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Technologies

A TREND Publication

Jean-Michel Cousteau,
son of Jacques Cousteau,
on a test dive of the Exosuit

DESCENDING TO **NEW** DEPTHS

DIVING 1,000 FEET BENEATH
THE SEA IN THE MACHINED
AND FABRICATED
ALUMINUM EXOSUIT

INSIDE

HYDRAULIC PRESSES Beckwood Press Co.'s integrated system makes presses better able to diagnose problems

Derailing unplanned downtime



Integrated system makes presses better able to diagnose problems

“**A**n ounce of prevention is worth a pound of cure.” Benjamin Franklin uttered his now-famous words as firefighting advice when he organized Philadelphia’s first fire company in 1736. Almost 280 years later, prevention remains a hot topic, especially for equipment manufacturers

like St. Louis-based Beckwood Press Co.

The company designs and builds hydraulic presses and automation systems engineered to customers’ unique applications, in addition to producing its Triform line of sheet hydroforming and stretch forming presses. Beckwood serves clients in the aerospace and defense, energy, oil

A 165-ton hydraulic trim press engineered by Beckwood Press Co. for an automotive industry customer. The press is outfitted with On-Board Pre-Preventive Maintenance technology.

and gas, automotive, construction and agriculture industries.

Reactive maintenance, a common task facing fabricators, has technicians scramble into action to repair machines when they break down without warning. Repair per-

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sonnel refer to it as firefighting. The state of emergency that unplanned downtime creates has birthed a series of maintenance programs, from proactive to predictive.

Beckwood has gone a step further with its On-Board Pre-Preventive Maintenance (PPM) technology, engineered to give its presses artificial intelligence and fabricators a glimpse into the future. Through Beckwood's integrated PPM system, critical data on press performance and component status is both mined and shared, with the goal of eliminating unplanned downtime.

Artificial intelligence

"These days manufacturers are operating with skeleton maintenance crews," says Darrell Harrelson, technical director for Beckwood. "Beckwood has identified this trend, and countered with smarter machines capable of alerting operators, maintenance crews and management teams with advance warning when a press system requires attention. The 911 emergency nature of a maintenance team's job is greatly minimized, allowing downtime to be scheduled when appropriate once production requirements, operator availability and other projects slated for the machine are factored in."

According to Harrelson, Beckwood has been on its own evolutionary track. For years, the press builder has integrated a remote hub into its presses, permitting its support technicians to remotely access customers' presses and troubleshoot problems online. The company has also built redundancy into its presses to guard against downtime due to the failure of relatively inexpensive components.

"Our presses, which are often critical path pieces of equipment, can't afford to be down due to, for example, a \$300 transducer," says Harrelson. "Including certain redundant devices keeps Beckwood presses running even when an individual component stops functioning."

Last year Beckwood made a companywide effort "to identify as many things as possible to boost machine intelligence and its ability to self-diagnose," Harrelson explains. "That analysis helped us define what we like to call a modern day crystal ball—On-Board Pre-Preventive Maintenance."



A Triform 25-10-12SC sheet hydroforming press. Beckwood offers its advanced PPM system on both its custom hydraulic presses, as well as on its Triform sheet hydroforming presses.



The press health screen gives operators all the system's vitals.

Closed loop monitoring of key systems and built-in component redundancies scrutinize a machine in operation, analyze data and alert operators before unplanned downtime can upset productivity.

The integrated package complements another trend among fabricators—that of the manufacturing metric Overall Equipment Effectiveness (OEE). OEE examines subcomponents of a manufacturing process such as availability, performance and quality, converting the results of these factors into a percentage that offers a snapshot of production efficiency for a machine or work cell.

Technology has been a big driver, Harrelson says. As technology has advanced, so has the ability to give management teams greater information. "Ten years ago

there were very few machines that could network to a central monitoring station. Standard equipment was typically a stand-alone device. You bought it, placed it, plugged it in and it ran on its own. That has changed. Packages like OEE can chart productivity, number of parts per hour and other factors—feedback that management can use to make more informed decisions about capital equipment investments and production schedules."

The methods under which manufacturers operate today has also created a ready market for smart machines. "Companies need a technological edge that can help them reduce turnaround time on parts production by eliminating a fabricator's worst enemy: downtime," Harrelson notes. "More and more we see manufacturers turning into short run specialists. Instead of dedicating machines to making millions of the same widget, they might make 1,000 of one part, then switch over to make a different component in a short amount of time."

Real-time diagnosis

Despite the trend toward short production runs, multiple die changes and rapid development, Beckwood believes smart machines should remain easy to operate.

"We never make a machine more complicated than it needs to be," Harrelson observes. "It's important to keep presses intuitive enough for operators with varying skill levels. You don't want a guy on third shift to be confused about the input required to make parts. Our goal is to keep it simple and straightforward, despite the underlying increases in technology and

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overall capability.”

Approaching the challenge of unplanned downtime with a risk assessment mentality is what helped Beckwood define and crystallize its On-Board PPM tool. Like the systematic process that evaluates potential risks associated with a projected activity, engineers analyzed all aspects of a press system’s health and identified more than 40 different action items and notifications falling into categories that include alarms, warnings, pump efficiency, safety systems status, oil health, filter status and valve performance.

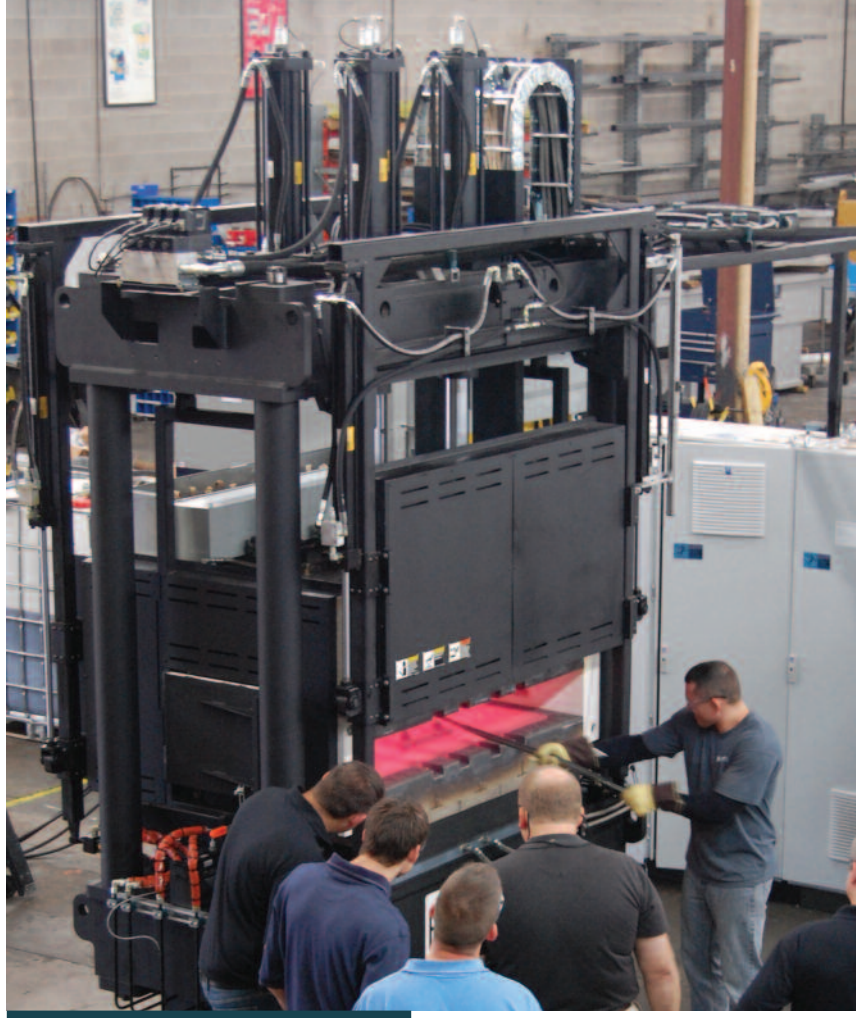
“A press system’s health can now be evaluated in real time with PPM,” says Harrelson. “The system is able to actually recognize acceptable parameters for each metric and notify the user’s team of emerging patterns that could lead to problems—before a shutdown.”

Take hydraulic and lube oil systems for example. Most hydraulic presses are equipped with filtration and visual bypass indicators set to remind operators to make periodic oil changes. However, changing oil doesn’t necessarily mean it’s clean, if the newly added oil isn’t properly filtered first.

“More than 75 percent of all hydraulic system failures are a direct result of contamination,” says Harrelson. “Fluid health can be monitored and controlled with the right onboard technologies and it’s a critical area of focus for PPM.”

According to Harrelson, if particulate count on a PPM-monitored Beckwood press begins to rise above acceptable levels, or if preset parameters are exceeded for particulate count and size, water content and oil temperature, early warning notifications are issued that give maintenance crews the “chance to get out in front of any potential problems before they happen.”

Unlike traditional presses that use a human machine interface to display warnings, the PPM’s notification system is a key component to its effectiveness. “The HMI method of notification works well if you’re the operator,” says Harrelson. “If you’re a maintenance manager, production manager or other key member of a manufacturing team, on-screen notifications are far from visible. Select



Beckwood’s PPM system can be programmed to monitor and report when temperature variances are out of spec on heated platen presses.

notifications from the PPM system are not only displayed on the press HMI, but are also e-mailed to preselected team members as well as Beckwood’s support technicians.” This 360-degree notification program makes sure that individuals who are mission critical to press operations are kept informed of its performance and service requirements.

While the system was designed to safeguard both the machine and users’ productivity, it also looks after another important resource: employees.

“PPM uses an internal calendar and intuitive process to regularly verify that all integrated safety devices are working prop-

erly,” says Harrelson. “Operators are guided through a mandatory verification process once a week to ensure all onboard safety systems are functioning correctly. The process takes just two minutes and doesn’t interfere with production.”

Beckwood’s risk assessment mentality is giving technical specialists ideas for new applications, he says. “We’re always asking: What can we add that will benefit the user? We can only go so far with press structure and hydraulics. Usability of our equipment, and the productivity levels we can help our customers achieve is what will set Beckwood apart in the future.”

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