (Figure 4).

Figure 4: IIoT Platform Capabilities of the Best-in-Class



- ▶ When asked in which asset areas are they seeing the most actual value in applying IIoT today, the top two answers are reduced maintenance costs and improved customer value. Thus, it's no surprise that the Best-in-Class are 2.6 times more likely than All Others to deploy IIoT platforms to enable industrial scale analytics for APM.
- ▶ The leading edge of the Best-in-Class are applying the newest artificial intelligence-based and Industry 4.0-based technologies in the service of predictive maintenance of assets. Thirty-seven percent are applying machine learning to big data to predict asset failure, and the same percentage has the ability to use the digital twin to predict asset failures.

We've looked a why manufacturers pursue APM and how they do it, but what outcomes do they achieve?

Best-in-Class Outcomes: Blazing A Better Path to Operational Excellence

Best-in-Class companies are pursuing a better strategic path than All Others and have achieved superior results for their efforts in four areas: maintenance; downtime; operational performance; and environmental, health, and safety (EH&S), as shown in Table 2.

Table 2: Best-in-Class Firms Achieve Superior Results

	Key Performance Indicator	Best-in-Class	All Others	Best-in-Class Edge
Maintenance	Maintenance Cost Reductions, YoY	11% less	3% less	3.7 times better
	Total Facilities Maintenance Cost Change, YoY	13% less	4% less	3.5 times better
Downtime	Plant Unscheduled Downtime	2%	8%	4 times better
	Unplanned Downtime Change, YoY	9% less	No change	>9 times better
	Asset Downtime Due to Spare Part Stockouts	2%	5%	7% better
	Asset Downtime Due to Safety/Env. Incidents	4%	6%	50% better
Performance	Operating Margins, Performance Against Plan	+14%	+5%	2.8 times better
	Net Income/Total Assets, Perf. Against Plan	+12%	+5%	2.4 times better
	Overall Equipment Effectiveness (OEE)	90%	79%	14% better
EH&S	Total Energy Consumption Change, YoY	6% less	2% less	3 times better
	Recordable Injury Frequency Rate	.86	1.87	2.2 times better
	Compliance-related Costs, Change Over 2 Yrs	6% less	1% less	6 times better
	Total Energy Consumption Change, YoY	6% less	2% less	3 times better

n=173

Source: Aberdeen 2017

Better Maintenance. The Best-in-Class report year-over-year maintenance cost reductions of 11%, 3.7 times better than All Others. Because poor maintenance strategies can reduce a plant’s overall productive capacity between 5 and 20 percent, the Best-in-Class maintenance edge is particularly compelling.

Leading manufacturers are also progressing farther along the maintenance continuum (see sidebar), evolving to predictive and prescriptive maintenance. Measured by percentage of assets tracked, the Best-in-Class have pulled ahead of All Others in prescriptive maintenance. With 27% of assets tracked by prescriptive maintenance, the Best-in-Class are 13% ahead of All Others. Predictive maintenance is popular across the board, with 24% of assets tracked via this method in all companies.

Best-in-Class firms are also doing a better job in maintenance than All Others in three ways (Figure 5).

The Maintenance Continuum


1. Break/Fix. A reactive strategy: fix asset when broken.
2. Preventative. A time-based strategy: scheduled maintenance activities based on average asset life.
3. Predictive. A strategy to predict machine reliability via advanced analytics and sensing data.
4. Prescriptive. A strategy that recommends one or more courses of action. It attempts to quantify the effect of future decisions in order to advise on possible outcomes before the decisions are actually made.

Figure 5: Best-in-Class Maintenance Capabilities



- ▶ The Best-in-Class are more attentive to asset health, and are 29% more likely to use remote asset monitoring to track the condition of assets. The sophistication of condition based monitoring (CBM) is also growing. While 56% of CBM is still based on simple alerts, 44% of CBM is now based in sophisticated analytics. The impact of remote asset health is significant; 69% of manufacturers use remote assets, so asset monitoring is necessary to maintain operational efficiency.
- ▶ The Best-in-Class have automated the maintenance dispatch function. Sixty percent implement automated technician scheduling based on maintenance/service needs.
- ▶ The Best-in-Class are making much better use of mobility for asset visibility — mobile devices to provide technician access to job orders, status, schematics, and parts availability. Other data in this study peg general mobility use for APM at 15%, so the Best-in-Class are thus 3.8 times more likely to use mobility in maintenance than the general manufacturing population.

Lower Downtime. Plant unscheduled downtime of the Best-in-Class is four times better than that of All Others. Best-in-Class manufacturers also report a year over year unplanned downtime decrease of 9% while All Others reported no decrease at all. This contributes to increased asset reliability and availability.



The impact of lower downtime is material. Recent studies indicate that unplanned downtime costs industrial manufacturers an estimated \$50 billion each year. The cost of unplanned downtime can be devastating, ranging from an estimated \$10,000 to \$250,000 per hour for industrial plants.

Higher Operational Performance. The Best-in-Class have reached optimal profitability via efficient, effective, and reliable operations. Having progressed further along the asset maintenance continuum, they post an OEE of 90%, which is 14% greater than All Others and 29% greater than Laggards. Operating margin outperformance is 2.8 times better than All Others.


Better EH&S. APM significantly reduces risk associated with asset failures and improve safety. This is important to the Best-in-Class; 67% of this maturity class have adopted a risk-based approach that considers the safety of the employee, equipment, and environment. Best-in-Class organizations lower recordable injury frequency rates, and decreased their two-year compliance cost decrease rates 6 times better than All Others. Lastly, Best-in-Class manufacturers are 3 times better at reducing their year over year energy consumption than All Others.

Summary

Manufacturers seeking the means to improved operational efficiency have found the answer in application performance management. Companies have seen the early benefits from investing in asset management, and are now experiencing even greater operational and financial success through the use of industrial IoT to achieve asset/risk visibility as well investing in advanced analytical and AI technologies (such as machine learning) to improve asset reliability, availability, and health via predictive and prescriptive maintenance.

For all their efforts the Best-in-Class have achieved superior results from APM, which pays off in improved asset health in four areas: better asset maintenance; lower asset downtime; higher operational performance; and better environment, health, and safety.

As the need for better operational efficiency in asset and facilities management accelerates, manufacturers are pressed by higher expectations and shorter decision windows. This requires real-time, critical decision making capability across operations, based on actual asset condition, not hunches, heuristics, or the way it was done in the past.



The demands on manufacturers are significant, but so are the rewards. Best-in-Class organizations are responding to pressures they face and meeting these challenges by pursuing operational excellence through APM. In short, they are seizing on the APM advantage and reaping the rich benefits.

Related Research

Maintenance, Repair, and Operations: The Rise of Remote Assets;
October 2016

Maintaining the Health of Your Most Critical Assets with EAM and IoT;
July 2017

Smart Buildings: Combining IoT and Analytics To Improve Facilities Management Operations; July 2015

IoT and Analytics: Better Manufacturing Decisions in the Era of Industry 4.0; August 2017

About Aberdeen Group

Since 1988, Aberdeen Group has published research that helps businesses worldwide to improve their performance. Our analysts derive fact-based, vendor-neutral insights from a proprietary analytical framework, which identifies Best-in-Class organizations from primary research conducted with industry practitioners. The resulting research content is used by hundreds of thousands of business professionals to drive smarter decision-making and improve business strategies. Aberdeen Group is headquartered in Waltham, Massachusetts, USA.

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