

## CASE STUDY



A 2015 Award of Distinction winner in the Hardware & Appliances category.

### Front and Rear Keepers for Electric Lock

**Process:**  
Metal injection molding

**Secondary Processes:**  
Coining and tapping

**Material:**  
17-4 PH stainless steel parts

**Density:**  
7.5 g/cm<sup>3</sup>

**Tensile Strength:**  
1,220 MPa

**Yield Strength:**  
1,100 MPa

**Hardness:**  
35–40 HRC

#### End Use and Function

The award was given to two MIM 17-4 PH stainless steel parts—front and rear keepers that go into industrial electrical locks.

#### Fabrication

The parts' complexity, with many cross holes and sharp knurl features, required the use of multiple slides, some moving at different angles. The parts are made close to net shape requiring only a final coining to adjust a small distortion and a tapping operation on the front keeper. Special setters were used for better shape retention during thermal sintering. The heat-treated properties include density of 7.5 g/cm<sup>3</sup>, ultimate tensile strength of 1,220 MPa, yield strength of 1,100 MPa, elongation of

7%, and a hardness range of 35–40 HRC. Annual quantities are 20,000 per part.

#### Results

Designing this component using any other metal-forming process would not be as cost effective. The completed part resulted in an estimated 15% cost savings.



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