

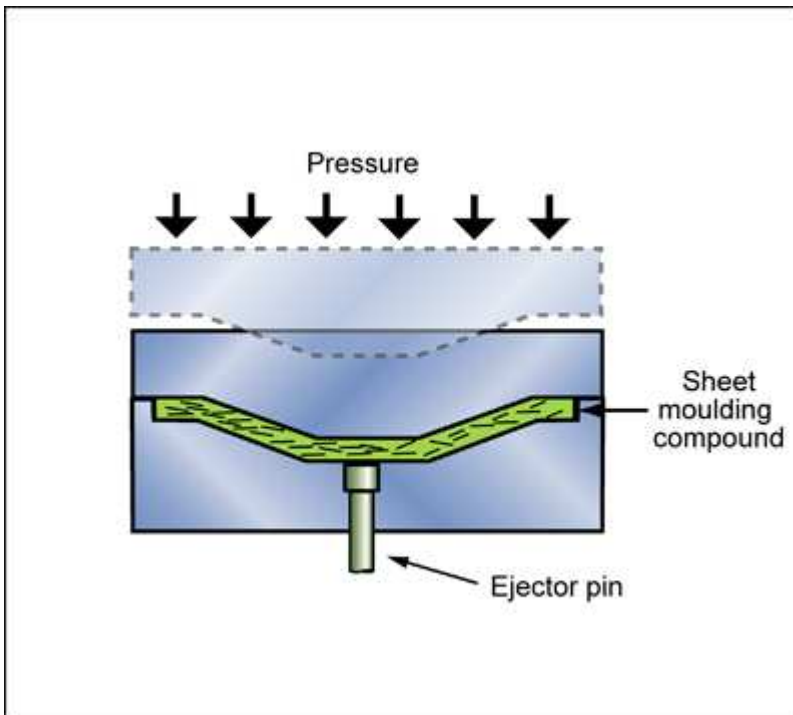
**Description****Image****Image caption**

(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

0.03 - 50 kg

Range of section thickness

1.5 - 25 mm

Tolerance

0.2 - 1 mm

Roughness

0.3 - 1.6  $\mu\text{m}$

Surface roughness (A=v. smooth)

A

## Process characteristics

Primary shaping processes



Discrete

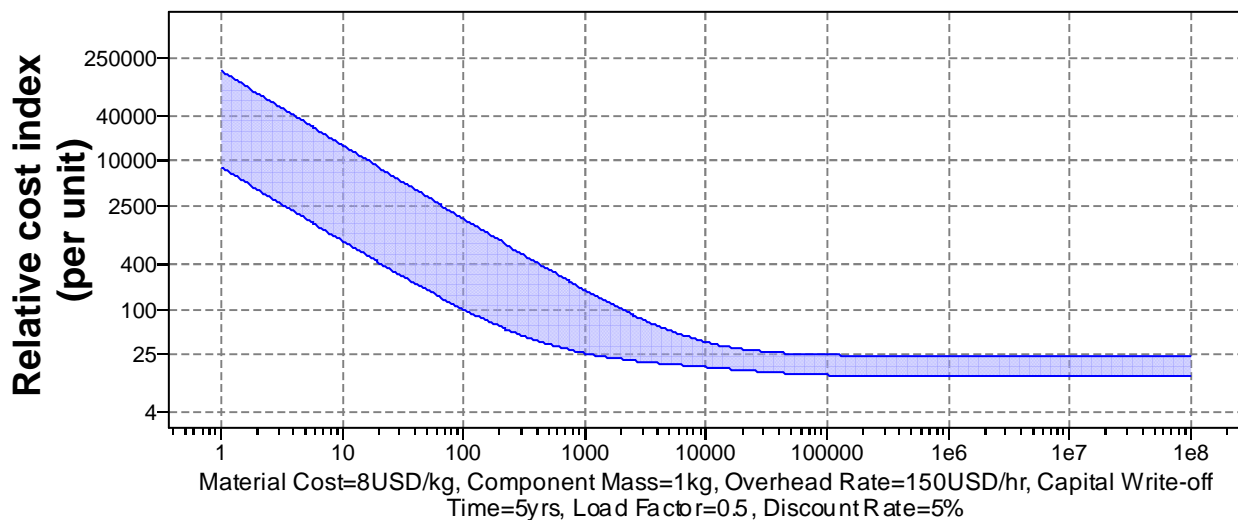


## Cost model and defaults

Relative cost index (per unit)

25.5 - 182

[Parameters:](#) Material Cost = 8USD/kg, Component Mass = 1kg, Batch Size = 1e3, Overhead Rate = 150USD/hr, Discount Rate = 5%, Capital Write-off Time = 5yrs, Load Factor = 0.5



## Batch Size

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