

Innovative design of multi-slide bend injection mould

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Abstract: This paper uses a common water pipe joint as an example, explains the design main point and work process of eluting injection mold, and the innovation point of mold design: The design method of arc core-pulling mechanism and gear driving slide block is adopted skillfully, which solves the problem of mold reverse demoulding well.

Keywords: Arc core pulling, The gear drive, Slider plus slider.

1. INTRODUCTION

At present, the development of China's mold industry has come since the end of the 1980s, it has already passed the 20 years of rapid development. From the previous simple and coarse-processed process to the current full computer control, high-precision and high-speed processing, From the previous triangle, it draws to the current full-digital computer drawing, and the mold designer is also changed from 70 to 80 or even 90. Today, people all over the world are using Chinese-made products, and the large-scale production of industrial products is inseparable from molds, so the level of mold design and manufacturing directly affects the quality of products. In mold design, slider is a common mold structure, usually side core pulling, slider movement track is usually linear movement. This paper introduces the characteristics of this injection mold: the slide block is not only linear movement, using the first straight line after the arc movement, this program for injection mold design experience or mold design beginners have a good reference.

2. PLASTIC PARTS ANALYSIS

Plastic parts figure 1 shows: the product is 90 degrees pipe elbow, hard PVC material, PVC is mainly used for building water supply and drainage, light and durable, beautiful color, bright and smooth, aging resistance, long service life, excellent physical and chemical properties, chemical corrosion resistance, high impact strength, small fluid resistance, high mechanical strength, health and non-toxic. Shrinkage rate is 0.3~0.6%, the shape size of plastic parts is 53.31mm * 53.81mm * 24.3mm.

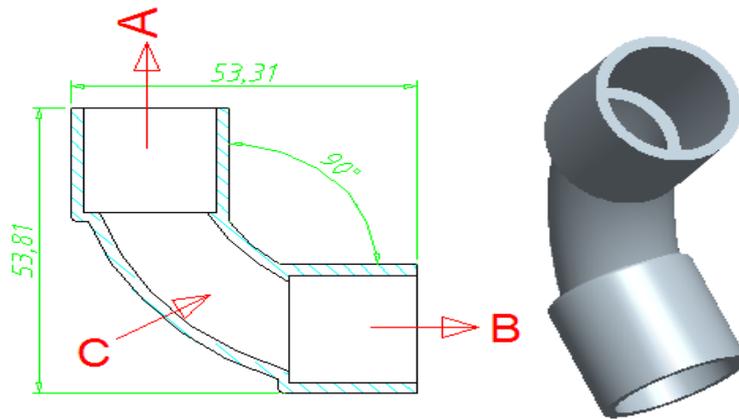


Figure 1 plastic parts

From the surface analysis, the structure of this product is simple. If the slider is moved in A and B respectively according to the usual practice, how can the mold be produced in product C? So, the product is simple does not mean that the mold is simple, this is a typical simple product mold complex. What would you do if you were a mold design engineer? It's impossible. Let's not do this product. Of course, this is not a principle of business survival. In fact, bending products are generally designed by arc core-pulling and gear driving. First of all, we divide the mold into three parts. The first part is the upper mold and the lower mold. This is the basic part of every mold. The second part is to make A slide block in the direction of A and B, which can solve the inverted buckle of two straight holes A and B. The third part is to divide another slide block inside the position of B slide block or A slide block, and this slide block is connected with the curved arc at C, which is called sliding up.

3. MOLD DESIGN

1. Demoulding mechanism design

According to the above analysis, as shown in Figure 2, the old problem comes up again: how to demould the mold at C? Now let's talk about the whole mold stripping process. When demoulding, first of all, the back and front molds are separated. Since the inclined guide pillar E is mounted on the front die, the inclined guide pillar is separated from the front die together. Because it is used together with slider AB, when the bevel guide column is separated, the slider will move laterally, which is bevel guide in design.

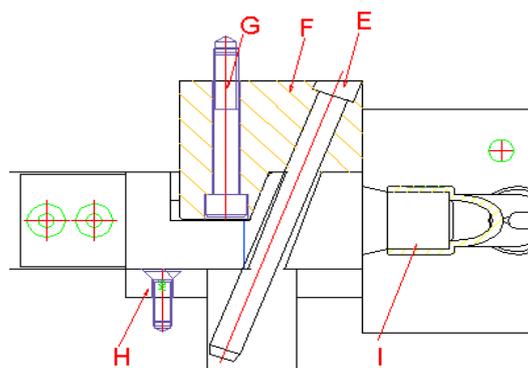


Figure 2 demoulding mechanism

There must be a long enough in the column to make the slider in the part of the product, and there is still a safe distance of 1 ~ 3mm. When the slide block AB completes its stroke, the large slide block K begins to rotate under the action of the rotating axis D. Of course, the rotating shaft is driven by the hydraulic mechanism installed below the rotating shaft gear rotation, so the time of this mechanism must be calculated well. If the AB slider has not finished the stroke, the hydraulic mechanism will drive the shaft to rotate, which will damage the slider A, or even the whole mold may be damaged. Because the slide block A and arc C are mounted on the large slide block K, the rotation of the large slide block K drives the slide block A and arc C to rotate together. When the bend C comes out of the product with the large slider K, the whole core-pulling action is completed. Of course the mold aspect looks easier, but it's still very difficult to make. The coordination between each mechanism, the stroke and positioning of the slider, the coordination between the gears, implicated knowledge is very wide, for beginners to understand the design may not come out. An important premise of this mold is that the curved slider C can come out of the hole of the product. If the arc bending slider friction with the product in the process of walking, then it will not work, so now product design engineers must consider the product mold problem, as well as the future assembly and other comprehensive problems.

2. Casting system design

Because the product use is very large, as much as possible a mold hole, product appearance requirements are not very strict. According to the special structure of the mold, the pouring system is designed as shown in Figure 3, and the commonly used balanced side gate is used for glue feeding.

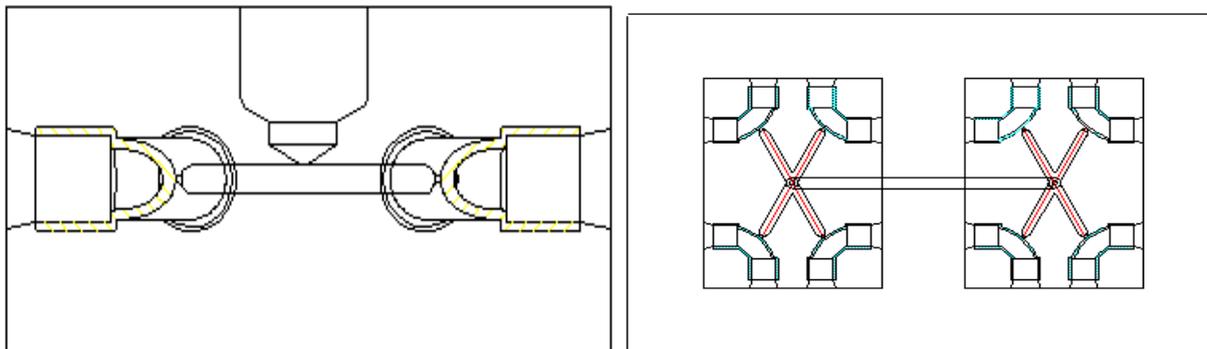


Figure 3 Casting system

The characteristics of the core, the model is two, each of the model has four points, the distance between the modes and the model is relatively large, so it is convenient for the slider, bending arc structure extraction, which will not interfere with each other, and it is also easy to process. This arrangement can make each product into the same environment, it can achieve at the same time into the glue, at the same time full. Each mold size is 150*200*40mm, using S136 mold steel.

3. Cooling system design

In the design of cooling waterway, the mold should be cooled evenly as far as possible, without interference with other institutions, and it should be convenient for processing. There are many sliding blocks in this mold, and the cooling system design is complicated. Since most of the product is in contact with the mold slider, the slider also has a cooling waterway. The front mold cooling system design: as shown in Figure 4, Because the structure of the precision is simple, the cooling system is also relatively simple. However, the product is a 90-degree bending arc product, so the product's

waterway cannot be parallel to the product. Parallel waterways can't cool the product evenly, nor can they be 90 degrees curved and curved.

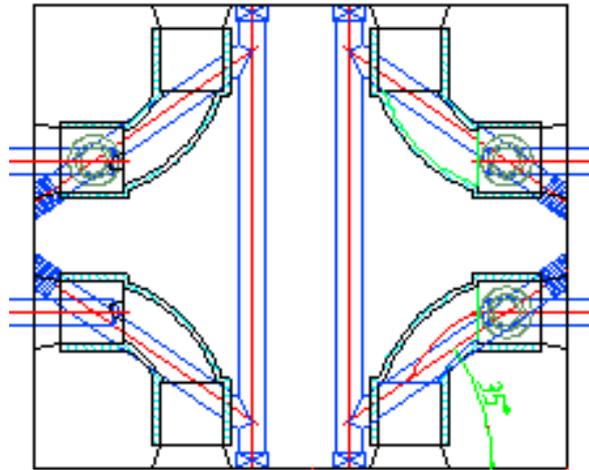


Figure 4 The front mold cooling system design

Although curved and arc-shaped waterways can make products cool more evenly, they cannot be processed. The current drilling machine is still not possible to complete the shape of the curved arc shape and the use of other advanced technology, the manufacturing cost is high, and the production interests of the company are not in line with the maximum production interests. Comprehensive economic benefits are considered to make 35 degrees with molds, which can reduce processing costs and achieve good cooling purposes. The front and rear mold waterways are similar in design, but avoid thimbles. Waterway design of slider: as shown in Figure 5, the size of slider is small, so large waterway cannot be made. Analysis shows that the two ends of the slider need cooling in the part of the product, but the size is very small, so a waterway with a diameter of 6mm is made. Add a spacer in the middle. If the spacer is not added, the part of waterway left in the product will become stagnant water, which seriously affects the cooling effect. As shown in Figure 5, pay attention to the path of the waterway.



Figure 5 Waterway design of slider

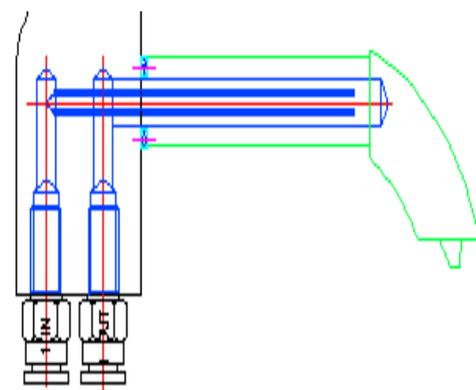


Figure 6 The waterway design

The waterway design of the curved slide block is shown in Figure 6: The analysis shows that the front part of the slide block is in the product. Normally, it is better to make a waterway, but the diameter of the slide block is only 14mm. If there is drilling to do water will certainly affect the degree of the slider, if you do not do water, will cause poor cooling effect, affect the quality, so that the designer in a dilemma. In order to cool the product well, try to make a 5mm diameter water hole, this hole is small

and long, especially difficult to process, and the water can only be turned. This waterway should pay attention to it, it is inserted in the middle of the aqueous hole, the water pipe is 4 * 2mm, and the water is from the middle of the water pipe, and then flows back from the perimeter of the water. This is good to use the water space.

4. Mold design

According to the above analysis, the bending die design assembly diagram is shown in Figure 7:

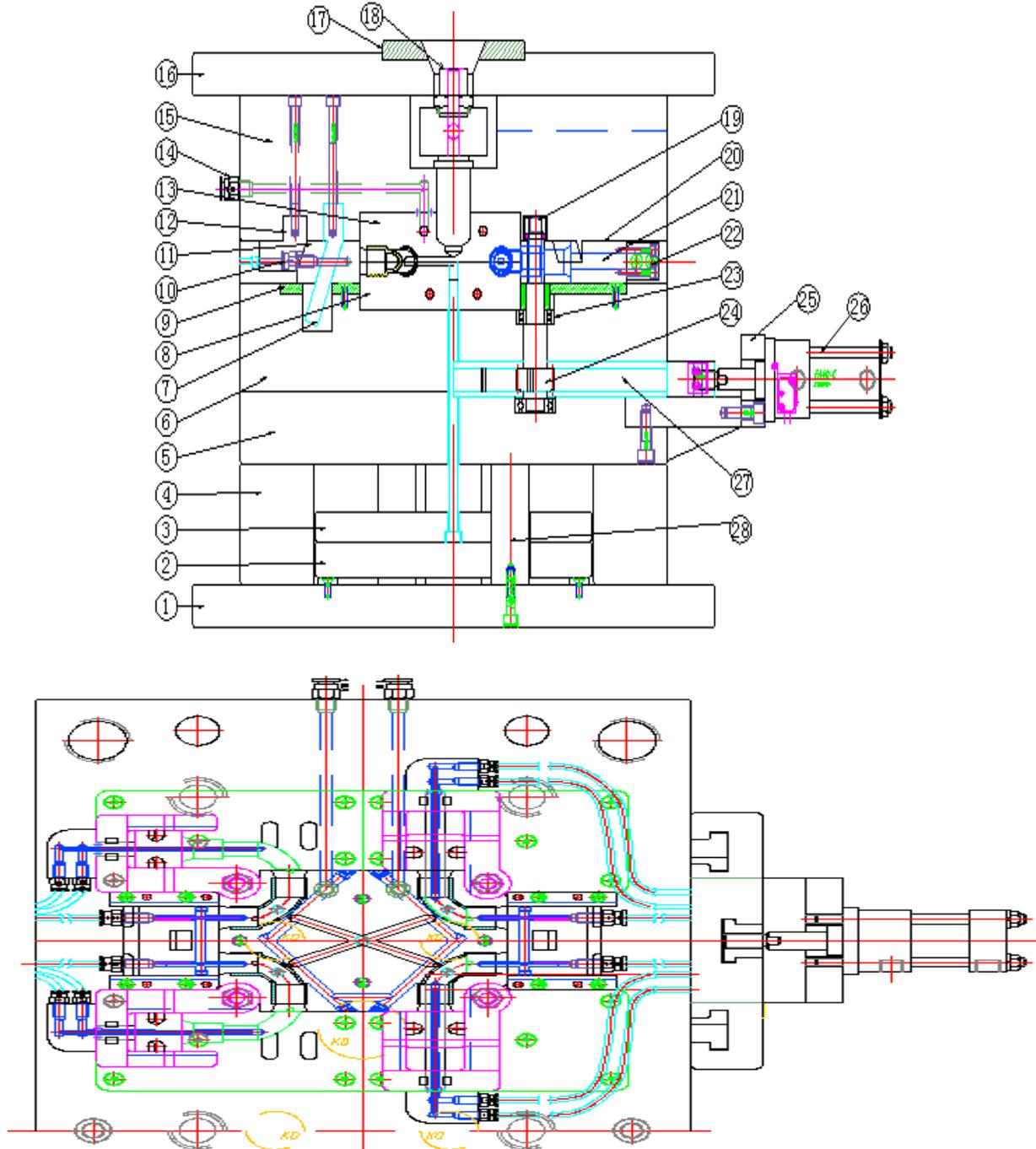


Figure 7 General assembly drawing of mold design

- 1 Bottom plate
- 2 Thimble bottom plate
- 3 Thimble bottom plate
- 4 Square iron
- 5 Backing plate
- 6B plate
- 7 Diagonal guide column
- 8 Rear mold kernel
- 9 Wear plate
- 10 The slider waterway
- 11 Slider
- 12 Locking block
- 13 Front die
- 14 Water pipe joint
- 15A Plate
- 16 Panel
- 17 Positioning ring
- 18

Nozzle 19 Rotation 20 Big slider 21 Curved sliding block 22 Water pipe connector 23 Bearing 24 Gear 25 Oil cylinder bracket 26 Cylinder (hot pressing mechanism) 27 Rack 28 Support column

In order to make the upper mold diagram see more clearly, I only grab half of the mold diagram, because the two parts are the same. The 3D diagram and the physical picture are attached in Figure 8, so that we can see the mold structure more clearly and understand the design method and principle of the mold.

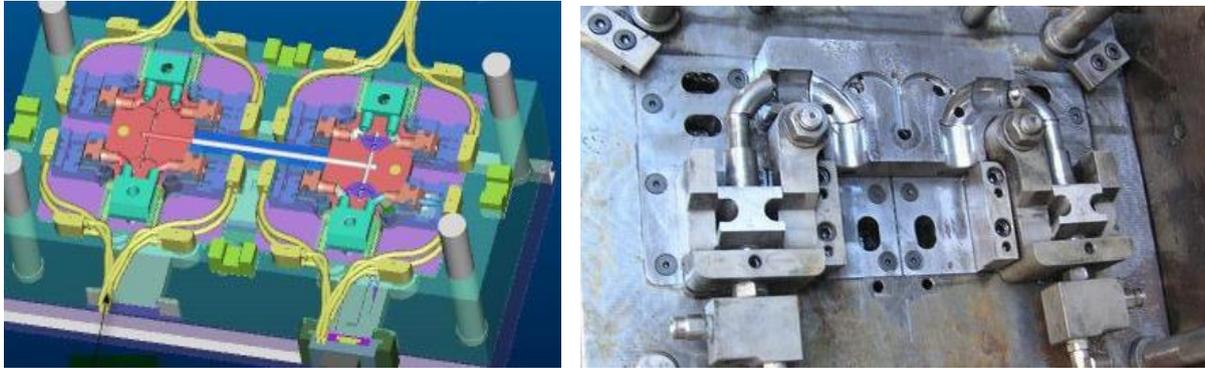


Figure 8 Bending Mold 3D

4. CONCLUSION

This article focuses on the mold design method of the bending product, for such products, the basic method is demolded by the gear rack of the bending slider. This mold has been mass produced, produced good plastic parts, and the quality of the mold is stable, long service life. The experimental results show that the mold structure design method is in line with the requirements of plastic parts, and the mold has high economic value, which can be used for reference in similar products.

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