

CASE STUDY



A 2015 Grand Prize Winner in the Hand Tools & Recreation category.

Pistol Breech Block

Process:
Metal injection molding

Material:
MIM-4605 low-alloy steel

Density:
7.5 g/cm³

Tensile Strength:
1,655 MPa

Yield Strength:
1,480 MPa

Hardness:
37–45 HRC

End Use and Function

This breech block is inserted into the slide body of a .22 caliber pistol and creates the breech face and other critical functions. The unique geometry of the part—composed of two large masses separated by a channel running axially down the length of the part, creating two distinct bodies connected by very small ribs—presented a significant challenge to keeping the part together during sintering and maintaining tight final tolerances.

Fabrication

The component was manufactured 100% to print with no secondary machining operations aside from a coining operation to qualify the width; it is heat treated to a hardness range of 37–45 HRC, and receives a black oxide finish.

Published properties include density of 7.5 g/cm³, ultimate tensile strength of 1,655 MPa, yield strength of 1,480 MPa, and 2% elongation.

Results

The fabricator believes this is the first breech block fabricated using MIM, an indication that it is possible to expand the application boundaries for MIM even in a mature arena such as firearms.

In addition to metal injection molding already being a sustainable process due to its low amount of scrap, this component's geometry is formed net-shape and generates almost zero metal scrap.



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