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The Business Case for Better Maintenance
By Kevin T. Higgins, Senior Editor

*When manufacturers tighten their belts, maintenance usually feels the pinch. By demonstrating maintenance's contribution to operational improvements, managers hope to change that.*

Can a plant's maintenance department be a profit center? It seems a stretch, but maintenance service providers are encouraging plant professionals to focus on organization and record-keeping issues to make the business case that investments in maintenance can generate huge production paybacks.

Every vendor has a tale about the client who dodged a $45 million new-plant project because overall equipment effectiveness (OEE) went through the roof, thanks to the vendor's reliability program or enterprise asset management system (EAM). How much credit is owed to the measurement tools is debatable, but maintenance metrics are helping shift perceptions of maintenance from a cost to a contributor to business health.

"Maintenance can contribute to profitability by becoming totally predictive," believes Tony Yanora, maintenance manager with Pepsi Bottling Group (PBG). "When you can do 80-90% of your maintenance on a scheduled basis, you start turning the lines into more profitable operations that increase plant efficiencies." While he hesitates using the term profit center, Yanora insists an effective maintenance program can boost OEE, reduce spare-parts inventory costs and make more effective use of the staff. His own experience in overhauling maintenance at Pepsi's Detroit facility illustrates how a broken maintenance program can be converted to a business asset.

The Detroit plant had limped along without a maintenance manager for seven years before 2003, when Yanora was brought in. The production manager did double-duty as maintenance overseer, with predictable results: "Production decreased and costs went up," he says. "It was constant firefighting. There was no plan."

On-the-job training for maintenance technicians, better job tracking to boost productivity, regular troubleshooting by an engineering consultant and reductions in unplanned downtime were part of Pepsi Detroit's overhaul. Parts inventory is low-hanging fruit in maintenance cost savings. Yanora outsourced electronics management to a local distributor. An inventory assessment determined the plant had 120 unique part numbers for proximity, photoelectric ultrasonic and capacitive sensors and their mating corsets. Drives had been standardized on Allen-Bradley, but more than 50 part numbers for the 330
installed drives existed, and multiple drive families were represented. Technicians were burning hours daily, searching for parts. By standardizing on the sensors and going to a single Rockwell drive family, sensor inventory plummeted 60%, and the number of drives on hand was cut in half.

"We insisted on delivery of managed inventory, with some items on consignment," Yanora recalls. "A $40,000 drive was put on our shelf, with payment due at the time we pulled and installed it.

"At most of the 60 PBG plants, there isn't any predictive maintenance going on," adds Yanora, who recently relocated to PBG's Baltimore site. In Detroit, 50% of jobs are predictive.

Comparing software panaceas for maintenance to snake oil, Randy Alter of ABB Reliability Services believes the key to profitable maintenance is a focus on a handful of key performance indicators (KPIs). Software has its place—after all, one of the Westerville, OH-based firm's core products is a program called PM30 Plus—but if the performance measures are dubious and there is no human input, software is useless. A glaring example is the application of OEE metrics that are not realistic. Alter cites the meat processor who claimed an OEE of 115% on a Formax machine. The unrealistic ratio was achieved by defining output at less than rated capacity because someone determined the machine "runs better" at a lower rate, remembers Alter. "An unrealistic OEE looks great on the board, but it doesn't move KPIs in the right direction."

Technology can overwhelm a maintenance team, notes Jim Hopkins, director-reliability solutions group at Greenville, SC-based AssetPoint LLC. A phased approach often is best, even in the case greenfield projects. AssetPoint had its EAM system running before production began at T. Marzetti's Horse Cave, KY facility ("Opportunity Knocks," Food Engineering, April 2007). But only after a year were technicians equipped with handheld devices to electronically convey work orders, parts lists and diagrams.

Based on 35 years of consulting in the maintenance area, ABB developed benchmark KPIs (see chart below), contrasting typical performance with the standards at world-class manufacturers. ABB distinguishes between preventive maintenance (PM) and planned work, the latter being machine faults detected before breakdown and corrected before machine failure. PMs at average and world-class organizations do not necessarily show much variance, but planned work is dramatically different. Consequently, the amount of emergency work is five times greater at typical plants than at world-class facilities.

ABB began providing engineering and consulting services to Hormel's Austin, MN plant in 2002. "You get your biggest bang in the first two to three years," allows Alter, after which a steady state usually prevails. At the beginning of the second year, scheduled PMs accounted for 19% of labor, unplanned repairs were 31%, and half the maintenance hours (1,340) went to planned repairs. By the end of the year, unplanned repairs had fallen to 9%, and scheduled PMs were 32%. Significantly, completed PMs rose to 89%, from 54%.

Over a four-year period, plant productivity improved 9%, while maintenance costs edged up 2%, down from a historical growth rate of 9%. Can all of the improvement be attributed to maintenance? Probably not. "We're not pro-operations or pro-maintenance," Alter says. "We're looking at where the opportunities are."

With maintenance, there is a finite number of wrench-turning opportunities. An hour of planned turning is worth at least 10 hours of unplanned work, plus lost productivity, he estimates. Not only is too much reactive maintenance being done, much of the preventive work is unnecessary, according to Mike Laszkiewicz, vice president of customer support & maintenance at Rockwell Automation. All told, 18% of those wrench turns are unnecessary, "and they can induce failure," Laszkiewicz told attendees at the firm's Automation Fair. Across all industries, 15% of labor is devoted to predictive maintenance, about half the optimal ratio, he says.

Predictive work is even rarer in food and beverage, though the needle is beginning to move. Thermal imaging equipment has become so affordable that Barilla America will make it part of its condition-monitoring program this year, reports Carmine Simone, manager of Barilla’s Avon, NY plant. Advanced oil analysis also has proved to be an effective preventive maintenance tactic.

Vibration analysis is a mixed bag, Simone adds. It was applied to the gearboxes of large extruders, but the screws only turn at 25 rpm, and vibration signals proved misleading. On the other hand, fans inside drying tunnels turn at 1,800 rpm or higher, and moderately priced sensors can monitor those machines.

Some manufacturers are flirting with complete outsourcing of maintenance operations, with in-house technicians employed by the supplier. Both Rockwell Automation and ABB have entered this arena in recent years, fixing total costs and setting OEE targets with incentives for exceeding them. Some heavy-industry firms with large maintenance staffs have gone this route, but PBG’s Yanora speaks for most in food and beverage when he says, “Maintenance is a core competence for us.”

Garbage in, garbage out

Poor record-keeping and sloppy metric tracking can torpedo efforts to measure maintenance’s contribution to plant profitability. ABB’s Alter cites the manufacturer who didn’t count failures of air compressors and other support equipment into downtime calculations, even when failure shut down a line. Similarly, a decision to shut a line down for a shift despite its repair and availability in under eight hours distorts OEE.

Marc Gottlieb can relate. As director-ERP systems at Irwindale, CA-based Nellson Nutraceutical Inc., he had been frustrated in efforts to capture better throughput data from the copacker’s Salt Lake City plant, where frequent changeovers and ramp-up issues blurred the accuracy of cost models. Identification of critical maintenance issues was difficult, and quality data wasn’t paired very well with machine performance. In short, OEE was more fiction than fact.

In March 2007, Nellson installed an EAM module from CDC Inc. to better track machine availability and quality issues. “When the accuracy of downtime is visible to everyone, 15 minutes becomes closer to 15 minutes,” Gottlieb points out. “It actually reduced finger-pointing.” Operators and maintenance workers use the same HMIs to record when a changeover begins and ends or when a machine goes off line. Online tracking of when a new run is in spec adds credibility to quality data. When paper logs are kept, records of scheduled events “are spectacularly precise,” he ironically notes.

Credible records, whether of OEE or maintenance activity, benefit both production and planned maintenance. “Based on data we never had before, we’re doing PMs on $5 parts, replacing them each four weeks and slashing downtime events,” Gottlieb says.

Accurate time-tracking was identified by CDC as a gap in many of the ERP and CMMS packages on the market, according to Mark Sutcliffe, general manager of the Atlanta firm’s CDC Factory system. “Connecting production workers with their maintenance colleagues is where they fall down,” he says, “and you end up with different metrics of downtime.” By providing a single, automated time-stamping system, actual maintenance response and ticket-closing times are logged, enabling continuous improvement efforts to proceed.

“Lean maintenance initiatives that reduce waste and inefficiencies are a must, and managers must get upper management to understand that maintenance is a key to organizational improvement,” seconds Johnny Bofilios, Infor’s manager of EAM solutions. In 2006, Infor acquired Greenville, SC-based Datastream, one of the dominant maintenance software suppliers. “A tool is just a tool,” says Bofilios, echoing Alter’s point. Unless technology is in sync with human assets, machine reliability and production won’t improve.
"The best predictive maintenance you can do is people walking around and observing," agrees Alter. A quarter of breakdowns can be prevented if operators lend their eyes to the maintenance program, he estimates.

"When we implemented our system, people feared it was a plot to speed production, but it's just about more hours of run time and increased equipment availability," Nellson's Gottlieb says. Harmonizing the efforts of production and maintenance and enabling staff with accurate measures of performance are critical in boosting the organization's profitability. For more information:

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The true return on a maintenance investment often is scattered across an organization's balance sheet, frustrating efforts to measure maintenance's contribution to profitability. A case in point is synthetic lubricants.

Polyglycol lubricants are the energy-efficiency stars in high-sliding applications such as worm gears, notes Mark Crombie, manager of application engineering at Londonderry, NH-based Klüber Lubrication NA. Their low coefficient of friction reduces power loss in a gear box, and better thermal stability makes synthetic gear oils vastly superior in run times compared to food-grade lubricants based on mineral oil.

"Synthetics extend lube intervals and reduce energy consumption, but someone else gets the credit on

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the energy side for the maintenance manager’s lube investment," he says. The main benefits for maintenance are optimized machine run times and a reduction in labor hours—an important consideration as worker availability becomes a bigger issue. But unless there is a collaborative approach to calculating the true return from these types of maintenance investments, managers will be de-incented from upgrading PMs, depriving organizations of productivity improvements.