

## Design of the Quick Positioning Mechanism of the Universal Automatic Inspection Tool for the Side Door Hinge

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### Abstract

In order to realize the fast positioning of the hinge parts of the car door with the moving pair, this paper designs a kind of quick positioning mechanism of the General Auto side door hinge. The mechanism includes base plate, base plate, positioning main body and driving main body. The positioning pin, pressure head, back plate, servo mechanism and pressure sensor are used to realize the rapid positioning of door hinge parts. The mechanism integrates the size and structure of the general automobile side door hinge. It has the characteristics of universal strong, convenient to change type, simple structure, precise positioning, etc., and it can cooperate with the robot to realize automatic detection.

### Keywords

Door hinge, Positioning mechanism, Positioning body, Driving body.

### 1. Introduction

With the rapid development of domestic production line technology, the efficiency of production has been improved year by year. The efficiency of traditional inspection tools for parts has been unable to meet the production status. However, there are many convenient methods for the detection of general single parts, but for the assembly parts, especially the parts with motion pairs, fast positioning has become a problem to be solved. In order to solve the problems of low efficiency, high labor intensity and tedious operation of the traditional automobile side door hinge detector, this paper designs a mechanism which can quickly locate the door hinge parts to match the automatic detection.

### 2. Structure composition

The quick positioning mechanism includes a base plate, a base plate, a positioning main structure and a driving main structure, as shown in Fig. 1.

The positioning main structure is composed of door positioning mechanism, body positioning mechanism and calibration points. The door positioning mechanism is composed of main positioning pin 15, auxiliary positioning pin 16, door positioning support 17 and baffle 24. The positioning mechanism of the body part is composed of a slide rail fixing plate 23, a first linear guide rail 22, a third slider 25, and a body part positioning back plate 12. 2 is the calibration point, which is used for the calibration of the gauge.

The driving body is composed of a door clamping body and a body positioning driving body. The clamping body of the door part is composed of the auxiliary positioning head 13, the main positioning head 14, the second sliding block 20, the sliding block sleeve 21, the cylinder fixing plate 19 and the cylinder 18. When the cylinder 18 is working downward, pull the slider 20 to move vertically downward along the slider sleeve 21, and compress the door parts through the main pressure head 14 and the auxiliary pressure head 13. The body part positioning driving main body is divided into two parts: pressure sensing device and driving device. The servo motor 5 drives the synchronous belt and synchronous wheel 6, transmits the power to the lead screw 8 through the coupling 7, and then the lead screw 8 drives the first slider 9 fixed on the second linear guide rail 4 on the base plate 3 to move forward and backward. The first slider 9 transmits the movement amount of the servo through the connecting plate 10, the force sensor 11, the linear guide rail 22 and the slider 25 to the body part positioning back plate 12, so as to realize its back and forth movement.

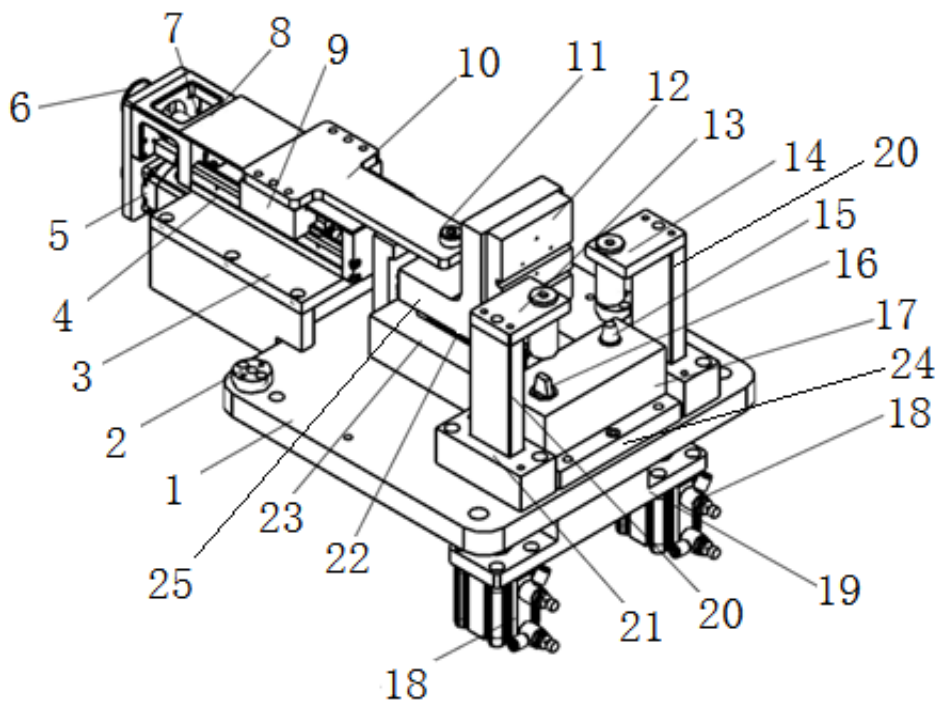


Fig. 1 quick positioning mechanism

1. Base plate 2. Calibration point 3. Bottom plate 4. Second linear guide rail 5. Servo motor 6. Synchronous belt and synchronous wheel 7. Coupling 8. Lead screw 9. First slider 10. Connecting plate 11. Pressure sensor 12. Body part positioning back plate 13. Auxiliary positioning head 14. Main positioning head 15. Main positioning pin 16. Auxiliary positioning pin 17. Door part positioning support 18. Cylinder 19. Cylinder fixing plate 20. Second slider 21. Slider sleeve 22. First linear guide rail 23. Fixed plate of slide rail 24. Baffle 25. Third slide

### 3. Working principle

The mechanism is mainly divided into two parts: door positioning and body positioning.

Positioning of door parts: first place the positioning hole of door hinge door parts in the main positioning pin 15 and auxiliary positioning pin 16, drive the cylinder 18 to work after placement, and drive the main pressure head 14 and auxiliary pressure head 13 to press down through the second slider 20, so as to realize the positioning and clamping of door parts and complete the positioning of door parts.

Positioning of body parts: the positioning backplane 12 of the motor car body parts is moved forward by the servo and slide mechanism. The moving angle of the door hinge body parts will gradually decrease with the positioning backplane 12 of the body parts. Meanwhile, the value of the corresponding pressure sensor 11 will change with the change of the hinge angle. When the positioning surface of the hinge body parts is parallel with the positioning backplane 12, the pressure value of the pressure sensor will be sent. When the servo motor stops working, the hinge state under the accurate angle can be obtained to realize the quick positioning of the hinge.

### 4. Structural features

The biggest feature of the structure is its strong universality. When detecting different door hinges for quick positioning, it only needs to replace the positioning support 17, the auxiliary positioning head 13 and the main positioning head 14 of the door parts with the main positioning pin 15 and the auxiliary positioning pin 16, and replace them with the parts matched with the inspected door hinge to complete the quick positioning.

## 5. Conclusion

- (1) The mechanism uses locating pin, pressure head, back plate, servo mechanism and pressure sensor to realize fast positioning of door hinge parts.
- (2) The mechanism is easy to operate and efficient when positioning the door hinge parts, and it can cooperate with the robot to realize automatic detection.
- (3) The mechanism integrates the size and structure of the common automobile side door hinge, which can realize the quick positioning of different hinges only by replacing parts.

## References

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