



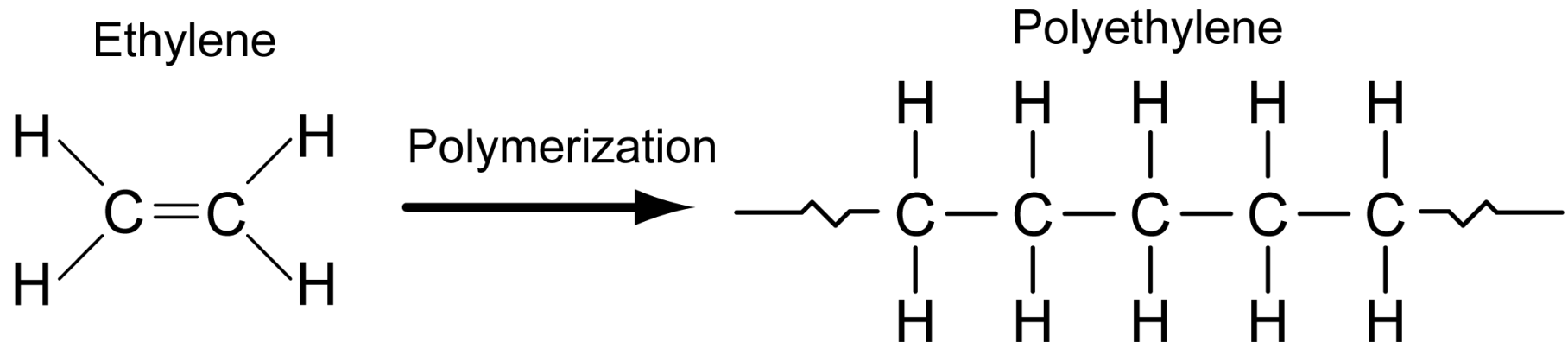
Plastics

What Is A Plastic (Polymer)?

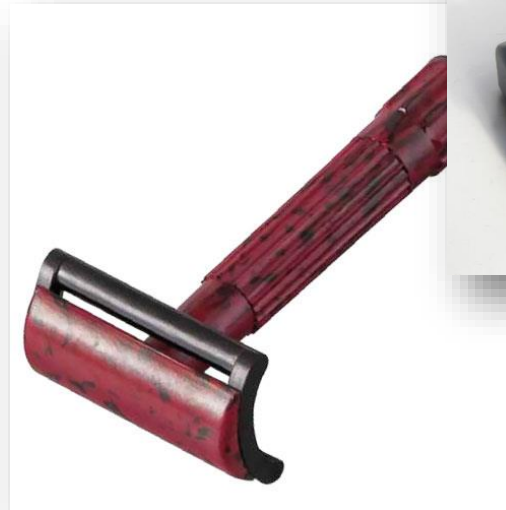
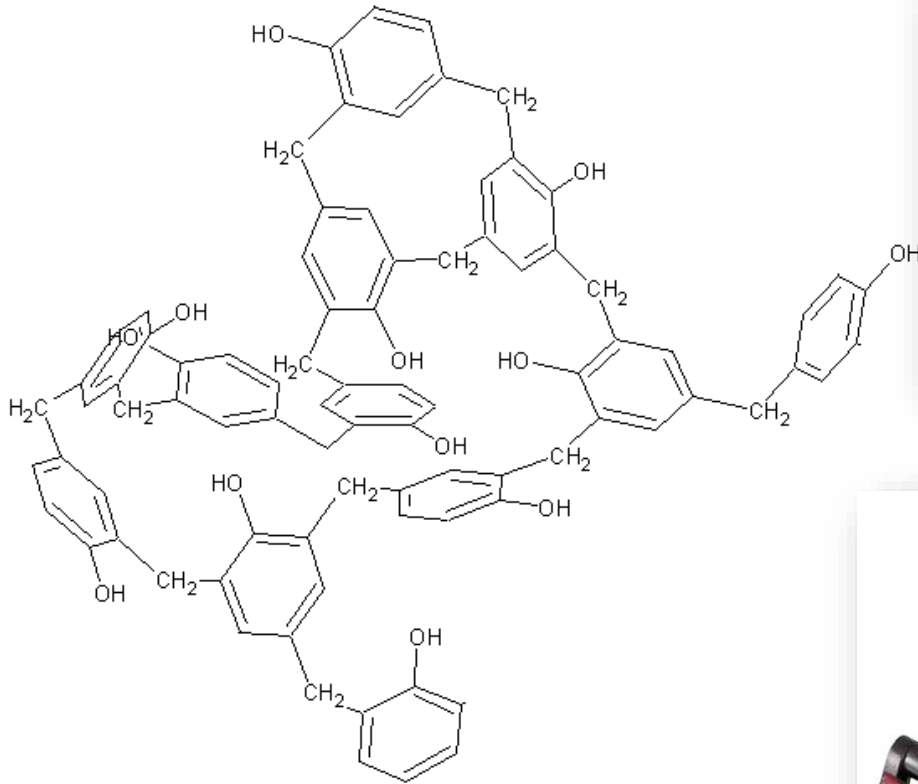
A polymer is a macromolecule composed of many repeated subunits (monomers)

Plastics are organic polymers that are easily molded or shaped while soft and then set into a rigid or slightly elastic form

All plastics are polymers, but not all polymers are plastics!



Bakelite - The First Synthetic Plastic

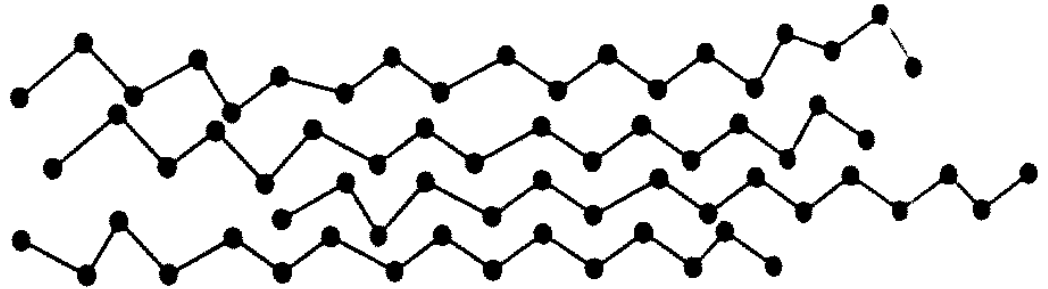


polyoxybenzylmethyleneglycolanhydride

Thermoplastics Vs. Thermosets

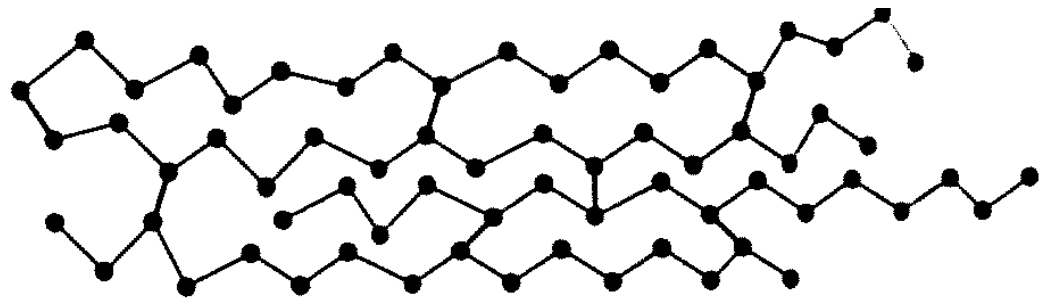
Thermoplastics do not cure/set when heated. These substances may be reheated and reformed. Cross-linking does not occur.

Thermoplastic



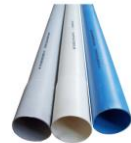
Thermosets crosslink under the application of heat (bonding between chains). This is an irreversible process.

Thermoset



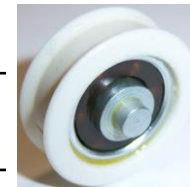
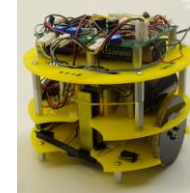
Types of Plastics

Name	Common Name	UTS (ksi)	Glass (°C)	Melting (°C)
Polyethylene terephthalate	Polyester, Mylar, PETE	9.4	75	260
High-density polyethylene	HDPE	2.9 – 4.6	110	108 – 134
Polyvinyl chloride	PVC	2.9 – 3.3	50	100 – 260
Low-Density Polyethylene	LDPE	1.1 – 1.7	110	
Polypropylene	PP	3.6 – 4.3	10	160-165
Polystyrene	PS	4.6 – 8.7	85	240
Polycarbonate	Lexan, PC	8.0 – 10.0	150	256

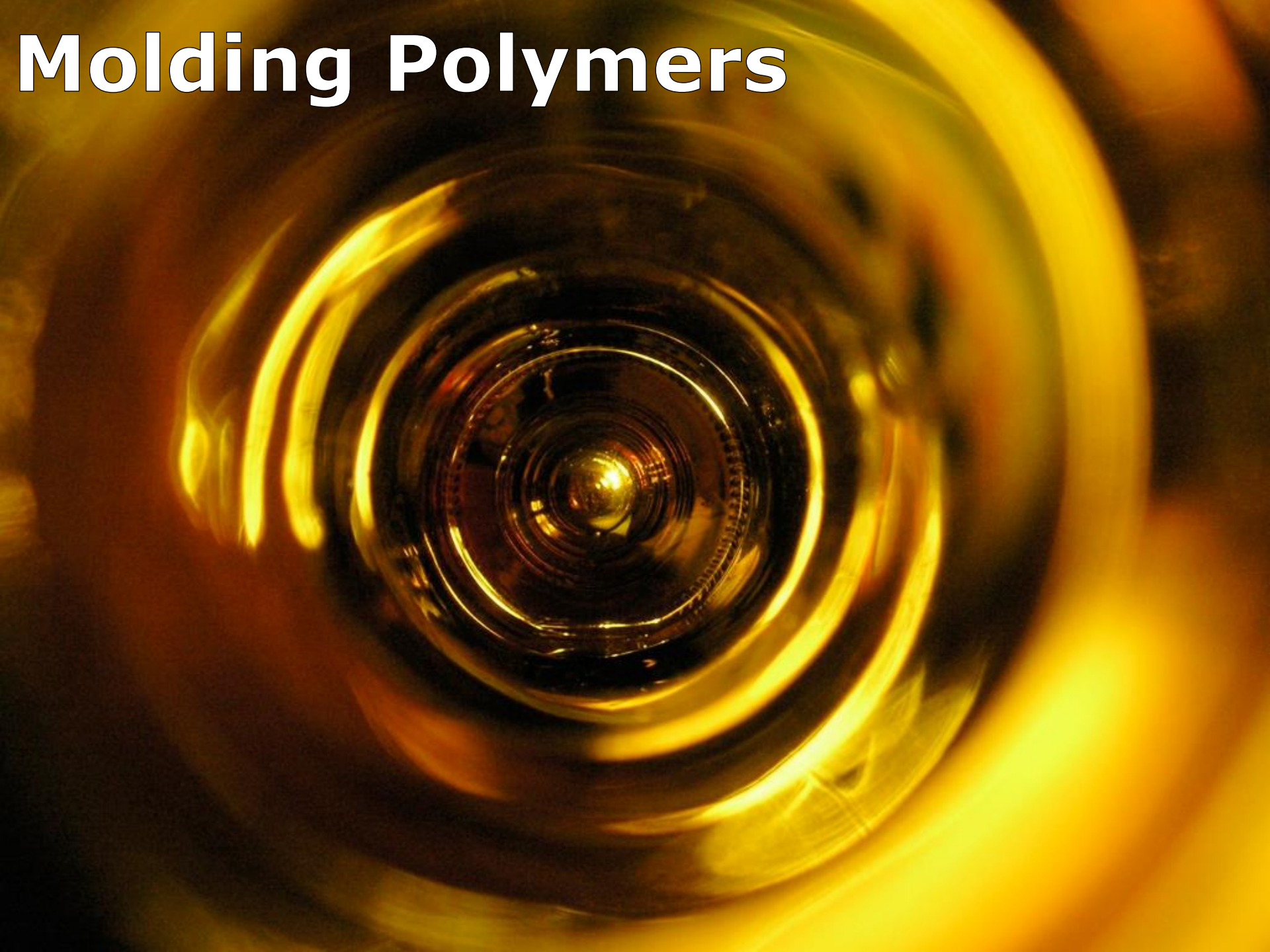


Types of Plastics

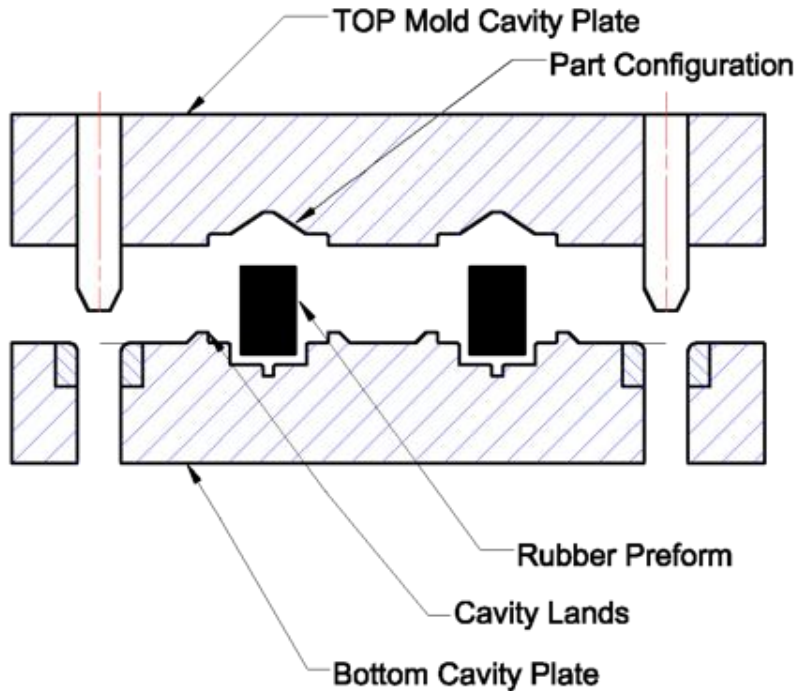
Name	Common Name	UTS (ksi)	Glass (°C)	Melting (°C)
Polymethyl methacrylate	PMMA, Acrylic	~7	105	135
Polyoxymethylene	POM, Acetal, Delrin	~9	125	175
Acrylonitrile Butadiene Styrene	ABS	~5.3	110	250
Polytetra-fluoroethylene	PTFE	~2.1	65	325
Polyamide	Nylon	~7.2	50	255
Polyether-etherketone	PEEK	~16	160	340
Polyetherimide	Ultem	~16.5	216	290



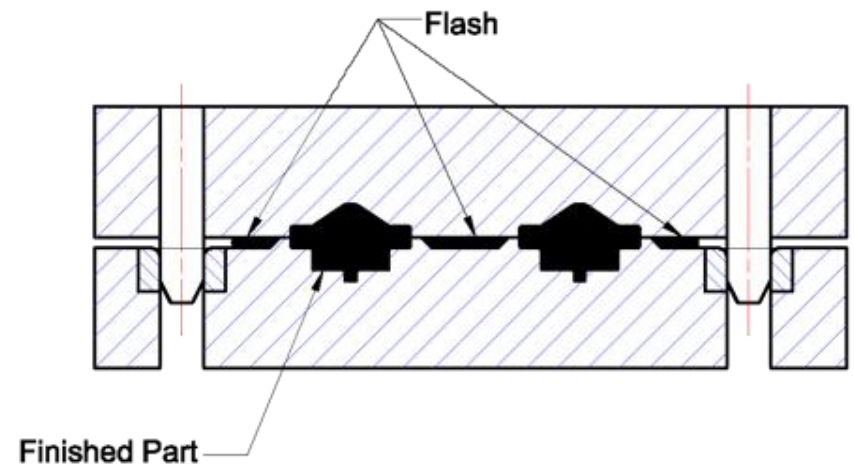
Molding Polymers



Compression Molding

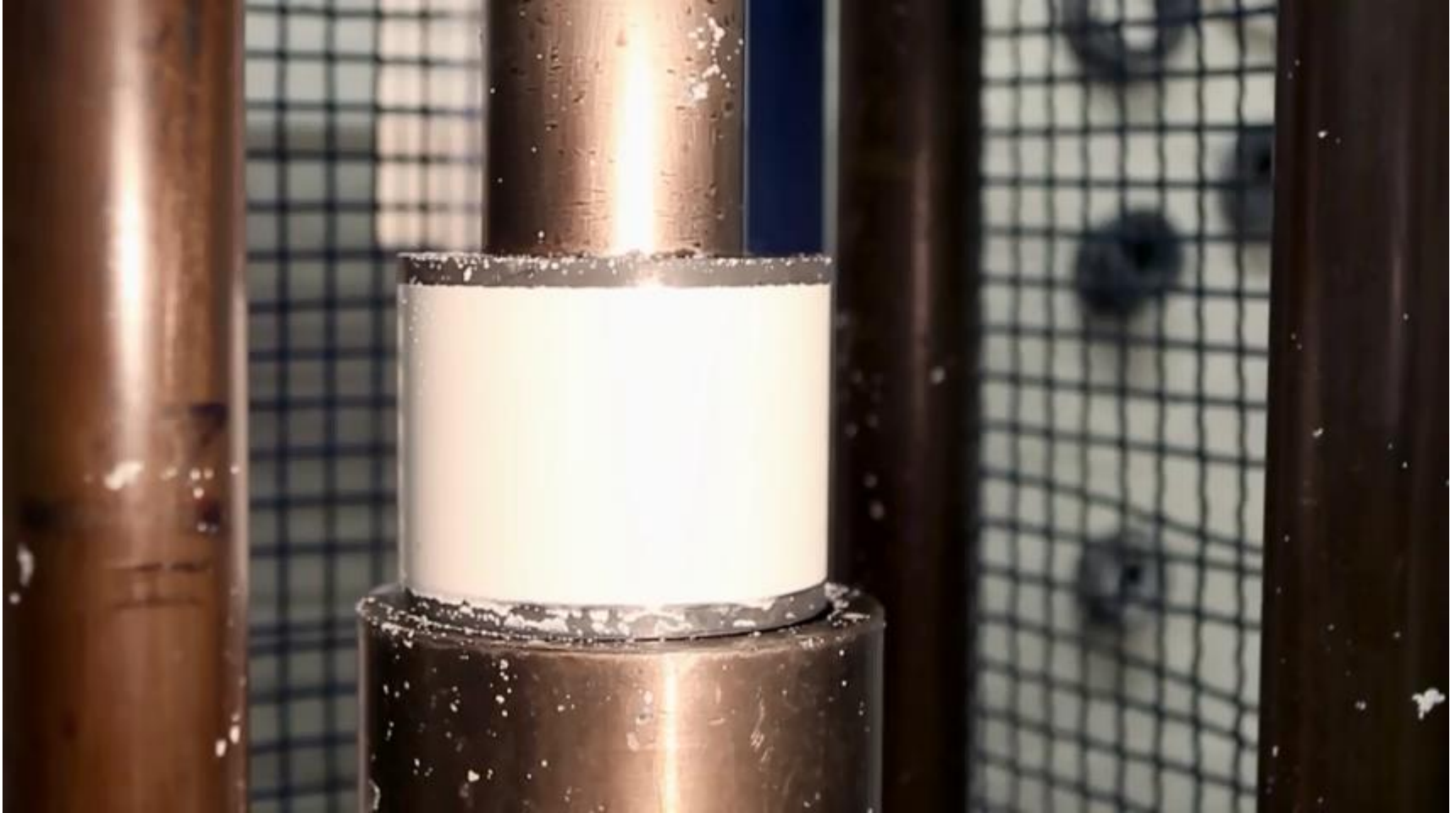


Compression Mold - OPEN



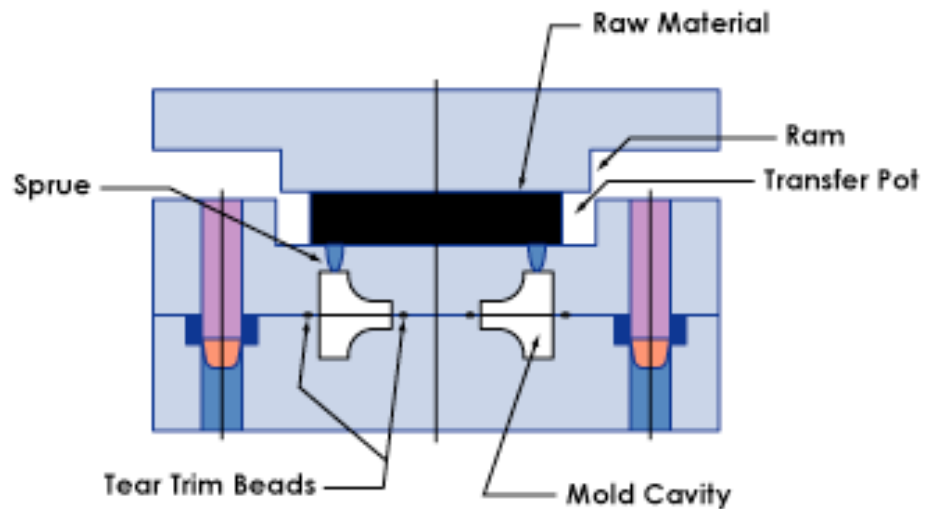
Compression Mold - CLOSED

Compression Molding

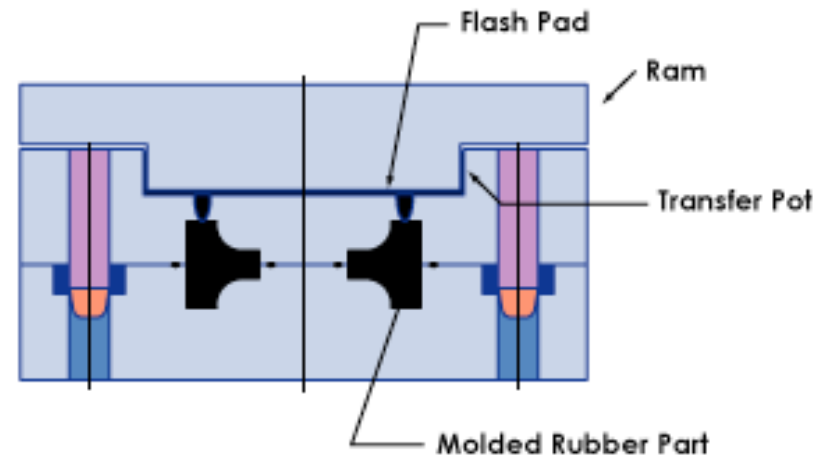


Transfer Molding

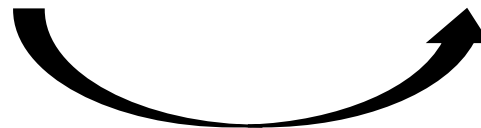
Transfer Molding



Transfer Mold - Open



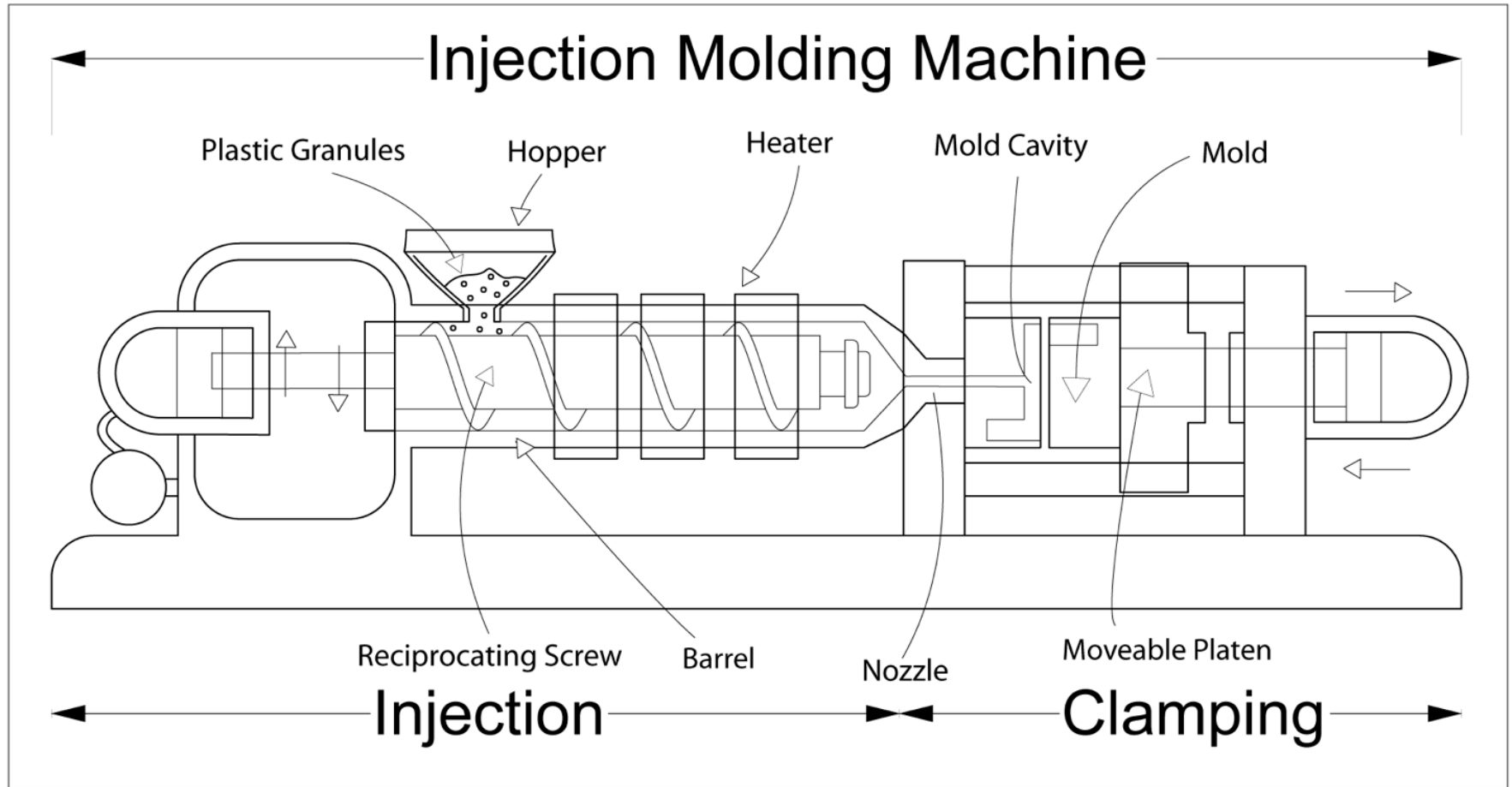
Transfer Mold - Closed



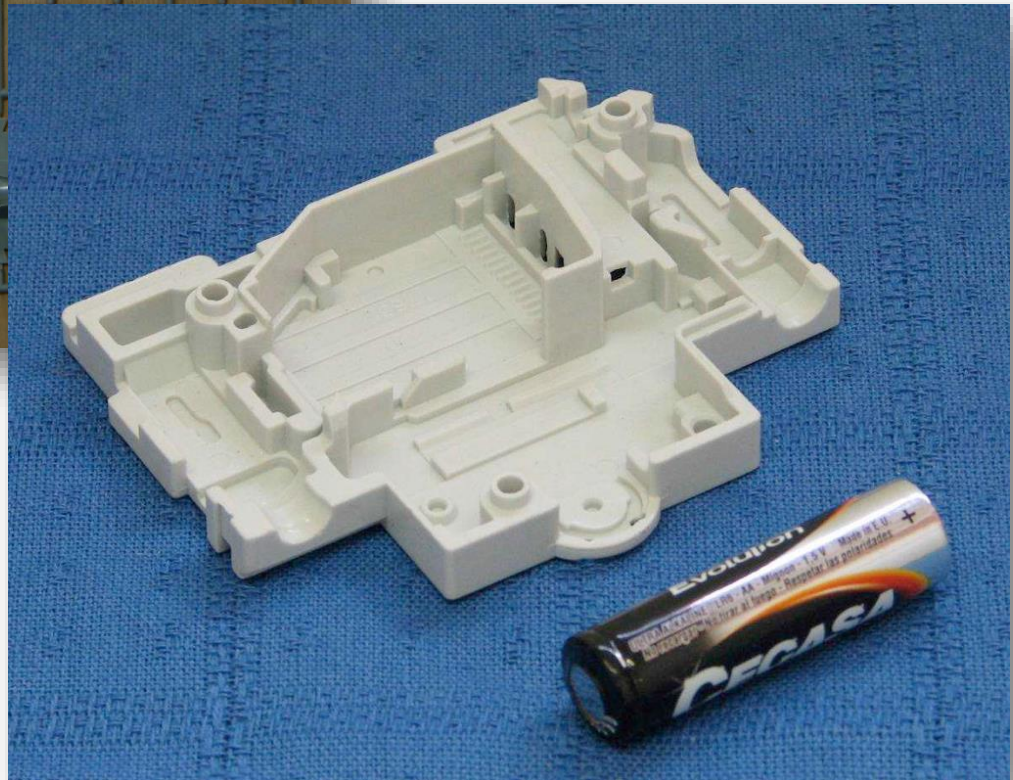
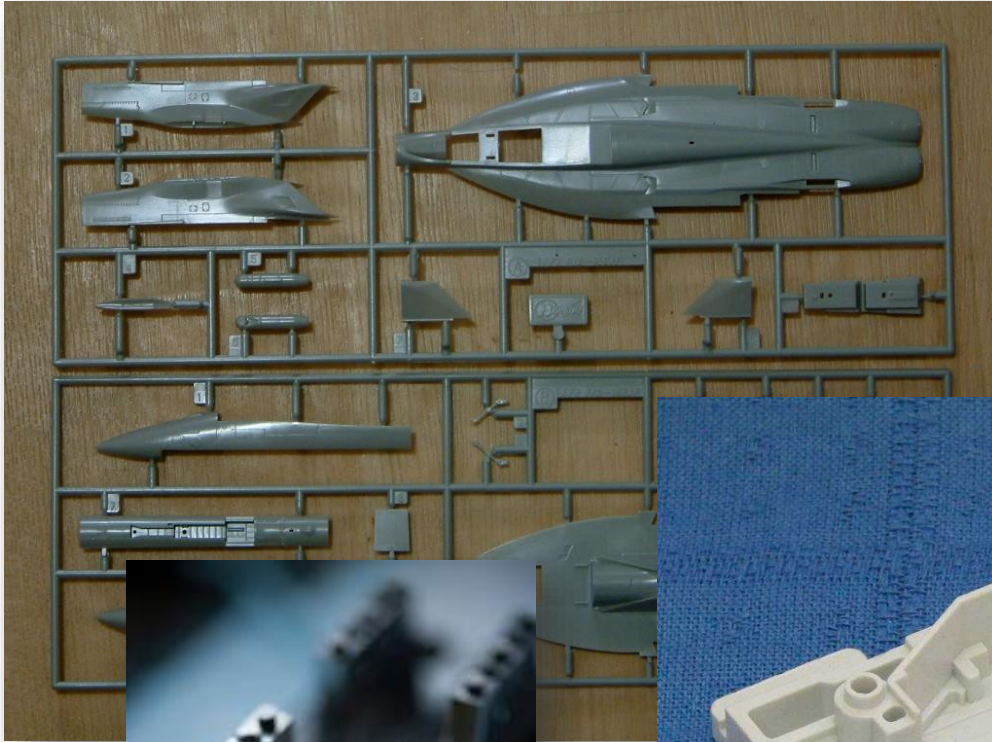
Transfer Molding



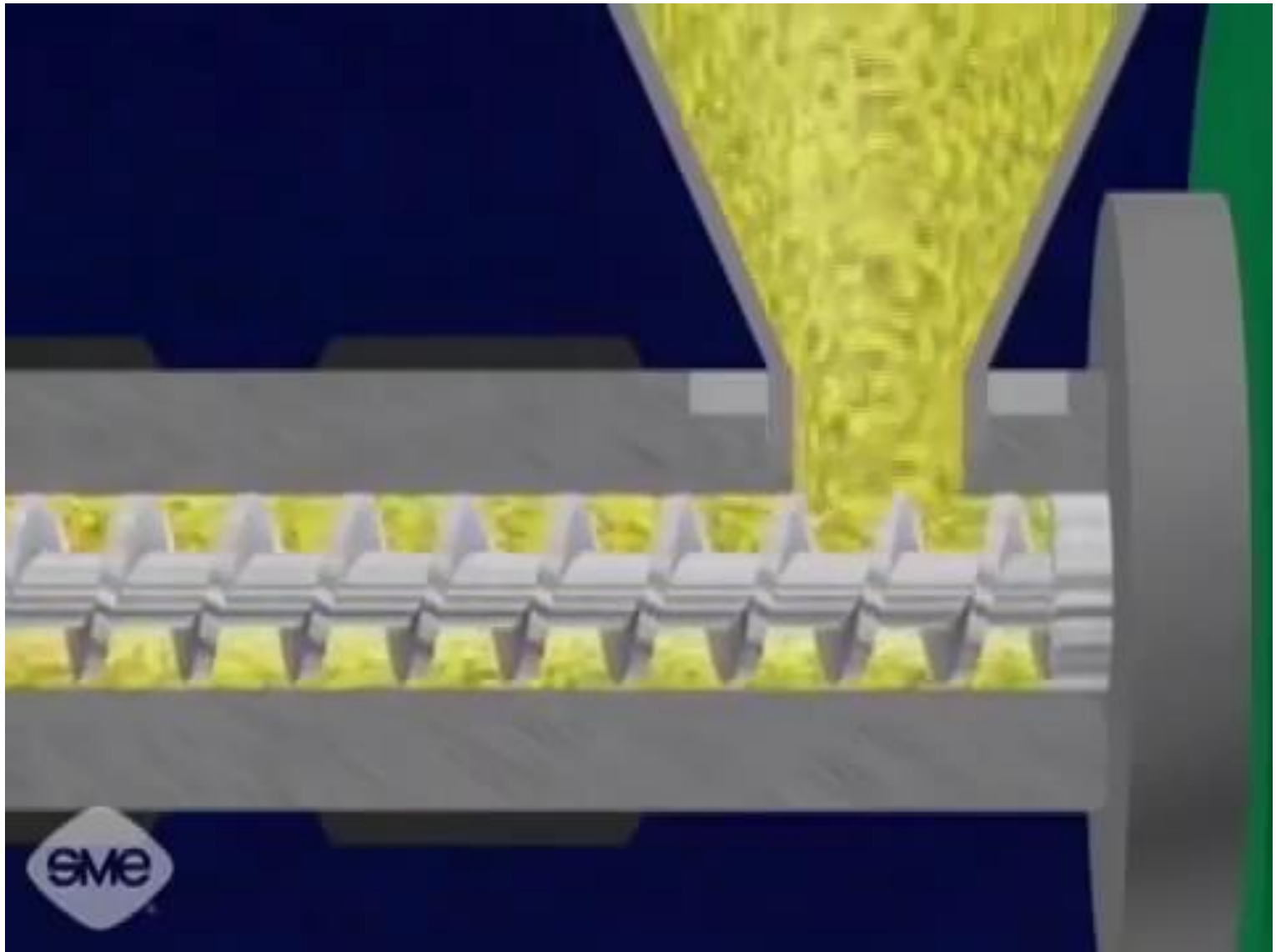
Injection Molding



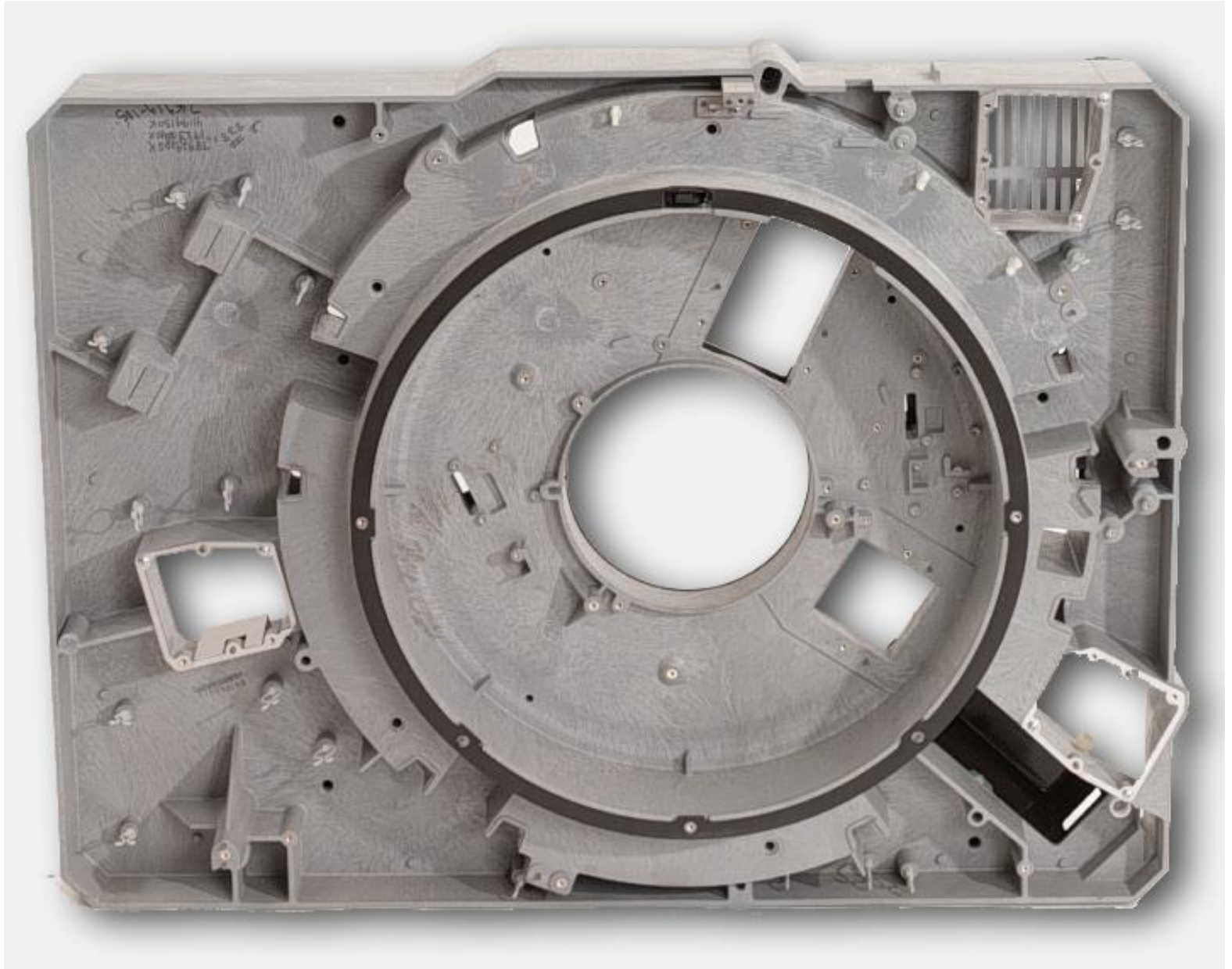
Injection Molding



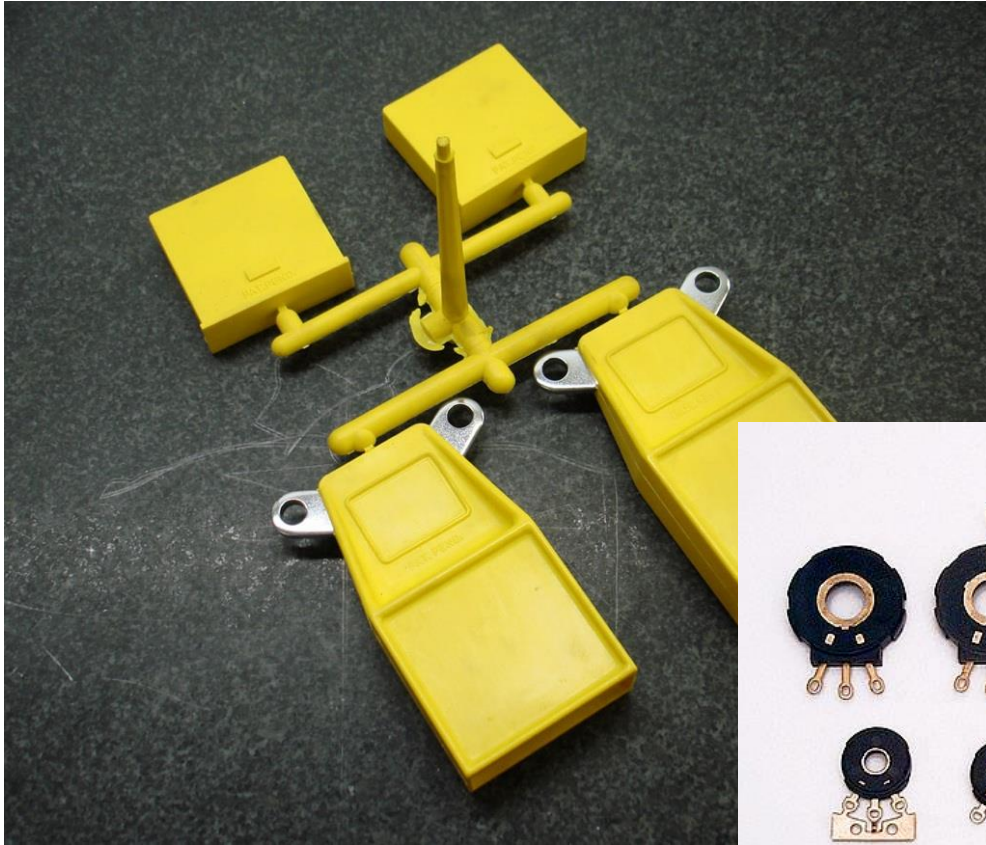
Injection Molding



Foam Molding



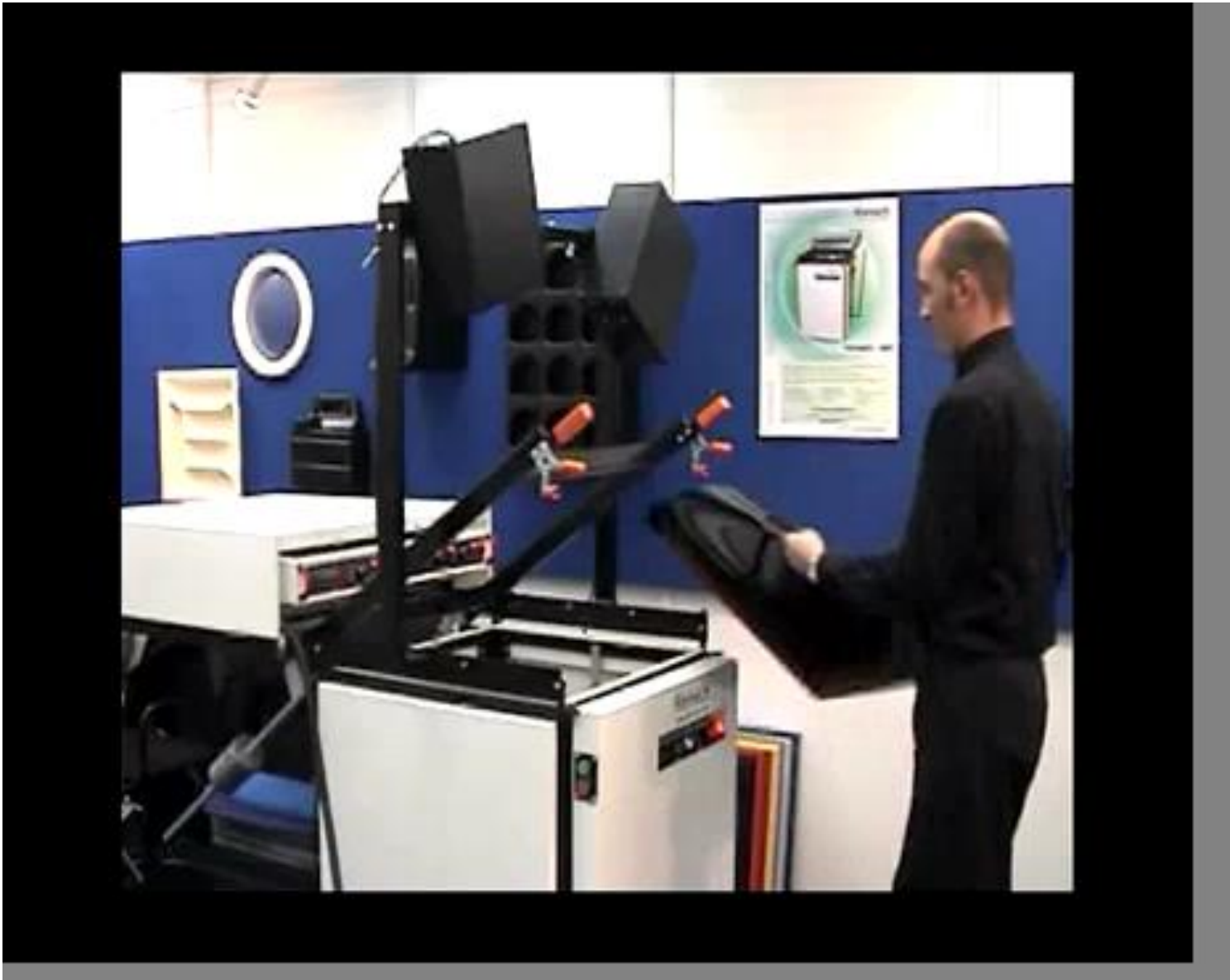
Overmolding



Thermoforming



Thermoforming



Rotational Molding



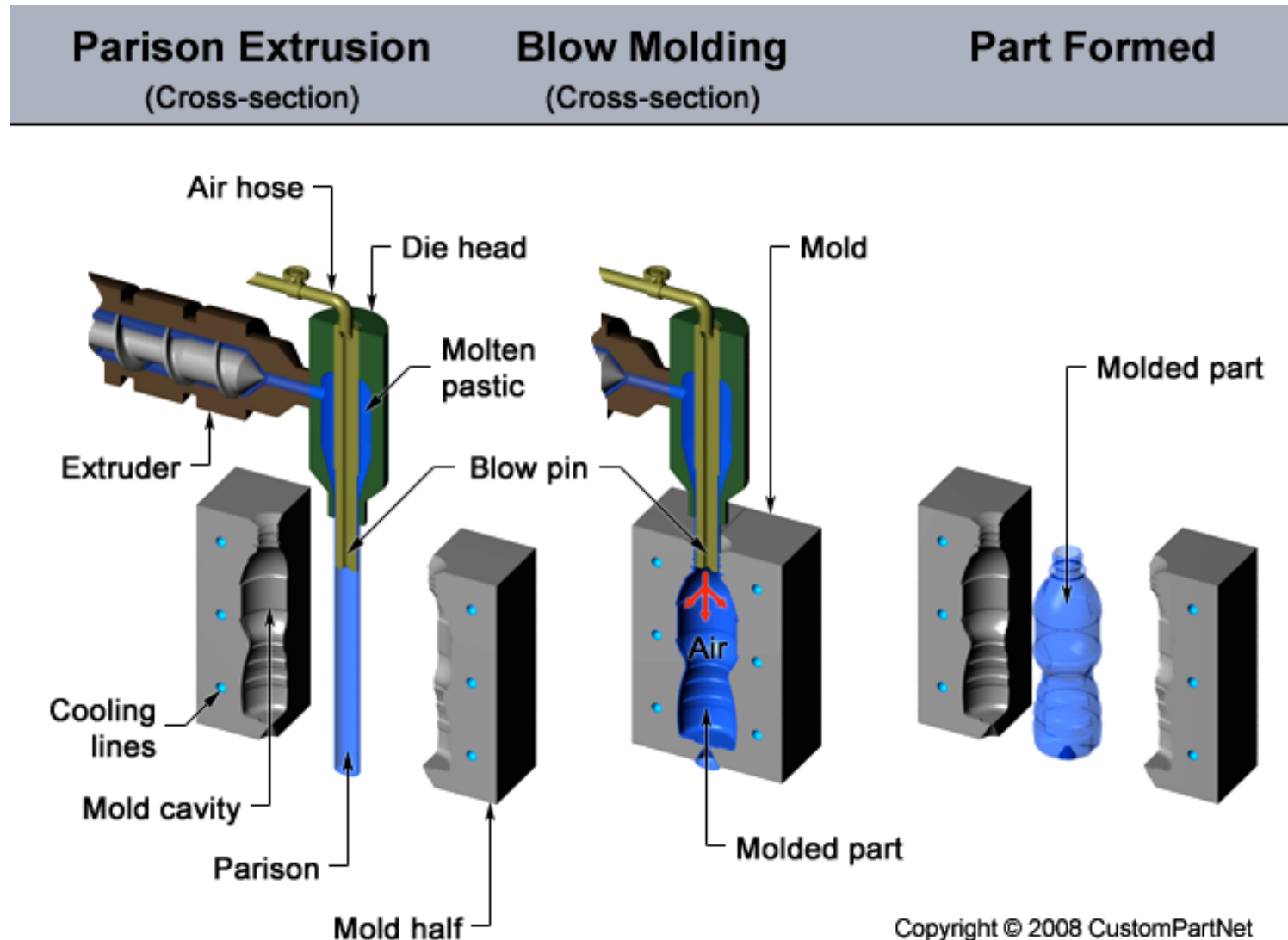
Rotational Molding



Blow Molding



Blow Molding



Blow Molding

