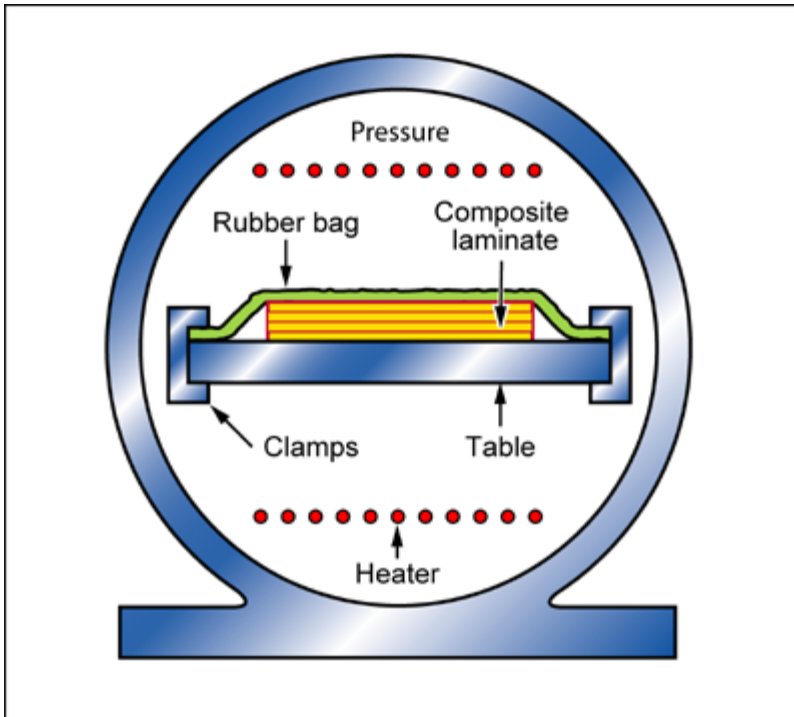


## Description

### Process schematic



**Figure caption**

Autoclave

### The process

In AUTOCLAVE MOLDING, reinforcement is layed-up on the mold and the resin is applied by conventional hand or spray lay-up techniques. The laminate is backed with a porous film parting agent and a layer of glass-fiber cloth or paper to absorb any excess resin. A flexible bag is placed on top of the glass-fiber layer. The laminate and the mold are then placed inside an autoclave and subjected to pressures of about 0.55 MPa compressing the laminate, squeezing out air pockets to give a dense product free from porosity. The autoclave is often heated to accelerate curing and increase productivity. Autoclave molding is used extensively to fabricate high strength aircraft and aerospace components. particularly for thicker parts or where high fiber volume fraction is required.

## Material compatibility

Composites



## Shape

Flat sheet



Dished sheet



Hollow 3-D



## Economic compatibility

Relative tooling cost

low

Relative equipment cost

high

Labor intensity

high

Economic batch size (units)	1	-	500
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### Physical and quality attributes

Mass range	1.76	-	4.41e3	lb
Range of section thickness	78.7	-	1.18e3	mil
Tolerance	* 31.5	-	39.4	mil
Roughness	* 0.0197	-	0.126	mil
Surface roughness (A=v. smooth)	A			

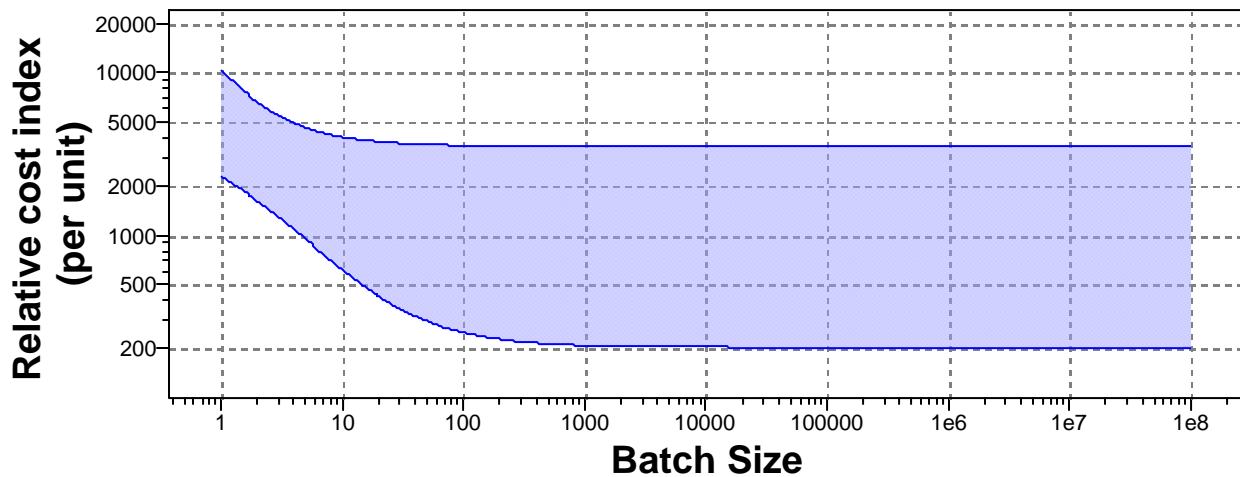
### Process characteristics

Primary shaping processes	✓
Discrete	✓
Continuous	✗
Prototyping	✗

### Cost model and defaults

Relative cost index (per unit)	211	-	3.53e3
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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



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

Capital cost	6.56e4	-	8.2e5	USD
Material utilization fraction	0.8	-	0.95	
Production rate (units)	0.05	-	1	/hr
Tooling cost	820	-	8.2e3	USD
Tool life (units)	100	-	500	

### Supporting information

#### Design guidelines

autoclave molding is limited to simple shapes with high surface area-to-thickness ratios. Ribs and bosses are possible but undercuts, inserts and foam panels should be avoided.

**Technical notes**

The reinforcement, typically, is glass (25-60%), carbon or aramid. Liquid polyester epoxy resins are sometimes used; but prepreg - epoxy, phenolic or polyimide are perhaps more usual.

**Typical uses**

Autoclave molding is, at present almost exclusively used for aircraft and aerospace

**The economics**

Tooling costs are low, and the process is not particularly labor intensive, making it attractive

**The environment**

Provision must be made for the efficient extraction of solvent

**Links**

MaterialUniverse

Reference