A COMPARISON OF ANCORDENSE™ PROCESSED MATERIALS WITH MALLEABLE CAST IRON

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ABSTRACT

A study was conducted that compared the mechanical properties of a series of ANCORDENSE prepared materials with malleable cast iron. This paper will present the mechanical properties (TRS, tensile, impact, and fatigue) of various ANCORDENSE prepared premixes in the as sintered condition compared with a malleable cast iron. The objective of this investigation was to demonstrate that an engineered P/M material coupled with ANCORDENSE processing can replace a malleable cast iron component giving equivalent mechanical property performance and potentially equivalent gear performance.

INTRODUCTION

The introduction of warm compaction processing enabled P/M part producers to make single press / single sinter components with sintered densities approaching that of double press / double sinter (DP/DS) components.(1) Displacing existing DP/DS parts proved more difficult than first expected, because of the existence of installed manufacturing capability and the need to recertify the warm compacted replacement component. However, warm compaction to high sintered densities is a proven technique for the economical production of high performance P/M parts to replace wrought steel components.(2) In particular; complex, multi level components made via casting or forging with extensive secondary machining are viewed as prime opportunities.

High strength cast irons are used in applications that require tensile strengths of <150,000 psi (1035 MPa) with minimal elongation and impact toughness requirements. Two methods of producing high strength cast irons are the malleable cast iron process and the ductile cast iron process. Malleable cast iron is initially produced as white cast iron with a lower carbon content, heat treated to covert the carbon containing phase from iron carbide to a nodular form of graphite called temper carbon.(3) The heat treatment cycle for malleable cast irons consists of heating the white cast iron to ~1700°F (925°C) up to 20 hours followed by rapid cooling to ~1400°F (760°C), then subsequent slow cooling to room temperature.(3) Ductile or nodular cast iron contains higher carbon levels and is treated with a nodulizing agent to promote the