CASE STUDY

A 2014 Award of Distinction winner in the Lawn & Garden/ Off-Highway category.

Brake Piston

Process:
Conventional powder metallurgy

Hardness:
80 HRB

Tensile Strength:
565 MPa

Density:
6.9 g/cm

Yield Strength:
448 MPa

End Use and Function
This parking/emergency brake piston is for hydraulic transmissions used in zero-turn-radius lawn-maintenance equipment.

Fabrication
Made from FC-0208 iron-copper steel, the piston is compacted with three features on top and six on the bottom, using two upper and three lower punches plus a die shelf. The piston has a density of 6.9 g/cm^3, a tensile strength of 565 MPa, a yield strength of 448 MPa, and a hardness of 80 HRB before steam oxide treatment. The part is an original design for PM, as its shape makes it impractical for traditional metal-cutting methods. It is pressed and sintered to net shape, requiring no secondary machining operations.

Results
The process for this part ensures 100% material utilization, eliminating waste at each step.