Reaction Injection Molding (RIM)

Low Volume Covers and Housings for Life Sciences Industry

Presented by Lucas Boettcher, Regional Manager at Premold Corp.
Areas to be Covered:

- History of RIM
- Overview of RIM
- Advantages of RIM process
- Materials
- Gating and Venting
- Applications
- About Premold Corp.
- Q&A
History of RIM

• Developed in Germany in 1969
• Evolved as a commercial process in the 1970s and then took off in the 1980s
• During the last 3 decades, the RIM process and resins have been fine tuned
• Today, RIM is a well engineered and highly controlled process
RIM Process

-2 Liquid Components: the Reactant and Polyol chemically react in a mold to form thermoset plastic part
-2 components combine in mixhead to form “resin system”
-Injection process takes 5-10 seconds depending on part size
-Cure time 3-9 minutes
RIM process Cont’d.

- Low Pressure: 50-70 PSI
- Low Temperature: 140-160 F
- Shrinkage factored into mold design
- No post-curing required
- All resins UL 94 V-0 rated
- RIM presses tilt and rotate molds to compound angles to facilitate filling molds
Advantages of RIM

- Lower Cost Tooling – Made in house at Premold Corp.
  - Lower molding pressures (50-70 PSI)
  - Lower molding temperatures (150-170 F)

Therefore... Aluminum Tooling is utilized
Advantages of RIM cont’d

- Shorter Tooling Lead Times – Faster machining aluminum molds
  - Premold Corp. has 3 fully robotic CNC machines – all tooling made in house
Advantages of RIM cont’d

- Quicker Setup Times and Lower Cost Runs
  - Ideal for low volumes (~200-2000 parts/year)
  - Ideal for small batch sizes (20-75 parts per order)
  - Well suited for JIT deliveries
Advantages of RIM cont’d

- More Design Freedom
  - Undercuts, varying wall thicknesses easily achieved
  - Bosses and ribs can be larger and taller
Advantages of RIM cont’d

- Low Cost, High Value Molds
- Low cost side actions
- Complex undercuts easily achieved using inexpensive loose pieces
- Average setup times: 20-30 minutes
- Multiple setups same day
Advantages of RIM cont’d

- Tighter Tolerances
  +/- 0.001 in/in is typical
- All part features molded-in – nothing glued or post-machined
- Easier to mold in locating features to make assemblies fit better consistently
- Resin flows easier to fill larger, more complex parts
Advantages of RIM cont’d

- Decreased Sub-Assembly Costs
- Insert molding and encapsulation of delicate components easily achieved due to low pressure/low temp. process
- Precise undercuts, molded in threaded inserts and through holes virtually eliminate subassembly with right design
Materials

-Polyurethane Thermoset Resins
  -UL 94 V-0 rated at a thin 1/8” wall thickness
  -Primarily from Bayer Material Sciences, Pittsburgh PA
  -Formulated to provide good stiffness, impact and strength-to-weight ratios for covers and enclosures
  -Excellent resistance to most chemicals
Gating and Venting

-RIM is “Resin Flow Based”
-Flow must be optimized to fill the mold
-Dam gate is common edge gating method – low pressure liquid flow process to fill the mold
-Resin enters the mold in a laminar flow condition
Gating and Venting cont’d.

- The resin is injected at the bottom of the mold and air is vented out the top.
- Premold’s presses tilt in multiple directions to allow for maximum design freedom.
- Air must be vented out as resin fills mold.
Applications

Premold Corp. Applies RIM to Life Sciences Industries.

Examples:
- Custom Medical Cart Skins

- Six complex geometries with tight tolerances, two-tone paint and high cosmetics
Applications Cont’d.

Pulmonary Device Covers

- 3 piece mold
- Mating of 3 highly detailed surfaces with tight tolerances
- Pad printing done in-house
Applications Cont’d.

Lab Instrument Door Panel
- Tool constructed with interchangeable inserts to mold left and right variation in one tool
- Saved customer capital investment cost for two molds and delivered first articles 2 weeks ahead of schedule
Applications Cont’d.

- Front Cover for Medical Cart System
- Deep draw, locating features and long bosses
- Fine details, outstanding cosmetics and tight tolerances
- Reduced tooling and sub assembly costs by combining multiple side cover into 1 part
Advantages of RIM –
- Ideal for low volume injection molding because of low cost setup times
- Shorter tooling lead times
- Better molding design generosity due to low temperature/pressure molding process
- Better cosmetics and lower cost features achieved through aluminum tooling
About Premold Corp.

- Oconomowoc, WI
- ~60 Employees
- Over 30 years experience in RIM
- 68,000 sq/ft. facility
- Vertically Integrated –
  - Tool Building, Molding, Finishing, Painting, Screen/Pad Printing, Subassembly, and Prototyping all done in-house
- ISO 9001:2008 Certified
- Premold is North America’s leading producer of RIM parts for the “Life Sciences” Industry
Questions?
Call us at 262-569-9044