

## Convincing performance in heavy-duty machining

In heavy-duty machining of ferrous materials, tool life is directly proportional to coating thickness. With FerroCon®Quadro, CemeCon achieves coating thicknesses of up to 12 µm on cutting inserts, making it the thickest PVD-based coating on the market. Compared to the CVD process, HiPIMS technology offers advantages such as smoother and tougher coatings, greater flexibility, more stable process control at lower temperatures and the possibility of targeted management of residual stresses.

Whether a high-speed train or a freight train weighing several hundred tons—the weights to which railroad tracks and switches are exposed give an idea of the immense demands placed on cutting inserts during overmilling for track maintenance. This also applies to many other applications in heavy-duty machining, such as the machining of large components for shipbuilding or mining, the aerospace industry or the energy sector: high metal removal rates, changing cutting conditions, extreme mechanical loads. At the same time, expectations regarding tool life, quality of the machined surface and process stability are increasing. A real test for the tool!

## Extremely smooth, hard and tough coatings for tools with a long tool life

HiPIMS technology provides a solution for competitive performance and quality in heavy-duty machining: With FerroCon®Quadro, coating thicknesses of up to 12 µm can be achieved on cutting inserts—significantly more than with other PVD processes. CemeCon has thus created a premium alternative to conventional CVD coatings. This is because the HiPIMS process—developed by CemeCon from sputtering—can be used to produce extremely smooth coatings with a dense and fine-grained structure as well as unprecedented toughness and homogeneity. The residual stresses can also be precisely adjusted via the layer thickness. Thanks to HiPIMS, a higher machining speed is often possible. In addition, the high machining quality remains constant over the entire service life of the cutting inserts.

## Technology that makes an impact

Furthermore, the process control is much simpler and more stable than with the CVD process thanks to the reliable deposition at moderate temperatures achieved with HiPIMS. Due to a process temperature of only around 500 °C, it is possible to coat temperature-sensitive substrates without them becoming brittle. It is also easier and more cost-effective to comply with environmental regulations, as no harmful waste products are produced in the process.

At the same time, HiPIMS technology offers maximum flexibility and versatility when coating a wide variety of tool types. Almost any chemical element can be used as a coating material on the same system—even extremely thin coatings of less than 1 µm can be applied to the delicate geometries of shank tools.

## A plus for tool manufacturers

The high performance of HiPIMS technology opens up significant potential for manufacturers of cutting tools. Heavy-duty machining is an excellent example: FerroCon®Quadro can be used to create coating solutions for a wide range of applications and new business areas. The unique combination of the greatest possible coating thickness, optimized toughness and flawless surface smoothness creates space for premium tools with a clear positioning in numerous markets.

Customers can rely on CemeCon's strong consulting services to help them navigate and develop these markets. With decades of experience in its own coating center, the CemeCon engineering team works closely together with the customers to individually adapt coating materials and coating processes to the application, substrate and geometry. This results in customized solutions for demanding fields of application in heavy-duty machining and beyond. Tool manufacturers gain a decisive advantage in terms of performance, quality and cost-effectiveness.

## 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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