

## CASE STUDY



A 2012 Grand Prize Winner in the Lawn & Garden/Off-Highway category.

### Gear-Race

**Process:**  
Conventional powder metallurgy

**Tensile Strength:**  
60,000 psi

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

**Yield Strength:**  
50,000 psi

### End Use and Function

The powder metallurgy (PM) steel gear-race is used in the OnTrac2 GPS-assisted steering system. The system positions agricultural planting and harvesting equipment to more accurately perform tillage, spraying, and spreading, as well as reducing skips and overlaps, thus reducing fuel consumption.

### Fabrication

Molded to a density of 6.7 g/cm<sup>3</sup>, the part has an ultimate tensile strength of 60,000 psi, minimum yield strength of 50,000 psi, 125,000 psi transverse rupture strength, and 23,000 psi fatigue limit. The complex net-shape design features 112 gear teeth and 16 assembly holes. The component is molded near-net shape, except for the tapping/threading of 14 assembly

holes, turned relief under the gear teeth, and trimming of the ID and bevel.

### Results

- 60% cost savings over the previous machining method of making the part.
- Designing with powder metallurgy reduced the assembly part count from 24 to 6 parts.
- Selecting PM also cut lead times and allowed for easier assembly and disassembly in the field.



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)