ENGINEERING YOUR SUCCESS.

HEAVY INDUSTRY CASE STUDY

Preventing Downtime in Industrial Manufacturing Processes

Revenue for heavy industrial facilities revolves around the health or condition of capital equipment in those facilities. When machines go down or stop producing, they not only affect the production of goods for sale. Production delays that affect one customer are likely to affect others. And customers who don't receive their orders on time tend to find different suppliers. Condition monitoring tools help solve these issues by giving operations engineers the gift of time. Having advance notice about deteriorating process conditions lets operational and maintenance teams weigh the costs of continuing to run until the next planned service day against the costs of stopping processes for immediate repairs. Depending on condition, they can continue to run while planning for the most opportune time to perform service. This combination of decisions, predictions and planning results in less downtime and improved costs, since managers have more control over when machines are serviced. This reduces the risk of running equipment blindly to failure.

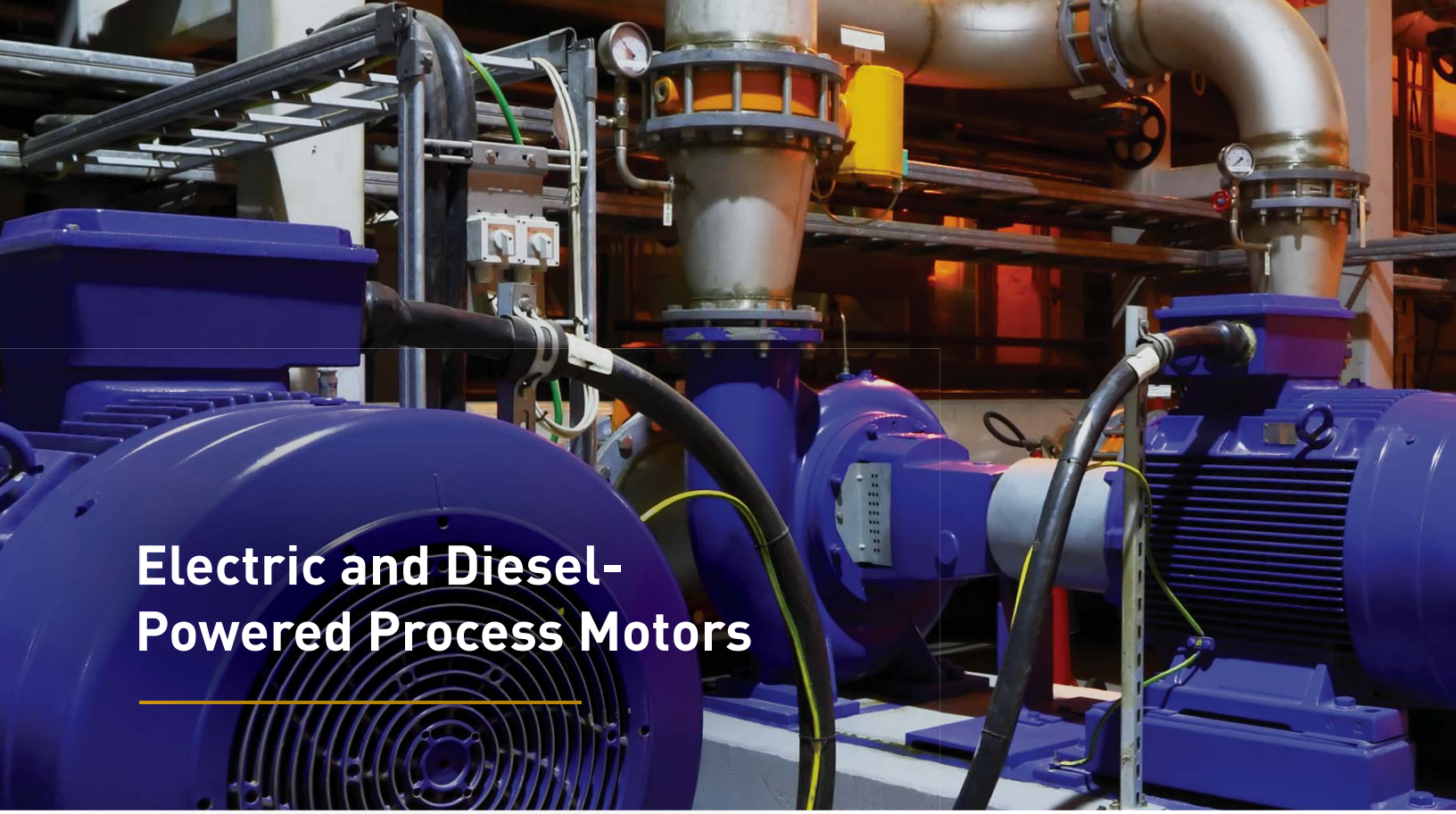
VOICE OF THE MACHINE™

Condition Monitoring with Parker's Voice of the Machine™ Solution

Assessing machine and process health is the core of Parker's Voice of the Machine™ Software and SensoNODE sensors. The Internet of Things (IoT) enabled wireless sensor system allows plant managers to set up baseline performance levels and easily monitor process parameters to reveal changes in machine health as they develop, giving them the time and information needed to prevent failures.

Sensors take readings automatically and unattended, contributing to higher productivity and better decision making. With access to more measurements, managers also get process histories that help them visualize issues of interest. Trending situations are communicated via notifications and dashboards, alerting maintenance engineers of the need to diagnose problems and allowing them to plan ahead of a failure.

Common industrial applications include electric and diesel-powered motors, hydraulic power units, accumulators, pneumatic systems and ambient air conditions.



Electric and Diesel-Powered Process Motors

Challenges

Rotating and spinning equipment can become unbalanced for any number of reasons, which leads to excessive machine vibration and overheat conditions that ultimately will damage machines and lead to downtime.

Solutions

Condition monitoring sensors can spot conditions or trends before they head out of the normal operation. This allows maintenance engineers time to complete batch processes if necessary and then schedule maintenance at the most optimal times and costs.

Vibration of Electric and Diesel Motors

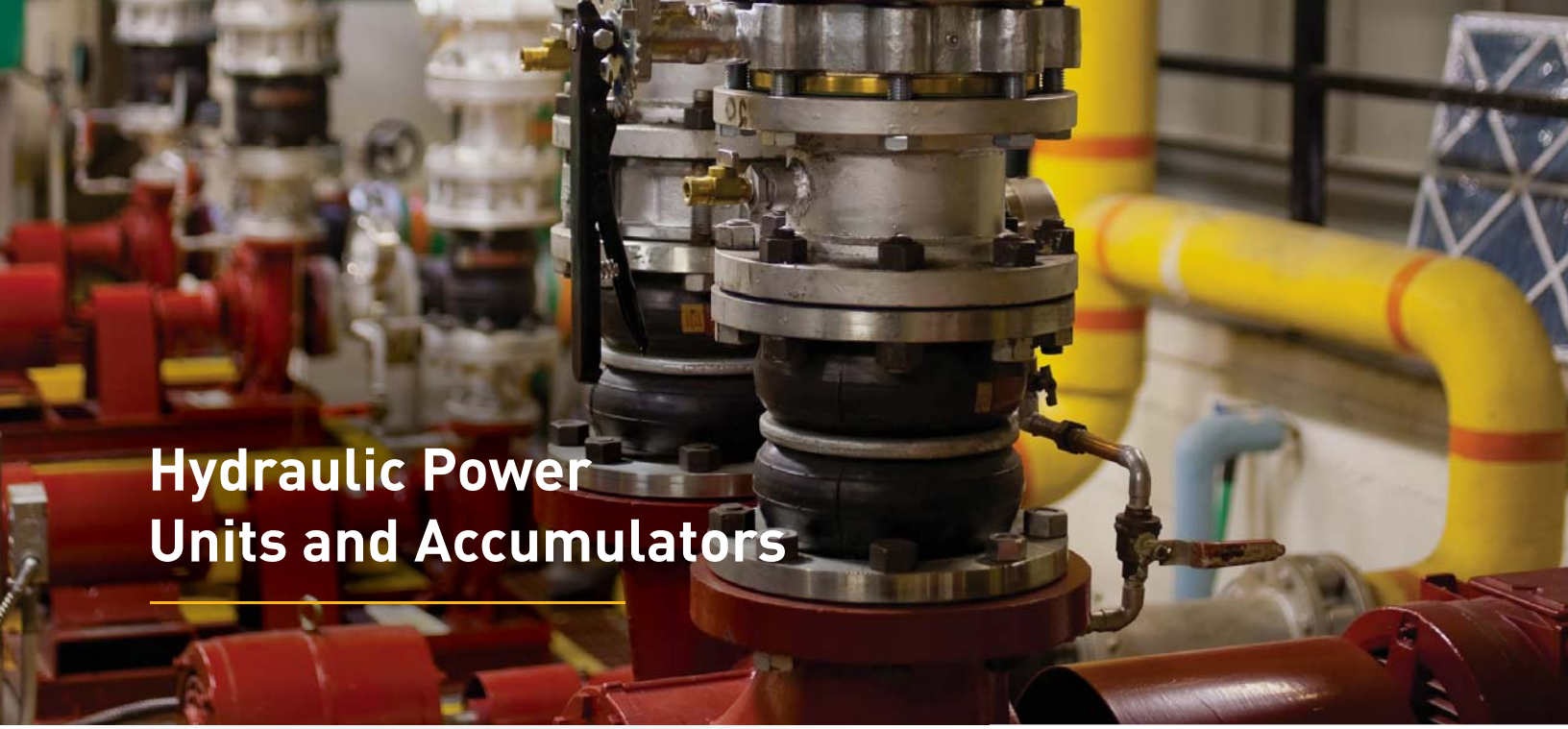
A change in motor vibration can indicate such issues as components out of balance, shaft misalignment, looseness or a failed bearing. Vibration levels beyond limits alert maintenance engineers to the need for troubleshooting.

Bearing Temperatures

Bearing housings are prone to overheating as the bearing begins to degrade or the motor is overloaded. Besides being a fire hazard, overheating damages motor shafts and other components. Monitoring housing temperatures allows for exception alerts to prevent damage.

Electrical Amperage to Electric Motors

Monitoring a motor's amperage draw shows when there is an unexpected rise or an increasing trend in the current the motor is consuming. From these changing conditions, notifications are sent to maintenance engineers to troubleshoot components or systems to avoid overloads. Causes of high amperage include excessive hydraulic pressures or low gearbox oil which leads to high friction.



Hydraulic Power Units and Accumulators

Challenges

Hydraulic power units (HPUs) and accumulators, as well as their components, can be susceptible to a number of issues, some of which might not be detected without condition monitoring tools. In addition, damaged HPU components might be replaced to treat a symptom and without ever solving the root issue, which leads to repeats of the same failure.

Solutions

Having access to automated measurements such as temperatures and pressures in HPUs and accumulators lets operations managers know when conditions are moving beyond normal ranges so they can take a diagnostic approach.

Hydraulic Oil Temperatures

Monitoring the oil temperature in HPUs allows maintenance engineers to be notified whether oil coming into the pumps has been sufficiently cooled. Overheated oil, which will damage expensive hydraulic pumps, might be attributed to a faulty heat exchanger. These faults may go undetected and stack up until the situation reaches a critical state.

Hydraulic System and Accumulator Pressures

Monitoring the hydraulic pressures from HPUs as well as accumulators gives engineers process histories and makes them aware of pressures heading outside of normal ranges. Hydraulic pressures that are too high can damage equipment, while hydraulic pressures that are too low will affect product quality. Some machines may be equipped with mechanical pressure gauges. Without constant monitoring these gauges may become useless in terms of preventing issues, particularly in relation to accumulators, which are often unmonitored and will lose pressure over time. In turn this can lead to defective product and machine damage.

Fluid Condition Monitoring

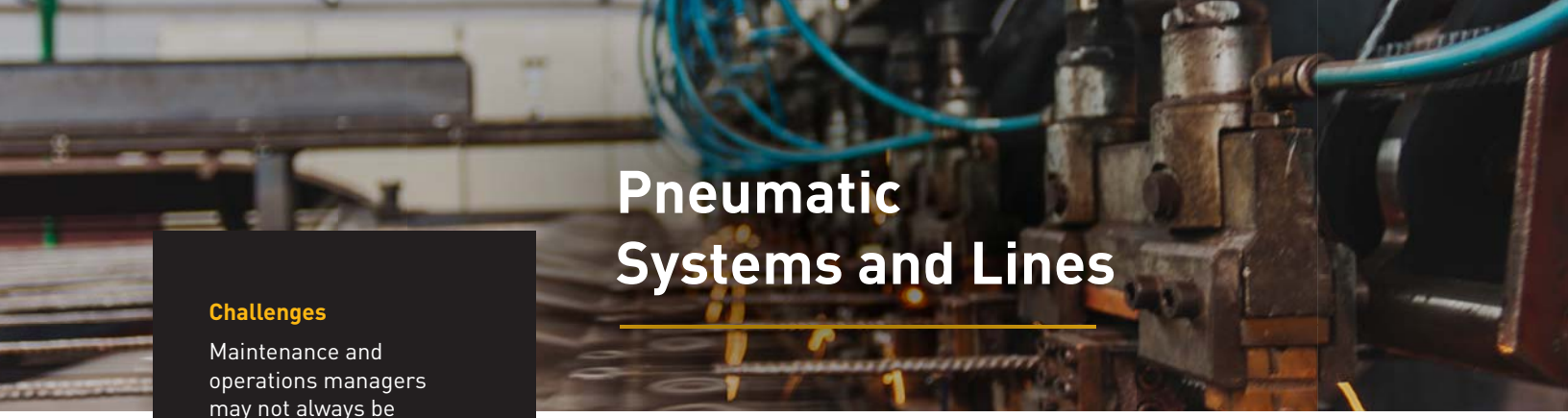
Running systems with dirty hydraulic fluid shortens machine life and leads to failure. Monitoring hydraulic fluid quality may help avert a significant number of system failures attributed to fluid contamination from particulates and moisture.

Fluid Flow Monitoring

Low pump outputs mean low system speeds and poor performance or reduced output. Monitoring the flow rate of hydraulic fluids can alert maintenance engineers to the need for diagnostic maintenance if flow rates drop. Monitoring case drain flow can be a leading indicator of pump wear and diminished efficiency.

Fluid Level Monitoring

Fluid reservoirs that have run low may indicate that a hose is broken or that there's a system leak. Monitoring fluid level alerts managers to the need for refilling before pumps are damaged or the system shuts down, thus allowing production to continue uninterrupted, allowing for maintenance to be planned.



Pneumatic Systems and Lines

Challenges

Maintenance and operations managers may not always be aware of pressure and cleanliness issues with the compressed air in pneumatic lines but these can affect product quality and equipment performance.

Solutions

Condition monitoring sensors can trigger notifications which help operations managers diagnose quality and performance issues faster.

Pneumatic System Pressure

Monitoring pneumatic system pressure off the main header can alert maintenance engineers when systems are approaching unacceptable levels for powering processes or power tools. This helps determine the need for attention to prevent low machine performance or bad production. Having a record of pressure changes also can indicate when pressure drop may have relationally affected product quality.

Humidity of Compressed Air

Monitoring the humidity in compressed air lines protects equipment and processes by alerting maintenance engineers of the need for dryer or filter maintenance. Humidity in supply lines will damage high value test equipment and can affect equipment performance and life.

Pneumatic Flow Rates

Low air flow rates cause tools and machines to run slowly or stop working. Monitoring flow rates can alert managers to unexpected changes in the supply or the consumption of compressed air throughout the plant, before failures or defects occur.

Additional Applications

Ambient Air Humidity in Stockrooms

Monitoring the humidity of ambient air in finished goods and raw material warehouses preserves product and process quality by alerting maintenance engineers to the need for cooling or drying operations. Humid air can destroy packaging and affect product quality or usability.

Adhesive System Temperature and Humidity

Monitoring these conditions helps ensure that adhesive systems are operated at the proper ranges and will have consistent curing times. This helps ensures product quality is maintained and provides notification when conditions move beyond desired baseline levels.

Existing Process Control Sensors

Integrating wireless sensors with existing analog process control sensors and expansion units allows operations engineers to unlock the valuable measurements that are often trapped in their current control systems. Better yet, that data can be unlocked with the need for to reprogram the machine controls or purchase additional sensors.

For details on these and other SensoNode condition monitoring solutions in industrial manufacturing facilities, visit **parker.com/conditionmonitoring**

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