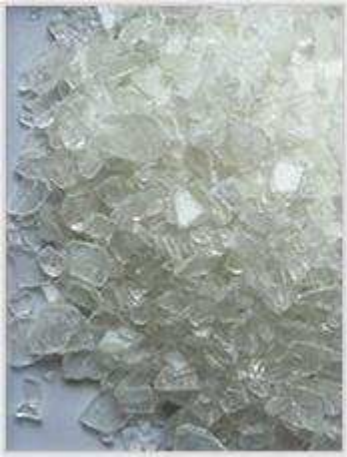
Description

Image



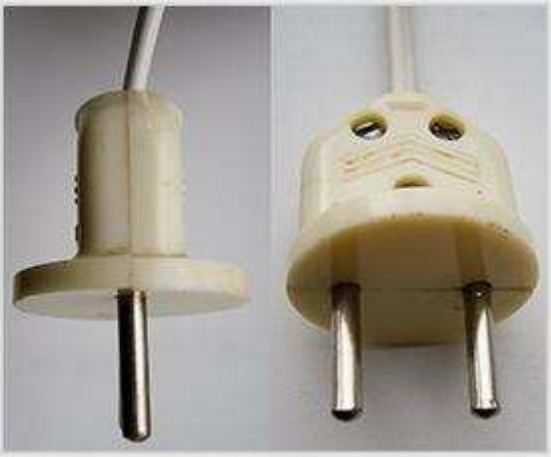


Image caption

(1) Polyester resin as raw material © Hardcoreraveman at Wikimedia Commons [Public domain] (2) Cubic compression molds © Remux at Wikimedia Commons (CC BY 3.0) (3) Soviet domestic power plug 6A 250V AC, unpolarised, unearthed © BPK at Wikimedia Commons (CC BY 3.0)

The process

BMC MOLDING is one of the most economical processes for the high volume production of small to medium sized components. In it, a preform of molding compound (resin, reinforcement, catalyst and additives already premixed in the optimum proportions) is placed in the heated mold cavity and then pressed into the finished shape. Pressures used vary between 0.5 and 15 MPa depending on mold dimensions and the material being processed. The mold is heated by steam, electricity or hot oil to temperatures of between 140-160C to cure the resin.
The heat transferred from the mold surface initiates curing - the length of which varies according to the resin system used and with the component thickness. Because of the low shrinkage additives, the surface finish produced is excellent.
The mold is either made of aluminum, cast iron or steel. The process makes use of a heated hydraulic press.

Process schematic

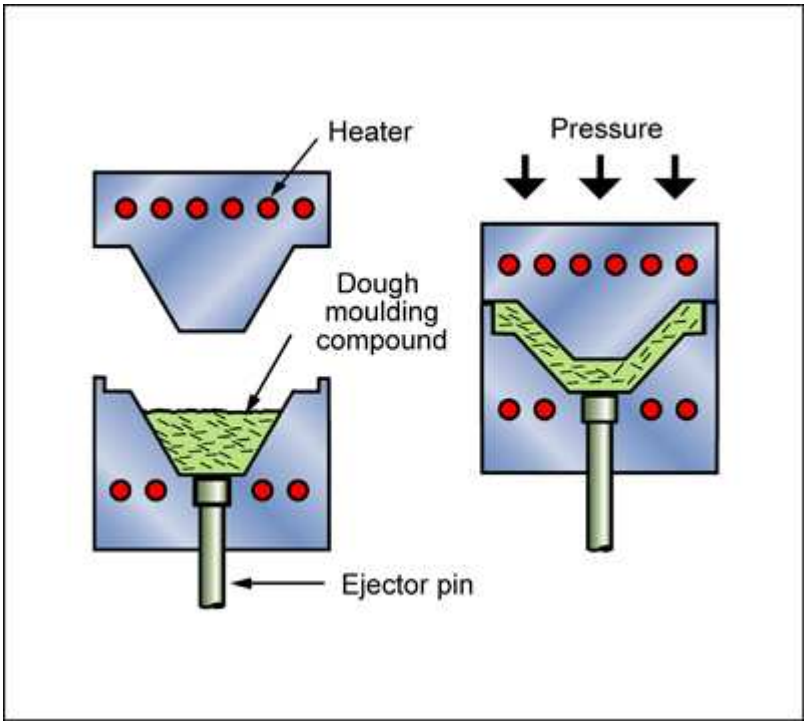


Figure caption

BMC or DMC molding.

Tradenames

Bulk molding (BMC), dough molding (DMC)

Material compatibility

Composites	✓

Shape

Circular prismatic	✓
Non-circular prismatic	✓
Solid 3-D	✓
Hollow 3-D	✓

Economic compatibility

Relative tooling cost	medium			
Relative equipment cost	medium			
Labor intensity	medium			
Economic batch size (units)	5e3	-	1e6	

Physical and quality attributes

Mass range	0.0661	-	44.1	lb
Range of section thickness	59.1	-	984	mil
Tolerance	4.72	-	39.4	mil
Roughness	0.0118	-	0.063	mil

Surface roughness (A=v. smooth)	A

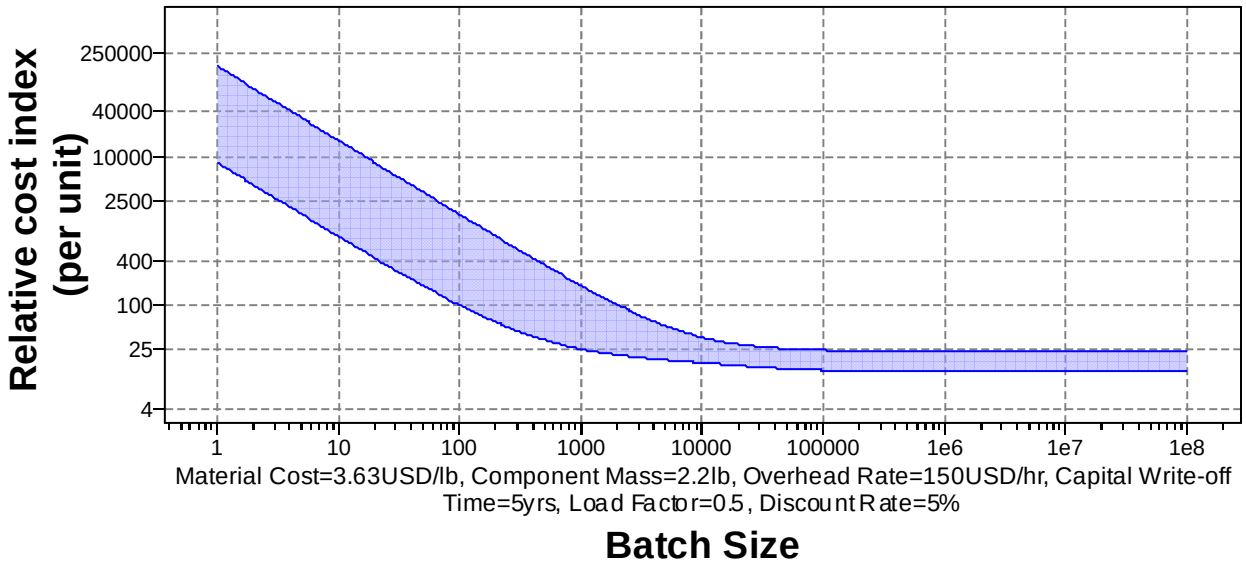
Process characteristics

Primary shaping processes	✓
Discrete	✓

Cost model and defaults

Relative cost index (per unit)	25.6	-	183

Parameters: Material Cost = 3.63USD/lb, Component Mass = 2.2lb, Batch Size = 1e3, Overhead Rate = 150USD/hr, Discount Rate = 5%, Capital Write-off Time = 5yrs, Load Factor = 0.5



Capital cost	5.74e4	-	4.92e5	USD
Material utilization fraction	0.8	-	0.95	
Production rate (units)	12	-	60	/hr
Tooling cost	8.2e3	-	1.64e5	USD
Tool life (units)	1e5	-	2e5	

Supporting information

Design guidelines

A range of shapes are possible including ribs, bosses, parallel holes and inserts but undercuts should be

Technical notes

Common resin systems: polyester, epoxy, vinyl ester, phenolic resins; thermoplastic resins such as PP, nylon, PEEK; reinforcement: glass (25-70%), carbon, others in the form of short (25 mm) fibers randomly orientated.

Typical uses

Electrical housings, car body parts, gas and electricity meter boxes, car road wheels.

The environment

Styrene emission reduced since it is a closed mold process.

Links

MaterialUniverse