

Drying Plastic Resin Pellets in Injection-Molding & Extrusion Processes

Models 303B, 3050-AM, 3050-OLV

Application

Moisture concentrations are measured in the dry purge air used to remove moisture from a hopper containing plastic resin pellets used in injection-molding and extrusion processes.

Problem

Moisture contaminates the plastic resin pellets causing several quality problems in the finished plastic products.

1. Moisture causes clear plastic products to have a cloudy appearance.
2. It will decrease the strength of the finished product.
3. It causes a poor surface finish on the final product.

Any of these defects force the customer to scrap the produced plastic parts.

Equipment

Typically, a sample of the gas is taken downstream of the dryers at a point providing adequate sample pressure for the analyzer selected. The 303B, with the low pressure accessory, should be used when positive sample pressure is unavailable. If the drying air is under pressure, the 3050-OLV or 3050-AM are recommended. For the 3050-OLV, a NEMA type

1 or 4 enclosure is recommended due to the nature of the industrial, manufacturing environment. The 3050-AM is recommended if a 19" rack is available for installation. The analyzer is typically vented to atmosphere since the sample gas is almost always air.

Procedure

The air used to dry the plastic resin pellets is often contained in a closed-loop system consisting of a multi-bed regenerative desiccant-type dryer and a hopper containing plastic resin.

The dryer produces hot, dry air that is blown through a duct to the hopper. This air removes moisture from the plastic resin pellets. The wet air exiting the hopper is returned to the dryer inlet.

In the dryer, the air is cooled, the desiccant absorbs the moisture, and then the air is reheated. The analyzer can be installed near the hopper to look for air leaks in the duct. The analyzer is vented to atmosphere.

How Previously Handled

Most desiccant dryer beds are switched with solenoid valves controlled by a simple timer. Switching the beds in this manner would do one of two things:

1. Switch the dryer beds before necessary thereby putting them through unnecessary regenerations

that cost money and shorten the remaining lifespan of the beds.

2. Flow wet air to the hopper whenever the dryer bed becomes saturated before the timer set point is reached. This greatly increases the chance that 'wet' pellets may be inadvertently used resulting in poor quality plastic.

Some customers have implemented moisture warning systems using a hygrometer such as an aluminum oxide sensor. However, many of these customers have become frustrated with the calibration drift, loss of sensitivity, and other maintenance requirements inherent in those sensors.

Results

With the 3050-OLV, 3050-AM, or 303B moisture analyzer monitoring the gas entering the hopper inlet, any failure of the air dryer is quickly detected. The analyzer's alarm contacts can be used to switch the dryer beds to prevent wet air from entering the hopper.

In addition, the performance of these analyzers is very stable over long periods of time thereby increasing operator confidence in the system. The use of a moisture analyzer will minimize the pellet drying time by ensuring that only dry air is sent to the hopper inlet.

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