HAITIAN INTERNATIONAL

HAITIAN

PLASTICS MACHINERY

Thermosetting product

BMC

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Thermosetting material

Thermosetting plastics are characterized by a chemical reaction and hardening at a certain temperature after a certain time of heating, pressurization or addition of hardener. After hardening, the chemical structure of the plastic changes, the texture is hard, insoluble in solvents, heating is no longer softened, and if the temperature is too high, it will decompose.

Common thermosetting plastics are phenolic plastics (PF, commonly known as Bakelite powder); Unsaturated polyresin; BMC … ...

Thermosetting material

——BMC

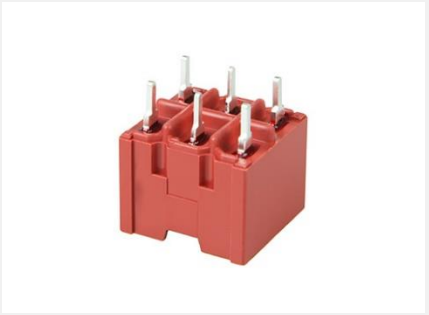
BMC(DMC/Bulk Molding Compound)

Its main raw materials are GF (cut glass fiber), UP (unsaturated resin), MD (filler calcium carbonate) and various additives, which are fully mixed into a pellet prepreg.

- **Dimensional stability**: Its coefficient of linear expansion is smaller than that of ordinary thermoplastics, so it has high dimensional stability and dimensional accuracy. The influence of temperature on its dimensional stability is small, but the influence of humidity is more serious, and the BMC will expand after moisture absorption.
- **Mechanical strength**: Its tensile, bending and impact strength performance is higher than that of thermoplastics, and its creep resistance is also better than that of thermoplastics.
- **Water and solvent resistance**: It has good corrosion resistance to water, ethanol, aliphatic hydrocarbon, grease and oil. BMC (DMC) water absorption is low, and the insulation performance is still good after soaking for a day.
- **Heat resistance**: Heat resistance is better than general engineering plastics, and can be used at 130℃ for a long time.
- **Aging resistance**: it can be used for 15 to 20 years indoors, and its strength retention rate is above 60% after 10 years of outdoor exposure.
- **Electrical performance**: arc resistance is the most prominent, which can reach about 190 seconds.

Thermosetting product

BMC has good physical properties, electrical properties and mechanical properties, so it is widely used, such as the production of mechanical parts : transmission components, intake pipes, valve covers, etc. It is also widely used in aviation, construction, furniture and other aspects that require shock resistance, high temperature resistance, flame retardant, beauty and durability. In its traditional electrical field, its use is also more and more extensive.



Thermosetting product

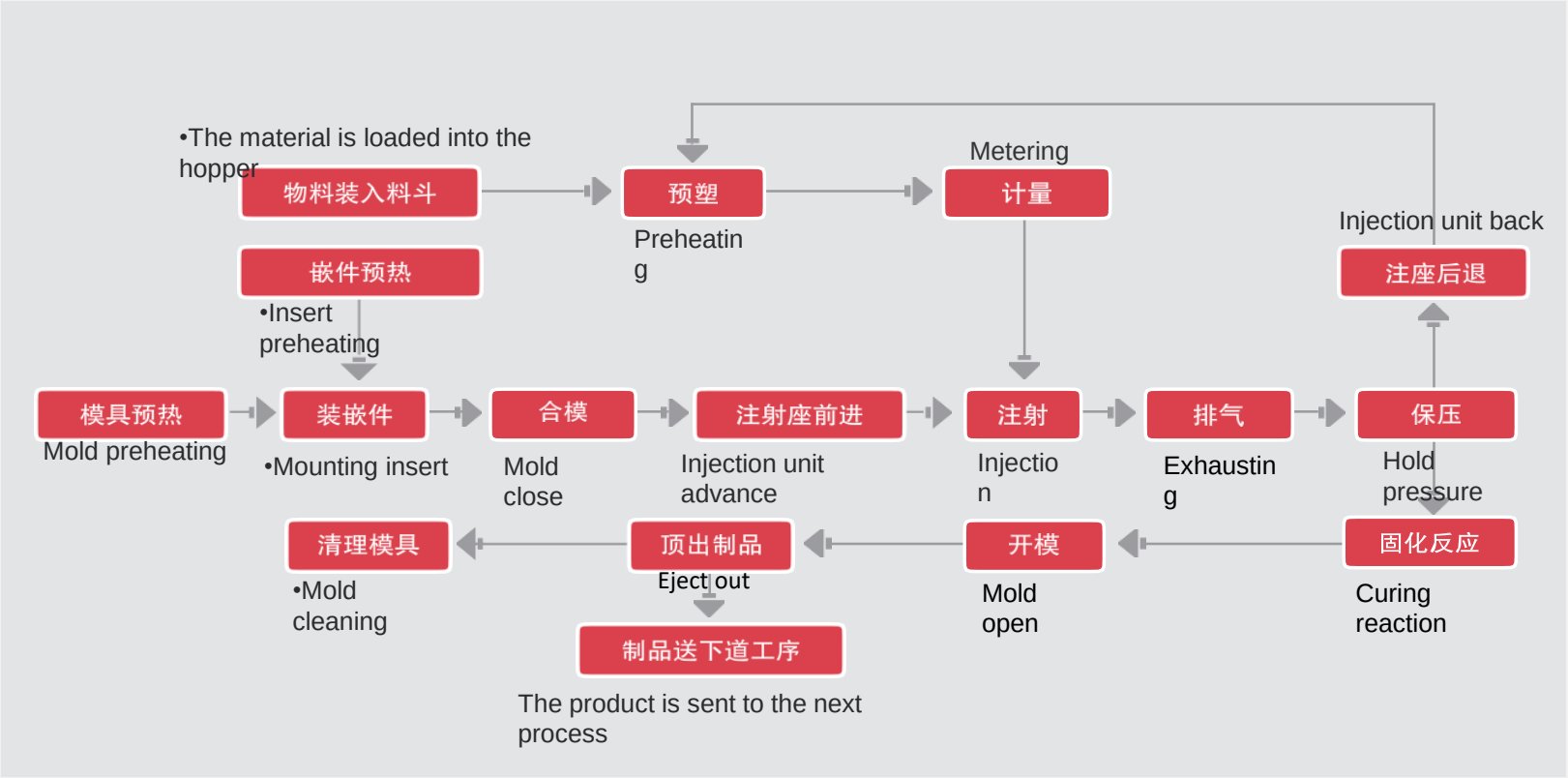
低压电器和电子元器件

车灯反射体及其它

端盖支撑件和绝缘塑封件

Injection molding process

——Technical process



Injection molding process

The molding of thermosetting plastics is gradually melted and plasticized by heating, and a chemical reaction occurs at the same time. Under the continuous action of pressure and heat, the component is formed in the mold and crosslinked curing becomes the finished part.

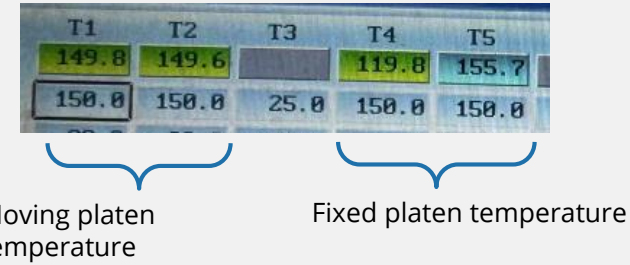
The injection molding process is to put the raw material into the feeding cylinder, press the raw material into the rotating screw through the built-in pressing ram to charge the material, and inject it into the mold through the push of the screw to cure the molding. Mold temperature is much higher than barrel temperature. In fact, when the plasticization enters the mold cavity, it has reached the temperature required to be able to cure the reaction, so the plastic can cure quickly in the mold cavity. Shorter production cycle than pressing molding.

Injection molding process

•——Barrel temperature and mold temperature

During injection molding, the BMC is required to maintain low viscosity flow dynamics at barrel temperature for a long time. The barrel temperature should be able to meet the BMC low limit. The barrel temperature is controlled by two or three zones, the near hopper end is low, and the near nozzle end is high. Generally, the difference is 20-60℃

Mold temperature: When thermosetting plastics are heated, their curing speed increases with the increase of temperature, and only when the temperature corresponding to a fairly high curing degree is selected as the mold temperature, can they be plasticized and cured in a relatively short time (generally controlled at 135~185 ° C, according to the actual raw materials and products).



Injection molding process

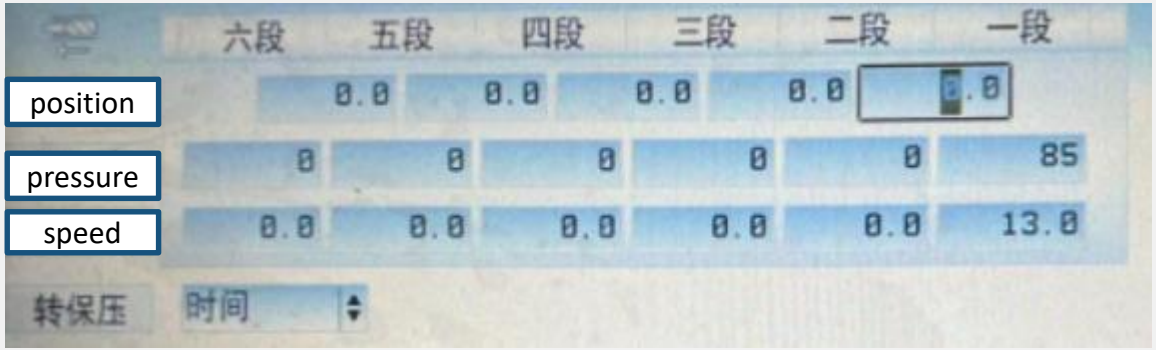
——Screw speed and back pressure

With higher speed, the shearing effect of the raw material is greater, and the heat generated by friction is increased, in order to minimize the shear of the glass fiber, so the screw speed should be set at a low value. For thermosetting products, it is generally 20~50r/ min. According to the viscosity of BMC, low back pressure is appropriate.

Injection molding process

——Injection pressure and injection speed

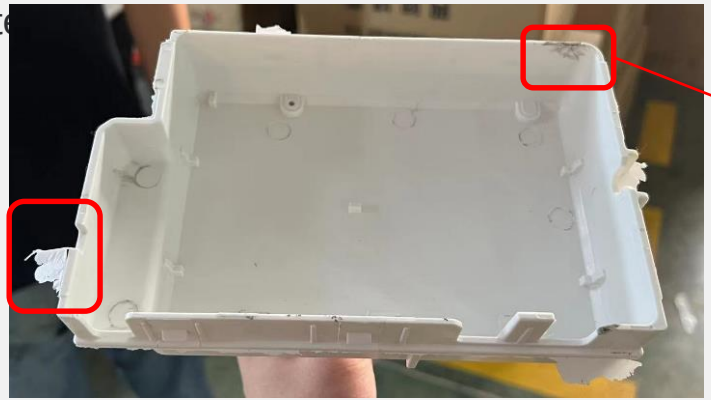
The injection pressure depends on factors such as the fluidity of the plastic, the curing speed and the mold structure. When the plastic fluidity is low, and the curing speed is fast, with a higher mold temperature, a higher injection pressure should be selected when the mold flow is large with a complex shape.



Injection molding process

——Injection pressure and injection speed

Injection speed and injection pressure play a complementary role. The increase of injection speed helps to improve the surface quality of plastic parts and shorten the curing time, but it is not conducive to exhaust gas and increase the orientation degree of glass fibers.- Therefore, a lower injection speed should be used under the premise of ensuring the surface quality of plastic parts. Some data show that when the phenolic resin is injected, the higher mold temperature and the slower injection speed can increase the tensile strength and tensile bending strength of the parts and reduce the shrinkage rate

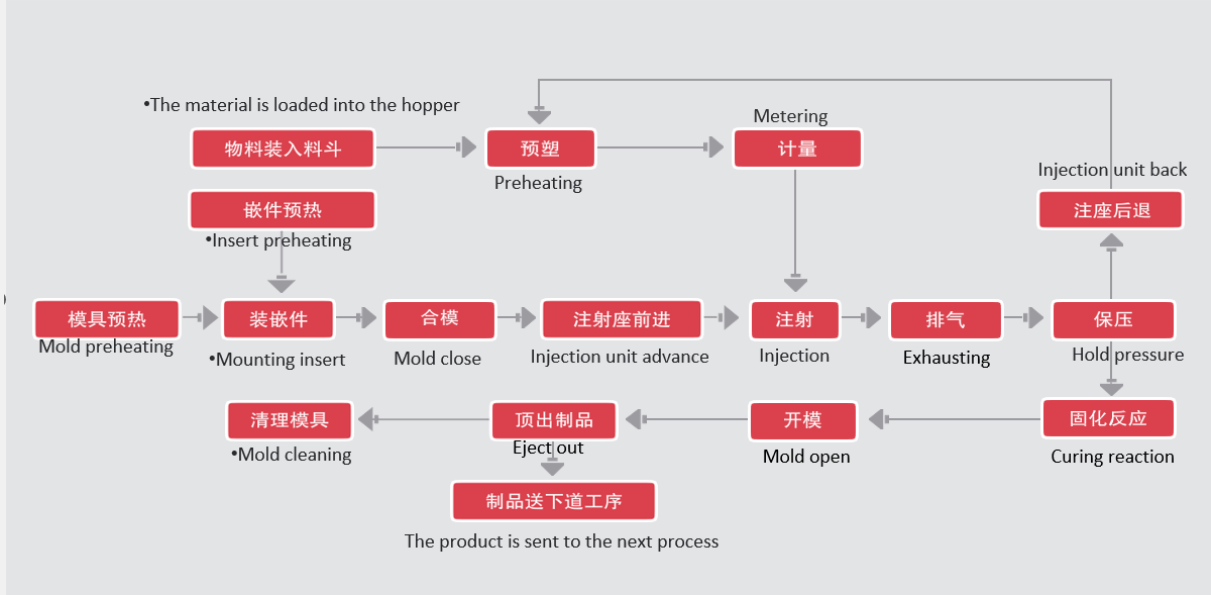


•Scorch marks from trapped air

•A flash occurs at high injection pressure

Injection molding process
——Cycle time

Cycle time refers to the total time taken to inject a molded part. Including injection, pressure holding, plasticizing, heat preservation curing, mold opening, taking out parts and closing mold time. In each operation step, the proportion of heat preservation and curing time is the largest 。



Thermosetting material——Pressure forming

Pressure molding, it is the powder, granular, or fiber resin raw materials into the heated negative mold groove, close the positive mold and heat it to melt, and under the action of pressure to fill the material with the mold cavity, forming a mold product with the same shape as the mold cavity, and then heating (so that it further cross-linking and curing) or cooling (thermoplastics should be cooled to harden it), The product is ready after ejection.

For the molding process, the molded product is beautiful, the size is accurate and the repeatability is good, but the procedure is complex and the cost is relatively high, and it is usually only suitable for small and medium-sized products

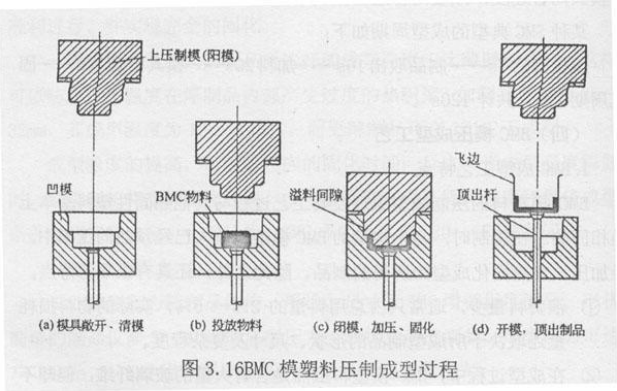
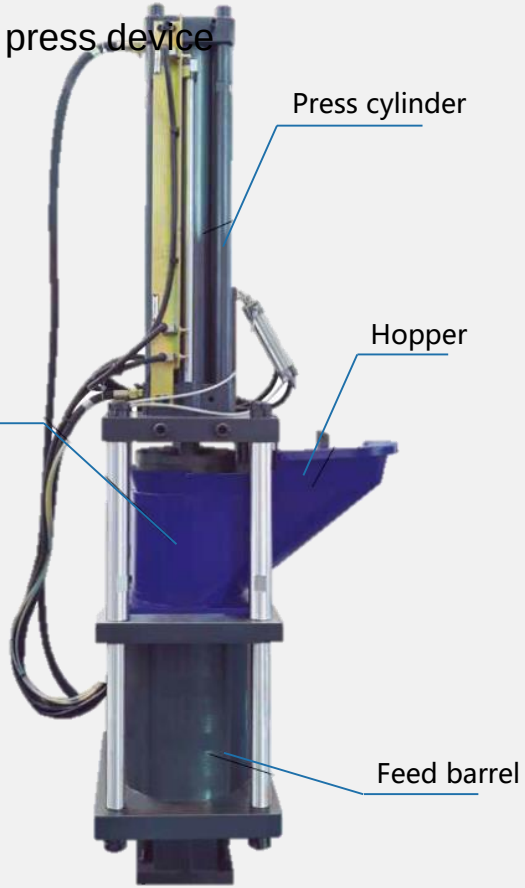


图 3.16BMC 模塑料压制成型过程

•Special machine for thermosetting industry

•——BMC material press device



» The convenient feeding device can add raw materials in batches, which can optimize continuous cycle production of the machine and improve production efficiency.

» Forced feeding system, by controlling pressure, flow, smooth and uniform extrusion BMC raw materials into the rotating screw for material charge, accurate and stable measurement.

» The specially designed built-in pressing ram is convenient to extrude raw materials, minimize the amount of residual material in the feed barrel, greatly reduce the waste of raw materials, and facilitate the cleaning of residual materials.

» Material level monitoring system, lack of material alarm, the machine action automatically stop when no material .

» Independent control of the oil circuit system, the feeding system can be set through the control panel.

•Special machine for thermosetting industry

•——BMC

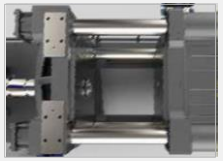
Main feature:

» The use of bimetal screw, small length-diameter ratio, easy to replace materials quickly, reduce the residence time of plastic in the barrel; Zero compression ratio, prevent friction overheating, reduce the chance of curing.

» The special screw groove and check ring design maintain the integrity of the glass fiber, accurate metering, and stabilize the pressure of the plasticizing system.

» Special cylinder design, operating screen real-time monitoring of barrel temperature, barrel temperature control using sleeve type internal circulation mode, reserved water or other control interface, easy to control and replace.

» Fixed and moving platen reserve 220V automatic mold heating and temperature control interface, the signal is directly connected to the machine computer, and is visually displayed on the computer screen.



*Mold insulation
Using imported composite material, high strength, small deformation, long life, remarkable heat insulation effect

•Thermosetting machine special plasticizing components
•Wear-resistant bimetal screw and barrel, carbide nozzle

•Linear guide rails are used for injection
•Low friction coefficient, high precision, low energy consumption

•High rigidity closing mechanism
Professional software finite element optimization, high rigidity and high strength support dry cycle faster

•Professional injection molding machine control system
Simple operation, fast response, high control accuracy, real-time Monitor production process

•Well-known brand high-performance electronic control components
Long service life, reliable component quality, to ensure the long-term stable work of the machine

THANKS