Description

Image

Image caption

(1) Car bumper © Fancycrave1 at Pixabay [Public domain] (2) Lateral panel of a truck © Werner22brigitte at Pixabay [Public domain]

The process

SMC MOLDING is one of the most economical processes for the high volume production of small-to-medium panels. Sheet molding compound (SMC) is premix of resin, chopped reinforcement, catalyst (if any) and additives. The process uses an accurate matched metal mold which is placed in a heated press. The sheet is first cut to a shape similar to the mold to minimize the distance the mix has to flow to fill the mold. . The mold is then closed and pressure (3-7 MPa) and heat are applied to form and cure the panel.

Process schematic

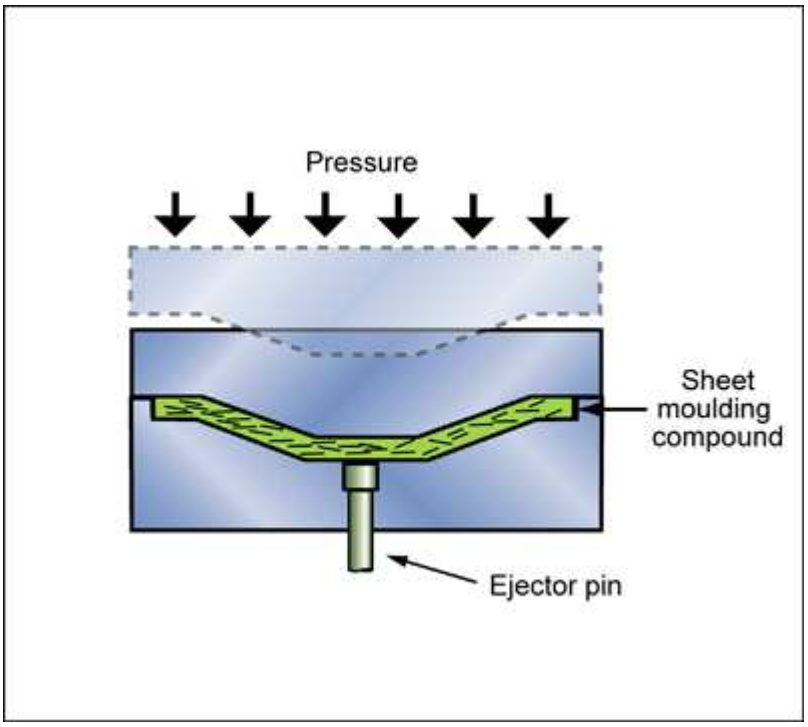


Figure caption

SMC molding.

Material compatibility

Composites	✓

Shape

Flat sheet	✓
Dished sheet	✓

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	-	110	lb
Range of section thickness	59.1	-	984	mil
Tolerance	7.87	-	39.4	mil
Roughness	0.0118	-	0.063	mil
Surface roughness (A=v. smooth)	A			

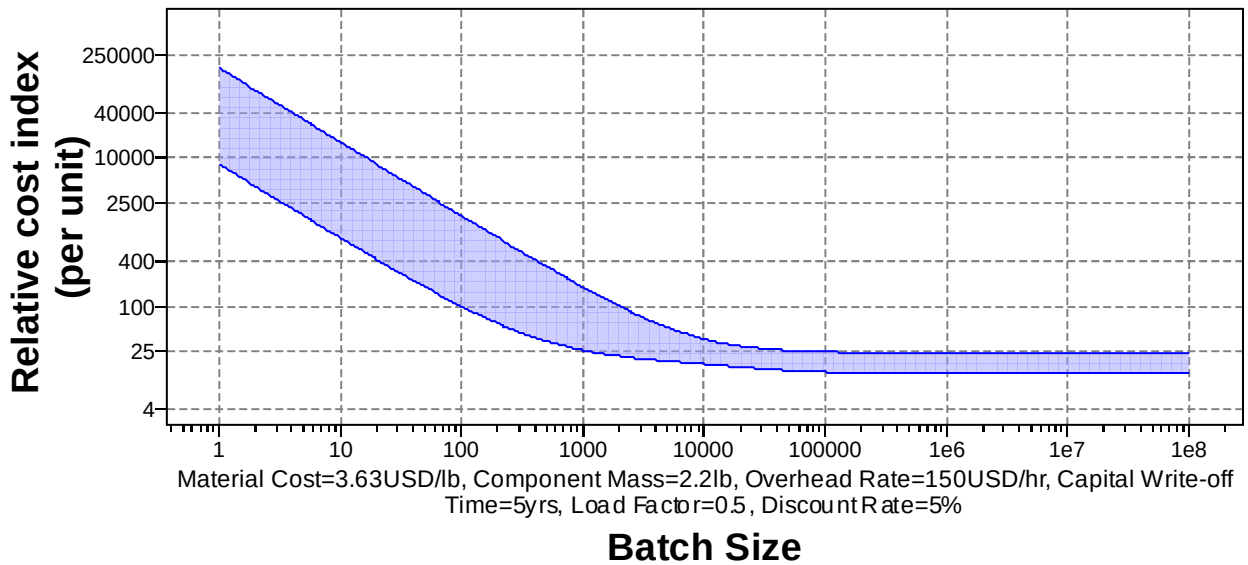
Process characteristics

Primary shaping processes	✓
Discrete	✓

Cost model and defaults

Relative cost index (per unit)	25.5	-	182	

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)	3e5	-	4e5	

Supporting information

Design guidelines

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

Technical notes

Common resin systems: liquid, prepreg, SMC - polyester, epoxy; reinforcement: glass (25-70%), carbon, others - in the form of long fibers 25-75mm long.

Typical uses

Automotive applications such as car bumpers and car and truck body

The environment

Styrene emission reduced since it is a closed mold process.

Links

MaterialUniverse

No warranty is given for the accuracy of this data