ASHLAND

Cycletime Tips - General

Volume 37: Cooling Difficult to Cool Areas in the Mold

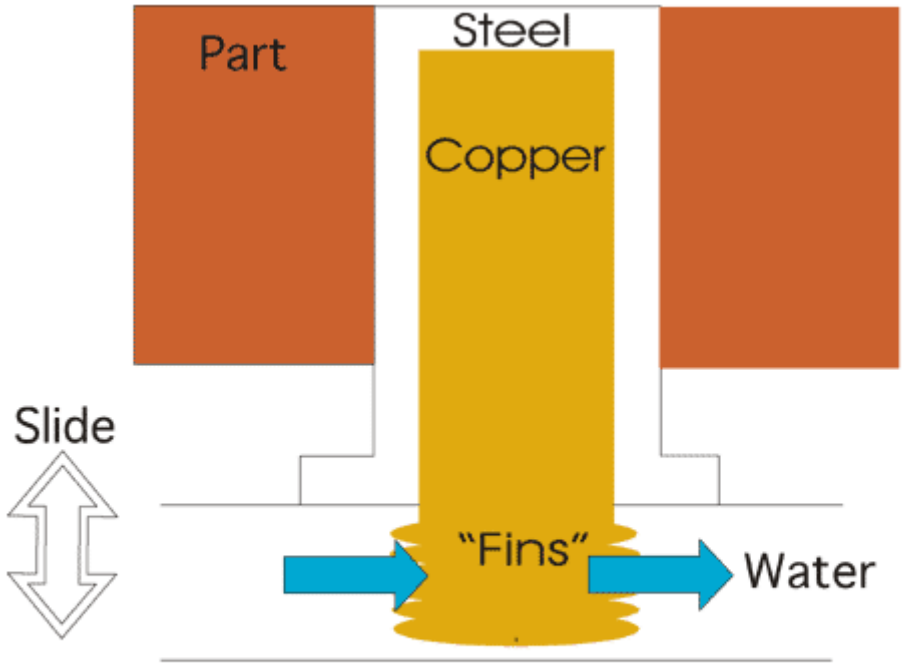
It has been said that the cooling portion of the injection molding process occupies 80 to 90% of the cycle time. Even if this is a small overestimation, the fact is that no other variable in the process impacts efficiency like the cooling or curing of the injection molded article. Knowing all of the tricks to remove heat from the cavity and core can pay huge dividends with respect to quality and profitability. We can't use beryllium copper alloys or thermal pins in every application because of mold construction but there is an alternative.

Four years ago, our technical group underwent some tool design training and was given a tip that has proven effective in many applications. When confronted with a long and thin cylindrical or conical shaped piece of steel involving a "shut-off", we can't always insert with the less durable alloy material. In this case, we've used a core involving steel on the outer contact portion (skin) and copper inside. This idea sounds quite simple, but the secret is in the implementation.

The core, often times, is still inserted but before the detail is cut to satisfy the part design, the copper insertion must occur. Most people just hammer a brass rod into a press fit, but this doesn't guarantee a 100% contact area within the pocket provided. The correct way is to heat the machined steel insert to the melting point of copper in the presence of a vacuum. This provides a complete transfer of heat from the heat to the highly thermal conductive copper with no air gaps (air is a great insulator).

At this point, with the assistance of O-rings, we need only to route cooling so the circuit will contact the copper. Increasing the surface area in contact with the copper will also improve heat transfer. The image below may provide a better understanding. Again, when you need good practical toughness and heat transfer, this method has been proven to work very well.

Bill Fierens
General Polymers
Technical Service Representative



Copper melted into cavity in presence of a vacuum
Fins cut to increase the effective cooling surface area