

## CASE STUDY



*A 2021 Award of Distinction Winner in Hand Tools/Recreation category for Conventional PM components*

### Gerotor Assembly

**Process:**

Conventional powder metallurgy

**Material:**

FN-0405 nickel steel plus M2 tool steel

**Inner Rotor Density:**

7.45 g/cm<sup>3</sup>

**Outer Rotor Density:**

7.15 g/cm<sup>3</sup>

**End Use and Function**

This fuel pump gerotor assembly is comprised of an inner and outer rotor pair. In this application, the gearset pair function to supply fuel for engines modified for performance racing applications. Racing applications bring the challenge of product performance and reliability in an environment requiring higher delivery pressures with fuel formulations that provide very low levels of lubricity.

**Fabrication**

A material formulation with a wear resistant hard phase dispersed within a metal matrix that retains some degree of formability was required. The ability to customize material formulation and increase mechanical properties without incurring the tolerance and performance penalties associated with heat treatment was critical to the success of the component. The customized composition combined a volume

fraction of M2 tool steel powder with an FN-0205 nickel steel premix that retained adequate compressibility for single press densities exceeding 7.1 g/cm<sup>3</sup>. Both components are ground to a discrete thickness tolerance to minimize pump internal leakage and the outer rotor OD is ground to carefully control the clearance to the pump body to ensure proper hydrodynamic journal lubrication.

**Results**

This application is an excellent example of PM product design and process execution. PM's net-shape capability for producing complex geometries minimizes material loss and energy consumption throughout the manufacturing process. These same net-shape processes produce a combination of material properties and demanding tolerances that provide optimum value to the customer.



*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 [www.PickPM.com](http://www.PickPM.com)*