

ASP®2008, a new PM-HSS for high performance forming tools with improved wear and chipping resistance

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Designing a powder metallurgical high speed steel (PM-HSS) means defining the best compromise between toughness, hardness at room or high temperature, wear resistance, grinding ability etc. The best compromise depends on final application. In this context, Erasteel developed a solution intended for tools that suffer mainly from mixed adhesive/abrasive wear and/or chipping/cracking together with high toughness requirements. This new grade named ASP®2008 is positioned between existing grades used for cold work tools or rolls.

During design of the new grade, computational thermo-dynamical simulation tools were used to fine tune alloying elements, V, Nb, Mo and W with the goal to obtain an extremely fine and even carbide distribution containing many but very small and hard MC-carbides. The theory behind was that the right balance of mainly Nb and V gives, according to the simulations, similar volume fractions of two MC carbide phases: one rich in Nb and one rich in V. Mo and W were adjusted to avoid presence of coarse M₆C carbides while providing a good hardening response. The target chemical analysis was validated by examining the microstructure of test heats with scanning electron microscopy, which confirmed a very fine microstructure.

Thanks to this a unique combination of wear resistance, edge strength, toughness and hardness was obtained. The alloying theory to obtain the outstanding fine microstructure, results from mechanical tests, wear tests and some first performance tests of actual usage of the grade in tool application will be presented.

Speaker Country

Sweden

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