Sajar Plastics

The Innovative Leader in Large Part Gas Assist Molding

Company Overview

Sajar Plastics

The Innovative Leader in Large Part Gas Assist Molding

Large Parts → **Complex Designs** → **Distinctive Cosmetics**

- Straight Injection Molding
- Gas Assist Injection Molding
- Structural Foam Molding
- 85T to 1500T Presses

Since 1949, Sajar Plastics has been providing:

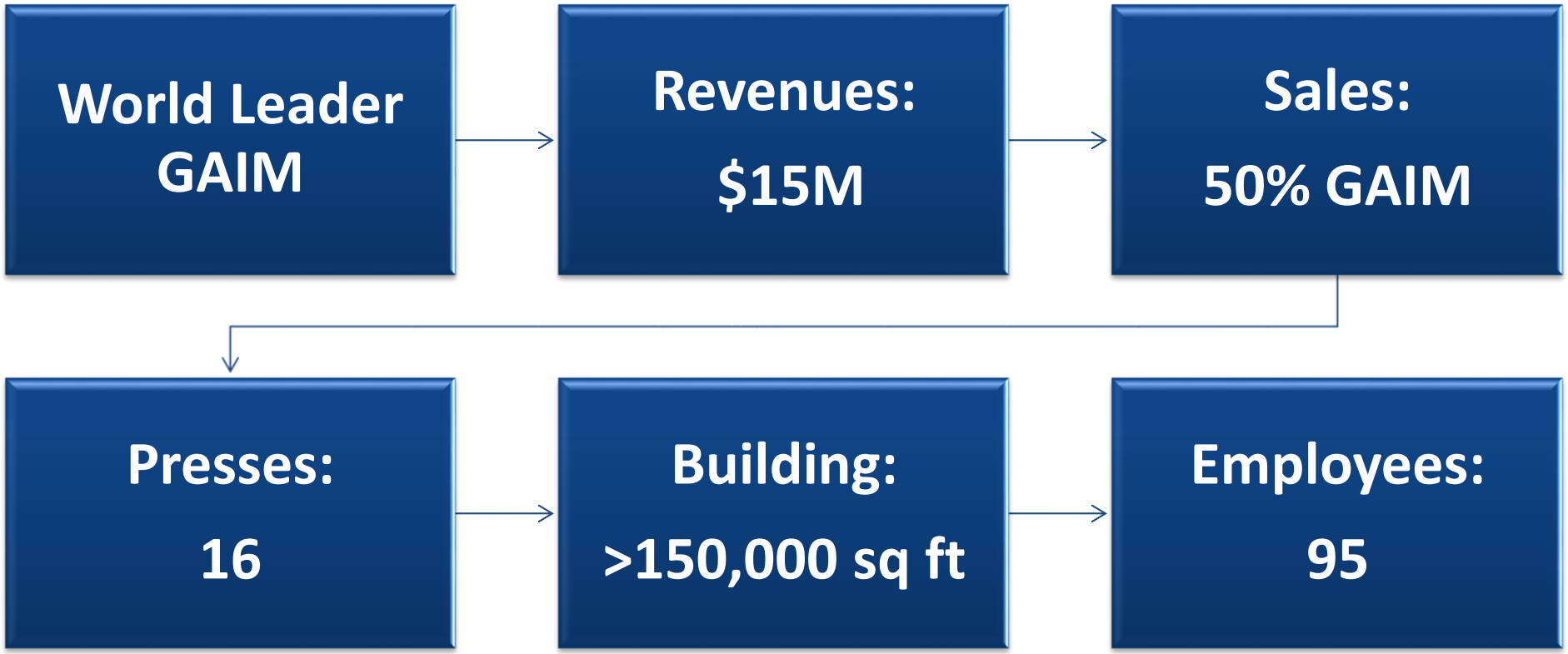
Plastic Enclosures Covers Bezels Handles Doors Skins

for OEM's in the medical, laboratory diagnostics, business and financial, and industrial equipment markets.

Molding Specifications

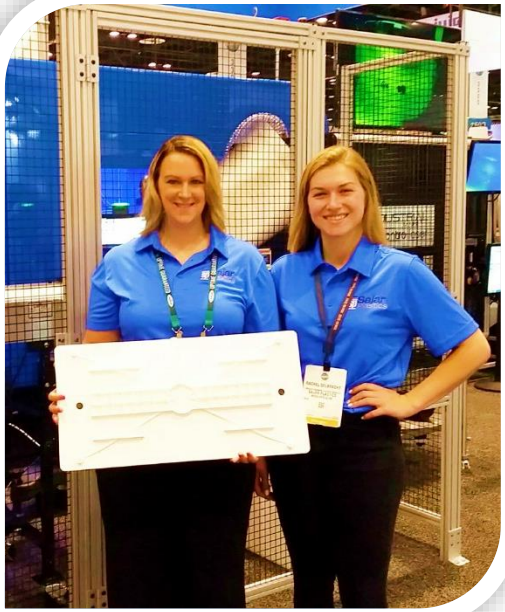
- Large Parts (10” to 80” horizontal, 10” to 70” vertical, Surface Area: In excess of 1,000 sq. in.)
- High Cosmetic Standards
- Conversions to Gas Assist Injection Molding
- Engineering Grade Polymers
- Part Consolidation for Cost Savings

Sajar Plastics: Key Figures

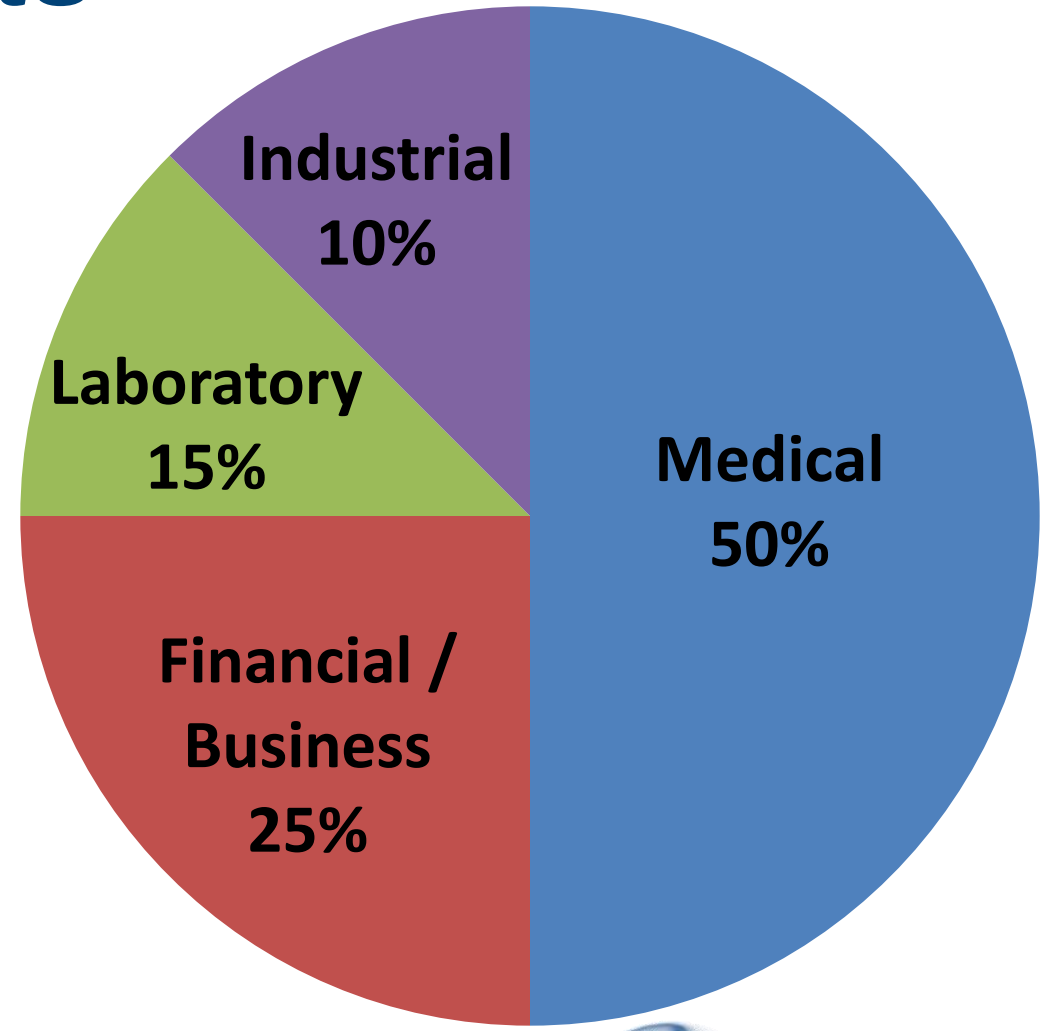


Our Culture

- Customer-Centric
- Commitment Intensive
- Technological advancements in GAIM
- Innovation to drive growth for customers
- Continually striving to be the best

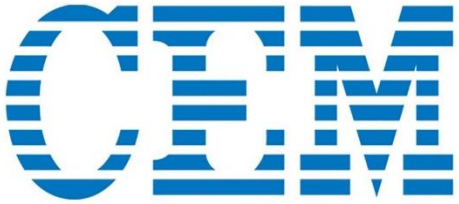


Markets


Industrial
10%
Laboratory
15%
Financial /
Business
25%
Medical
50%

Customers


American Standard


CEM


Humanscale


HOLOGIC


BD


IGT


Brooks


Alcon

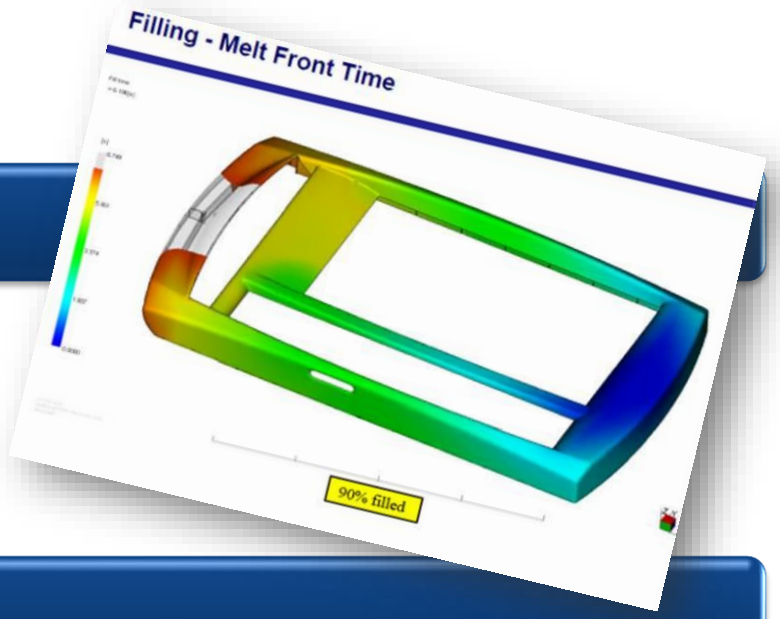

Ortho-Clinical
Diagnostics
a Johnson & Johnson company


Datascope


xerox


Hill-Rom

Engineering



Customer Support

- Design for manufacturability (DFM)
- Mold cost minimization
- Mold performance optimization

Broad CAD Capability

- SolidWorks, ProE, IGES, STEP, etc

CAE ANALYSIS

- Mold flow analysis
- Mechanical analysis (FEA)

Quality

- ISO 9001-2015 certified
- RoHS and Reach compliant
- UL Yellow Card for Gas Assist
- Utilize CMM software
- Preventative Maintenance

CERTIFICATE

Certificate Number: 111287.01

The Quality Management System and implementation of:

Sajar Plastics, LLC
15285 South State Avenue
Middlefield, OH 44062
United States

meets the requirements of the standard:

ISO 9001:2015

DEKRA

Quality

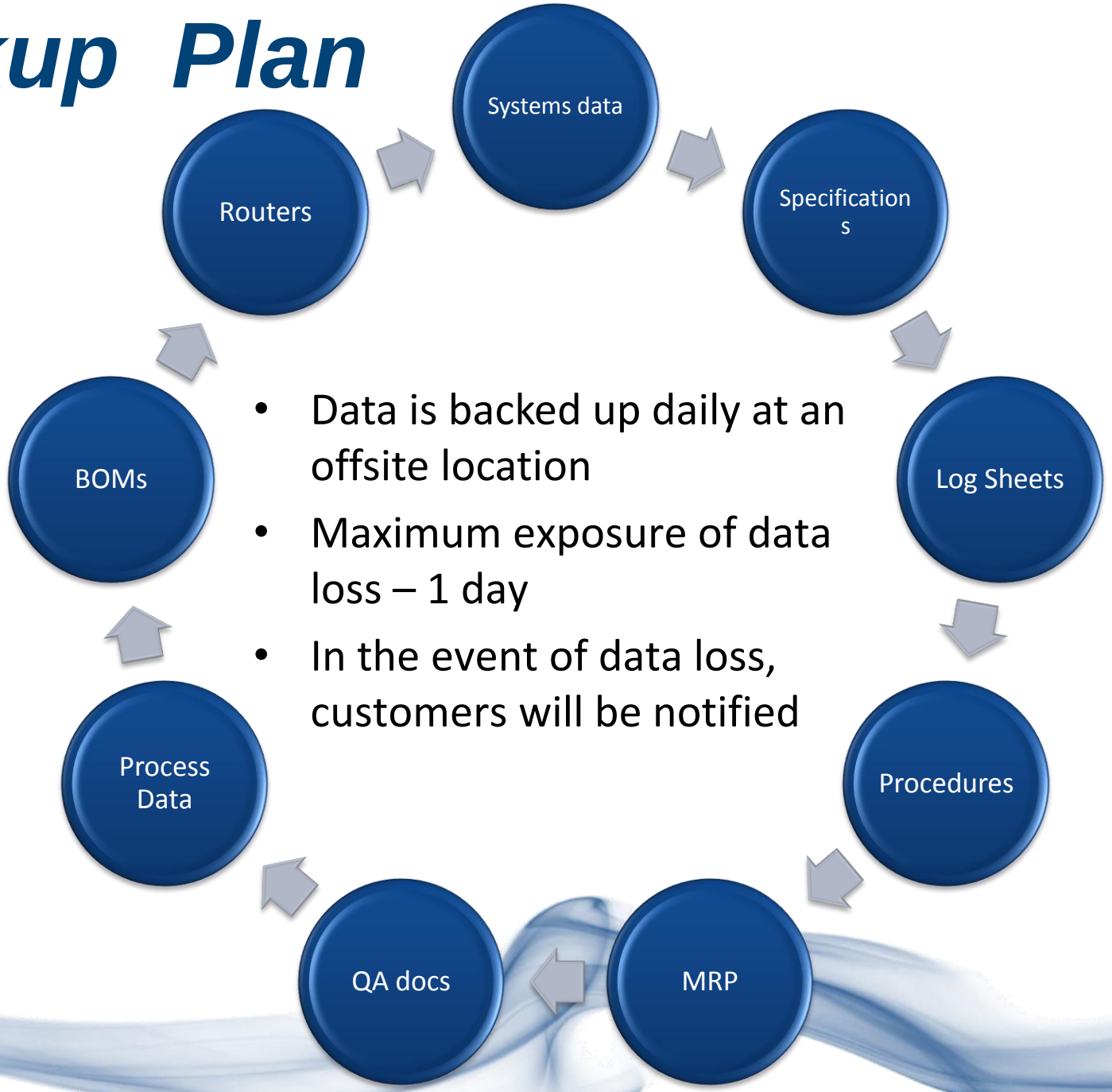
Equipment

- Colorimetric Spectrophotometer
- Gloss Meter
- Cordax RS-150 measuring machine

Inspection Procedures

- Inspection procedure cards follow every work order
- Senior Quality Technician establishes working standard
- Quality inspectors perform first piece check in
- Continual inspection performed and documented by QC in molding, finishing, and assembly every 1-2 hours

Backup Plan

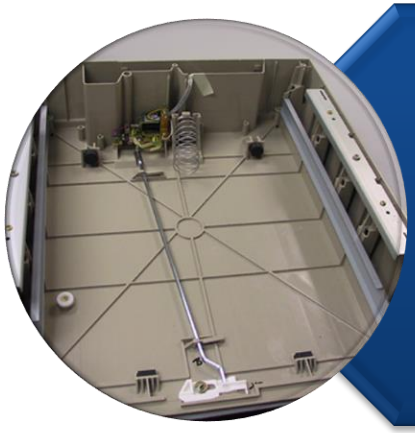


- Data is backed up daily at an offsite location
- Maximum exposure of data loss – 1 day
- In the event of data loss, customers will be notified

Decoration and Assembly

Decoration

- Mist Coat Painting (solvent / aqueous)
- Finish Gloss or Textured Painting (solvent / aqueous)
- Pad Printing
- Label Application



Assembly

- Complex Parts & Kits
- Electronics
- Sonically Welded Inserts
- Packaging

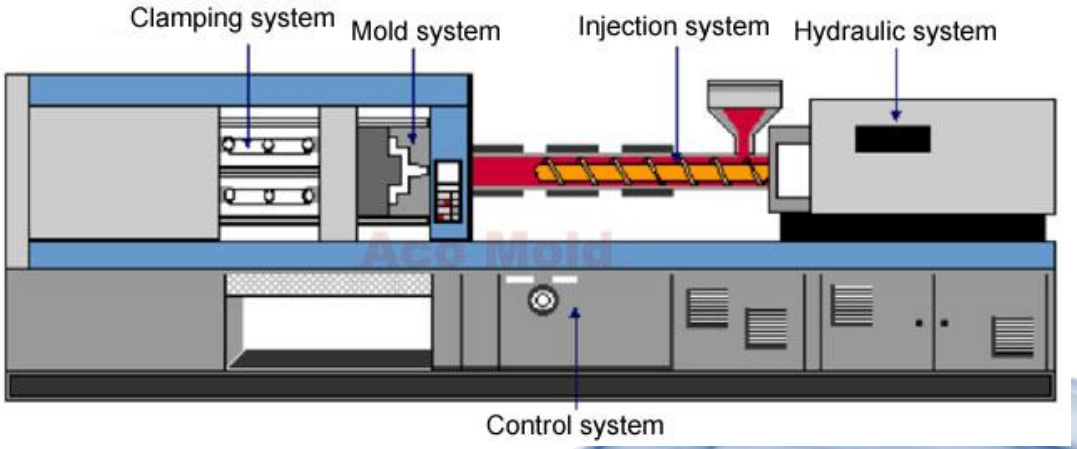
Gas Assist

- 30 years of Experience with Gas Assist
- Over 500 Gas Assist parts commercialized
- Over 300 Gas Assist parts in production
- Proprietary nozzle design/technology
- World Leader in Gas Assist

Injection Molding

Process Characteristics:

- Part Cost: Low
- Tooling Cost: High
- Can produce intricate parts
- Large variety of polymers gives wide range of properties
- Can produce a wide range of part sizes with different press sizes



Gas Assist Injection Molding

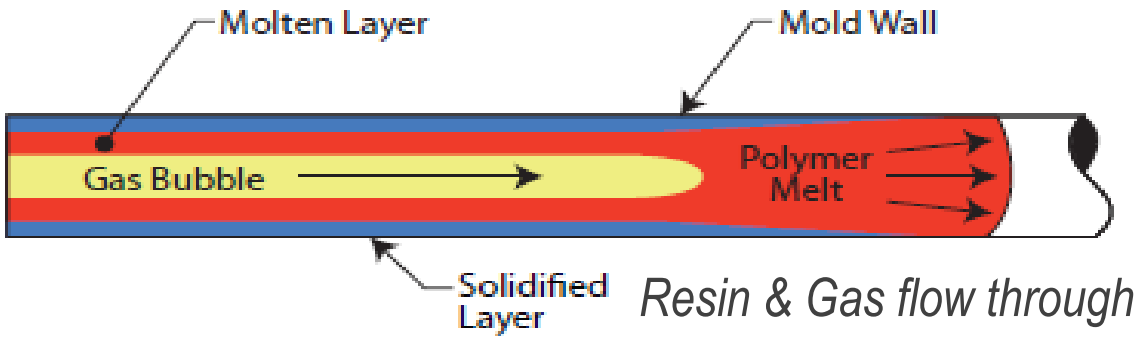
Gas Injection Molding uses a partial shot of plastic and high-pressure gas to finish filling the mold cavity. This process gives designers flexibility.

Process Characteristics:

- Tooling Cost: High
- Part Cost: Low
- Design Flexibility due to elimination of sink, warp, internal part stresses associated with high pressure filling. Tight dimensional control
- Press size is reduced due to lower molding pressures
- Especially suited to large, complex parts with critical dimensions, high cosmetics, and reverse features

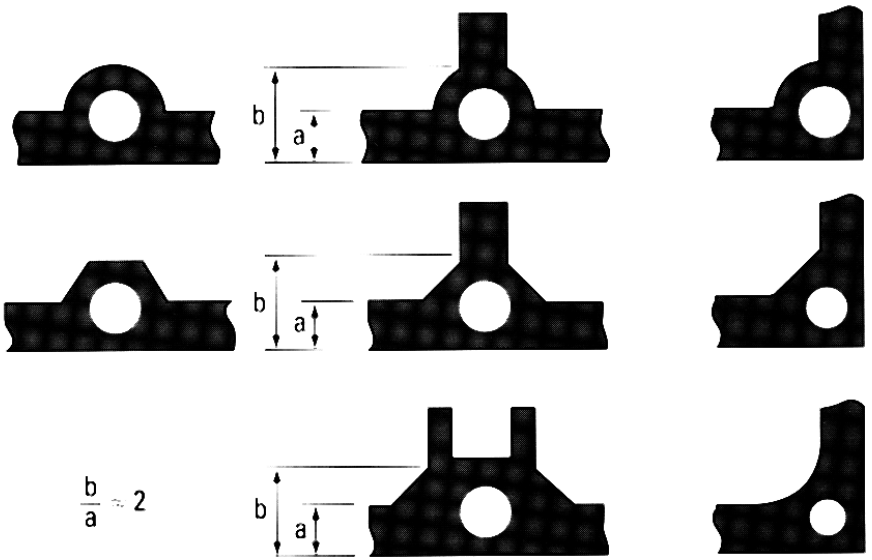
Gas Assist: Internal Process

- Low-pressure injection molding process
- Requires a short shot of resin to fill a mold
- High pressure N_2 or CO_2 gas injected after resin



Resin & Gas flow through mold

Internal GAIM Diagrams



Gas Assist: Internal Benefits

Superior Aesthetics

- Excellent process for high profile, large, thick section parts
- Elimination of warp & sink marks
- Potential elimination of painting/finishing

Design Freedom

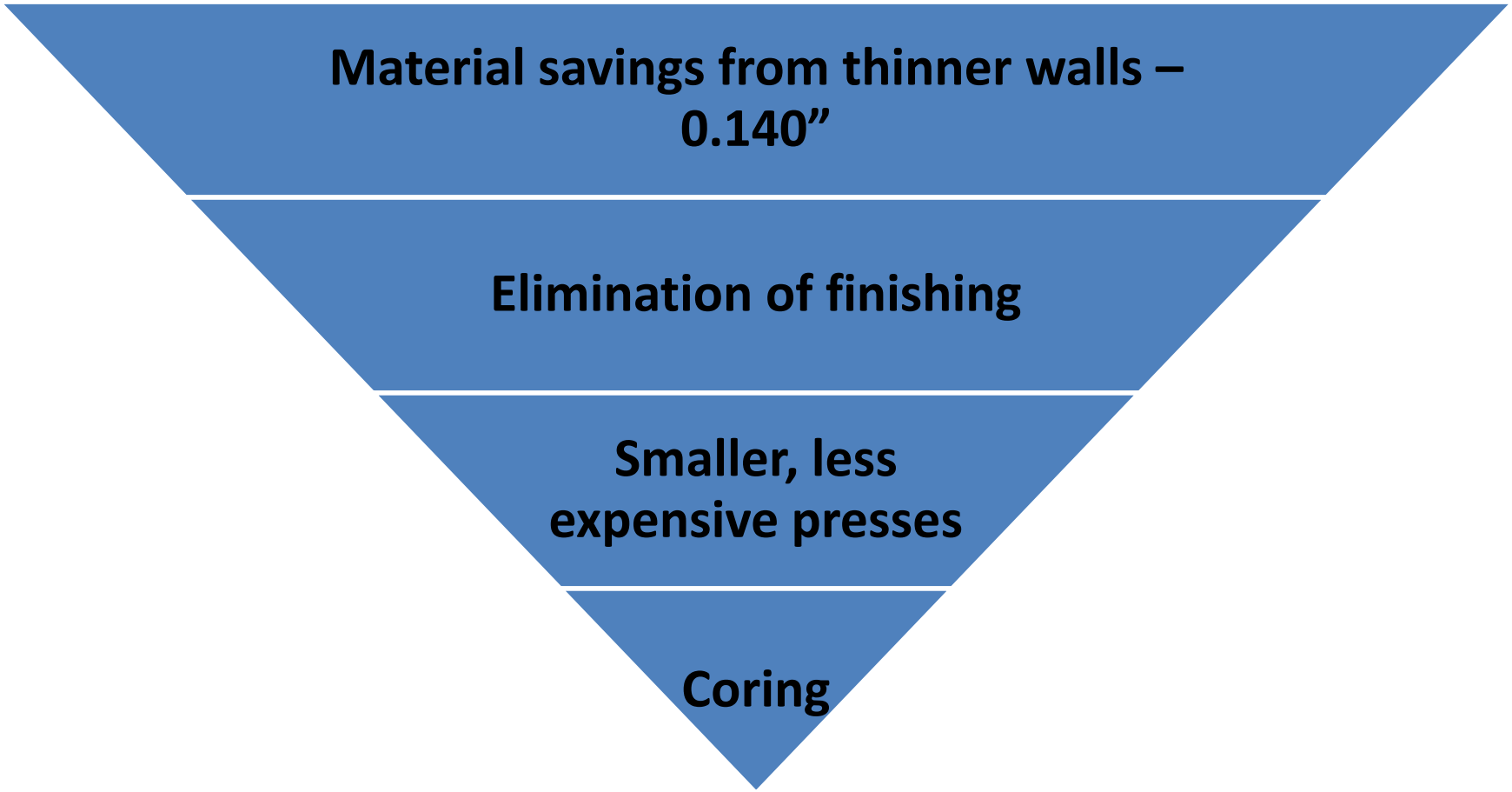
- Exceptional dimensional stability & tight tolerances
- Best for full geometry, thick parts
- Lighter weight
- Support ribs & bosses molded in

Gas Assist: Internal Benefits

Operational Advantages

- Reduction of resin material, and power consumption
- Reduction of mold pressures, residual stress, & wear on molds
- Decreased part and tooling costs
- Uniform pressure transmission over part surface
- Production of larger parts employing smaller presses = SAVINGS

Reduced Costs

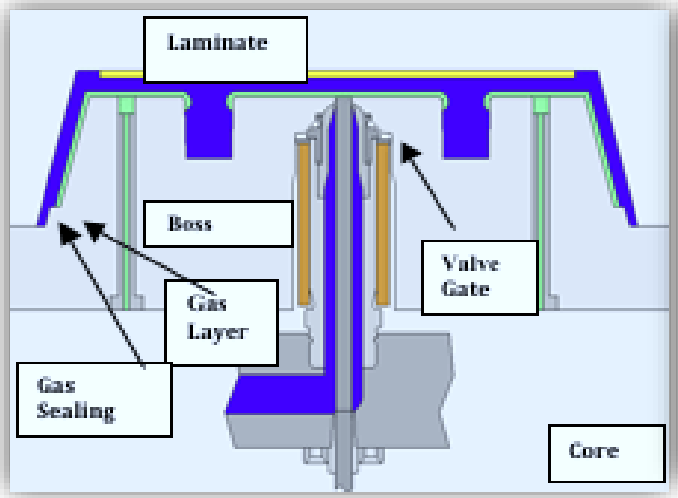


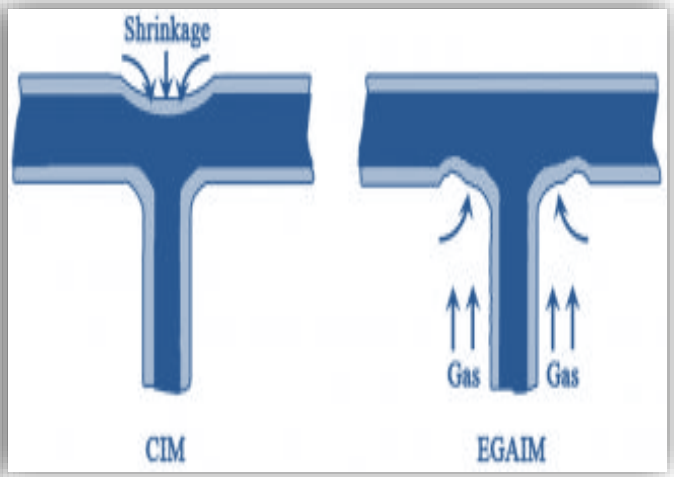
External Gas Assist: Process

Micro-thin layer of gas between back surface of part and mold core

Front surface of part forced against opposite side of mold cavity

Improved replication of the part front surface





External Gas Assist: Benefits

Superior Aesthetics

- Best process for high profile, large surface area parts
- Further benefits on Large parts
- Elimination of warp & sink marks
- Potential elimination of Finishing

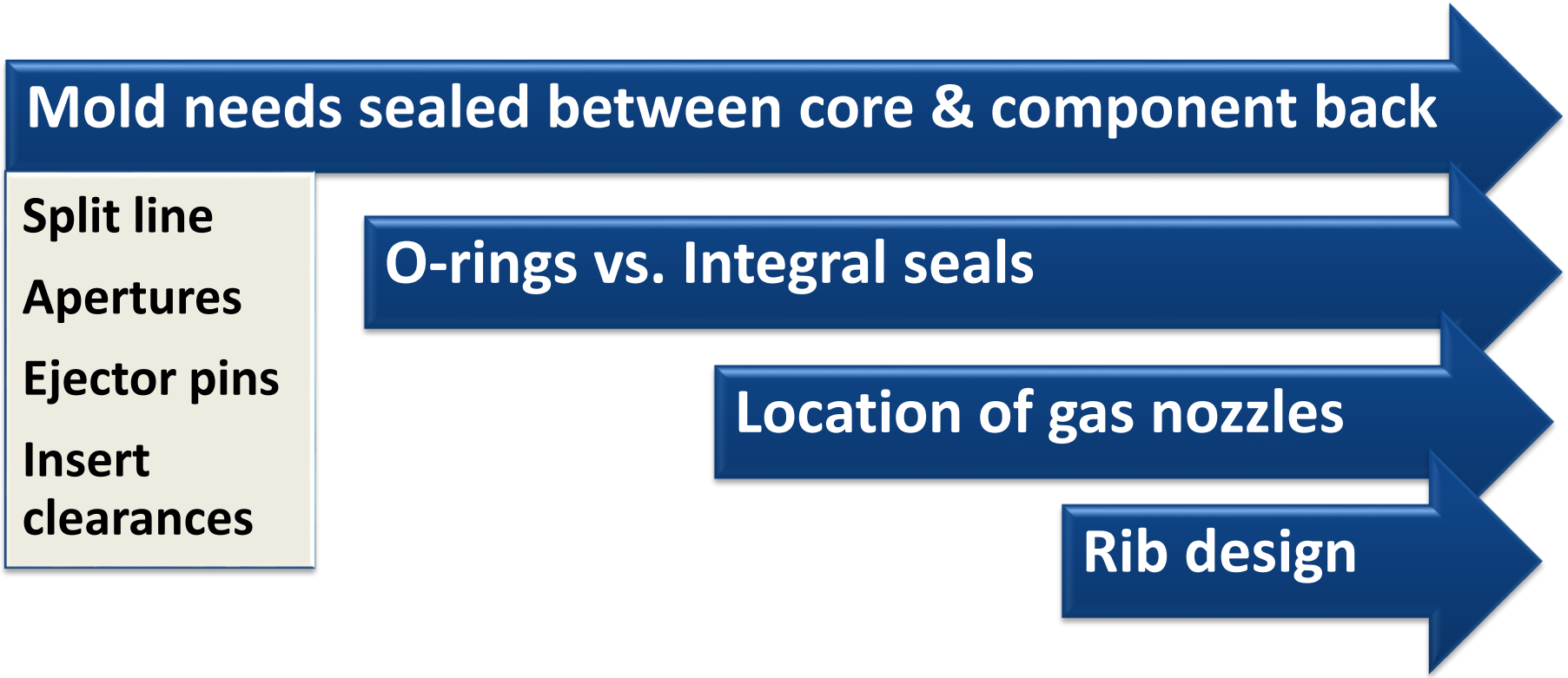
Design Freedom

- Exceptional dimensional stability & tight tolerances
- Greater rib width to nominal wall thickness (1:1 ratio)
- Support ribs & bosses molded in

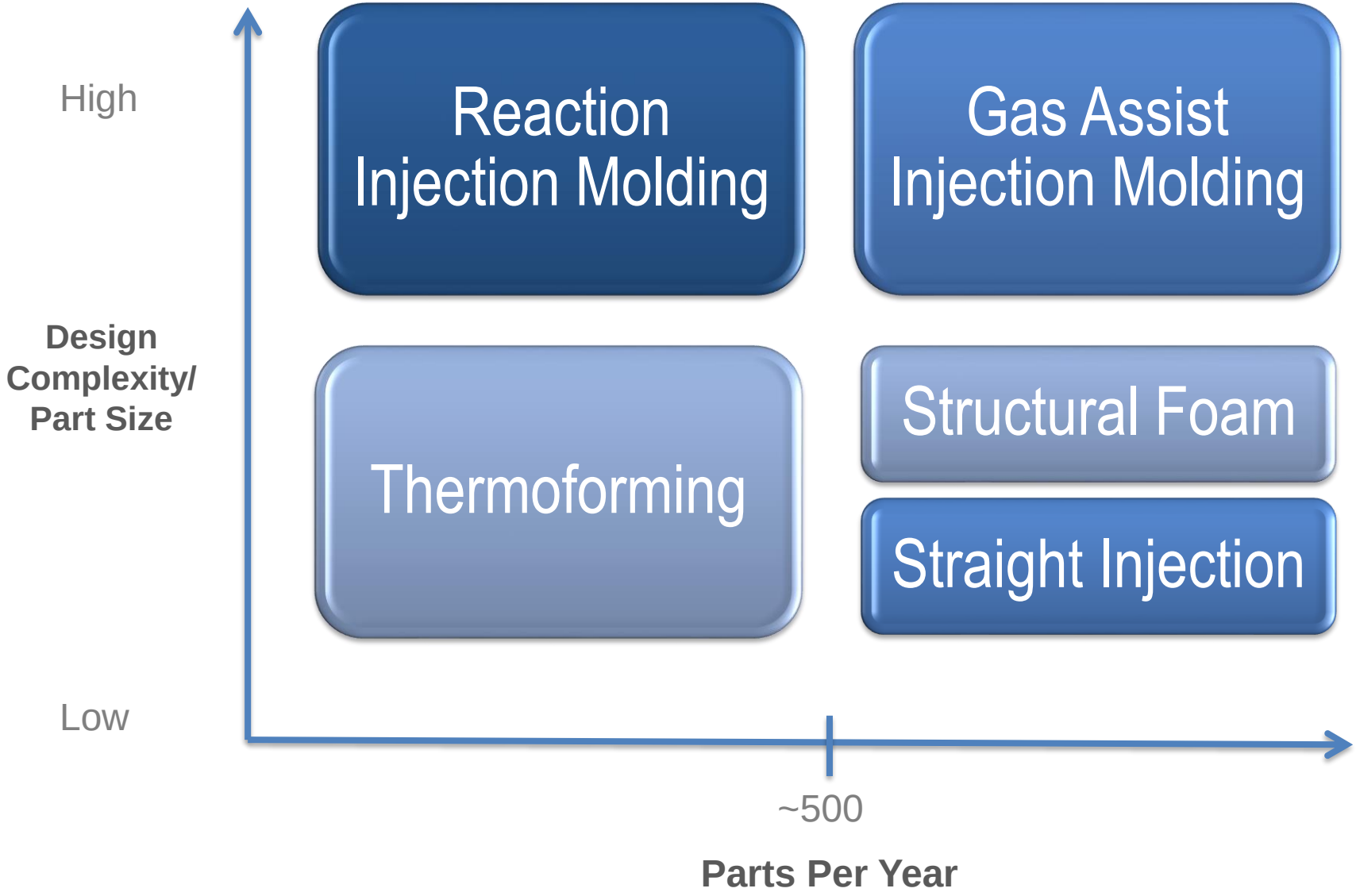
Operational Advantages

- Reduction of mold pressures, residual stress, & wear on molds
- Enables larger moldings using smaller presses

External Gas Assist: Tooling



Production Process Selection



GAIM Advantages v Alternative Molding Technologies

MOLDING TECHNOLOGY	GAIM ADVANTAGES	REASON / RESPONSIBLE FEATURE
Structural Foam	Less Weight	Thinner walls can be designed; more environmentally friendly
	Less Finishing Cost	Swirls and bubbles in structural foam require sanding, priming, and base painting
Thermoforming	Design Freedom	GAIM can accommodate more complex part designs & part consolidation
	Much Wider Resin Selection	Very few resin options for thick sheet thermoforming
	Lower Part Cost	Much faster & less manual mfg process; GAIM best for >500 units/year
	Reverse features molded in	Ribs and bosses must be glued or screwed to back of thermoformed parts, increasing expense
	Windows molded in	Windows must be machined in for thermoformed parts, increasing expense
	Wall thickness control	Far better wall thickness control with GAIM
Straight Injection	Design Freedom	GAIM can accommodate larger & more complex part designs; part consolidation
	Elimination of sink & warp	Gas pressure packs out areas where resin shrinkage is greatest (front side of ribs & bosses)
	Better dimensional control	Lower required press tonnage means less residual stress in the finished parts
	Better surface cosmetics	Gas pressure assures consistent surface and texture reproduction
	Reduce finishing and painting	Better surface cosmetics (above) reduces sanding and priming on high profile parts (especially external gas assist)
	Larger moldings with smaller presses	GAIM requires 1/3-1/2 of the molding pressure of straight injection molding.
Reaction Injection Molding (RIM)	Much lower part cost	Much faster & less manual mfg process; GAIM best for >500 units/year
	Much Wider Resin Selection	Very few resin options for RIM
	Better dimensional control	Lower required press tonnage means less residual stress in the finished parts
	Better surface cosmetics	Gas pressure assures consistent surface and texture reproduction; RIM requires extensive sanding & finishing

Increase Design Freedom

Increase Part Size, Complexity, & Cosmetics

Improve Physical Integrity with Integrated Ribs & Bosses

Increase ribs & boss standoff sizes

- GAIM: Potentially no limits
- Straight Injection: 40-50% of nominal wall thickness

Thick areas cored with internal gas channels.

Mold thick cross-sections in one piece

- Examples: A handle and work surface combined into one part

Exceptional Dimensional Stability

Hold tight tolerances on large parts

Minimize warp over large flat surfaces

Lower molded-in stress

- Part is packed from nearest gas channel rather than the gate
- Better chemical resistance due to lower molded in stress

Gas pressure is present in the entire cooling phase

- Not limited by gate freeze off (straight injection molding)

Reduce Cavity Pressure

Allows production of larger parts on smaller presses

- Lower cost/hour
- Faster cycle time

Clamp tonnage rules

- GAIM: ~1.0-1.25 tons per sq in of part surface area
- Straight Inj.: ~3.5-4.5 tons per sq in of part surface area

Less pressure reduces warp on large, flat surfaces

Cavity packing pressure applied by nitrogen gas

Rapid Heat and Cool with Gas Assist (RHRC)

Purpose

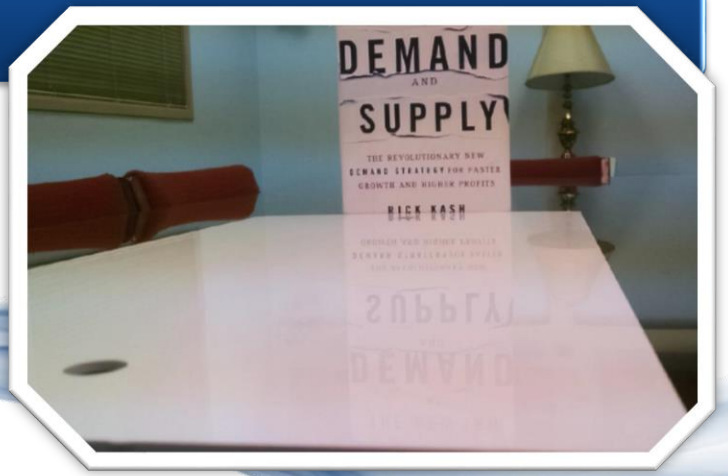
- Imparts a ***glossy, Class A finish*** to ***unpainted***, un-textured plastic parts by eliminating weld lines, splay, and shadow marks on part surfaces

Process

- Quickly raise and lower temperature of mold surfaces
- Resin introduced to hotter mold surfaces
- Many methods to accomplish Rapid Heat and Cool (steam, hot water or induction)

Additional Benefits

- Reduced fill pressure
- Filling very thin walls is possible
- No sink marks



Reaction Injection Molding (RIM)

Two highly reactive liquid ingredients are mixed and immediately injected into a mold cavity at low pressure and heated to the point where chemical reaction leading to solidification occur.

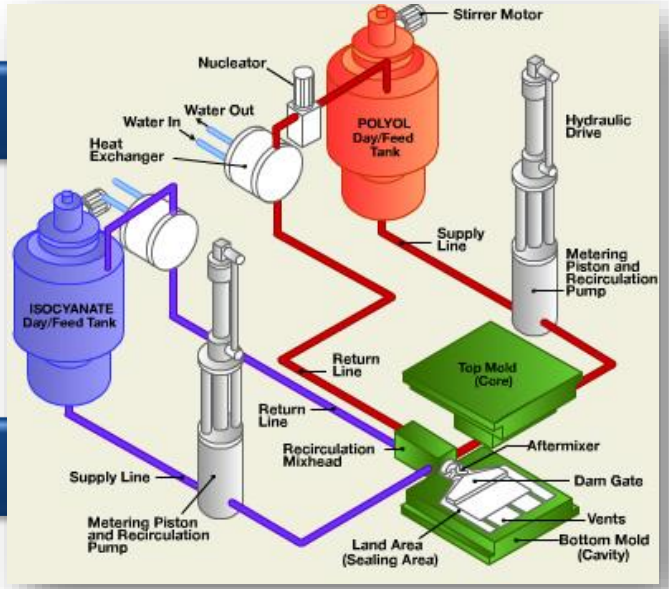
Process Characteristics:

- Part Cost: High
- Mold Cost: Low
- Cycle Time: High
- RIM polyurethane parts possess a foam internal structure surrounded by a dense outer skin
- Common Materials include Polyurethane, Epoxies, Urea-formaldehyde

Reaction Injection Molding

Benefits:

- Low cost molds
- Complex designs possible
- Reverse side features are available



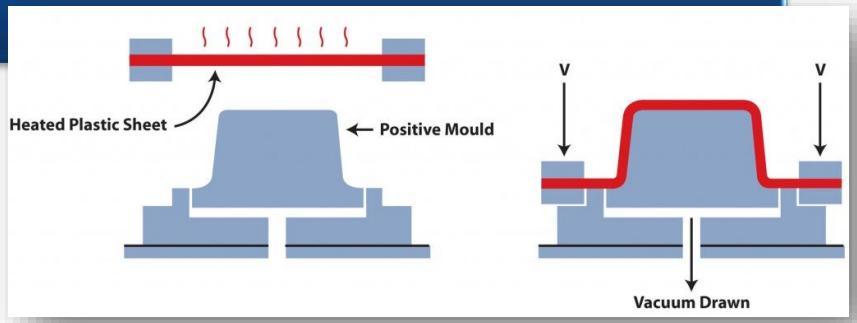
Shortcomings:

- Incredibly limited material selection
- Incredibly long cycle times due to slow polymer curing
- Poor dimensional repeatability
- Low impact resistance over time
- Cosmetic parts must be painted

Thermoforming

Thermoforming is a manufacturing process where a plastic sheet is heated to a pliable forming temperature, formed to a specific shape in a mold, and trimmed to create a usable product.

Process Characteristics:



- Part Cost: High
- Tool Cost: Low
- Best for very low volume production
- Capable of producing very large parts
- Reverse side features (ribs/bosses) must be bonded to part. Windows must be machined in
- Inconsistent wall thickness

Structural Foam Molding

Structural foam is well suited for large plastic parts as the foaming gas bubbles in the resin matrix pack out the resin and reduce the incidence of sink. These parts are usually very thick, nearly 0.250” wall thickness, and are ideal for structural elements that will not be in view.

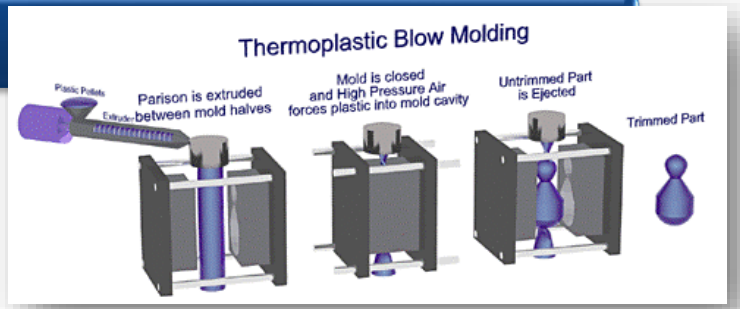
Process Characteristics

- Part Cost: Comparable to GAIM
- Tooling Cost: Comparable to GAIM
- Sink marks are reduced
- Parts have a swirl patterns and bubbles so they must be finished for cosmetic purposes.
- Parts can be molded with thick cross sections
- Process can produce parts up to 100 lbs. and 12ft. X 10ft. in area.

Blow Molding

Blow molding is accomplished by vertically extruding a hollow tube (parison) of molten plastic. The parison is then clamped between two mold halves and expanded into the desired shape by inflating it with compressed air. After cooling, a hollow part emerges.

Process Characteristics

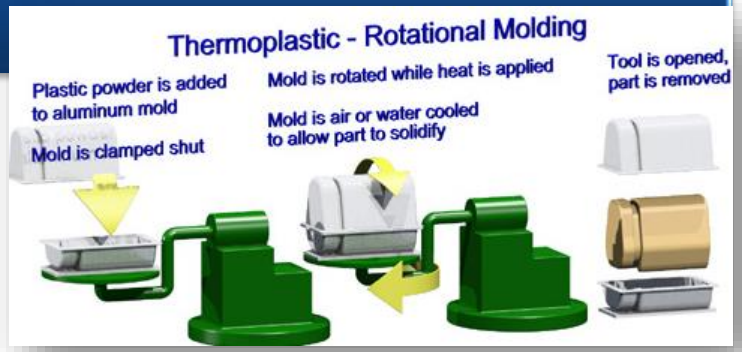


- Part Cost: Moderate
- Tooling Cost: Moderate
- Parts as large as 12ft. X 4ft. can be formed
- Blow molding produces parts with the highest strength to weight ratio of any plastic process
- Complex, hollow parts are formed with no internal stresses

Rotational Molding

A method of casting hollow plastic parts with few restriction regarding size or complexity. Plastic powder is fused in a hollow female mold by rotating it simultaneously in two directions while heating it in an oven. Once the plastic is fused, the mold is cooled to solidify the plastic and the part is removed by splitting the mold.

Process Characteristics



- Tooling Cost: Low for large parts
- Very stable parts – no molded in stress
- Can produce complex part geometries
- Can mold in metal inserts and graphics
- Suited for low volume production, especially of drums and tanks

Weld/Knit Lines (PMMA)

Conventional Molding
Showing Weld line

RHCM
No Weld lines

High Gloss Surface Glass Filler (ABS+GF20%)

Conventional Molding
Filler Exposure

RHCM
No Filler Exposure

Advantages of RHRC

	Conventional Molding	RHCM Molding
Weld/Knit lines	visible	**not visible**
Flow Marks	visible	**not visible**
Class A Surface Gloss	difficult to obtain	**possible, even with filled resins**
Glass/Carbon Fillers	Filler shows on surface	**Filler does not show on surface**
Transference of textures	difficult to obtain fine transcription	**Fine textures are possible**
Post Mold Painting	required	**not required**
Thin wall parts	difficult (insufficient resin flow)	**possible**
Thick wall parts	long cycle time	**cycle time reduction is possible**
Biodegradable resins	long cycle time	**cycle time reduction is possible**

Thank You

Contact Us

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