World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:8, No:10, 2014

Carbide Structure and Fracture Toughness of High Speed Tool Steels

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Abstract : M2 steels, the typical Co-free high speed steel (HSS) possessing hardness level of 63~65 HRc, are most widely used for cutting tools. On the other hand, Co-containing HSS's, such as M35 and M42, show a higher hardness level of 65~67 HRc and used for high quality cutting tools. In the fabrication of HSS's, it is very important to control cleanliness and eutectic carbide structure of the ingot and it is required to increase productivity at the same time. Production of HSS ingots includes a variety of processes such as casting, electro-slag remelting (ESR), forging, blooming, and wire rod rolling processes. In the present study, electro-slag rapid remelting (ESRR) process, an advanced ESR process combined by continuous casting, was successfully employed to fabricate HSS billets of M2, M35, and M42 steels. Distribution and structure of eutectic carbides of the billets were analysed and cleanliness, hardness, and composition profile of the billets were also evaluated.

Keywords : high speed tool steel, eutectic carbide, microstructure, hardness, fracture toughness
Conference Title : ICGME 2014 : International Conference on Green Manufacturing Engineering
Conference Location : Osaka, Japan
Conference Dates : October 12-13, 2014