

Stamping process of gasoline tank cover shell

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Abstract

Proportion of mold in the machinery industry is more and more big, has great research significance. Through the study of the structure of the mould and stamping process analysis can make us know more about mould technology and technology principle and development trend of stamping process and the importance [1]. For we use the learned knowledge to apply, to carry forward the mould in dustry in our country contributes an own strength. This paper designed a jeep steam shell stamping process and die structure, oil steam shell oil, mainly covering and sealing role. Its appearance is symmetrical, with no sharp corners structure, two circular groove through deep drawing forming, a hole with two distributions in the same plane, pitch position requirements, but no tolerance matching, the aperture by turning to the outer edge of the inner hole and forming, there are two hole distribution on flanging corner, which pulls the commune for ordinary circular edge.

Keywords

Stamping process, mold design, steam shell oil.

1. Introduction

Through the comparison of several schemes to determine the stamping process of the optimal solution: a. blanking, deep drawing for the first time; b. again, deep drawing, bulging; c. punching; d. inside and outside the flanging; e. measuring hole. a, b and d for compound die, c, d for single process model [2].

2. Organization of the Text

2.1 Process analysis of stamping parts

Jeep gasoline tank cover shell, mainly covers and seals. The two circular grooves are formed by deep drawing, one hole and two holes are distributed on the same plane, and the two holes are distributed on the side surface of the part. Through the above analysis, we can see that this part is a typical stamping parts, size accuracy requirements are not high, the production volume is larger, suitable for stamping method production [3]. Figure 1 shows the part drawing.

2.2 Determine the process plan

2.2.1 Sub-section Headings

- (1) blanking and drawing for the first time.
- (2) drawing and bulging again.
- (3) punching.
- (4) inside and outside flanging.
- (5) punching hole.

2.2.2 Operation combination and scheme comparison

Scheme 1: blanking , large cylinder drawing , small cylinder drawing , bulging , punching hole , middle hole flanging , outer edge flanging , punching hole.

Scheme 2: blanking and punching holes and holes, twice drawing depth and bulging composite punching, middle hole flanging, outer edge flanging and punching holes.

Scheme 3: blanking and drawing for the first time, drawing and bulging again, punching holes and holes, punching holes by flanging twice and punching holes.

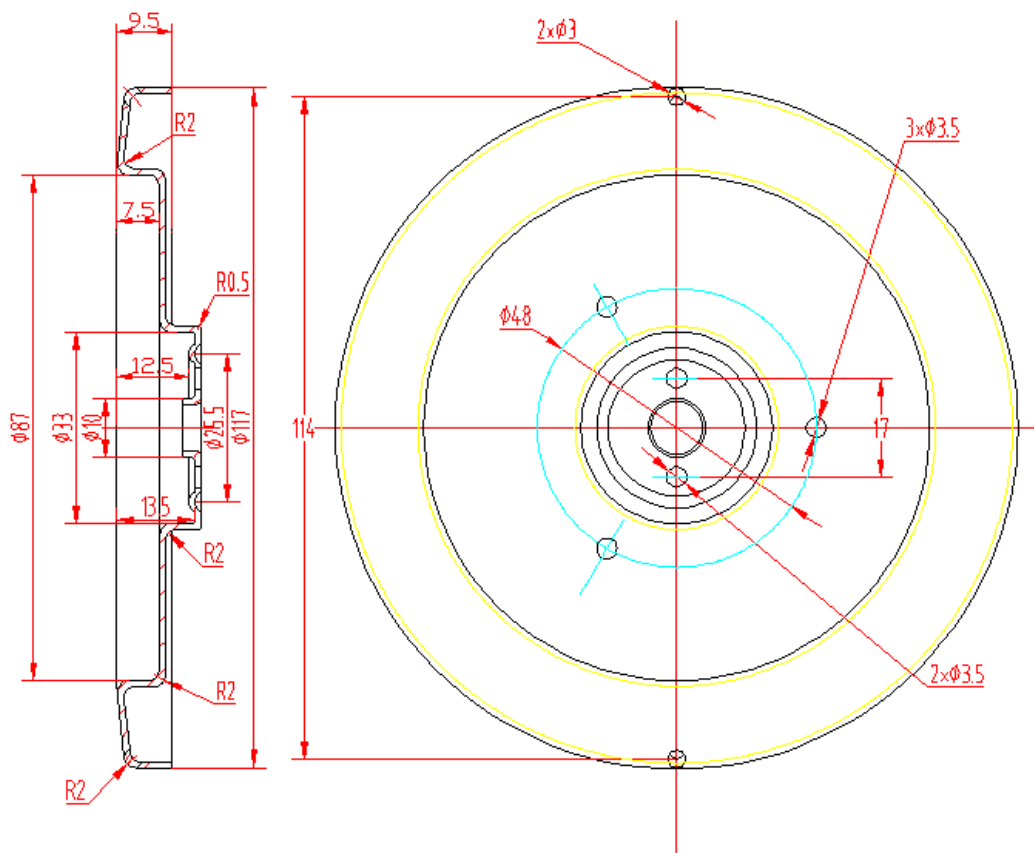


Fig. 1 Part drawing

2.3. Choose the best solution

By comparing the three options, we can draw the following conclusions: Scheme 1, the die structure is simple, but eight single-process dies are needed, the production efficiency is low, and the requirement of mass production of the workpiece is not favorable; In the second scheme, blanking and punching, drawing and bulging are combined and punched, so that the production efficiency is high, but the punching is arranged before the drawing process, so that deformation of the hole can be caused during drawing, and the precision of the hole is influenced. Scheme 3, blanking and drawing for the first time, drawing and bulging again, inside and outside flanging compound punching, production efficiency is extremely high, although the mold is more complex than a single process die, but because the parts are simple and symmetrical basin-shaped parts, die manufacturing difficulty is not big. Through the analysis and comparison of the above three schemes, considering production efficiency, production cost, die structure, die life and other factors, the stamping production using scheme 3 as the best scheme [4].

The processing procedures are shown in figure 2, 3, 4, 5 and 6.

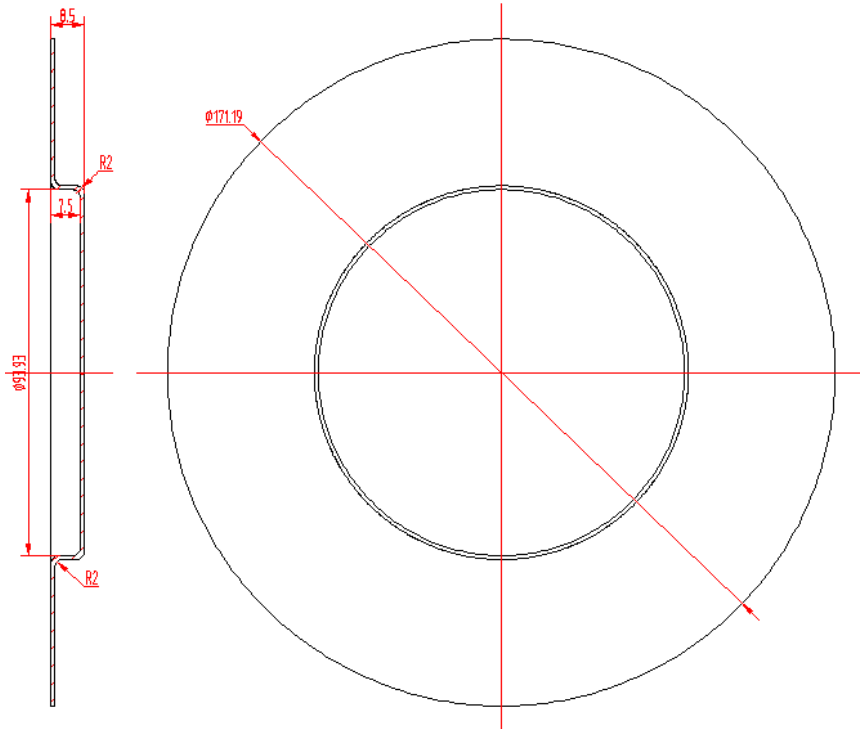


Fig. 2 Part drawing after blanking and drawing for the first time in the first process

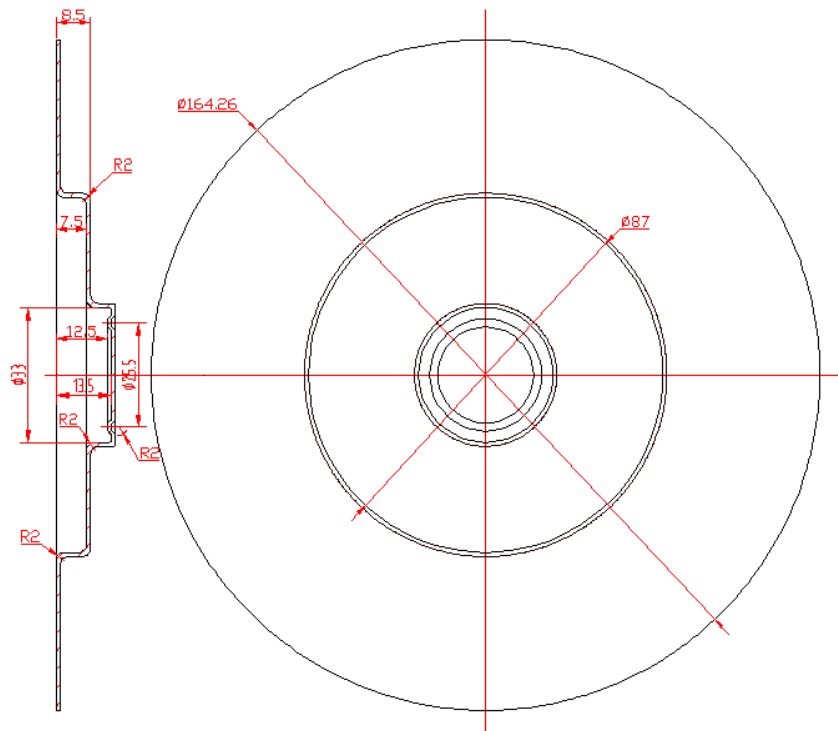


Fig. 3 Drawing of parts after drawing and bulging in the second process

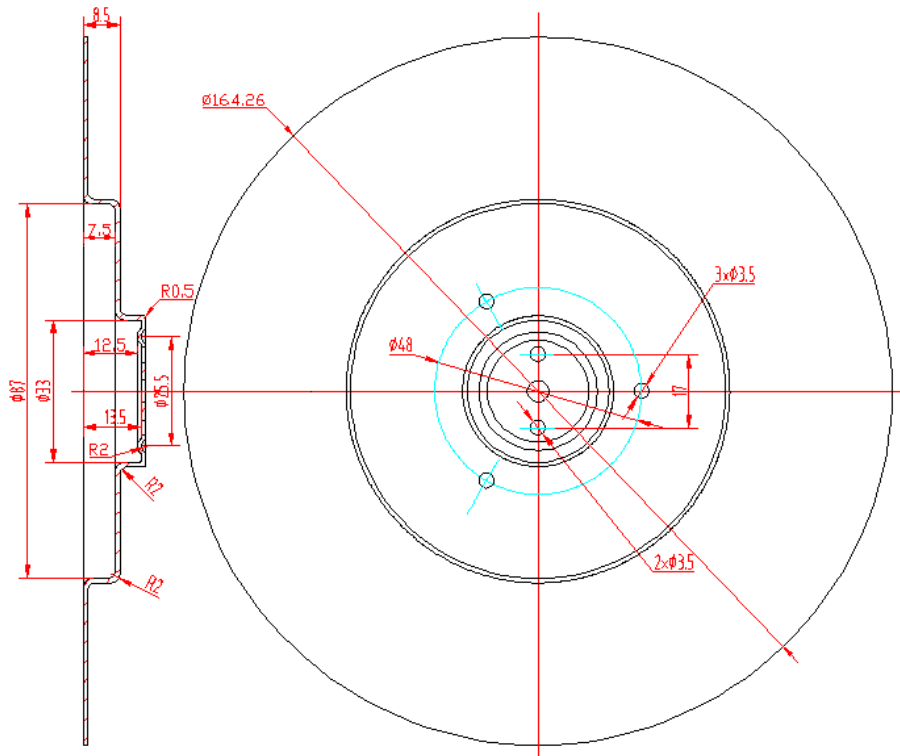


Fig. 4 Part drawing after punching in the third process

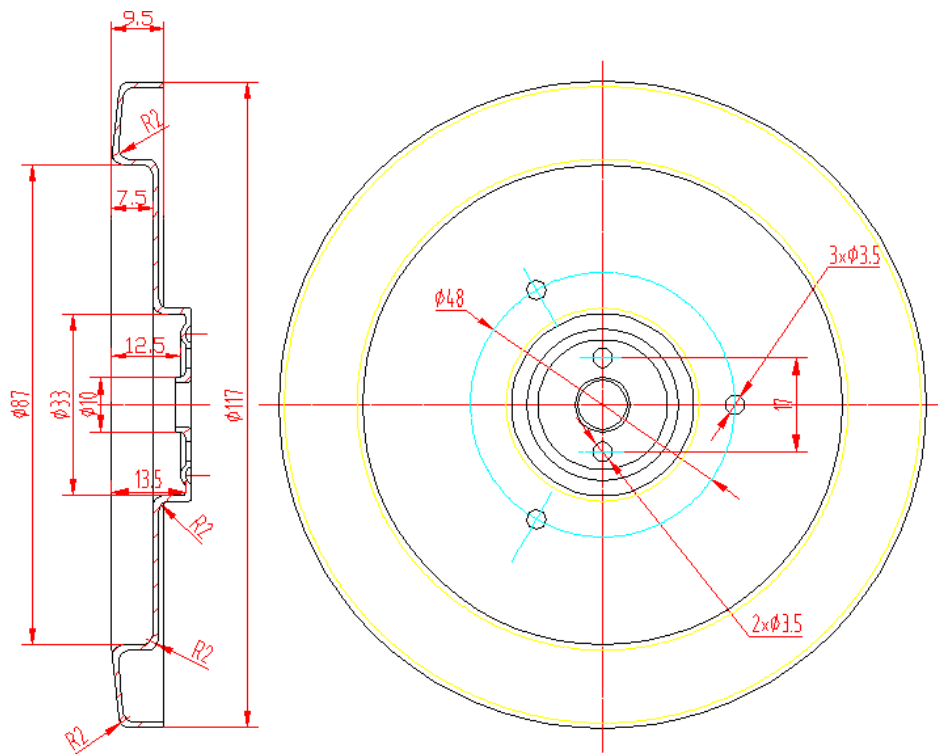


Fig. 5 Part drawing after flanging inside and outside the fourth process

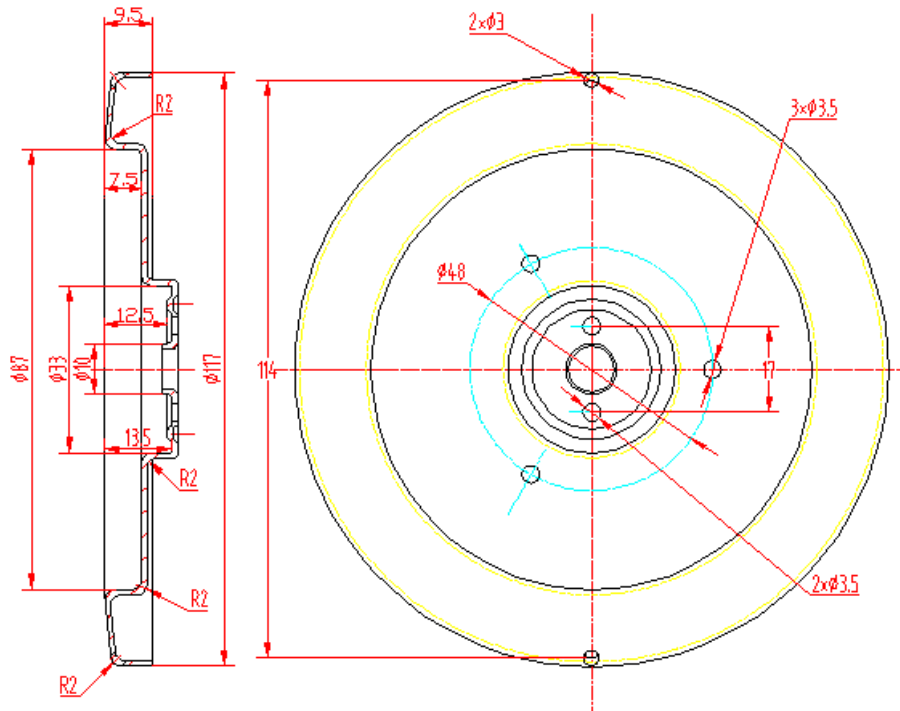


Fig. 6 Part drawing after punching side hole in the fifth process

3. Calculation of blank size

Blank size is the most important data for designing molds, so accurate calculation is required.

3.1 Drawing part blank size

$$A_1 = \pi d(h_1 - r) \tag{1}$$

$$A_2 = \frac{\pi}{4} [2\pi r(d - 2r) + 8r^2] \tag{2}$$

$$A_3 = \frac{\pi}{4} (d - 2r)^2 \tag{3}$$

$$\Sigma A = A_1 + A_2 + A_3 \tag{4}$$

$$D = \sqrt{(d - 2r)^2 + 2\pi r(d - 2r) + 8r^2 + 4d(h_1 - r)} \tag{5}$$

The blank diameter of the drawing part is calculated by the above formula:

$$D = 198.4\text{mm} \tag{6}$$

Blank development figure as shown in figure 7.

3.2 Select material

Jeep gasoline tank cover shell using 08 steel, 08 steel has low strength and good hardness, plasticity, toughness, easy to deep drawing, drawing, bending and welding characteristics [5].

3.3 Arrangement pattern

This part adopts single row layout, take lap edge width is 1 mm, edge width is 0.8 mm, as shown in figure 8.

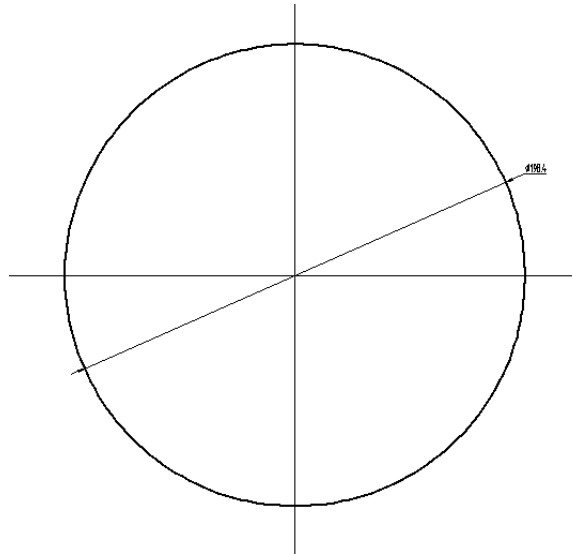


Fig.7 Blank development plan

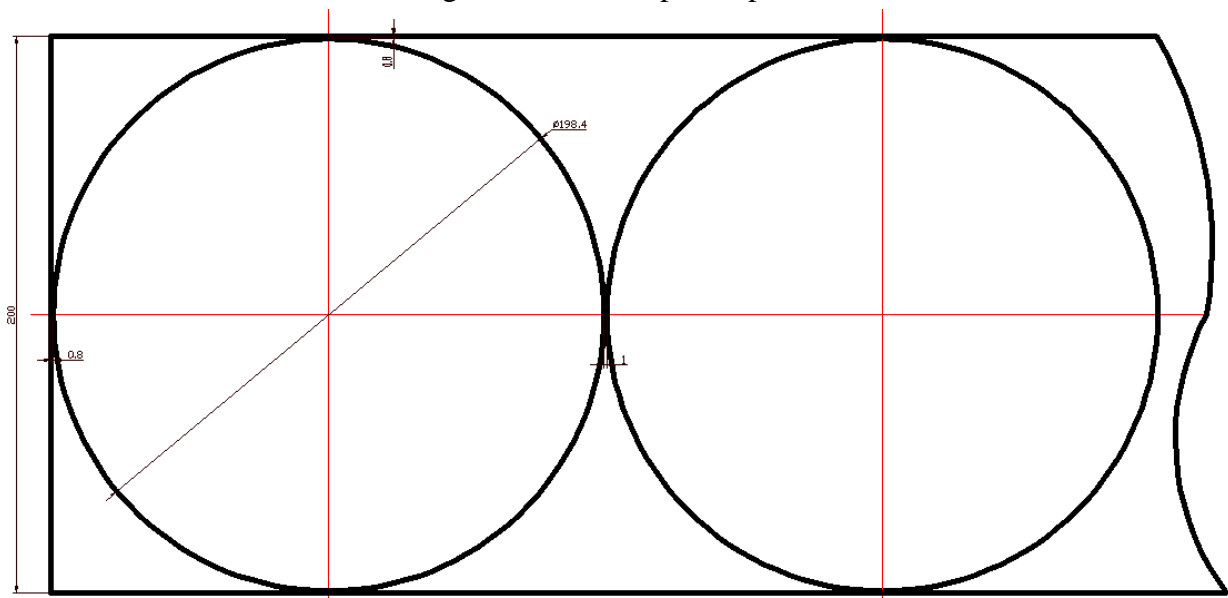


Fig.8 Single - row arrangement sample

4. Conclusion

The main works are as follows: (1) the stamping process of the parts of the gasoline tank cover of jeep is analyzed, and the structure of the parts completely meets the requirements of the stamping process; (2) through the analysis and comparison of each scheme, the best stamping process is determined; (3) the blank size and shape are determined by calculation, and the layout method with high material utilization rate is determined.

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