Workshop »Coatings for Tools & Components«

The Influence of Pulse Parameters on Plasma Properties and Performance of HiPIMS Coatings for Cutting Tools

Dr. Stephan Bolz, Dr. Biljana Mesic, Dr. Oliver Lemmer

CemeCon AG, Würselen

stephan.bolz@cemecon.de

To increase energy efficiency in industries such as automotive and aircraft, the weight of modern materials must be reduced and their strength increased at the same time. The demands on coatings for cutting tools used for economical machining of such materials are therefore constantly increasing. One of the highest challenges in the cutting sector is machining of difficult-to-machine materials like stainless steel, hardened steel, titanium- and high-temperature alloys. Machining them requires high demands on adhesion, hardness, surface finish and chemical resistance of coatings.

In this context, high-performance coating technologies, such as HiPIMS, play an increasingly important role. Thanks to HiPIMS dense, hard, adhesive and droplet-free layers can be deposited in highest quality with high energy efficiency at high deposition rates.

The presentation shows the relationship between HiPIMS pulse parameters, plasma properties, coating properties and cutting performance of coated cutting tools. Thus, by tuning HiPIMS pulse parameters a significant increase in metal ionization could be detected by optical emission spectrometry, accompanied by improved coating properties of an (Al,Ti,Si)N layer. Finally the improved coating properties led to a significant increase in machining performance, proven in turning of austenitic stainless steel.