Minnesota Rubber & Plastics
Quadion LLC

Tooling for Elastomers and Thermoplastics

Minnesota Rubber & Plastics' experience and expertise in the design and manufacturing of production tooling ensures the quality and integrity of your component or assembly. References to tool life are estimates, not guarantees.
Actual tool life is determined by part geometry, molding process and material.

Plastic SPI Plastic Tooling Classifications		Rubber MR&P Rubber Tooling Classifications	
SPI Class 101 Mold	• Cycles: 1,000,000+ • Built for extremely high production of parts with the tightest tolerances. The most expensive tool made from the highest quality materials capable of handling the most corrosive materials. • All molding surfaces and functional parts made to a minimum of Rc 52. • Detailed 3D solid mold design required. • Molds may have hot runner systems • Top locks and guided ejection. • Highly polished cavity and core details. • Temperature control provisions in cavities	MR&P Class 11 Mold	• Cycles: 250,000+ for Rubber and 500,000+ for LSR • Built for very high production volumes of parts with the tightest tolerances. • Class 11 "flashless" tools can be made for injection and transfer processes. • Class 11 tools can be made for LSR, direct injection, injection transfer and injection compression processes. • Tool can run fully automatic and may produce parts that do not require de-flashing. • Hardened steel in the Rc 58-60 range • Heat treated plates, self-aligning cavities and precision venting.
SPI Class 102 Mold	• Cycles: under 1,000,000 • Built for medium to high production and hardened to a minimum of Rc 50. • Detailed 3D solid mold design recommended. • Top locks and guided ejection. • Highly polished cavity and core details. • Temperature control provisions in cavities	MR&P Class 12 Mold	• Cycles: under 100,000 • Transfer/compression/cold pot tools • Tool can have some level of automation, requires manual demold. • Uses a range of selected steel hardness's.
SPI Class 103 Mold	• Cycles: under 500,000 • Most popular mold for low to medium runs. • Cavities and cores hardened to Rc 30 or higher. • All other extras are optional.	MR&P Class 13 Mold	• Cycles: under 50,000 • Transfer/compression tools • Completely manual molding process • Simple geometry parts • Stainless steel cavity inserts with Rc 38-42 hardness. • Parts require flash removal as a secondary operation.
SPI Class 104 Mold	• Cycles: under 100,000 • Limited production, relatively low price, recommended for non-abrasive materials. • Mold base and cavities and cores can be made from aluminum or mild steel.	MR&P Class 14 Mold	• Cycles: under 10,000 • Transfer/compression tools • Completely manual molding process. • May have cavity inserts but frequently cut directly into the soft steel (Rc 28-30) plates.

Tooling for Elastomers and Thermoplastics - Continued

Rubber Tooling Features & Benefits:

Tooling Steel Types:

- Stainless steel is a more corrosion resistant tool so maintenance is reduced. Commonly used in Class 11, Class 12 and Class 13 tools. Stainless steel has inherent mold release properties so chrome plating may not be required.
- P-20 steel is commonly used for Class 14 tools. It provides an easier to machine steel but cycle life can be reduced and it usually requires chrome plating for corrosion resistance and mold release.

Hardness level of steel:

- Hardened steel in the Rc 58-60 range is used in Class 11 and in parts of Class 12 tools. This steel is much more difficult to machine and may require EDM to achieve required dimensioning. Hard cavity inserts can be tangentially ground for venting resulting in longer life and less maintenance.
- Medium hard steel at Rc 38-42 is used in parts of Class 12, 13 and 14 molds. It is less difficult to machine than hardened steel so it is less costly to cut cores and cavities. The steel wears better over time, is tougher and resists general mold wear better than softer hardness levels.
- The softest tools are made to Rc 28-30. This hardness level is the easiest and fastest to machine. At this hardness level, no heat treatment is needed.

Self-aligning cavity inserts:

- Each cavity is machined with a precision line up ring. These cavities are then placed in a mold frame for molding. As the cavity plates and molding frames thermally expand, each cavity continues to line up vertically and radially onto itself.
- Out-of-tolerance components created by thermal expansion of the cavity plates and frames are eliminated.
- Mismatch and off-register conditions are eliminated.