10. Compression Molding

Overview

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10.1. Introduction

Compression molding involves molding a pre-manufactured compound in a closed mold under pressure and often using heat.

Typical compression molding applications include:

- Appliance housings
- Automotive body panels and structural parts
- Basketball backboards
- Cafeteria trays
- Door skins
- Furniture
- Electrical circuit boards and boxes
- Personal water craft
- Satellite dishes
- Shower/tubs and sinks
- Utility boxes

A pre-manufactured compound is a combination of some or all of the following: thermoset resin, catalyst, mold release, pigment, filler, various additives, and fiber reinforcement.

Compounds can be produced in several forms, including sheet molding compound (SMC), bulk molding compound (BMC), and wet molding compound.

Two additional compound forms are Low Pressure Molding Compound (LPMC) and Low Pressure, Low Temperature Molding Compound (LPLTMC). These compounds can be either in sheet or bulk form but are specially formulated to allow molding at lower pressures and/or lower temperatures than conventional SMC and BMC. Lower molding pressures mean lower press tonnage requirements, which reduces the capital expense for a new press or increases efficiency of an existing press. Lower molding pressures can also mean lower tooling costs since materials other than tool steel can be used. Lower molding temperatures can result in lower tooling costs and lower energy costs.

Table 10-1 compares the various types of compounds.

Table 10-1. Various types of compounds used in compression molding

Property	Sheet Molding Compound (SMC)	Bulk Molding Compound (BMC)	Wet Molding Compound
Part cross-section	Complex	Complex	Uniform
Parts per eight-hour shift	100-500	100-1000 (could be higher if multiple cavity molds used, i.e., dishes or electrical outlet boxes)	50-100
Compounding equipment	SMC machine and required mixing and dispensing equipment	BMC mixer	Mixer
Time required for maturation after compounding	2-5 days	0-2 days	None
Glass type	Normally chopped, but may include unidirectional or rolled/mat products	Chopped	Preform or rolled/mat products
Mold charging	Charge weight and geometry are predetermined. Charge cutting and loading is done manually or by computer-controlled slitting and loading.	Various (manual, injection or transfer)	Place preform in mold by hand and pour resin over
Molding temperature	Conventional: 270-320°F (132-160°C) Low temperature: 180-220°F (82-104°C)	Conventional: 270-320°F (132-160°C) Low temperature: 180-220°F (82-104°C)	Room temperature to 300°F (149°C)
Molding pressure	Conventional: 500-3000 psi Low pressure: 50-200 psi	Conventional: 500-3000 psi Low pressure: 50-200 psi	<50 psi
Mechanical properties	Good to high (with roll good or unidirectional fibers)	Low	High