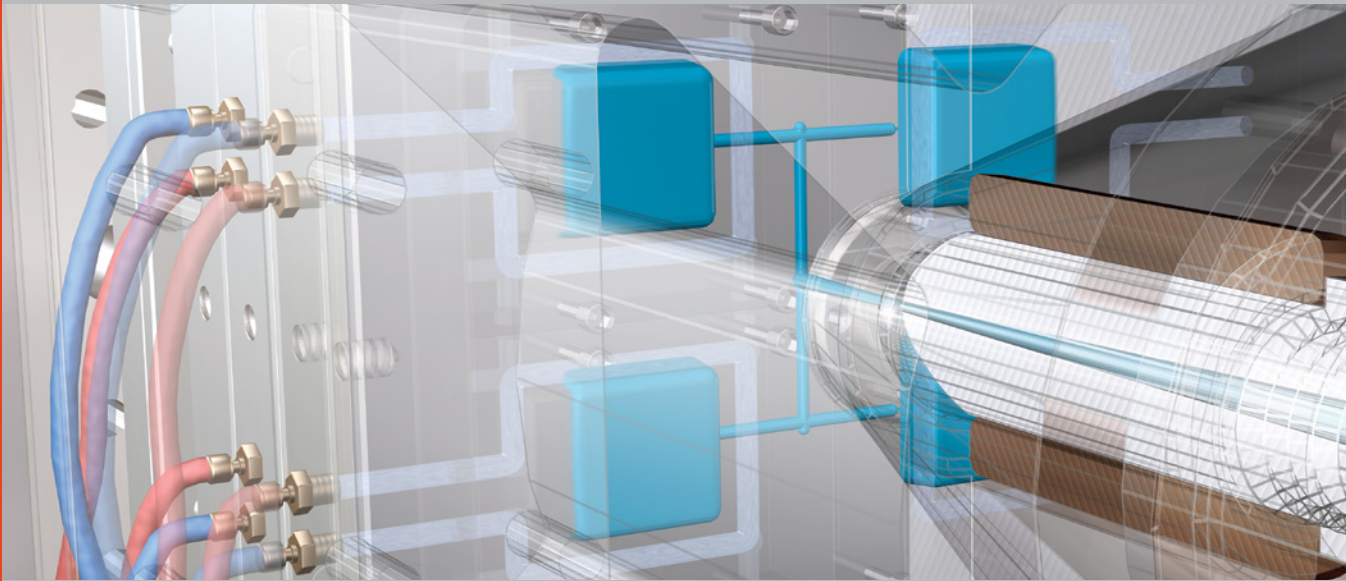


Scientific Troubleshooting: Short Shots



nexeo
plastics

Created exclusively for **Nexeo Plastics** by Routsis Training, this free guide contains excerpts from Routsis's *Scientific Molding Courses*.

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TROUBLESHOOTING SHORT SHOTS

A short shot is an incompletely filled mold cavity and can be attributed to several different causes, including insufficient Melt Temperatures, Injection Velocity, and mold damage.

Short Shots can be caused by one of six major factors:

- Material Temperature
- 1st Stage Injection
- 2nd Stage Pressure
- Mold Temperature
- Clamp Tonnage
- Mold Damage

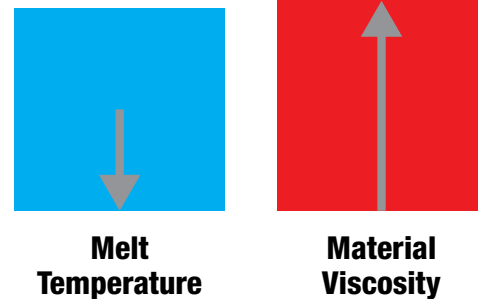


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Material Temperature

A **Melt Temperature** that's too low may cause a short shot. If a low temperature, high viscosity, polymer is injected into the mold, the resistance to flow may prevent the mold from filling enough during 1st Stage Fill and result in a short shot.

To address a short shot produced from a low Melt Temperature, it is recommended to measure the Melt Temperature, and return it to the documented standard.



1st Stage Injection

Short shots can result from insufficient material injection, low Injection Velocity, cavity filling imbalances, or gas entrapment.

If insufficient material is injected during 1st Stage, the packing pressure may not be high enough to complete mold filling. A properly established process should fill the mold between 90 to 95 percent during 1st Stage Fill with a visible short when 2nd Stage packing is turned off.

When using a low Injection Velocity, the material viscosity will increase. This will result in short shots since too little material will enter the mold during 1st Stage Fill.

In multi-cavity molds, a large filling imbalance can cause some mold cavities to begin packing while other cavities are significantly short during 1st Stage.

During mold filling, the gases present in the mold must escape the mold as the material fills the mold cavity. If the gas becomes trapped during 1st Stage Fill, short shots can occur.

If you suspect a problem with 1st Stage Fill, it is best to turn off 2nd Stage Packing and ensure that both the 1st Stage Fill-only Part Weight and the 1st Stage Injection time match the documented standard.

When correcting for filling issues, you should check and clean the vents, runners and gates. Next, use a **Dynamic Cavity Imbalance Test** to ensure the best balance is achieved. Third, the tooling department should be involved to determine the proper way to improve the cavity balance during 1st Stage Fill.

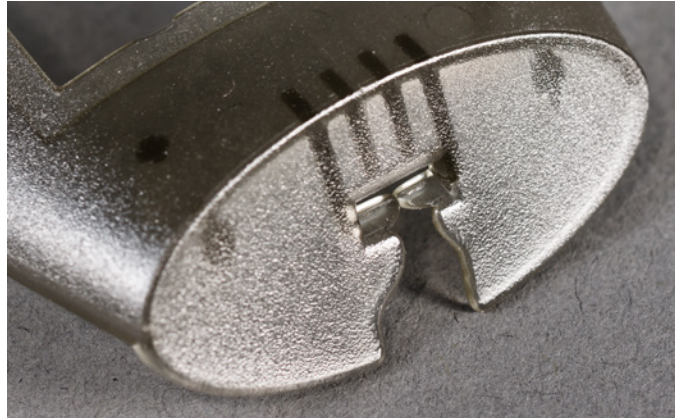


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2nd Stage Pressure

Short shots can result from insufficient Packing Pressure during 2nd Stage.

When the 2nd Stage Pressure is significantly low, there may not be enough pressure to complete mold filling when a short shot is used during 1st Stage Fill.

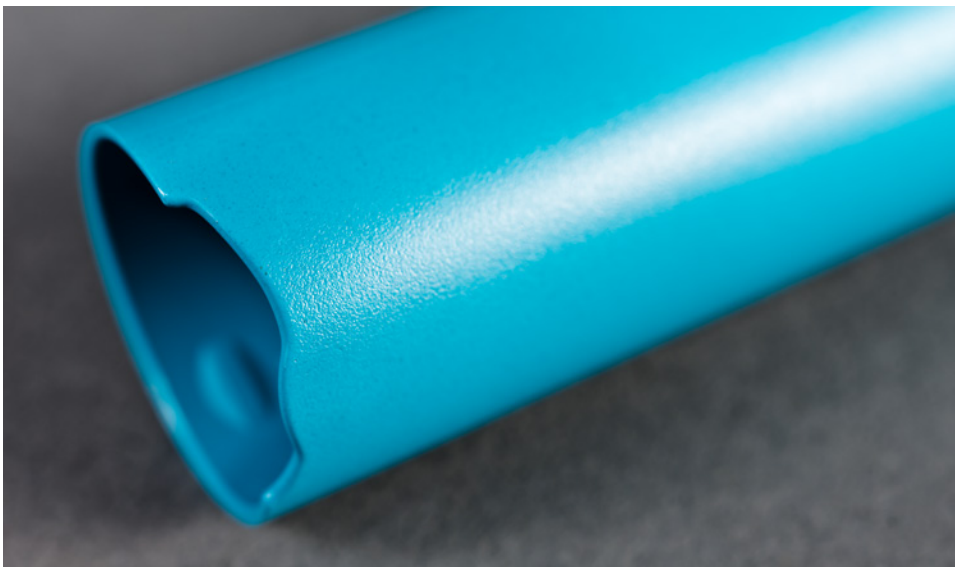


If 2nd Stage parameters are suspect, return the Packing Pressure to the documented standard.

Mold Temperature

Short shots can result from a low Mold Temperature. If a significantly low Mold Temperature is used, excessive pressure drop may occur during 1st Stage Fill. This pressure loss may prevent the mold from filling — producing short shots.

When comparing Mold Temperature to the documented standard, the temperature of the water entering and exiting the mold should be measured and returned to standard. Also check the difference between the temperature of the water entering and exiting the mold. A low difference could indicate excessive coolant flow.

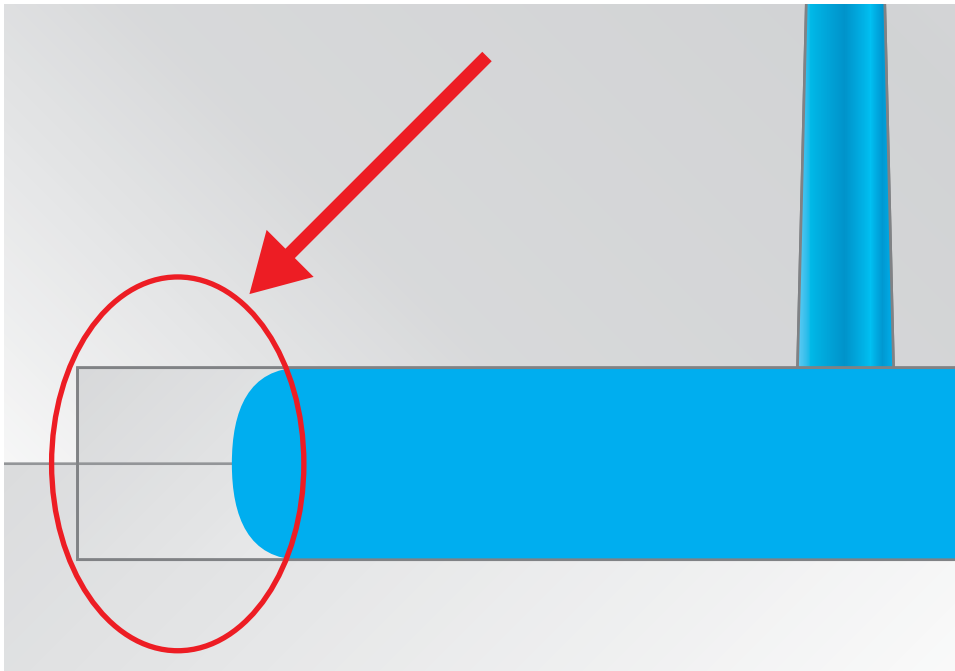


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Clamp Tonnage

Short shots can also be the result of high Clamp Tonnage. Excessive Clamp Tonnage can compress the mold vents and prevent gas from exiting the mold during 1st Stage Fill. This trapped gas collects at the end of fill and prevents the polymer melt from filling the mold, thus resulting in a short shot.

Verify that the Clamp Tonnage setting matches the documented setpoint. You should also reset the Clamp Tonnage if a toggle clamp is being used.



Mold Damage

Damaged vents may also be responsible for short shots.

Both long term usage and high Clamp Tonnage will cause the parting line and mold components to wear, reducing the effectiveness of the vents. When this occurs, gas entrapment will often cause short shots during 1st Stage Fill.

If you suspect vent damage or wear, an experienced technician or mold maker should measure the vent depths and determine whether mold repairs are required. If mold repairs are being done, it may be beneficial to increase the number of vents to help prevent gas entrapment.



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