

CASE STUDY



A 2017 Award of Distinction winner in the Lawn & Garden/Off-Highway category

Pivot Shift Fork

Process:
Conventional powder metallurgy

Materials:
Sinter-hardened steel

End Use and Function

This powder metallurgy (PM) part is a pivot shift fork that goes into a shifting mechanism in an all-terrain vehicle transmission. The two sets of journals are an absolute requirement as they enable the fork to pivot, which is its very function. The 0.38 mm (0.015 inch) flatness requirement, as well as the fatigue properties on the interface between journals and body, made this component design highly challenging because of their length, but ultimately very successful.

Fabrication

In the alternative fabrication process considered—a machined and ground stamping, assembled via welding with a pin—the journals represented a substantial cost. Careful

engineering analysis by the PM fabricator determined that only a portion of the journal radius was required for proper functioning, and this could be achieved via a face-form on the punch face. The sintering temperature, ramp-up, and cool-down process had to be precisely controlled in order to prevent the component from warping out of tolerance.

Results

The part fabricator overcame a challenging PM component to create a complex, 3D shape in a high-performance material for a fraction of the cost of a heat-treated, machined, and welded stamping component. Using PM saved the end user approximately 40% when compared to the alternative process.



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