Static Pins for Cavity Pressure Applications

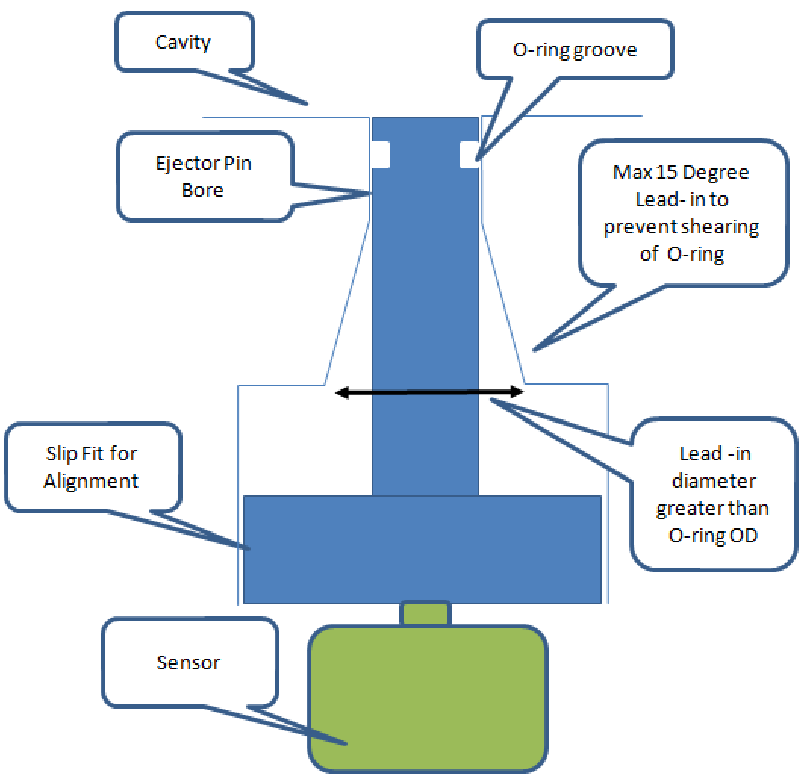
Static pins can be used as an alternative to flush mount sensors for measuring cavity pressure. Advantages of static pins include:

- Lower cost of sensors and installation
- Easier sensor maintenance
- Flexibility in sensor/pin sizing
- Flexibility in sensor location

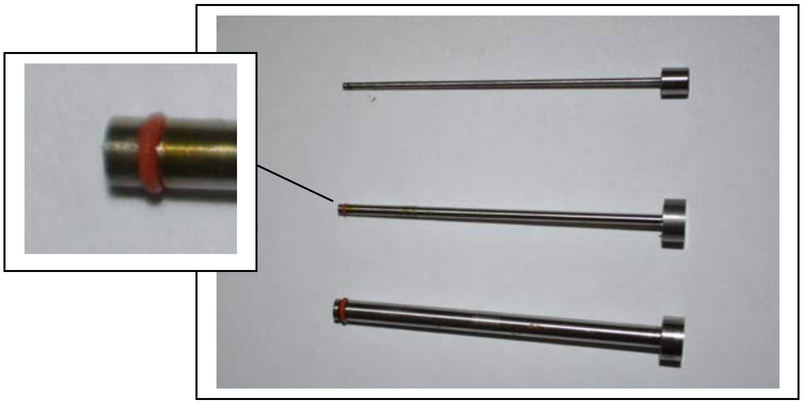
The success of a static pin application relies on the use of an O-ring at the tip of the static pin. This summary gives an overview of the static pin, and provides a case study using a 16 cavity mold

Static Pin Overview

The static pin uses a button style sensor behind a non-moving, or static ejector pin. Unlike a moving ejector pin, which self-cleans on each ejection cycle, static pins can allow build up of contamination around the pin over time if an O-ring is not used. This contamination creates friction which prevents full loading of the sensor, creating measurement errors. The use of an O-ring on the end of the pin allows the pin to read correctly over time.

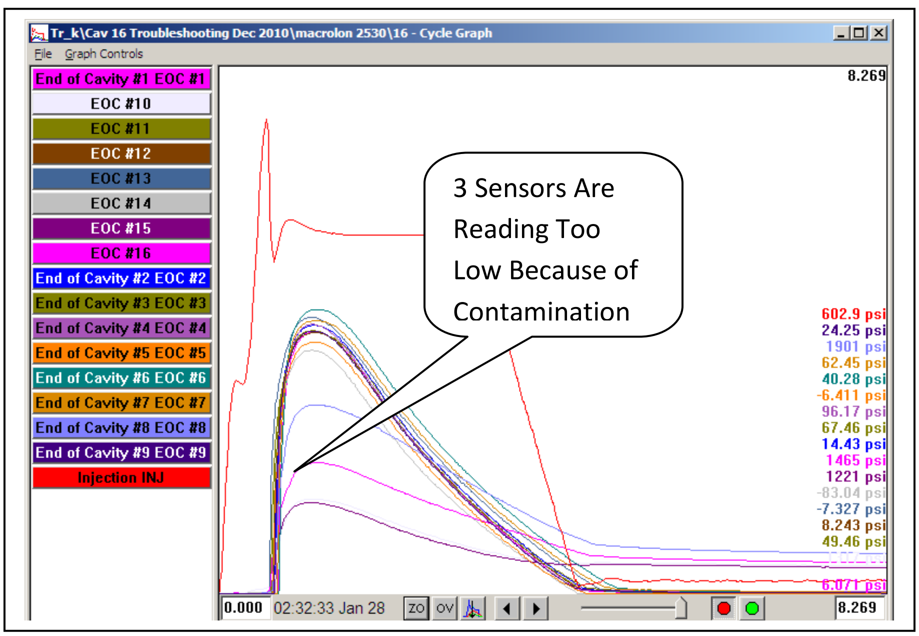


An O-ring is located near the tip of the pin to prevent contamination build-up. This photo shows O-rings installed on a 1/8”, 1/16” and 1 mm pin.

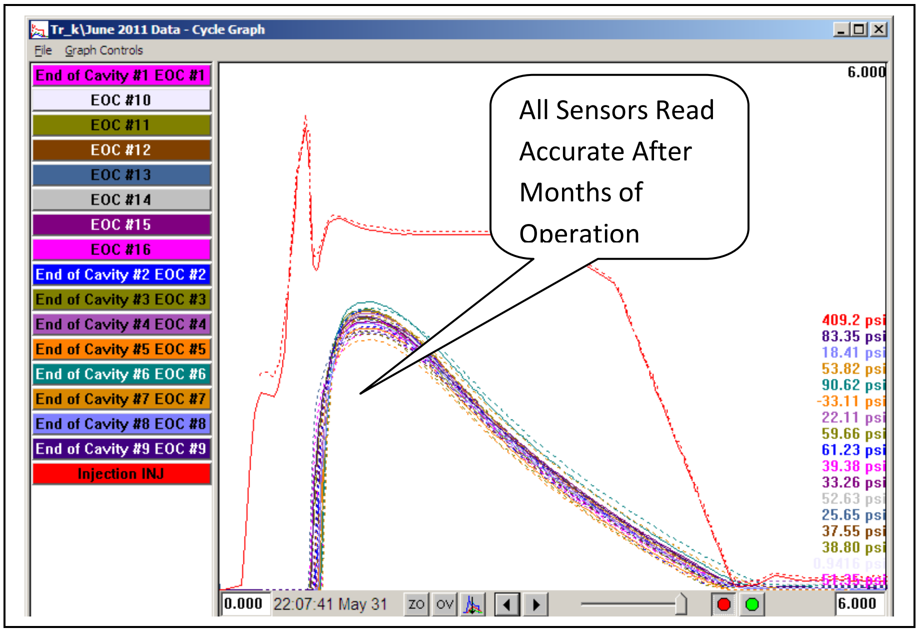


Data from a Static Pin Application

Below is data from a 16 cavity mold using 1/8” pins BEFORE O-rings were installed. Over 1 month, several of the pins became contaminated, resulting in low pressure readings.



Here is the same mold AFTER installation of O-rings. The template (dashed lines) shows data collected shortly after O-ring installation. The solid lines show data after 4 months of continuous production. The sensors continue reading the same now that the O-rings are installed.



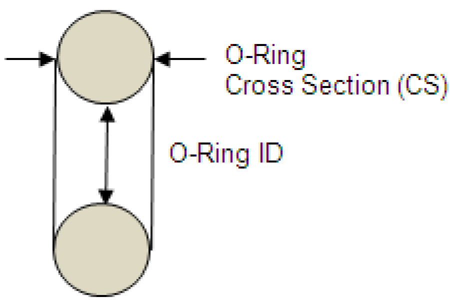
Keys to Successful Static Pin Application

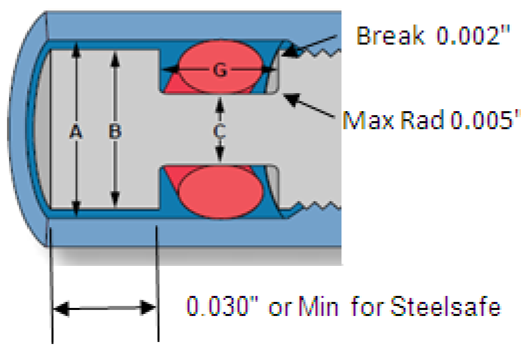
O-Ring Sizing:

The O-ring is sized according to its inside diameter (ID) and cross section (CS). When ordering an O-Ring, the size is called out as the ID x CS, usually in inches. For example, a 0.072 x 0.036 O-ring would have an ID of 0.072" and a cross section of 0.036".

The O-Ring is installed in a groove, or gland, that is cut in the tip of the pin. The gland has two primary dimensions, the diameter (C) and width (G). The diameter (C) is cut to ensure that the O-Ring is stretched between 0-10%. The depth of the gland is designed so that the O-Ring is compressed around 20-35%.

RJG can help with proper sizing of an O-ring for your application. Contact our support group (231-947-3111, or support@rjginc.com). Give us your pin diameter (B), and we'll give you the proper O-Ring size and gland dimensions.





O-Ring Materials:

In addition to the O-Ring size, the material must be specified at the time of order. The injection molding environment is harsh for O-Rings, and standard (buna-N) O-Rings will not survive. For most molding applications, a 70 durometer silicone rubber (70SLR) is preferred, and usually available in stock. For very high temperature applications and some LSR molding applications, a 75 durometer Viton (75Viton) is required. This is usually not in stock, and often requires an 8 week lead time.

Sources for O-Rings:

We have found that Apple Rubber (www.applerubber.com) has a very good selection of O-Rings in stock, and provides strong technical assistance. Minimum orders are usually $50 for in-stock items.

Tolerancing:

The static pin should move freely in the ejector pin bore. This requires normal ejector pin tolerancing, and usually has little impact on the O-Ring function. However, for very small O-Rings (e.g. for 1 mm static pins), the tolerancing of the bore may affect the compression of the O-Ring, and additional attention to the tolerancing of the bore and the gland ID may be required.

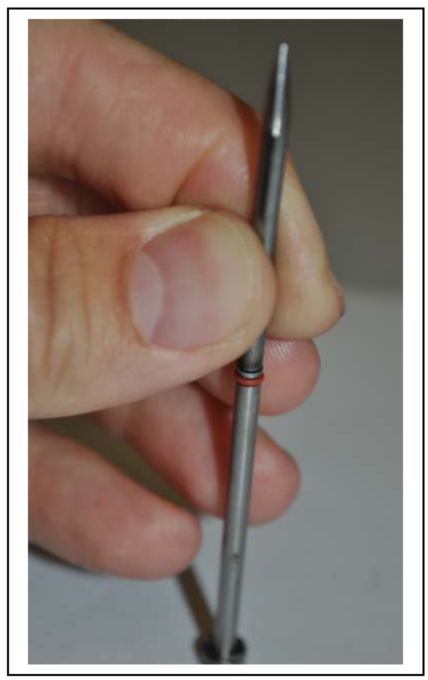
Installation of O-Rings onto the Pin:

The most difficult part of the installation is getting the O-Ring onto the pin without damaging it. When improperly installed, the O-Ring can be torn as it is pulled over the sharp edge of the ejector pin.

To ease installation onto the pin, a simple tool can be built using a pin of the same diameter as the ejector pin. A tapered end can be ground on the end of this pin, usually on a grinding wheel, as long as it is buffed on a wire wheel to remove any burrs that could damage the O-Ring. The sensor can be easily slid onto this tapered pin, and then slid onto the end of the static pin, as shown below.

Installation Tool

Using Tool to Install O-Ring



Inserting Pins with O-Rings Into the Bore

With the O-Ring installed, the pin can then be inserted into the bore. An O-Ring lubricant can be used to help prevent damage. It is important to use a lubricant that does not attack the O-Ring. Many silicone based lubricants can damage silicone O-Rings. A good general purpose lubricant is P-80 THIX lubricant from International Products Corporation (http://www.ipcol.com/shopexd.asp?id=31). Samples are also available through RJG by emailing mike.groleau@rjginc.com

When inserting the pin, the tapered lead-in should allow the pin to be inserted without damaging the O-Ring. However, it is good practice to spin the pin as it is being inserted. This will ease installation and limit the potential for O-Ring damage.

Maintenance:

Properly installed, the O-Ring should survive for long periods inside the mold. However there are two instances where O-Rings may need replacement:

1. Flashy materials: If material flashes around the pin, it may be necessary to pull the pin and remove the flashed material during regular PM cycles. If this is required, the O-Ring should be replaced.

2. Damage to O-Ring during PM cycles: If the pin is removed for inspection and/or cleaning during mold maintenance, the O-Ring should be inspected for damage. Over time, repeated insertion and removal can cause nicks, cuts or other damage to the O-Ring. If this occurs, the O-Ring will need to be replaced.

What Questions Do You Have?

We're here to help. Contact RJG support at 231-947-3111, or email at support@rjginc.com