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5 (Wed.) ~ 7 (Fri.) October 2016

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- Future Manufacturing Technology Innovation Toward the 4th Industrial Revolution



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A Novel Traction Device for Clipping Large Perforation in Endoscopic Surgery	96
Hyun Gyu Roh, Yongho Jeon(Ajou Univ.), Yunho Jung(Soonchunhyang Univ. College of Medicine), Moon G. Lee(Ajou Univ.)	
Tribology effects of a rough sliding surfaces using a contact model of asperities with an average flow analysis	97
Mi-Ru Kim, Deug-Woo Lee, Seung-Jun Lee, Liang Li, Gil-Ho Son(Pusan National Univ.)	
Temperature-insensitive Ultrasonic Flow Meter for Smart Building Applications	98
MinYoung Park(KEMCTI (Korea Electronics-Machinery Convergence Technology Institute)), JiHoon Yang, DongYoung Jang, DongHa Shim(Seoul National Univ. of Science and Technology), ChangWoo Ban(KEMCTI (Korea Electronics-Machinery Convergence Technology Institute))	
The Mixing Performance with Locations of the Microstructure in the Microfluidic Mixer	99
JiHyeong Ryu(Korea Institute of Machinery and Materials), Sang-Ho Lee(Wonkwang Univ.), HyungJun Lim, JaeJong Lee(Korea Institute of Machinery and Materials)	
Effects on surface hardening of sharp edge using 100W power diode laser in flexible die of high carbon steel (AISI W1-8)	100
Min-Wook Kim(Fine Tech), Ki-Ha Hwang(Pusan National Univ., Korea Institute of Machinery and Materials), Ki-Teak Ryoo(Fine Tech, Pusan National Univ.), Sung Hak Cho(Korea Institute of Machinery and Materials), Myung Chang Kang(Pusan National Univ.)	
Topology Optimization for Static Nonlinear Structures Using Imperialist Competitive Algorithm	101
Tae-Do Park, Seog-Young Han(Hanyang Univ.)	
Shape Optimization for One-valve Type of a Ceramic Porous Chuck	102
Ji-Hoon Park, Seog-Young Han(Hanyang Univ.)	
Fabrication of Flexible Piezoelectric Sensor using 3D Printed Mold Assembly	103
Han-Bit Lee(Korea Institute of Industrial Technology, Hanyang Univ.), Nak-Kyu Lee, Suk-Hee Park (Korea Institute of Industrial Technology)	
A Study on Personalized Product Development using 3D Printing Technology	104
Nanhyeon Jo, Sang Won Lee(Sungkyunkwan Univ.)	
Identification and Analysis of FDM Process Parameters Affecting Dimensional Accuracy of 3D Printed ABS Parts	105
Nanhyeon Jo, Jung Soo Nam, Sang Won Lee(Sungkyunkwan Univ.)	
Die Shift Caused by Flow Drag Force in Wafer-Level Molding Process	106
Simo Yeon, Jeanho Park, Hye-Jin Lee(Korea Institute of Industrial Technology)	
Stress and Deformation Evaluations of Polyethylene (PE) and Graphene (xGnP) Composites in Selected Laser Sintering (SLS)	107
Jung Sub Kim, Sang Won Lee(Sungkyunkwan Univ.), Haseung Chung(Hongik Univ.)	
Development of a Tool Condition Monitoring and Diagnosis System using LabVIEW for Milling Process	108
Hyun Jung Choi, Ji Woong Lee, Sang Won Lee, Jung Soo Nam(Sungkyunkwan Univ.)	
A Study of Bio-PC Mechanical Properties According to 3D Printing Toolpath	109
Ji-Eun Lee, Seong-Je Park(Korea Institute of Industrial Technology, Seoul National Univ. of Science and Technology), Jin-Ho Park, Nak-Kyu Lee, Yong Son(Korea Institute of Industrial Technology)	

[Poster Session II]

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Effects on surface hardening of sharp edge using 100W power diode laser in flexible die of high carbon steel (AISI W1-8)

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The laser surface hardening of flexible die is very important, because of the reducing tool wear and increasing die life. In this study, the diode laser surface hardening system was newly manufactured considering optical device and driving performance. The flexible die was successfully hardened on AISI W1-8 carbon steel material by a laser surface hardening system using 100W diode laser. The diode laser surface hardening effects for sharp edge of the flexible die were analyzed and actually evaluated. The finite element method was used to determine the heat flow, the hardness distribution and the microstructure change. Vickers hardness of flexible die was increased as increasing laser power and hardness was measured maximum 840HV at 40W of die power. And characteristics of laser surface hardening according to conditions such as laser power. As a result of observed microstructure, the hardness was increased according to the higher the compact of the martensitic structure.

KEYWORDS : Flexible die, High carbon steel, Diode laser, Surface hardening, Sharp edge

1. Introduction

The flexible fine die was manufactured that chemically etched, CNC-sharpened and superbly finished with smooth polished cutting edges. In laser surface hardening of flexible fine die, the laser power was very important according to cutting edge shape as like pinnacle, the properties of flexible fine die were successfully performed on AISI W1-8 substrates by a laser surface hardening system using 100W diode laser.

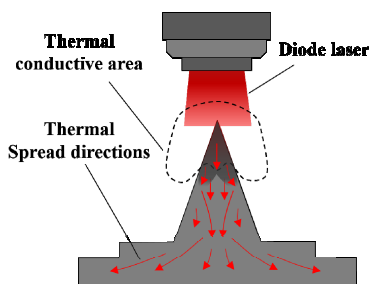


Fig 1. Schematics of laser hardening on flexible fine die

2. Experimental

The characteristics of laser surface hardening according to conditions such as laser beam power, feed speed and pinnacle edge angle were investigated by hardness and microstructure.

3. Result and discussion

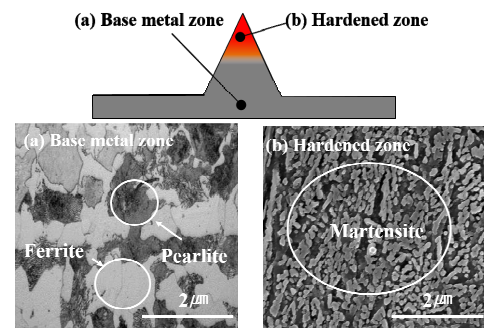


Fig 2. Comparison of microstructure with (a) base metal and (b) hardened zone measured by FE-SEM image

AISI W1-8 carbon steel microstructure was gradually changed according to depth of hardening. The martensite was generated to pinnacle edge. And micro structure was gradually changed according to the higher the compact of the martensitic structure.

REFERENCES

- [1] Jeon Y. H., Choi B. J., Lee M. G., Cho I. S., Kim D. H., Lee C. M., 2012, Effect of laser heat treatment on fatigue behavior in SCM440H, Proceedings of ICMTE, 263-263.
- [2] Ryoo K. T., Kang M. C., Hwang K. H., Kim M. W., Kim C. E., 2016, Characteristics of hardness and microstructure with variable power in diode laser hardening on pinnacle, Proceedings of KSPE 2016 spring conference, OP020.