

## Workshop »Coatings for Tools & Components«

### From Powder to Target – Customized Solutions for High Power Sputtering and Arc Evaporation

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Today, majority of cutting tools and many components are coated with different, application dedicated thin films by utilizing physical vapor deposition methods. The continuous improvement of coatings is supported by introducing advanced deposition methods but also implementation of new material compositions. These developments require increasingly, not only new materials with adjusted phase composition, but also special design of targets and cathodes to fulfil the needs for stability, heat transport and finally the lifetime in industrial applications.

Manufacturers of PVD coated tools and components work on cost and quality optimization for mass product implementation. The outcomes of these efforts are for instance larger coating chambers and shorter process times, leading to new target sizes and shapes as well as the increase in power density applied to the targets. Concurrently, as new coatings and processes become widely accepted, the target manufacturers must support the development by elaborating suitable solutions for each requirement.

The targets used for hard coating applications are produced either by powder or by melting metallurgy processes. Targets manufactured by powder metallurgy are characterized by several advantageous properties such as uniform microstructure, high density, adjusted phase composition as well as homogeneity concerning distribution of chemical elements. The quality of such targets depends on the choice of suitable manufacturing process and for the most part on the quality of the powder ingredients used.

On the one hand the development of coatings is focusing on utilizing the beneficial effects by alloying with selected elements to control the composition and therewith the properties of the coating. On the other hand, the development goes also in the direction of optimizing PVD processes, resulting in adjusted coating microstructure and architecture. The mentioned efforts are also strongly related to the increase in power density applied to the targets, which is the case for HIPIMS technology. Therefore, the development of materials with high heat conductivity and thermal shock resistance are included in the challenges for target manufacturers.