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Advances in HIPIMS Coatings for Cutting Tools

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The cutting tool industry is using HIPIMS coatings for about two years when the 2012 PSE will take place. This paper gives a review of the state of the art and the current trends for further advancing the HIPIMS technology for hard coatings for cutting tools.

There is a general trend from CVD coatings to PVD coatings for cutting inserts. The PVD technology allows a much wider choice of the coating composition and sputtered films have low compressive stress whereas CVD films tend to have tensional stress. SEM images and other surface characterisation techniques show how the highly ionised species contributed by HIPIMS accelerate this trend by enhanced film properties. Various field tests have been carried out to correlate the film properties with cutting data. The data show that HIPIMS gives a very uniform thickness distribution on rake and flank face of inserts combined with a super smooth surface free of any droplets.

The first commercial HIPIMS films were standard $Ti_xAl_{1-x}N$ systems. It is well known that the addition of doping elements to a more complex system influences the performance of a film greatly. Hybrid DCMS/HIPIMS machines are most commonly used for industrial coating production. Depositing a multinary coating in a hybrid system raises the question about the difference of depositing a certain element on either a DCMS or a HIPIMS source. A detailed analysis of the resulting plasma characteristics will be presented.

Keywords

HIPIMS

Sputtering

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Plasma Characteristics