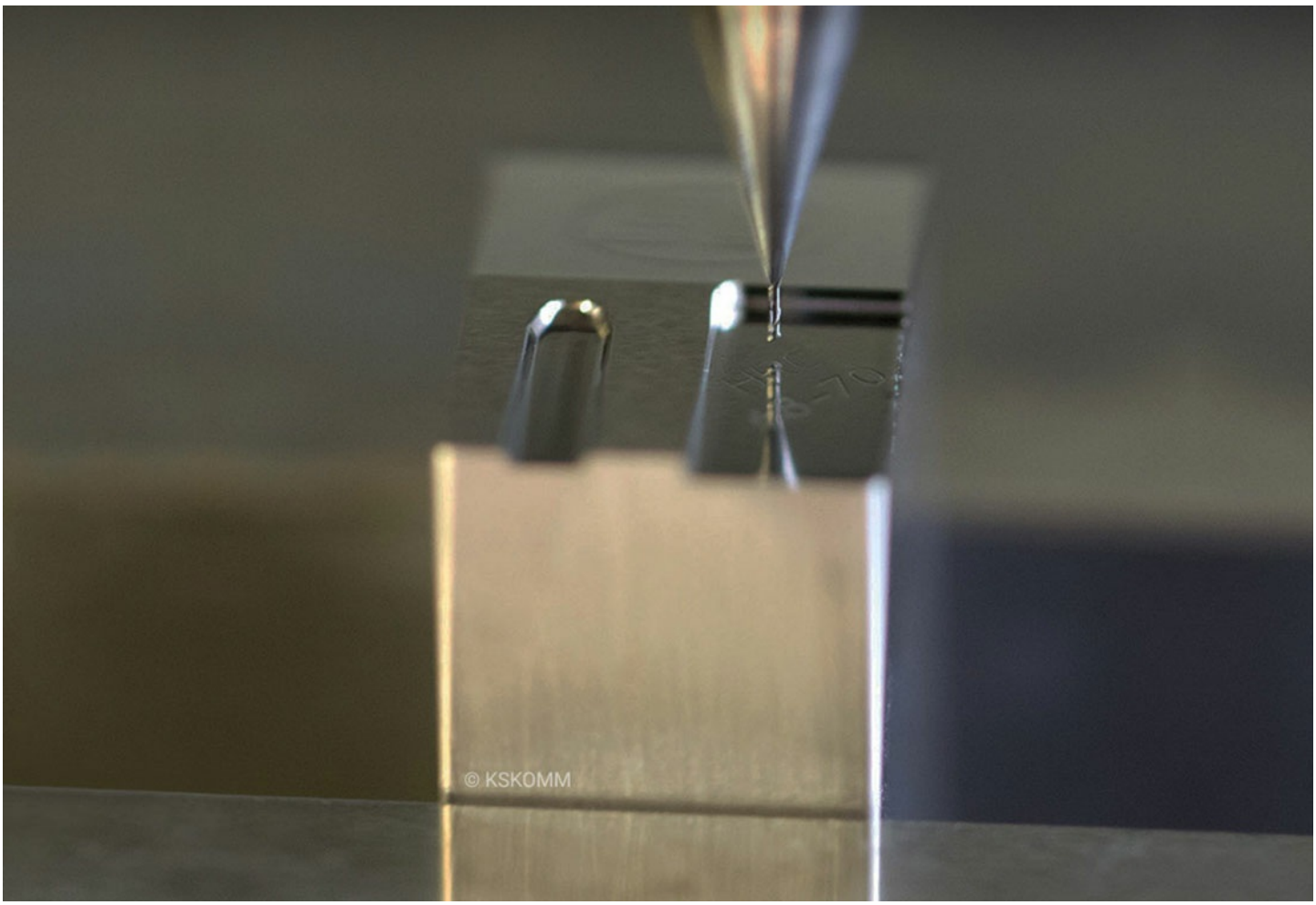
HiPIMS coatings for small and smallest tools



Ultra thin and extremely smooth

The high-precision machining of the smallest components with tools that are only a few millimetres or even tenths of a millimetre thick is more than ever the key to innovation, for example in **electronics** or **medical technology**. Ultra-thin and extremely smooth **HiPIMS** coatings from CemeCon AG provide the decisive advantages here - especially in **hard materials** that are **difficult to machine**.

High-precision tools are required to be able to machine a workpiece reliably and economically in working ranges from 2 mm to 0.1 mm. In addition to special geometries, efficient coating solutions provide the decisive advantage. A prerequisite is the precise coordination of geometry, material and coating. With CemeCon, tool manufacturers have the perfect partner at their side.

"With our premium engineering service, the focus is on the tool in its customer-specific form and function. Especially with new geometries, innovative tool concepts and special applications - such as tools for micro cutting - the path is increasingly leading to this fully engineered premium coating. In close cooperation with the tool manufacturer, we project a **coating solution** that is precisely tailored to the tool and application requirements," says Manfred Weigand, Product Manager Round Tools at CemeCon.

As smooth as no other

When every µm determines the success or failure of a**micro tool**, tool manufacturers must be able to rely on the performance of the coatings. Uncompromising smoothness is a must. Manfred Weigand: "The HiPIMS process becomes the key to success here. Coating errors such as droplets cannot occur with this unique technology. This results in extremely smooth coatings that also meet the **low tolerances** of **miniature production**. When used on cutting tools, such perfectly smooth surfaces reduce both friction and built-up edges, while at the same time shortening the contact time between chip and tool. The **heat input** is thus lower and much of it is dissipated with the chip. **Oxidation wear** is also significantly lower. The result is a long service life - even with **dry** and **HSC machining**.

The list of positive properties is long

"HiPIMS coatings combine an extraordinary number of positive properties - perfect for **micro cutting**: They are not only extremely smooth, but also incomparably adhesive, hard and tough at the same time. At the same time they have a fine-grained, very **dense morphology**, **low residual stress** and high **thermal stability**. This is how they effectively counteract **abrasive wear**. No other coating process can achieve this combination," says Manfred Weigand enthusiastically. **Ultra-thin coatings** around 1 µm have (almost) no influence on the filigree geometry of the micro tools. Thanks to the HiPIMS process, the **cutting edges** are also not unintentionally rounded. Thereby HiPIMS enables a homogeneous layer growth on complex **tool geometries** around the cutting edge. This ensures an even **layer thickness distribution** within very narrow tolerances, which are required for micro cutting.

InoxaCon® for demanding tasks

Especially in miniature production, **wear resistance** and **temperature resistance** of the tools are decisive factors for the economic efficiency of production. This is especially true when very hard materials have to be machined, such as those used in medical and **dental technology**. "The composition of the coating material has a great influence on the cutting process. InoxaCon® - one of our HiPIMS coating materials - offers tool manufacturers decisive advantages, for example in the machining of chrome-cobalt alloys **for implants**," says Manfred Weigand. The smooth surface of InoxaCon® reduces friction during machining. The very good coating properties allow the use under the toughest conditions with low coating thicknesses of, for example, 1.5 µm. Therefore, the cutting edges remain so sharp that feed and cutting speed can be selected for minimum cutting forces and thus better machining results. InoxaCon® prevents work hardening and ensures process stability - also because the HiPIMS coating material.

Micro tools

Implants

Tool geometry

Thermal stability

Low abrasion wear

Dense morphology

Wear resistance

Miniature production

Low abrasion wear

Low tolerances

Reduction of built-up edges

Low oxidation wear

Dry machining

Ultra-thin coating

Cutting edges

Thickness distribution

Dental technology