

## Mechanical Properties of D2 Tool Steel Cryogenically Treated Using Controllable Cooling

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**Abstract :** The hardness and hardenability of AISI D2 cold work tool steel with conventional quenching (CQ), deep cryogenic quenching (DCQ) and rapid deep cryogenic quenching heat treatments caused by temporary porous coating based on magnesium sulfate was investigated. Each of the cooling processes was examined from the perspective of the full process efficiency, heat flux in the austenite-martensite transformation range followed by characterization of the temporary porous layer made of magnesium sulfate using confocal laser scanning microscopy (CLSM), surface and core hardness and hardenability using Vickr's hardness technique. The results show that the cooling rate (CR) at the austenite-martensite transformation range have a high influence on the hardness of the studied steel.

**Keywords :** AISI D2, controllable cooling, magnesium sulfate coating, rapid cryogenic heat treatment, temporary porous layer

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