Transverse Rupture Strength of a PM Tool Steel

Oscar O. A. Filho [(1)], Francisco Ambrozio Filho [(1)], Mauricio D. M. das Neves [(1)], Odília C. S. Ribeiro [(1)], Cesar H. L. da Silva [(2)]

(1) IPEN, Instituto de Pesquisas Energéticas e Nucleares, Av. Prof. Lineu Prestes 2242, Cidade Universitária, CEP 05508-000, São Paulo, Brazil,

(2) Hurth Infer Indústria de Máquinas e Ferramentas Ltda.

e-mail:oscaroaf@net.ipen.br

Abstract

Powder Metallurgy has been reported as a suitable alternative processing route for tool steel manufacturing. The advantage of this technique is the promotion of a refined and more uniform microstructure which improves properties such high wear resistance and toughness. A molybdenum AISI M3:2 tool steel, trade name Sinter 23, manufactured from spherical gas atomized powders by hot isostatic pressing plus subsequent hot working was tested in three point bending after various heat treatments procedures. Transverse rupture strength (TRS) samples were cut and heat treated at four distinct austenitizing temperatures, each austenitizing temperature being combined with three tempering temperatures giving a total of twelve different conditions of hardening. Hardness tests were performed in order to evaluate the effectiveness of heat treatment, the hardness values and the TRS results. At least five parallel samples were tested to each heat treatment condition.

Keywords: Powder Metallurgy, High speed steels, Heat-treatment, Transverse rupture strength.

1. Introduction

Since the introduction of the first prototype by Taylor and White in the early 1900's, high speed steels (HSS) have long been used for the manufacture of cutting tools, with a wide range of