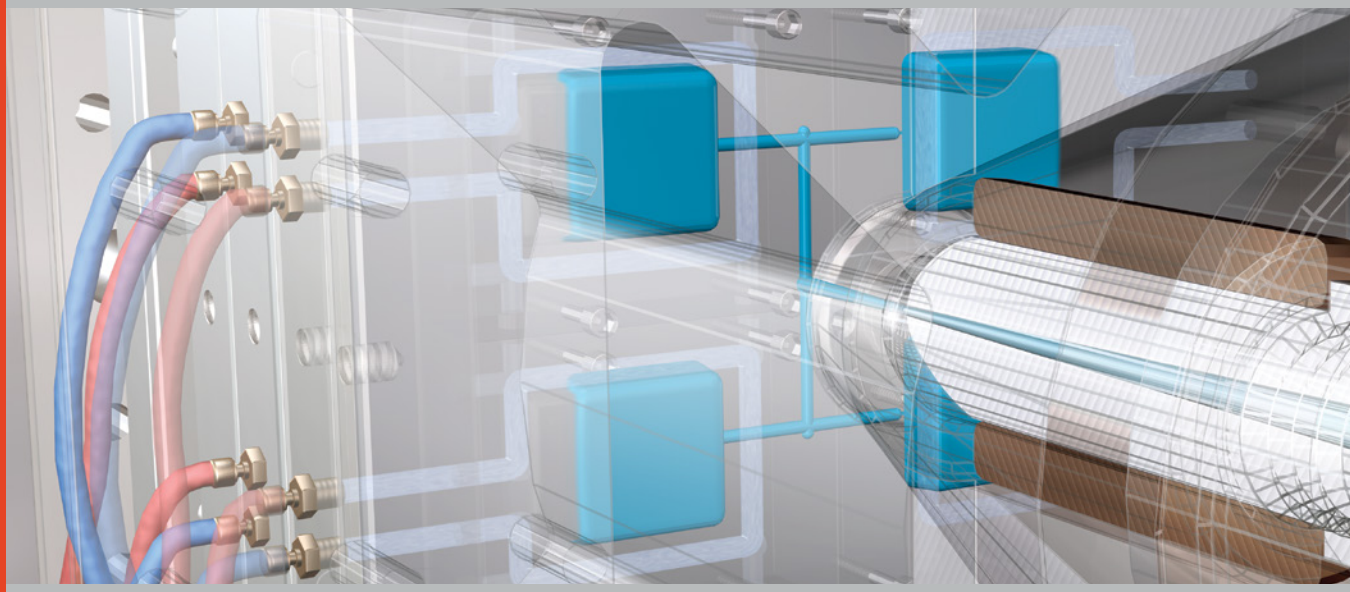
REFERENCE SERIES: DESIGN

Gate Design: Self-Degating



nexeo plastics

Created exclusively for **Nexeo Plastics** by Routsis Training, this free guide contains excerpts from Routsis's ***Mold & Part Design Courses***.

Routsis Training, LLC
379 Amherst Street PMB 233
Nashua, NH 03063 (USA)

978 957 0700

Routsis Training
Hands-on. Online. Ongoing.
www.traininteractive.com

SELF-DEGATING GATES

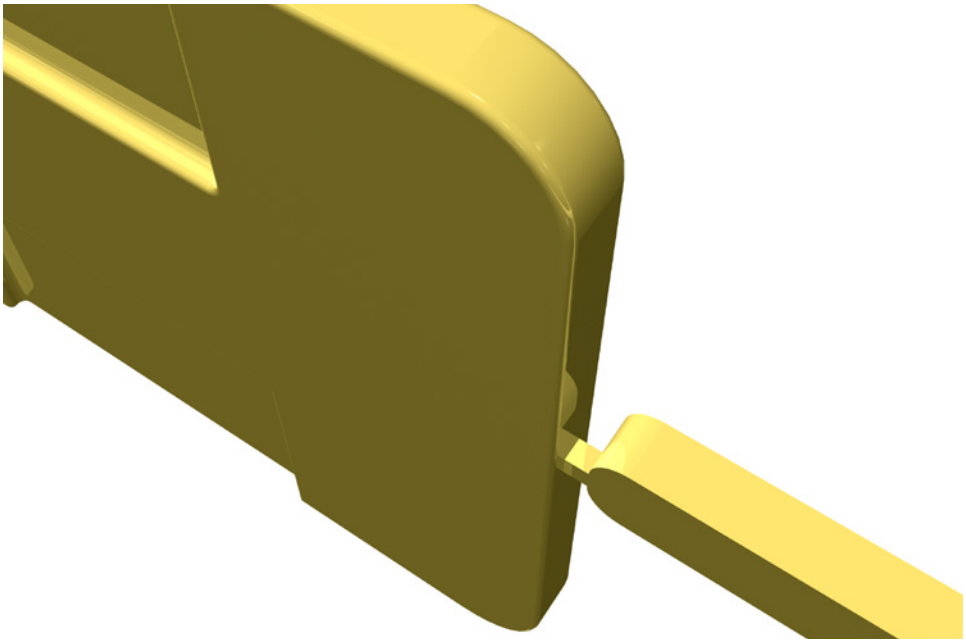
Self-degating gates automatically separate the part from the gate. This occurs during mold opening or as the part ejects. There are many gate types designed for this purpose. Here, we will look at some of the most common options.

Pin Gate

Pin gates are a form of self-degating gates, and pass the material from the runner to the part using a single narrow gate. This thin gate breaks off during ejection, yet a two-stage ejection system can be added to help facilitate part sorting.

Pin gates are commonly machined to 1/8 of the part thickness using a conventional or CNC milling machine. Pin gates only allow a small amount of material to pass, and should only be used to fill small parts that require minimal packing.

Due to their size, these gates leave little vestige on the part and produce minimal runner scrap. Pin gates are used for small, thin parts that require short filling and packing times, such as caps and needles.



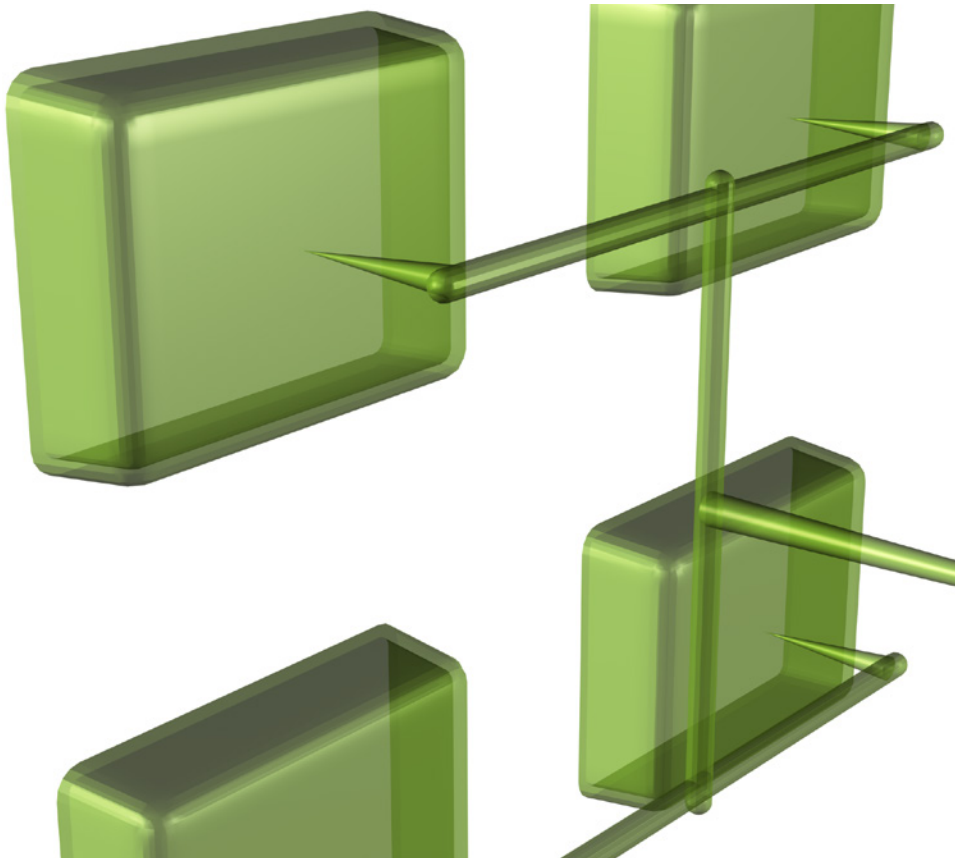
Pinpoint Gate

Another type of a self-degating gate is the pinpoint gate. Pinpoint gates are used in multi-cavity three-plate molds, and pass through the floating center plate to the mold cavity. Pinpoint gates taper down to a diameter of approximately 1/3 of the part thickness as they approach the cavity.

These tapered gates separate from the part as the mold opens. Unfortunately, a moderate amount of vestige is left behind on the part.

Pinpoint gates are difficult to machine since they pass through the cavity block into the mold cavity. Die sinking EDM and CNC milling are the recommended methods of machining pinpoint gates, because of their inherent accuracy.

The pinpoint gate is used for round, concentric or symmetrical parts, which can be gated on the cavity side. Larger parts call for multiple gates to be used — yet as the number of gates increase, so does the amount of runner scrap.



Submarine Gate

Submarine gates, also known as Tunnel Gates, transfer the polymer from the runner to the mold cavity by channeling underneath the parting line. During ejection, the submarine gate is sheared from the part, and a moderate amount of vestige is left behind. Like pinpoint gates, multiple submarine gates are needed to fill large parts, yet the amount of runner scrap increases with the number of gates used.

The submarine gate diameter at the mold cavity should be approximately 1/3 of the part thickness. This gate should have at least a five-degree taper per side so it can be removed without complications. When using softer, low-strength materials; such as polyethylene or polypropylene, the submarine gate can be angled up to forty-five degrees. More rigid materials, such as polycarbonate and nylon, require angles over 45 degrees to keep the gate from breaking apart during ejection.

The angled gate is difficult to cut in a milling machine and typically requires a die sinker EDM machine. Submarine gates must tunnel under the parting line and the core side of the mold before filling the cavity.

When molding flat parts, a 'stepped' parting line is required to gate on the side of the part. This is often done using a core insert on the parting line, which contains the submarine gate detail.

Submarine gates are used for parts that must be gated below the parting line, in order to avoid gating on cosmetic surfaces at the cavity or at the parting line.

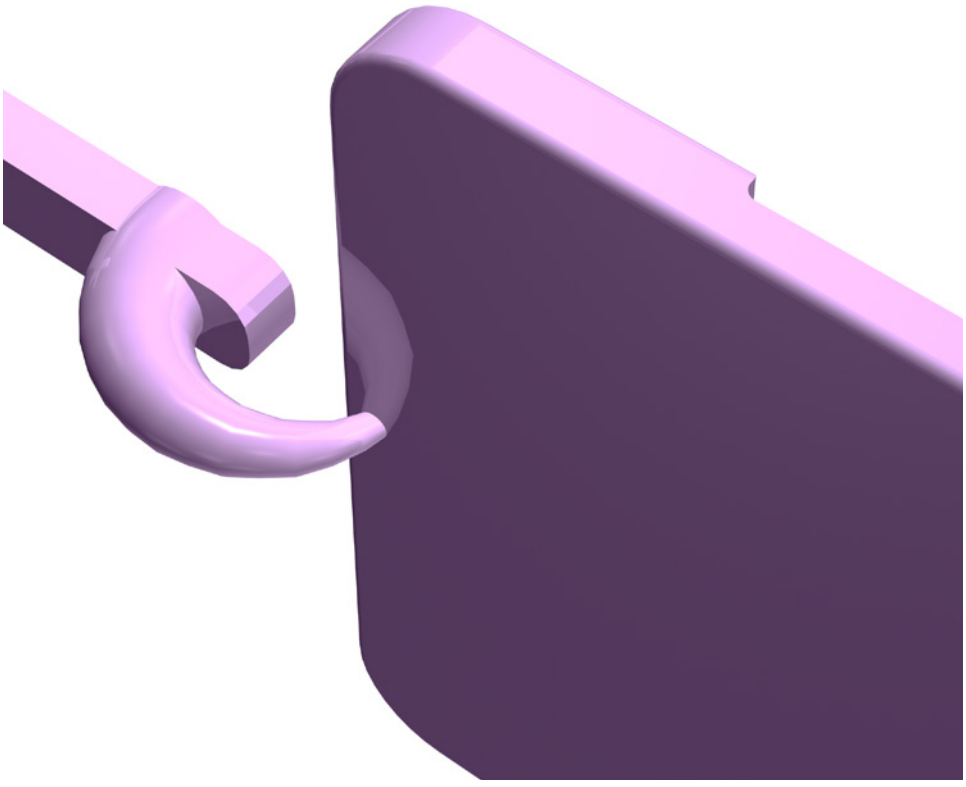
Cashew Gate

Cashew Gates, or Banana Gates, are curved gates that tunnel under the parting line to gate on the underside of the part.

During ejection, a moderate amount of vestige is left behind since these gates must pull from the part and curl out of the mold. Therefore, only softer materials, such as polyethylene or elastomers, can be used with cashew gates.

These gates are difficult to machine since they cannot be machined directly into the core. The runner has to be machined into a pair of core inserts — each containing half of the cashew gate detail. This is done using a CNC milling machine or a die sinker EDM machine. The diameter of the cashew gate tapers to approximately 1/3 of the part thickness.

Cashew Gates allow a moderate amount of materials to pass, yet multiple gates are required to fill large parts. These gates are ideal for flat parts that require gating from the underside.



Hot Runner System

Gates used with hot runner systems are self-degating and do not generate runner scrap during production. These gates include the insulated, externally heated and internally heated.