

Article Abstract

Title:	The effect of powder metallurgy process parameters on mechanical properties of micro and nano-iron powder
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Abstract:	The ever-increasing development of applying the iron pieces made by powder metallurgy in car industries and other usages depends on making pieces with high density and consequently acceptable physical and mechanical properties. Regarding the effect of decrease in the powder bits' size on improvement of the mechanical characteristics and on decrease in the temperature of sinter, the experiments on the pure iron powder with the bits' size of 5, 45, 63 micron in which 20% of iron nanopowder was added to the powder with the bits' size of 45 micron, have been studied. Mere iron nanopowder also was applied for experiments. Pieces are compacted under 300-850 MPa and lubricants by 0.4 and 0.6 percent of the total weight was mixed with the powders. Various amounts of sintering time and sintering temperature were considered for the sintering of the samples. The survey suggested that applying micro powders resulted in an increase in the linear density and the strength at the relatively high temperatures and high keeping times. Sintering temperature and shrinkage has declined considerably with the decrease in the powder size and as a result the strength increases. High strength for products made by smaller powders under high pressures and low sintering temperatures using lubricated frame wall are obtained. SEM pictures from the fracture junctions of the samples show the decrease in porosity due to the close impact of the smaller powder size.
Keywords:	sintering, mechanical properties, hardness, erosion resistance, compaction