

CASE STUDY



A 2025 Grand Prize Winner in the Lawn & Garden category for conventional PM components

Clutch Shoe

Process:
Conventional Press & Sinter (PM)

Material:
FL-4905 prealloyed steel

Density:
6.9 g/cm³

Hardness:
900 HV (microindentation)

End Use and Function

The clutch shoe is a critical component in a chainsaw's centrifugal clutch, designed to engage and disengage the engine power efficiently during operation.

Fabrication

Manufactured using FL-4905, the clutch shoe is produced with a complex geometry that posed compaction challenges, including crack potential and density distribution issues. These challenges were addressed with an innovative tool set featuring two upper punches, four lower punches, two core pins, and a compensated fill die equipped with a powder sweep. The parts achieve a minimum density of 6.9 g/cm³ and undergo chamfering before carbonitriding to reach a microindentation hardness of 900 HV.

Results

The resulting clutch shoe meets stringent strength and wear requirements for chainsaw applications, ensuring reliable performance and longevity. The innovative manufacturing approach using powder metallurgy allows for complex geometries at high production volumes, making it economically viable compared to traditional methods while maintaining high quality standards.



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