

## CASE STUDY



A 2015 Award of Distinction winner in the Hand Tools & Recreation category.

### Rifle Bolt

**Process:**  
Metal injection molding

**Material:**  
MIM-4605 low-alloy steel

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

**Tensile Strength:**  
1,550 MPa

**Yield Strength:**  
1,400 MPa

**Hardness:**  
28–35 HRC

### End Use and Function

This powder metallurgy component is a rifle bolt used in a Crickett 22LR rifle. To pass qualification testing, the component had to withstand 20,000 rounds of firing tests without any failure.

### Fabrication

Made via metal injection molding using a MIM-4605 low-alloy steel. The part's design features many cross holes and undercuts, requiring complex side core matchings in the molding cavity. The part has a heat-treated density of 7.5 g/cm<sup>3</sup>, ultimate tensile strength of 1,550 MPa, yield strength of 1,400 MPa, elongation of 3%, and a hardness range of 28–35 HRC maximum.

### Results

This single part replaced one produced by brazing together three machined parts, delivering an estimated 35% cost savings in the process. Additionally, using MIM resulted in 60% reduction in lead time. The fabricator delivers 60,000 pieces annually.



PickPM is a resource created by the Metal Powder Industries Federation, a trade association for the metal powder industry, for the benefit of the metal powder industry. To learn more about powder metallurgy, or to find a part fabricator, visit us at [PickPM.com](http://PickPM.com)