

INJECTION MOLDING CASE STUDY

Maximizing Productivity in Injection Molding Operations

Whether manufacturing millions of toys or hundreds of thousands of car parts, product quality and production cost are two of the biggest concerns for injection molding operations. And in many cases, the two variables are inextricably linked. Quality issues may arise because of faulty processes or equipment. If this results in scrapped products and rework, production costs increase. The solution for injection molding companies is to prevent both situations with the help of automated conditioning monitoring tools for processes and equipment.

With many injection molding processes running unattended for long periods, there are significant process risks that allow poor quality to be produced unknowingly. Continuous condition monitoring automatically sends alerts when process conditions are changing or deteriorating. Notification allows operations teams to intervene and remedy the fault. This maximizes labor productivity and quality while reducing scrap costs.

VOICE OF THE MACHINE™



Condition Monitoring with Voice of the Machine™ Software and SensoNODE

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

Sensors take readings automatically, contributing to higher productivity and allowing better decision making. With access to more automated measurements, managers now have access to process histories and trends that will help them visualize and understand upcoming issues. Trending measurements are communicated via notifications and dashboards; alerting maintenance engineers of the need to attend to developing problems before a full stop failure condition occurs.

Common injection molding applications include monitoring of ambient air humidity and temperature, hydraulic pressures, related cooler temperature, tooling temperature and chiller systems.



Raw Materials Storage of Pellets and Powders

Challenges

The usability of plastic pellets and powders used for injection molding is affected by excess humidity. Since these materials often absorb moisture from the environment, allowing humidity to persist in storage areas leads to poor processing and faulty products, particularly in humid regions or seasons.

Solutions

Monitoring humidity of the ambient air in warehouse storage areas where the raw materials are stored helps to maintain process quality and reduce rework, which minimizes preprocessing time. Humidity sensors can alert operations managers when humidity is nearing or has reached unacceptable levels, informing them of the need for drying processes and to plan for the necessary drying conditions or time.



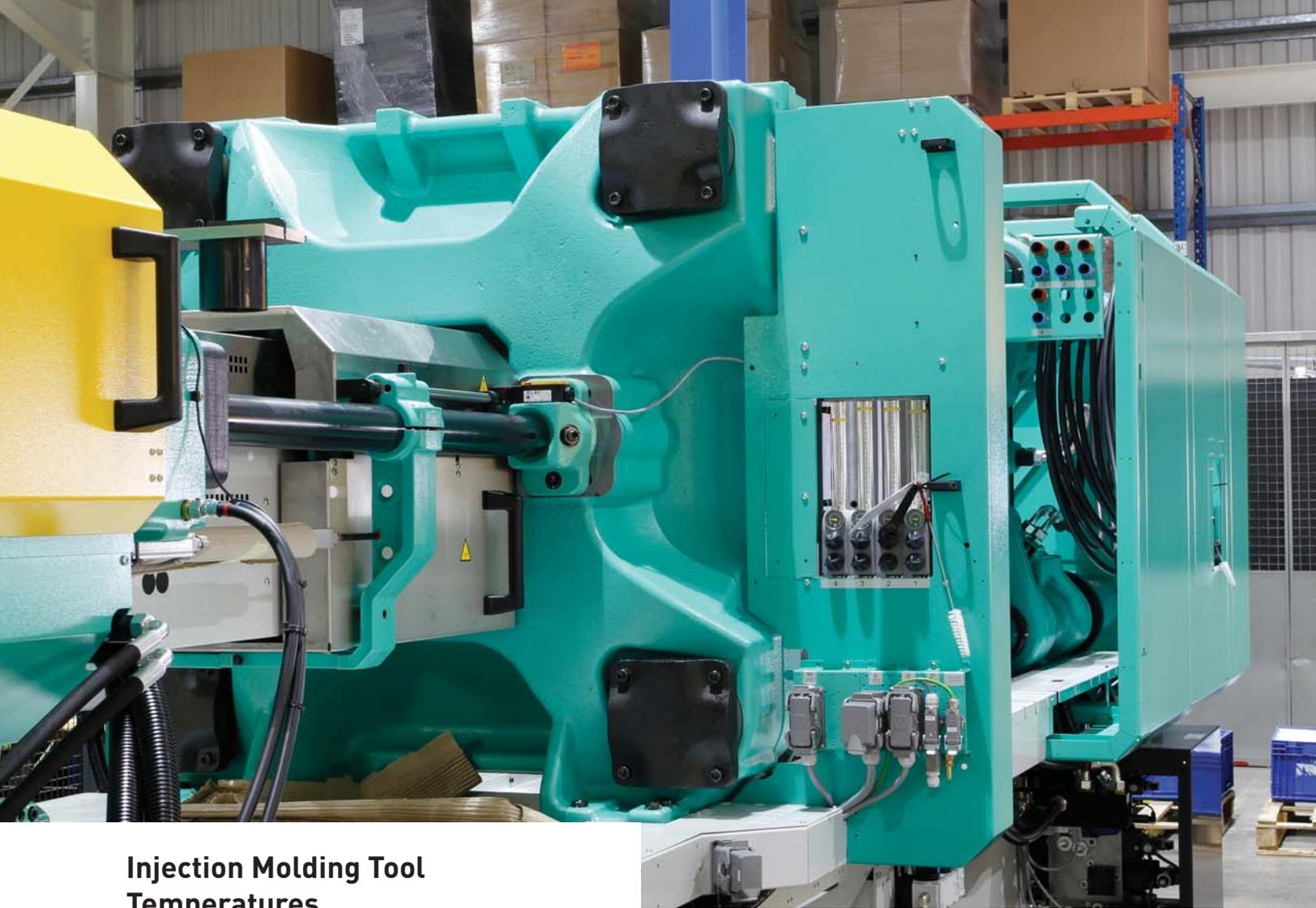
Injection Molding Systems With Hydraulic Power Units

Challenges

Older injection molding systems powered by hydraulic power units often lack sensors to provide cycling and pressure measurements. Low hydraulic pressures, for example, can lead to product flash and defective parts that require rework labor or scrapping of the parts.

Solutions

Monitoring hydraulic pressures of HPU-powered injection molding machines ensures consistency in product quality by alerting operators to low or declining pressures early, so unacceptable production processes can be stopped and HPUs checked. Having advanced notice helps avoid the production of high quantities of defective parts.



Injection Molding Tool Temperatures

Challenges

Injection molding is a temperature-controlled process, but because injection molding tools are often custom-designed and unique, each tool requires its own optimal temperature parameters, which makes it difficult to fit the tool with wired sensors. However, if tool temperatures are not monitored, operators waste production time if tools are used at incorrect temperatures upon startup or during production.

Solutions

Temperature monitoring of molding tools can help save time for technicians by letting them know when tools have heated to the proper temperatures for use or have cooled for safe removal, as well as alerting if molding tools are too hot or too cold for satisfactory production during use. This information can be used to prevent the production of products that have to be scrapped or reworked. Wireless sensors for this application can be moved from one tool to another and helps to simplify tool changes because there are no umbilical cables to disconnect or damage.



Electric Motors and HPUs

Challenges

Hydraulic power units, cooling pumps, material transport systems and servo drives that power injection molding machines are driven by electric motors. These motorized systems are susceptible to unplanned failures, which can halt production. Bearing failures, broken drive couplings, unbalanced pumps or fan blades are typical culprits.

Solutions

Monitoring the vibration of drive motors can indicate developing problems. A changing or increasing vibration signature could indicate that a pump, screw or servo is beginning to fail. By being alerted to the change early via wireless condition monitoring sensors, production and service teams may be able to plan ahead for repairs and replacements to avoid unplanned production stoppages and related recovery efforts.

Additional Injection Molding Applications



Pellet/powder, chemical additives and other consumables can be monitored throughout injection molding production facilities to automate measurement-taking and trigger early warnings of deteriorating process quality. Additional applications include:

- Liquid level monitoring of critical fluids such as coolant or hydraulic fluid
- Electrical current/amperage to heating equipment or motors powering pumps
- Cooling system or utilities temperature and humidity
- Vibration of hydraulic pumps and power units
- Motion profile of injection molding equipment

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

