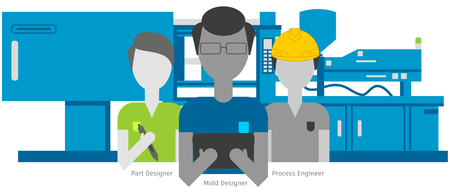
MAXIMIZE INJECTION MOLD CYCLE TIME REDUCTION THROUGH COLLABORATION



TIME TO VALUE

Working together, part designers, mold designers, and process engineers can make better decisions about reducing cycle time while optimizing quality and cost. Use this guide to start the conversation.

1 PART DESIGN

- Keep walls as thin as possible given the material, machine capability, and part function.
- Strive for uniform wall thickness, following transition guidelines when this is not possible.
- Size and locate ribs and bosses to avoid thick sections where the base meets the nominal wall.

Wall Thickness

Rib Design

THINKING THIN

Recommended Wall Thickness Of Various Resin Types

Resin	Inches
ABS	0.045 - 0.140
ACETAL	0.030 - 0.120
ACRYLIC	0.025 - 0.500
LIQUID CRYSTAL POLYMER	0.030 - 0.120
LONG-FIBER REINFORCED PLASTICS	0.075 - 1.000
NYLON	0.030 - 0.115
POLYCARBONATE	0.040 - 0.150
POLYESTER	0.025 - 0.125
POLYETHYLENE	0.030 - 0.200
POLYPHENYLENE SULFIDE	0.020 - 0.180
POLYPROPYLENE	0.025 - 0.150
POLYSTYRENE	0.035 - 0.150
POLYURETHANE	0.080 - 0.750

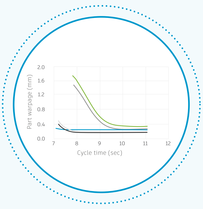
2 MOLD DESIGN

MATERIALS

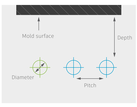
- Use inserts made from high thermal conductivity material (such as beryllium copper alloy) for more uniform heat exchange.

KEY

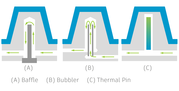
- H13 (Tool Steel)
- 420SS (Stainless Steel)
- C17200 (Beryllium Copper)
- C18000 (Copper Chromium Nickel Silicon)
- C17510 (Beryllium Copper)



COOLING SYSTEM DESIGN



- Place cooling circuits according to accepted guidelines for depth and pitch to achieve uniform temperatures across the mold surface.
- Deploy baffles, bubblers, and thermal pins in areas of the part formed by long, slender cores.
- Apply additional cooling to thicker areas of the part.

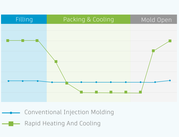


Traditional cooling

Conformal cooling

COOLING SYSTEM TECHNOLOGY

- Adopt conformal cooling in core inserts or throughout the mold for parts with complex geometries.
- Explore using rapid heating to reduce cooling time with lower-temperature coolant when surface finish quality is a concern.



3 PRODUCTION

- Perform gate freeze studies to pinpoint exactly when screw recovery can begin.
- Set coolant temperature as low as possible to achieve the desired surface quality.
- Maintain high flow rates to ensure turbulence and avoid laminar flow that slows heat exchange.
- Clean and maintain cooling channels to prevent corrosion, scale build-up and leaks.
- Perform Design of Experiments (DOE) analyses to optimize settings for coolant temperature, pack time, and melt temperature.

Ideal flow rates to achieve turbulence in various pipe sizes

Pipe size NPT	Approximate Minimum Flow (In gallons per minuet) Drilled Passage I.D. Inches	Flow Rate GPM
1/16 NPT	0.250"	0.33
1/8 NPT	0.339"	0.44
1/4 NPT	0.483"	0.55
3/8 NPT	0.593"	0.74
1/2 NPT	0.719	0.9
3/4 NPT	0.939"	1.17
1 NPT	1.156"	1.44

Approximate Minimum Flow (in gallons per minute) required for turbulent flow In drilled water passages based on a Reynolds number 4000.

To explore more information about mold design, cooling systems, and cycle time reduction visit our CAE Analyst resource center.

CAE ANALYST RESOURCE CENTER ❯

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