

A Dissertation Report on

**Effect of Particle Size and Process Parameters on Dimensional
Shrinkage in Atomized Iron Powder Sintered Compacts**

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of the degree of

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By

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ABSTRACT

Powder Metallurgy (PM) has got an importance because of its ability to form powders directly into finished components. Changes in dimensions of metal powder compacts do occur during sintering. The control dimensional change is one of the challenging tasks for PM part manufacturers. Dimensional change of the material must be known and it is one of the most important parameter while designing compaction dies for new components. The principal objective of this work to establish a mathematical equation which would predict the dimensional shrinkage in Atomized Iron Powder. Also to provide a solution for minimizing the dimensional shrinkage. Effect of particle size and process parameters like compaction pressure, sintering atmospheres and sintering treatment is analyzed in present work. Cylindrical compacts of Atomized Iron powder were compacted at 600, 650 and 700 MPa and sintered at 1120°C for isothermal holding of 30 min. Sintering was carried out in two different types of atmospheres that are 90% N₂ and 10% H₂ and 80% N₂ and 20% H₂. Two different sintering cycles viz. conventional sintering followed by furnace cooling (CS) and conventional sintering with cyclic cooling (CSCC) were implemented. CSCC is found to be an effective method of sintering for minimizing dimensional shrinkage. The dimensional shrinkage model is formulated and successfully verified with actual results having 95% confidence limit.

Keywords: Powder Metallurgy (PM), Dimensional shrinkage.