

DEVELOPMENT OF INDUCTION SURFACE HARDENING PROCESS FOR SMALL DIAMETER CARBON STEEL

Daisuke SUZUKI, Koji YATSUSHIRO, Seiji SHIMIZU ^(a), Yoshio SUGITA ^(b),
Motoki SAITO ^(c), Katsuhiko KUBOTA ^(d)

(a) Yamanashi Industrial Technology Center, Kofu, Yamanashi 400-0055, Japan

(b) YS Electronics, Kofu, Yamanashi 400-0043, Japan

(c) ASAKAWA HEAT TREATMENT, Nakakoma-Gun, Yamanashi 409-3853, Japan

(d) Marushin Heat Treatment, Kai , Yamanashi 400-0116, Japan

In case of Induction Hardening, the highly frequency generator brings shallow hardened layer. And hardening for smaller diameter specimen is enabled. In this study, we developed an induction surface hardening process with a super high frequency generator of 2MHz that almost had not been used general conventional process. The purpose of this study is to reduce distortion and to provide compressive residual stress for small diameter carbon steel in induction surface hardening.

Specimens (6mm in diameter) were hardened under various conditions of generator voltage and specimen transfer speed. Hardened specimens were evaluated by measuring residual stress distribution, cross-section observation and hardness distribution.

As a result, the depth of hardened layer was 0.4mm and hardness near the surface was 600HV brought about the best hardening condition. In addition, the maximum compressive residual stress of this specimen had nearly -500MPa at the surface in the longitudinal direction, and it decreased slightly from surface to center. However, in the hoop direction, compressive residual stress was -50 ~ -150MPa. This anisotropy was due to large thermal stress compared with the present induction hardening.

Furthermore, the best result in 3mm diameter specimen was the 0.09mm depth of hardened layer and the hardness near the surface was 600HV.