

## 유압 요소부품 레이저 열처리 적용에 관한 Tribology 특성 연구

서준호<sup>†</sup>(자동차부품연구원) · 나병철\* · 김진용\*\* · 박승욱\*\*\* · 김현철\*\*\*\*

### A Study on Tribology Characteristics of Laser Tempered Hydraulic Element Parts

JoonHo Seo, ByungChul Na, JinYoung Kim, SeungUk Park, HyunChul Kim

**Key Words:** laser(레이저), wear(마모), friction force(마찰력), friction coefficient(마찰계수), tribology(트라이볼로지), hydraulic parts(유압부품)

**Abstract :** The recent technical trend of high pressure hydraulic main control valve requires reliable durability under long term high pressure condition and high speed operation with precision control mechanical efficiency at the life time. In this study, specially made tribological specimen was prepared using materials of real spool and block, and special heat treatment was applied using laser equipment. Tribological characteristics of laser tempered specimen of main control valve was investigated compared with the normal heat treated specimens. the results present the trend of friction coefficient, friction force and wear rate enhancement of laser tempered specimen.

## SM45C 중탄소강의 CW Nd:YAG 레이저표면경화와 고주파표면경화 특성 비교

신호준<sup>†</sup>(조선대 원) · 유영태\* · 안동규\*(조선대) · 신병현\*\*(조선대 기계공학부)

### Comparison of Characteristics on Induction and Continuous Wave Nd:YAG Laser Surface hardening for SM45C Medium Carbon Steel

Ho Jun Shin, Young Tae Yoo, Dong Gu Ahn and Byung Heon Shin

**Key Words:** Laser Surface hardening(레이저표면경화), Input Capacity(입열량), Heat Treatment Optical System(열처리광학계)

**Abstract :** Laser Surface hardening technology is used for improving the feature of fatigue and wear resistance in automotive parts. The purpose of this study is to compare the characteristics of laser and Induction Surface hardening, which is commonly used in industrial place. For the preemptive experiment, the distribution, depth and size of hardening and its micro-structural features were compared between surface hardening case by defocusing and variables of each process for heat treatment by exclusively manufactured heat treatment optical system. CW Nd:YAG laser is selected as the heat source. The optical lens with the elliptical profile is designed to obtain a wide heat treatment area with a uniform hardness. As a result, Induction surface hardening has wide distribution of hardening depth and width about 3 times larger than laser surface hardening, however, its average hardness showed 621.4Hv which is smaller than the average hardness of laser surface hardening with 691Hv.