Binoculars Enclosure Design

Objective

The objective is to create a structural design for a set of binoculars with a discrete magnification power of 2.5:5.

The binoculars are designed for watching sports and other public events in stadiums, open areas and large enclosed spaces in the afternoon and in the coming dusk. The product lies within the lower price range.

The binoculars should meet the following criteria:

- Sitting comfortably in your hand
- Bright colors
- A special logo spot

The product's dust and water resistance requirements, based on the price category, did not require complete sealing of the product. The only special feature the device needed was splash protection.

The product's original optical circuit influenced the engineering solutions. The problem was that the binoculars had variable magnification. A magnification switching circuit was included in the specifications.

Solution

1. Design

The magnification switching mechanism and compact size of the product determined its exterior. Its small size with rounded forms lent it a special charm and appeal.

After a preliminary study of the design options allowing for a magnification switching mechanism, the customer chose the following option:

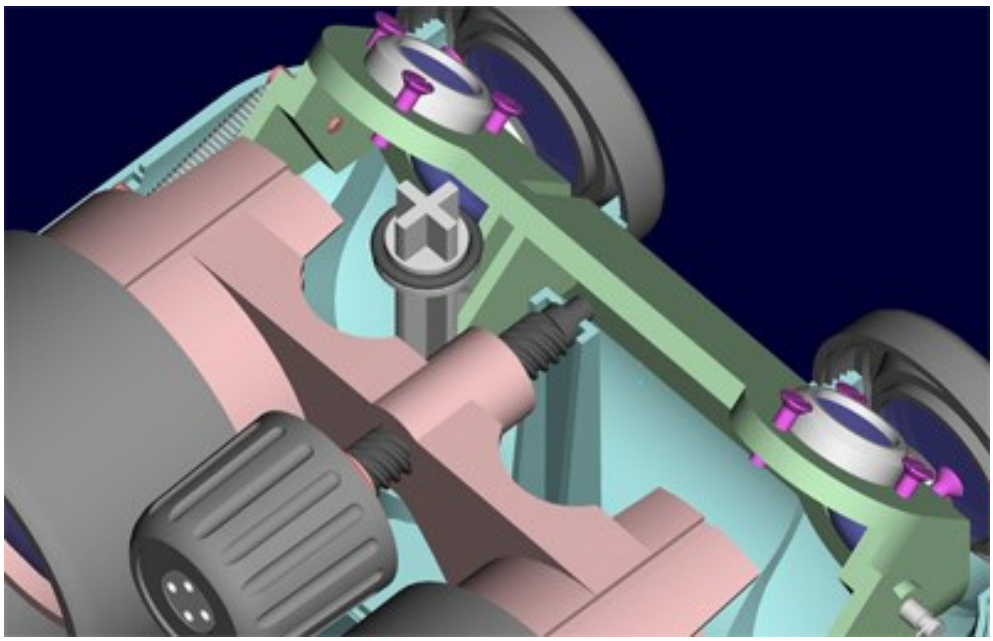
2. Structure

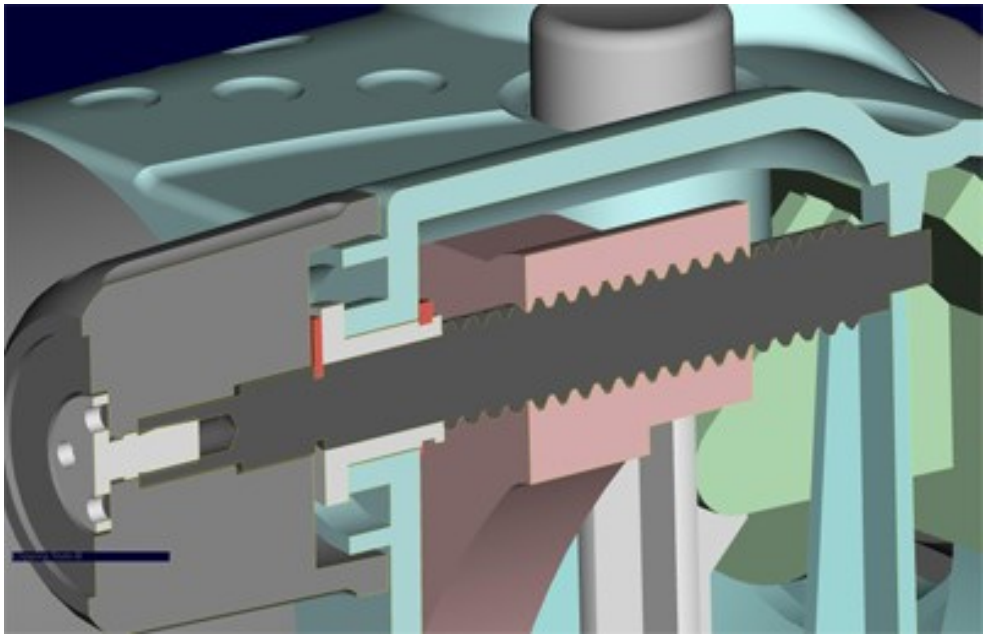
After we examine the customer's option for the mechanics of switching magnifications, we developed an absolutely original mechanism based on the pushbutton function of transferring pressure from the thumb to the lens system rotation axis, thus changing

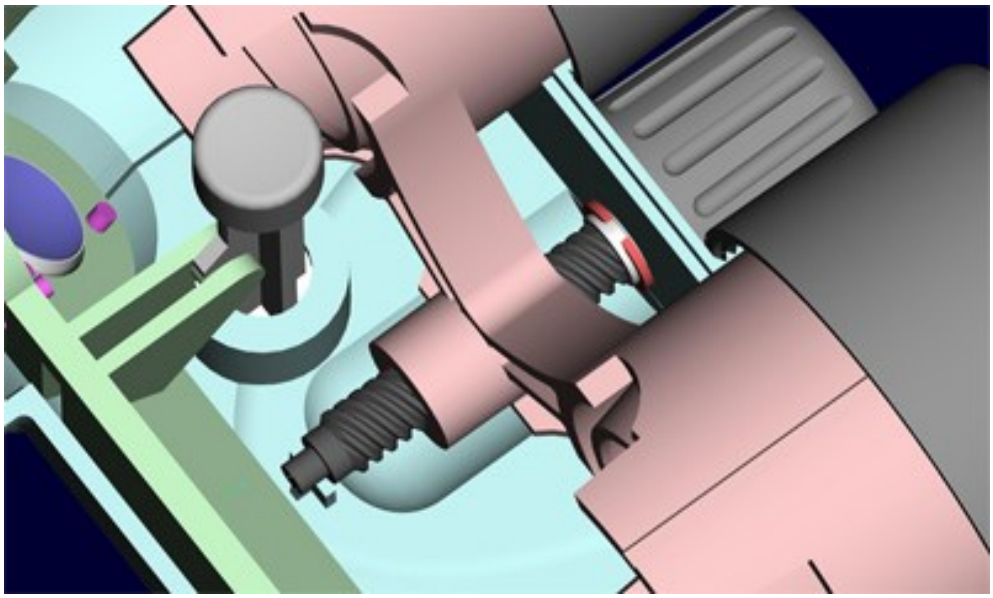
multiplicity. The original design helped reduce the risk of breakage of the lens system drive mechanism and switch multiplicity without taking the product away from the eyes.

The lower price category products required a maximum of plastic parts. That is why only the most important parts included in the product design are made of metal.

Major bearing parts of the enclosure are made of ABS plastic. The load-bearing parts are made of polyamide with 10 per cent glass filling.







3. Start of Production

The development of molds for casting plastics involved the steps to reduce the cost by combining multiple plastic parts in the same mold. The manufacturing process used two types of plastics: ABS plastic for outer enclosure parts and polyformaldehyde for inner structural parts which perform an executive function and require high durability.

All plastic parts are painted in mass. Generic outer parts are given RAL numbers for the same color to ensure repeatability in batches. Inner structural plastic parts are painted black to eliminate glare. Aluminum anodizing help make the product's aluminum parts identical to black plastic.

To improve tactile sensation and give the binoculars a strict look, the eyepieces and controls (focus wheel and magnification switch buttons) were coated with a soft-touch paint.

The production stage involved the use of five molds for plastic parts.

Promwad's trusted partner in China was selected to provide a production site and was able to implement the project in keeping with specified quality, time and cost parameters.

Advantages

- Low cost of a set of enclosure parts in batch production
- Ease of assembly: no screws for fastening the whole device
- Sophisticated ergonomics: the product is easy to work with to the touch
- Low cost of a set enclosure parts in comparison with analogues
- The devices are designed to meet all the customer's requirements
- The customer can change the color of enclosure parts in each batch or get multiple colors of choice in the same batch