

EDITORS

ERRY YULIAN TRIBLAS ADESTA

MOHAMMAD YEAKUB ALI

AKM NURUL AMIN

DESIGN FOR MANUFACTURE

Towards Improved Manufacturability



IIUM Press

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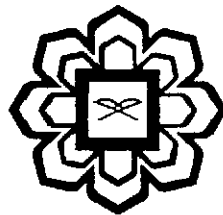
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Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

ISBN: 978-967-418-159-8

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN.BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan
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The Effect of Deep Cryogenic Treatment on The Properties of AISI D2 Tool Steel

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1. Introduction

The life of a tool plays an important role in improving productivity for manufacturing industries. The high demand for tools that can withstand high abrasive conditions during manufacturing commodities influences the researcher to develop process that can improve the life. In order to improve the steel properties and life, a common approach has been used in the past is through heat treatment, heat treatment provides controlled over properties of the tool as consequent it can increase the tool life. Cryogenic treatment is one of the common method has been recently utilized to improve properties and performance of tool steels. It has been utilized since the middle of the 19th century. It has been reported that, cryogenic treatment improves the mechanical properties of tool steels [9-15]. The mechanism behind the improvement of tool steels been cryogenically treated is basically attributed to the enhancement of the microstructure of the steel caused by the treatment.

The methodology adopted in this research is library based research and data is collected from reliable resources. The research highlights the effects of the cryogenic treatment upon the mechanical properties of tool steels and the metallurgical principles stand behind the improvement the steel properties. The research explores those reported mechanical properties that been witnessed to be improved by cryogenically treated the hardened steel.

2. Tool Steels

Tool steels are iron- based alloys with properties, which are different from those carbon steels due to the presence of alloying elements [5]. They belong to a large group of steels, which it can be heat treated to exhibit high hardness, wear resistance and higher strength. Furthermore, many of these