Microstructure and Properties of HIPped P/M High Speed Steels
열간등압소결 된 고속도 공구강의 미세조직 및 기계적특성

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High speed steels (HSS) with a combination of good wear resistance and toughness are finding new, non-cutting applications such as rolls and rollers. In this paper, the research interests are focused on the microstructural evolution of a 5Mo-6W series high speed steel during HIPping and the effect of HIPping process parameters on its microstructure and properties. HIPping process variables includes; temperature, pressure and hold time. The microstructures of the HIPped HSS were examined by SEM, OM and X-ray diffraction whereas the properties measured were the relative density, hardness, and bend strength at room temperature. In HIPped materials, MC and M6C were the major carbides formed in a matrix of martensite. The effect of powder size on the microstructure and mechanical properties of HIPped materials was insignificant. However, HIPping temperature and hold time strongly affected the carbide size and distribution. The results show that at proper HIPping temperature and pressure conditions, the final products approach the full density (> 99% RD). The particle boundaries were completely eliminated without an eminent microstructural coarsening. The bend strength was about 2.3 Gpa, which is superior to cast HSS. At excessive HIPping temperatures, rapid carbide coarsening occurred, thus deteriorating the mechanical properties of the P/M steels.