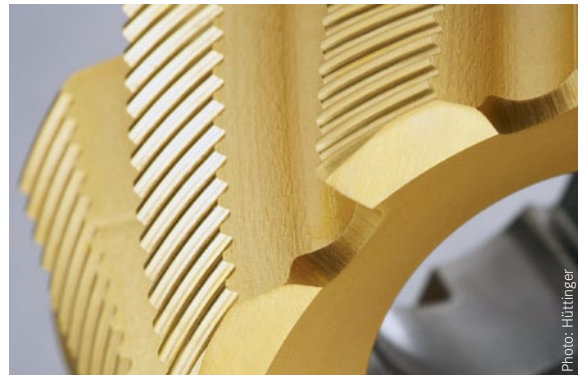


INNOVATIVE GENERATORS FOR HIPIMS HARD COATINGS

Megawatt Pulses for Better Coatings

Hard coatings applied using High Power Impulse Magnetron Sputtering feature a high density and very good adhesion to the substrate material. Generators developed specifically for this coating process help to ensure that the potential of this process is optimally used.



When it comes to improving the performance of cutting tools, hard coating is the method of choice. One of the most recent hard coating methods is High Power Impulse Magnetron Sputtering (HIPIMS), also called High Power Pulse Magnetron Sputtering (HPPMS). The process was developed a few years ago and is convincing more and more users of its merits. The process is characterised by short pulses of several megawatts that are applied to the coating systems in order to achieve better coating qualities.

Dense plasma due to high power pulses

Tools are usually coated using vacuum processes. The coating is conventionally applied either using magnetron sputtering or with various forms of arc or electron beam evaporation.

Traditional arc evaporation adds energy to the coating flux by ionising the coating material as it passes through the dense plasma of the arc. This improves the properties of the coating. However, this process frequently tends to “spit” molten material from the molten pool at

the base of the arc. These “spits” end up as microscopic lumps in the final coating and have a negative impact on the coating quality.

This is where the HIPIMS process has considerable benefits. For sputter processes, it delivers the same ionisation in the coating flow as arc evaporation. This is possible because the plasma output is supplied in very high power pulses. This results in a very dense plasma upstream from the sputter source.

The sprayed metal atoms are ionised as they pass the dense plasma on the way to the substrate. The coating flow ionised in this way is free of “spits”. It can be aligned definitively to the substrate with an applied bias voltage and better regulated. The degree of ionisation can be controlled in order to precisely match the coating method. In this way, HIPIMS results in very dense hard coatings with outstanding transition layers to the substrate.

Dealing with the very high currents in the HIPIMS method places high demands on the power supply used. The generators (TruPlasma Highpulse Series 4000) from Hüttinger are optimally designed

to meet these requirements. The generator family, which is specially designed for high power impulse magnetron sputtering, generates pulses of up to 8 megawatts that enable it to produce extremely dense, metallic plasma. Due to its wide output bandwidth for HIPIMS processes, the generator is highly flexible for use in industry and research.

Because thousands of amperes flow in the HIPIMS pulses, it is a major priority to prevent the formation of arcs. Hüttinger therefore also uses an arc management system (CompensateLine) in HIPIMS generators. As a result, users can now also benefit from fast arc detection in HIPIMS processes and from a reduction in arc energy of up to 90 percent. The result is drip-free sputtering and minimal surface defects. The new generator series therefore provides optimum support for HIPIMS processes and makes a significant contribution towards ensuring that users can fully exploit the potential of this coating process. —

Contact:

Hüttinger Elektronik GmbH + Co. KG,
Freiburg, Germany, Tel. +49 761 8971-0,
info@de.huettinger.com, www.huettinger.com