

Optimum coating of mini and micro tools: High-tech on the smallest cutting edge

Miniaturization is setting trends – from dental implants to electronic components and clockworks to micro ball bearings. The demand for ever smaller components leads to ever smaller precision tools and ever tighter tolerances. As a consequence, the coating must also be able to measure up to these developments. What counts here is not only that the coatings combine minimal coating thicknesses with outstanding properties, but also that work processes and handling are adapted to tools that are only a few millimeters or even tenths of a millimeter thick. Tool manufacturers can find this comprehensive know-how from the coating experts at CemeCon.

When tolerances in the micrometer range have to be maintained, there are high demands on process reliability, tool life and precision. Ultra-thin and smooth HiPIMS and diamond coatings ensure that micro tools achieve the required performance in everyday machining. And if you have your tools coated in one of the CemeCon coating centers, you can be sure that your mini tools and micro tools are in good hands.

This is made possible by a passion for perfection and attention to detail, which is reflected in the sophisticated work plans. Quality is the sum of many building blocks and so every work step is documented. “We have developed coordinated workflows, processes and devices for handling the delicate micro-tools to enable our employees to work reliably. Examples include special holders for the micro tools during charging or the specially developed cleaning system for evaporating cooling channels. No system available on the market convinced us. That is why CemeCon Production Engineering has built a system that is perfectly suited to micro-tools. To avoid direct contact with fingers, our colleagues also use tweezers and wear gloves during handling,” says Manfred Weigand, Product Manager Round Tools at CemeCon, explaining some of the adaptations in CemeCon production specifically for micro tools.

Absolute cleanliness is particularly important when coating micro-tools. Even the smallest particles on the tools affect the coating and therefore the quality. This is why CemeCon places a special focus on cleaning: This applies not only to the tools, but also to cladding, charging material and, quite simply, the entire production process. Particularly gentle cleaning of the micro-tools during pre-treatment ensures an excellent coating result. CemeCon’s diamond coating department also has another special feature: tools are processed in the clean room – protected from external influences.

Why is CemeCon so good at coating micro-tools? CemeCon has over 35 years of experience in the coating of cutting tools and has specialized exclusively in this field. This means that all procedures and processes are tailored to precision tools – whether HiPIMS or diamond coatings. This comprehensive expertise in dealing with tools makes it easier to adapt the processes to the “minis”. “We also started coating small tools very early on – when micro tools were still rather exotic. Sputtering is our technology of choice and – just like HiPIMS as its further development – is perfect for coating miniature tools. The traditional arc process is out of the question here. We have been able to gain experience in this field over many years,” adds Manfred Weigand.

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HiPIMS and diamond – Customised coatings for micro tools

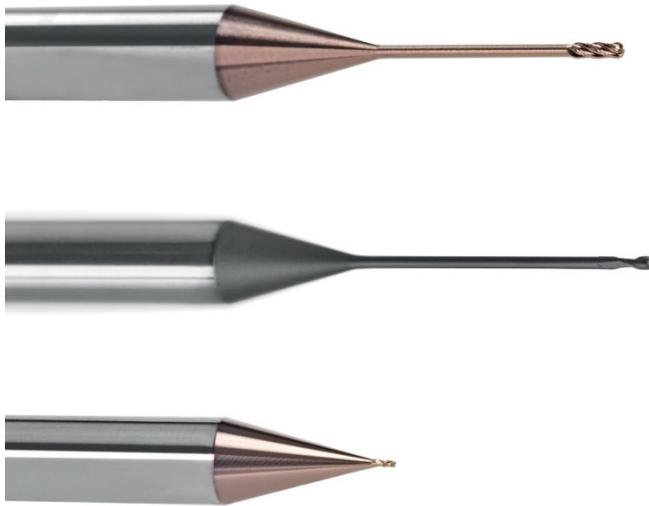
“HiPIMS is perfect for micro tools”, says Ramesh Agarwalla, Director at CTC Praezision Tools, India – an expert in micro tools for PCB production or micro metal cutting tools for dental and medical technology. “Defects in the coating – known as droplets – are particularly fatal with micro tools, as they have a much more extreme effect in these tiny dimensions than with larger tools. Consequently, uncompromising smoothness is an absolute requirement and therefore, the HiPIMS process – in which no droplets can occur due to the process – is the key to our success!”

The ultra-thin HiPIMS coatings reproduce complex tool geometries one-to-one. Christoph Schiffers, Product Manager Technology at CemeCon: “If you want to apply coatings to the filigree geometry of a micro-tool in an adhesive and process-reliable manner, you need adapted residual stresses. This is the only way to homogeneously coat fine cutting edge geometries. With our HiPIMS technology, the residual stresses can be controlled and significantly reduced – perfect for sharp cutting edges on micro tools.”

The high-precision multilayer CCDia® coatings are ideal for high-end micro tools, for example for the production of highly complex graphite electrodes or dental implants. Production using the hot filament process ensures thin layers with a homogeneous layer thickness distribution within narrow tolerances – even with complex, delicate geometries. “To ensure that the high accuracy of the tools is also guaranteed after coating, we coat precision tools to the desired final dimensions on request – and this can be reproduced at any time, including documentation,” adds Manfred Weigand.



Processes specially adapted to the handling of micro-tools ensure quality at CemeCon.



Whether HiPIMS or diamond – CemeCon premium coatings are ideal for mini and micro tools.

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CemeCon with comprehensive know-how for optimum coating of mini and micro tools

Meta-Description

CemeCon has over 35 years of experience in the coating of cutting tools and has developed workflows, processes and devices tailored to the handling of delicate micro-tools. These are the prerequisites for the successful ultra-thin, smooth CemeCon HiPIMS and diamond coatings.

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CemeCon, micro tools, micro cutting, micro machining, coatings, HiPIMS, diamond, precision tools, coating solutions, miniaturization, den-tal implants, electronic components, clockworks, micro ball bearings, wear resistance, thermal conductivity, process reliability, performance, service life, precision

About CemeCon AG

CemeCon is the world market leader in diamond coating and technology leader in PVD coating of precision tools for machining. The coating materials required for premium coatings are produced within the coating systems developed by CemeCon.

Customers make use of the company's expertise in both coating services and plant engineering. Renowned tool manufacturers worldwide use the technology and expert knowledge of CemeCon for their own competitive advantage and to open up new business areas.

CemeCon has brought the future technology HiPIMS to market maturity. It combines the advantages of all common PVD coating processes – and that with high economic efficiency. With HiPIMS, maximum performance and a significantly longer tool life are possible even when machining materials that are extremely difficult to machine. Maximum productivity in the machining of innovative materials – such as fibre-reinforced plastics, ceramics or graphite – is guaranteed by the patented multilayer technology in diamond coating developed by CemeCon.

Founded in 1986 by Dr. Toni Leyendecker, CemeCon AG has expanded continuously over three decades. At its headquarters in Würselen, the company operates the world's largest coating center. All important international markets are served from there and from the centers in the USA, China and Japan as well as by our sales partners in the Czech Republic, Denmark, Taiwan, Korea, India and Russia.

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