

## Surface hardenability studies of the die steel machined by WEDM

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### ABSTRACT

The mechanical properties of steels are well known to be sensitive to the surface treatments or alterations in the surface morphology and the subsurface. The current work attempts to perform the surface/subsurface modifications of the die steel using wire electric discharge machining (WEDM). The effects of WEDM parameters such as servo feed (SF) and wire speed (WS) on the recast layer formation have been discussed. Detailed scanning electron microscopy (SEM) was conducted to observe the nature of the recast layer formed. SEM-energy dispersive X-ray line-scan analysis suggests that the thickness of the recast layer increases with the increase in the WS, for a given SF of the WEDM. The elemental line scan reveals the presence of C, Cr, Cu along with Fe in the recast layer. Microhardness was measured across the recast layer to evaluate the effects of WEDM parameters on the hardenability of the die steel. Results divulge the increase in the surface and subsurface hardness of the die steel due to WEDM. The mechanism of surface hardening involved in the current work is discussed herein.

### KEYWORDS

WEDM; Machinability; Hardenability. Micro-hardness; Surface/subsurface; Martensite

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