



## FORMATION OF PRODUCTS FROM POWDERED POLYMERS BY ROTATIONAL AND BLOWING METHOD

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**ABSTRACT:** - This article describes the schemes for molding products from powdered polymers by rotational and inflatable methods, the order of operations and requirements for them, the advantages and disadvantages of the system.

**KEYWORDS:** Rational, polymer powder, molds, polyethylene, tanks.

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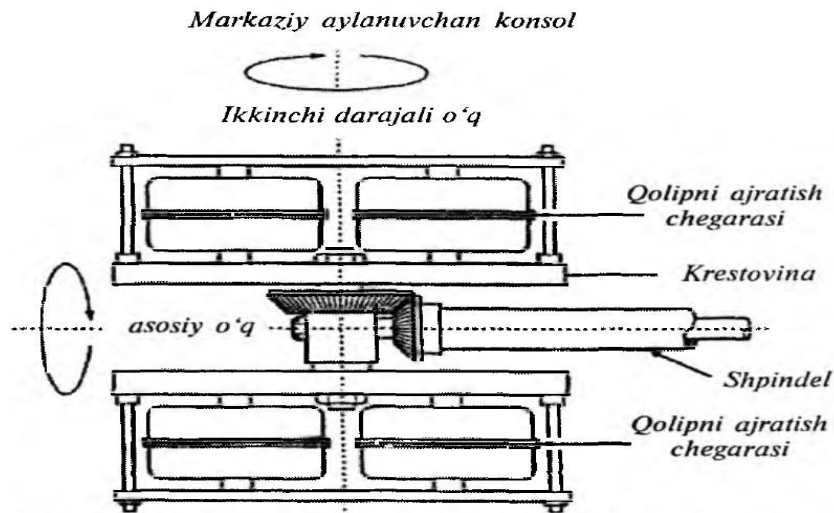
## INTRODUCTION

Rotational molding is a method of producing hollow products. To do this, the thermoplastic must be in the form of a polymer powder or paste. Forming consists of the following operations: a certain amount of polymer is poured into a hollow mold made of metal, which is closed and rotated. The mold is heated to the liquidus temperature of the polymer. When the metal is molded, the polymer material is evenly distributed on the inner surface, compacted, and forms a monolithic coating of definite thickness. In this case, the liquid sticks to the mold due to centrifugal force and adhesion. After cooling, the mold is opened and the finished product is removed. The two-axis rotary forming device is shown in the figure [1-7].

### Materials and methods

What we need in the 1st place to make the rotation technology is polyethylene. Because

polyethylene is the most important material. This polyethylene comes from the Shurtan gas plant. Granules are released from the plant and distributed in bags. It is granulated to a powder in a mill and diophene and benzene are added to it with a filler ratio of 0.8% to 0.1%. These are added to bring it to a certain state. They protect our polymer composite materials from solar radiation from decomposing when combined with toxic chemicals [8-14]. After mixing the powdered materials, open the mold and add the required amount of high-pressure polyethylene and low-density polyethylene powder. How much polyethylene is added depends on the thickness of the wall. After casting, the mold is closed and then fastened to the rationing device, then heated by means of awnings, and the mold is rotated perpendicular to each other. It is heated to melt at 320 °C and rotated for 20 min and cooled by air [13-18].



**Figure 1. Two-axis rotary forming device**

Polyethylene is mainly needed to implement the rotation technology. Because polyethylene is the most efficient and convenient material in the creation of this technology. It is not difficult to find these polyethylene products in the local market. There are enterprises producing such polymeric materials in the country. Such materials were produced from the plant in the form of granules. It is ground to a powder in a mill, with the addition of diophene and benzene at a ratio of 0.8% to 0.1%. These are added to make it specific [17-29].

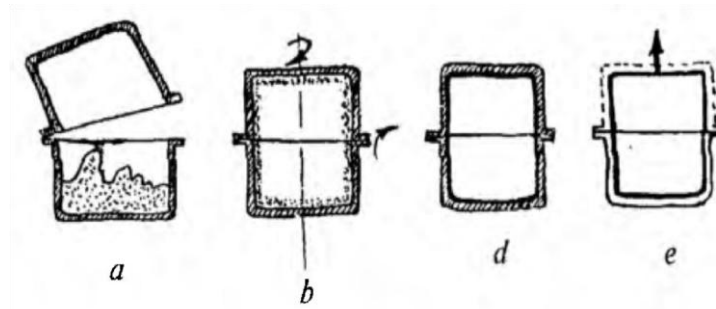
They protect our polymer composite materials from decay when combined with toxic chemicals. Then, after mixing the

powdered materials, open the mold and add the required amount of high-pressure polyethylene and low-density polyethylene powder. After casting, the mold is closed and then fastened to the rotating device, then heated by awnings and the mold rotates perpendicular to each other. It is heated to melt at 320 °C and rotated for 20 min and cooled by air. The mold will then open. We use these reservoirs as agricultural spraying tanks. Polyethylene, polyethylene, polyethylene [—CH<sub>2</sub> — CH<sub>2</sub>—] is a colorless, semi-transparent substance with a carbochain polymer. Depending on the method of obtaining the liquidus temperature 105—130 °C, density 920– 970 kg / m<sup>3</sup>. High elasticity and elongation resistance. Resistant

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to alkalis, chlorides, sulfates, fluorides and organic acids; chlorine and fluorine. Soluble in carbohydrates above 80 °C and their chlorinated derivatives; resistant to radiation; physiologically harmless. Polyethylene is one of the cheapest polymers in the world in the production of thermoplastics. In industry,

ethylene is polymerized in 3 different ways: high pressure (1200-1500 hp), medium pressure (30-40 hp) and low pressure (1-7 hp). It is used in the manufacture of electrical insulating coatings, films, corrosion-resistant materials, unbreakable containers and others [21-28].



**Figure 2 Rotational forming operations**

a - fill the mold with raw materials; b is the formation of the product; d - cooling of this product; e - removing the item from the mold.

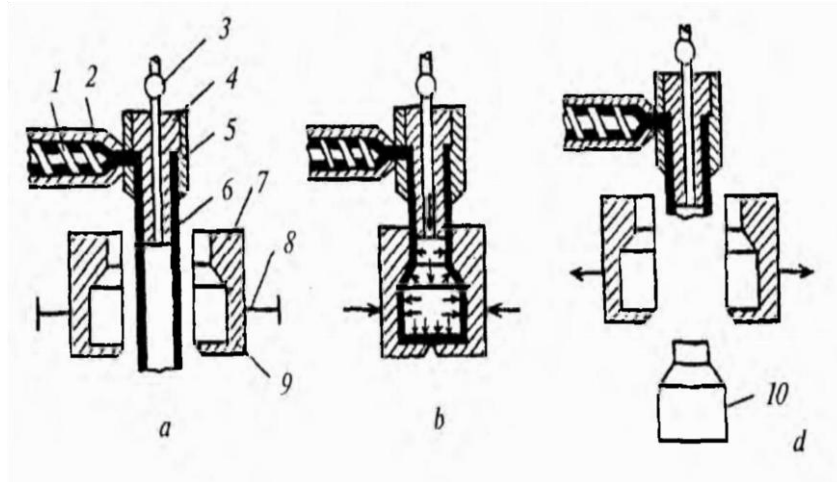
Rotational molding (Figure 2) has the following advantages over other methods:

- You can get large items;
- The thickness of the product is almost the same;
- Almost no waste;
- Provides residual voltage in the product;
- Low cost of equipment;
- High economic efficiency.
- The disadvantages of this method are:
- Formation time is long;

- Low density of the material of the product;
- The dimensions of the item are not clear.

The following thermoplastics (in the form of paste) are used to obtain products by this method: polyvinyl chloride, low and high density polyethylene and their mixture; polyethylene filled with carbon powder, polyamides are used. The maximum volume of removable material is 500 l, and the wall thickness can be up to 16 mm [29-37]. Formation by rotational puffing. Extrusion of thermoplastics (or injection molding) into a "sleeve" mold and blowing it into a hollow object is called puffing (Figure 3).

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**Figure 3 Scheme of extraction of hollow tanks by extrusion**

*a - obtaining a tubular blank by extrusion; b - zagotovkani*

*blowing and molding; d - take the item. 1 - auger; 2 - extruder*

*cylinders; 3 - tap for delivery of compressed air; 4 - dorn; 5 - mouthpiece;*

*6 - tubular blank; 7 - half mold; 8 - device for closing and opening the semi-mold; 9 - press edge; 10 - item.*

There are two ways to do this:

1. Remove the workpiece from the pipe mold using an extruder and blow compressed air into it.
2. Take a mold on a casting machine and blow it on this machine.

The following polymeric materials are mainly used in this method: polyethylene polystyrene, polyethylene terephthalate, polyvinyl chloride and others. From these materials you can get a variety of containers: bottles, canisters, containers with a capacity of 0.005 to 500 l. The main parts of the machine are: extrusion machine, head,

forming mold, mold closing and opening mechanism and pneumatic system for blowing [38-49].

### CONCLUSION

The basic process is almost the same as the process of extruding thermoplastics.

The fact is that the front of the workpiece, which is protruding from the head, cools down a bit, and the part closest to the head is warmer, so the blowing of the workpiece may be different from the longitudinal. Therefore, as much as possible, the viscosity of the blank is kept high so that the blank does not break.

If the flow rate of the liquid is increased, then

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the polymer can be destroyed. The main parameters of the process include:

- Extrusion temperature;
- The speed of the workpiece from the device;
- The degree of blowing of the workpiece;
- Temperature of the mold;
- Cycle time;
- Performance of the unit.

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