



ARCONIC

ARCONIC MOLD & TOOLING  
TECHNICAL FACT SHEET

# QC-10<sup>®</sup> MOLD MATERIAL

High Strength Aluminum for Production Injection Molds

## DESCRIPTION

### QC-10: HOT RUNNER INTEGRATION

Hot runner systems can be successfully integrated into aluminum molds. In fact, many hot runner manufacturers are experienced with producing hot runner systems specifically for use in aluminum molds. It is important that the mold and hot runner design take into account the thermal and mechanical properties of aluminum. Following are some helpful design considerations for incorporating a hot runner into a QC-10 mold.



## COMMUNICATION

First, it is critical that the hot runner supplier understands the manifold system is being used with an aluminum mold. The hot runner manufacturer should have specific design standards for aluminum molds.

## THERMAL ISOLATION

Thermal isolation of the hot runner from the mold is critical given aluminum's high thermal conductivity. Aluminum has 4-5 times higher thermal conductivity than P-20 steel. One of the simplest ways to thermally isolate the hot runner is to utilize a hot half. Most hot half systems have a water cooled plate that isolates the hot runner system from the mold. This hot half plate isolates the QC-10 from both radiant and conductive heat transfer. In addition, the hot half will absorb most of the mechanical forces and stresses exerted from the injection pressure in the runner system.

*Note: If a hot half is not a good option for you, then refer to our design considerations on the reverse side.*



Photo courtesy of Synventive Molding Solutions, Inc.

## CONTACT AND PROCUREMENT

For additional information on QC-10 mold material, contact your local Arconic Sales Account Manager.

## DESIGN CONSIDERATIONS

Should a hot half not be utilized, it is important to consider the following design guidelines:

### AREAS OF CONTACT

Hardened steel inserts, sleeves, bushings or pads must be used at all hot runner-to-aluminum contact areas. This is necessary for thermal isolation and to prevent wear or damage to the base aluminum tool block. Here are some examples of areas to insert:

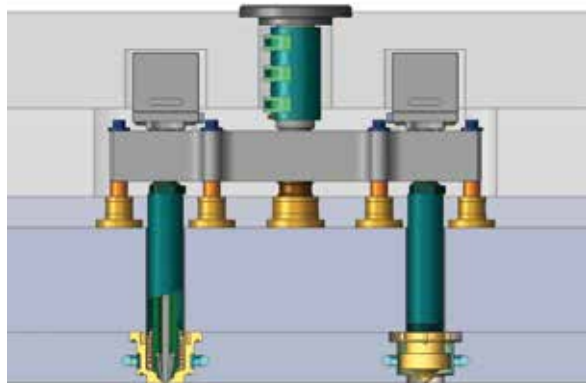


Image courtesy of Synventive Molding Solutions, Inc.

- Contact areas with support pad
- Critical bolt down locations
- Location and expansion dowels
- Support ring/sliding nozzle seats
- All inserts/bushings must be properly engineered to support the loads of dynamic thermal expansion and the static preload of hot runner components
- All inserts should be of adequate hardness and strength to prevent hobbing in from thrust pads, support ring/nozzle head, nozzle tip, and inlet nozzle area
- All inserts/bushings must be tightly fitted to provide sufficient thermal transfer in critical areas (i.e., nozzle tip diameters)

### GATE/TIP AREA

The next area to consider is the nozzle tip contact area. Should a plunge through tip be utilized, gate inserts may not be required. However, water cooled gate inserts should be used in conjunction with blind nozzle tips.

#### Plunge through style tip

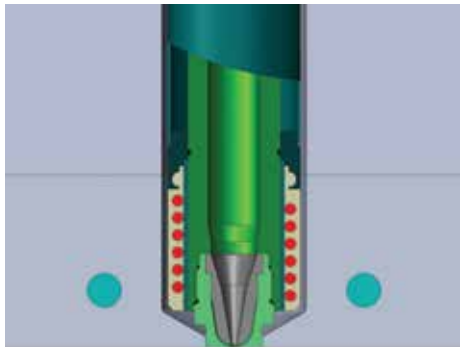


Image courtesy of Synventive Molding Solutions, Inc.

Care should be taken during installation and removal of the nozzle when using a "plunge through" style tip. (Gate inserts can also be used with this tip style.)

#### Blind style tip

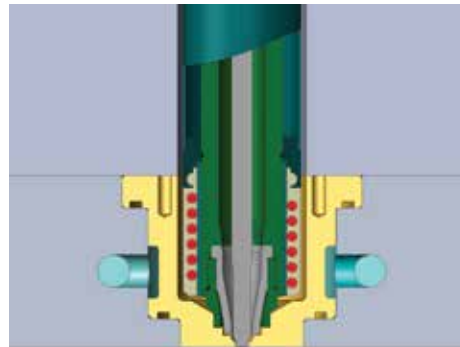


Image courtesy of Synventive Molding Solutions, Inc.

Gate inserts recommended for "blind" style tips.

### THERMAL EXPANSION

When designing the mold and hot runner, it is important to understand that QC-10 expands at twice the rate of P-20 steel. The expansion rate for QC-10 is  $13.7 \times 10^{-6}/^{\circ}\text{F}$ . This should be considered for mold and hot runner design.

*Product specifications are subject to change without notice*

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