Four questions to ask when the mold will not fill right

A pressure sensor can be a big help when your mold isn't filling properly. Here are four questions to ask when shopping for the right sensor.

Shane VandeKerkhof | RJG |

Some molding problems can be diagnosed with a little pressure data from inside the mold. But whether you're new to molding or a seasoned veteran trying to solve a problem, selecting a cavity pressure sensor and positioning it can be an uncertain decision.

There are now more options than ever to fit an application and make it work. Start the diagnosis with these simple questions:

1. What problem are you trying to solve? Short shots? Flash? Incorrect dimensions?

Just put a sensor where the problem is. Most often, that will be the last location to fill, or what is commonly referred to as the end of cavity. Most quality defects can be correlated to the pressure at this location. Too much pressure and the parts get bigger; not enough and they get smaller. All in all, it's a pretty straightforward correlation.

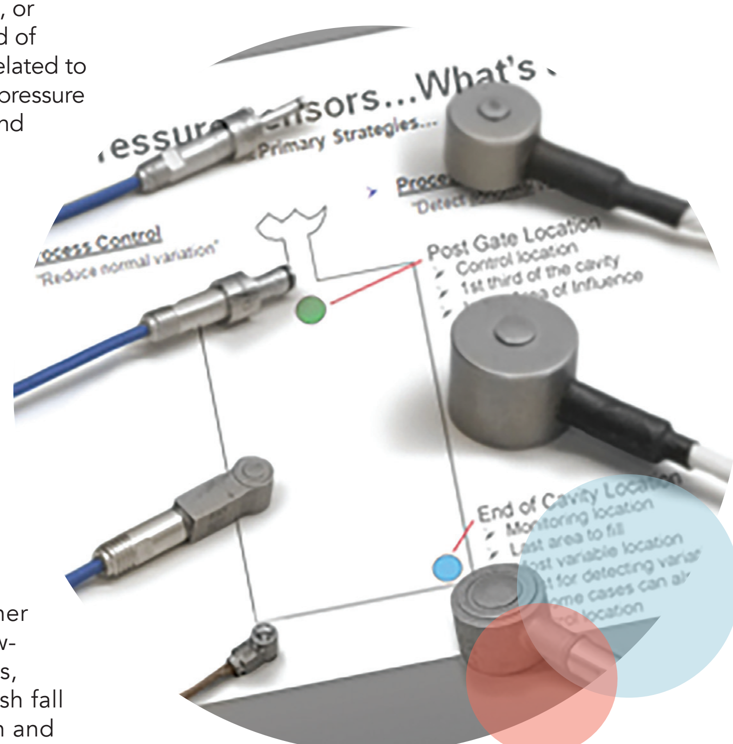
Placing sensors does require modification of the mold, depending on the type of sensor. For button-style sensors, a channel and pocket are milled into the ejector retainer plate where the sensor lead and sensor head will sit, underneath the ejector pin. Flush-mount sensors need a hole in the surface of the cavity, where the sensor is then placed so it has direct contact with the material as it flows in.

Pressure-related defects include short shots (non-filled parts), dimensional variation, flash, surface finish and strength issues. These further fall into two categories: high- and low-pressure conditions. Short shots, sinks, too-small dimensions and surface finish fall into the low-pressure condition. Flash and too-large dimensions fall into the high-pressure condition. It will be necessary to select control limits for each application on a case-by-case basis.

When determining the end of cavity, we typically ask customers to produce a short shot, find that place in the mold and place a sensor as close to it as possible. If the tool hasn't been built, a flow simulation study can help determine that last place to fill. Short of that, experience and gate location is also an option for determining the end of cavity location.

2. How many transducers would be needed in a multi-cavity mold?

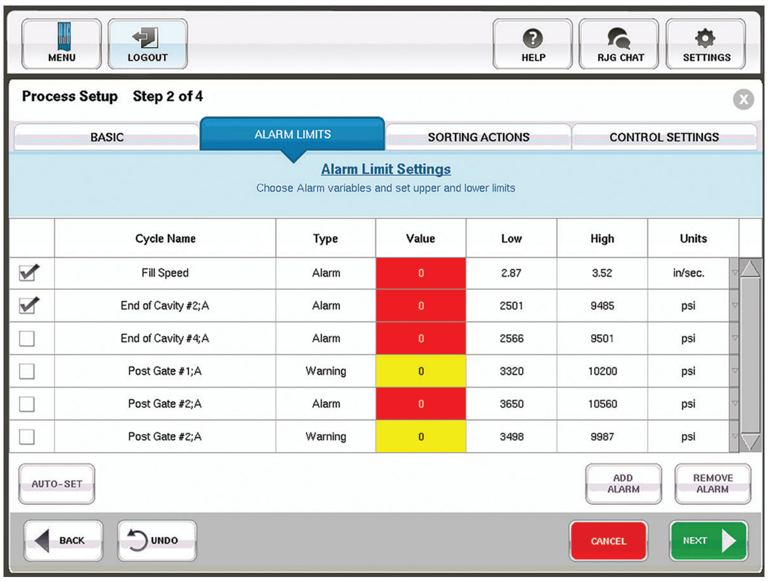
Start with whether the mold has a cold-runner or hot-runner tool. If it's a cold-runner

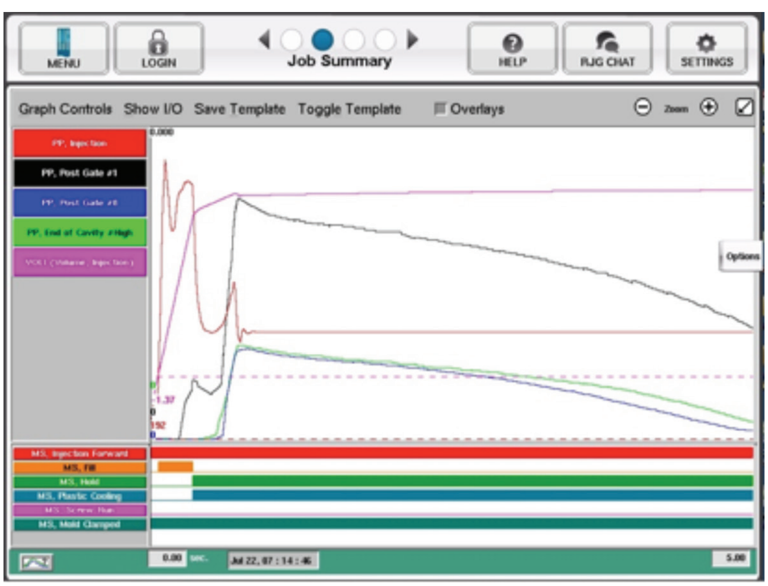


Pressure sensors come in a variety of designs for a range of pressure applications and the temperatures they will encounter.

mold, the flow pattern will be consistent. Typically, we can reduce the number of transducers necessary by putting a sensor at the end of the cavity that fills last. This strategy works well up to about eight cavities. As the cavity count increases, so will the number of needed transducers.

For hot-runner tools, the previous strategy grows more complex because of thermal cycling, which occurs in hot-runner manifolds and tips. The flow pattern has a tendency to change over time, so more transducers will be needed to catch quality defects.





3. How do you decide between flush-mount or ejector pin-style sensors?
This is simply determined by availability and real estate. Where there's an ejector pin in the last place to fill, that's the place to put the transducer. Where there's no ejector pin nearby, the situation calls for a flush-mount sensor.

4. How do you know if the application calls for a piezoelectric or strain gauge sensor?
First, all flush-mount sensors are piezoelectric, but ejector pin transducers come in both technologies. Strain gauges are the cheaper of the two, and until recently, piezoelectric came in smaller sizes that work better in small parts. Our new 6 mm strain gauge sensor matches the performance and size of the smallest piezoelectric sensor head at a more cost-effective price. In the end, sensor selection comes down to what technology best fits an application.

A more recent option is a multi-channel setup. For those with high-cavity-count molds, the number of connectors and wires becomes an issue. To alleviate this, we developed a multi-channel solution for both piezoelectric and strain gauge sensors. This significantly reduced the number of connectors and wires and therefore reduced breakage in these components.

The most common use for cavity pressure sensors is to automate the inspection of the molded part. The sensors provide data that allows a part inspection with every cycle. Control limits are set, and any parts that do not meet those limits can then be segregated by a robot or conveyor. M

TOP: Part of the eDart system requires setting alarms for low and high pressure. That is accomplished with selections in an easy to read table.

BOTTOM: The Job Summary screen in eDart provides a pressure record of an entire cycle.