CASE STUDY

A 2021 Award of Distinction Winner in the Lawn & Garden/ Off-Highway category for Conventional PM components

Transmission Bush Gear

Process:
Conventional powder metallurgy

Material:
FD-0105 diffusion-alloyed steel

Density:
6.9 g/cm^3

End Use and Function
This bush gear is used as the 1st, 2nd, 3rd, and reverse low-speed gears in tractor transmissions. It is used to connect the main drive transmission shaft & coupling assembly.

Fabrication
There are 4 similar parts with only a variation in height, with a total weight of 900 g. (2 lb.) The heat treatment process was challenging, as the ID spline tolerance was very close. The PM process eliminated broaching that would have been necessary in the forging process. The only machining performed was on the OD. The parts receive a carbonitriding surface treatment.

Results
The PM process was selected for accuracy and repeatability. The ID spline accuracy eliminated broaching, reducing lead-times for the parts. The PM-friendly design resulted in a 20% reduction in assembly weight and 40% reduction in the cost per part. Current production is over 800 sets of bush rears per day.