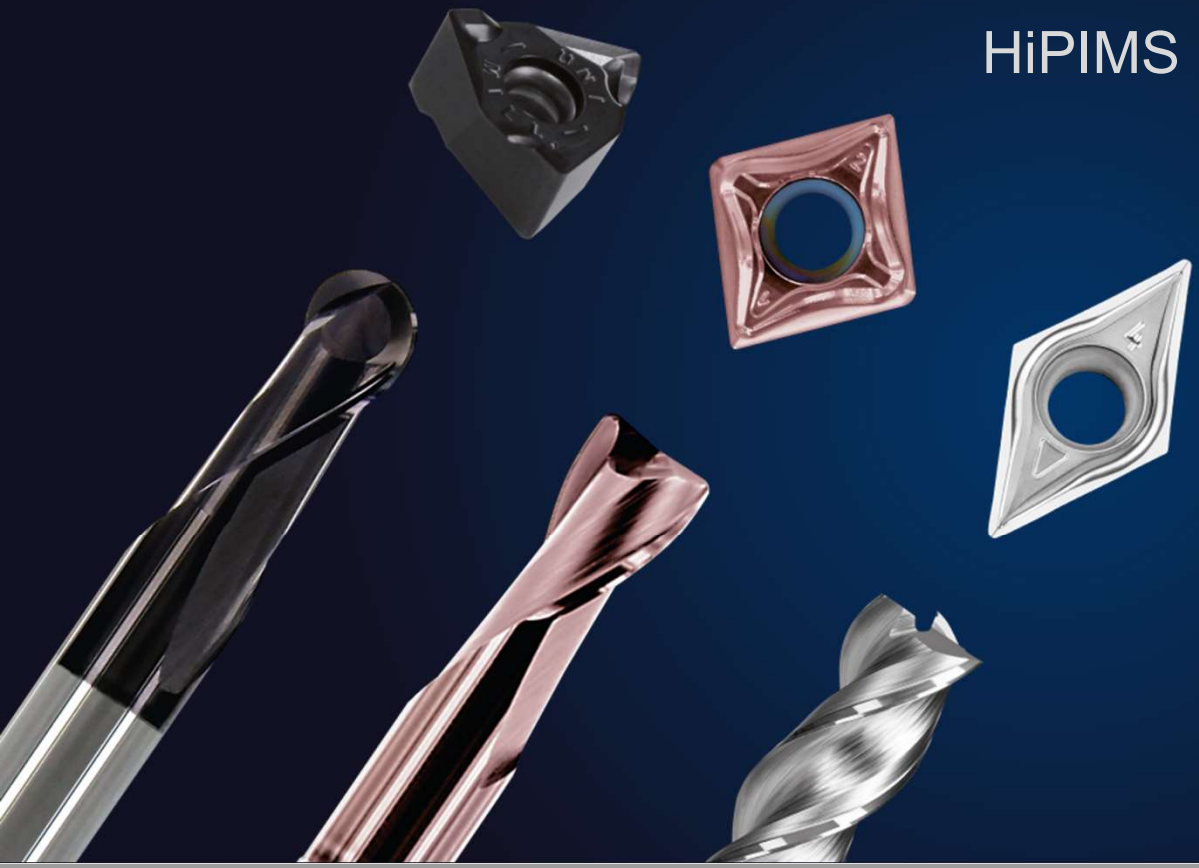
CemeCon
The Tool Coating



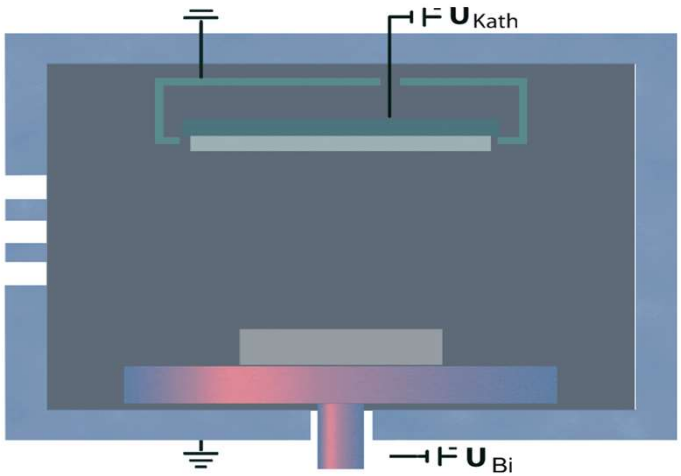
HiPIMS - Eine Beschichtungstechnologie setzt sich durch

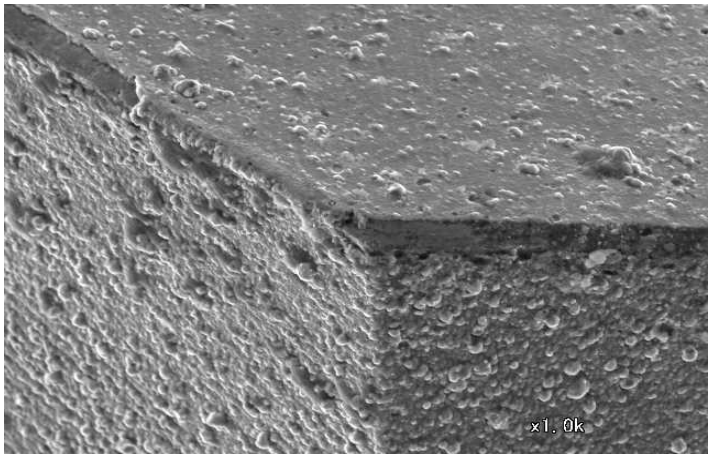
Wernesgrüner Werkzeugsymposium
01. Juni 2022

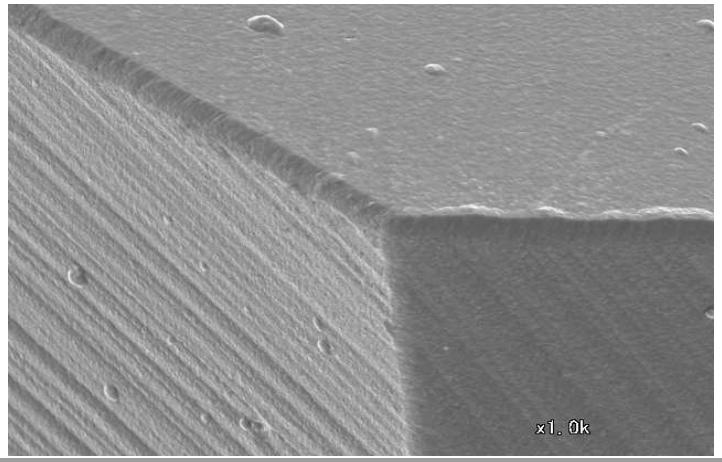
Was bedeutet HiPIMS?

High
Power
Impuls
Magnetron
Sputtering

ARC vs. Sputtern?







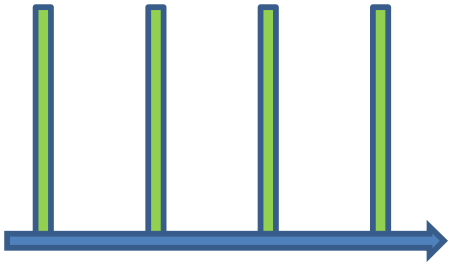
Was kann HiPIMS?

CEMECON The Tool Coating

	Arc	CVD	HiPIMS
Oberfläche	**Droplets**	**Rau**	**Glatt**
Beschichtungstemperatur	**500 °C**	**1000 °C**	**500 °C**
Max. Schichtdicke	**4 µm**	**10–15 µm**	**12 µm**
Eigenspannungen der Schicht	**Hohe Druckspannungen**	**Zugspannungen**	**Niedrige Druckspannungen**
Zähigkeit der Schicht	**Hoch**	**Niedrig**	**Sehr hoch**
Einfache Produktion	**Ja**	**Nein (Präkursor)**	**Ja**
Flexibilität	**Geringe**	**Keine**	**Hoch** (alle Materialien, alle Substrate)
Miniwerkzeuge	**Nein**	**Nein**	**Ja**

Wie funktioniert HiPIMS?

HiPIMS = kurze Hochenergiepulse



\+ Bias Synchronisation

\+ HiPIMS (ohne Kabel)

= Gesamte Leistung in das Plasma

Wie funktioniert HiPIMS?

Phase 1
Arbeitsgas

off

Phase 2
ionisierte Bestandteile des Targetmaterials dominieren das Plasma und bilden die Schicht

Synchronisation von Kathoden und Substrattisch

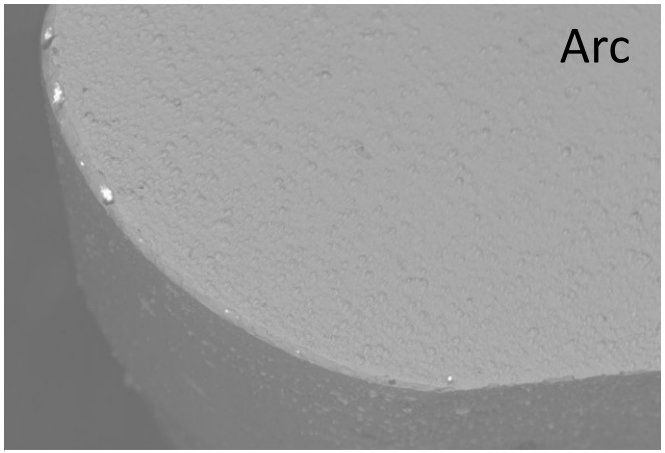
on
Beschichten

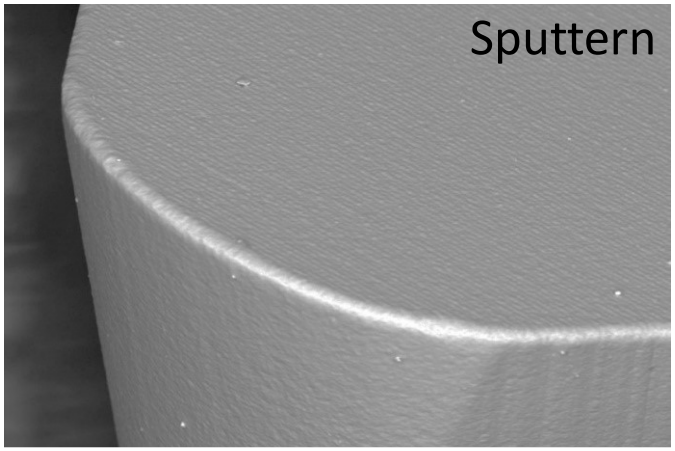
Phase 3
Arbeitsgas

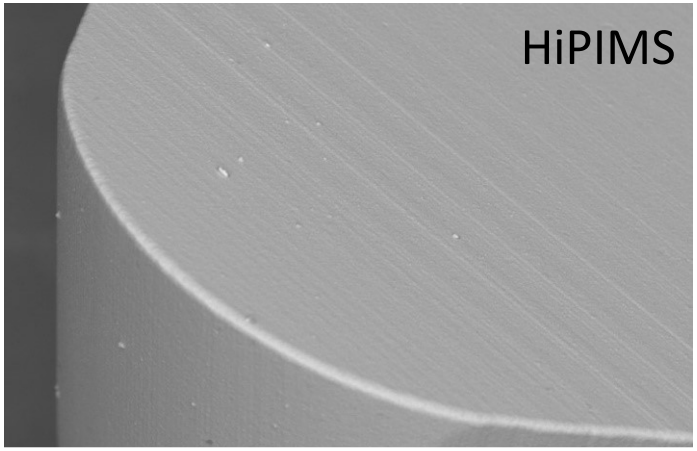
off

Eigenspannungsmanagement

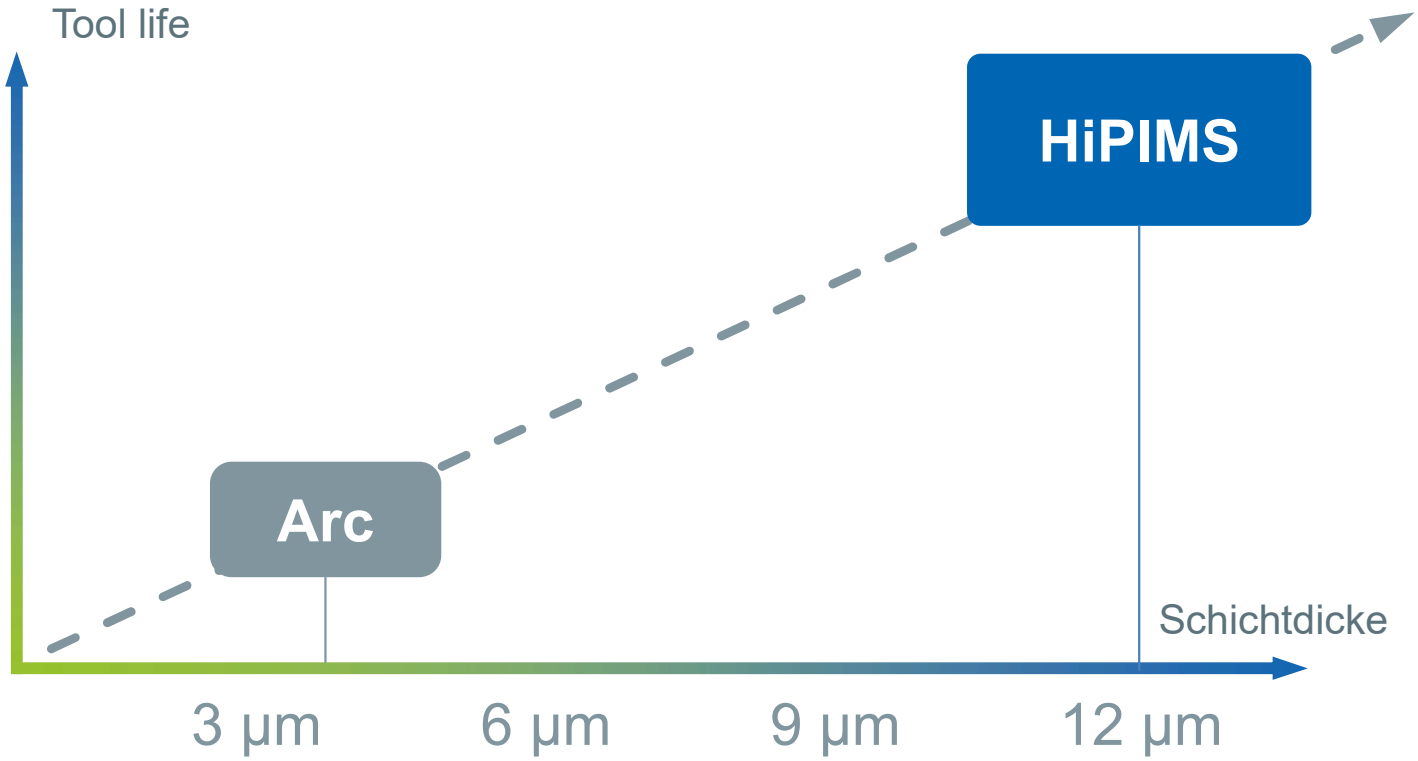
Eigenspannungen



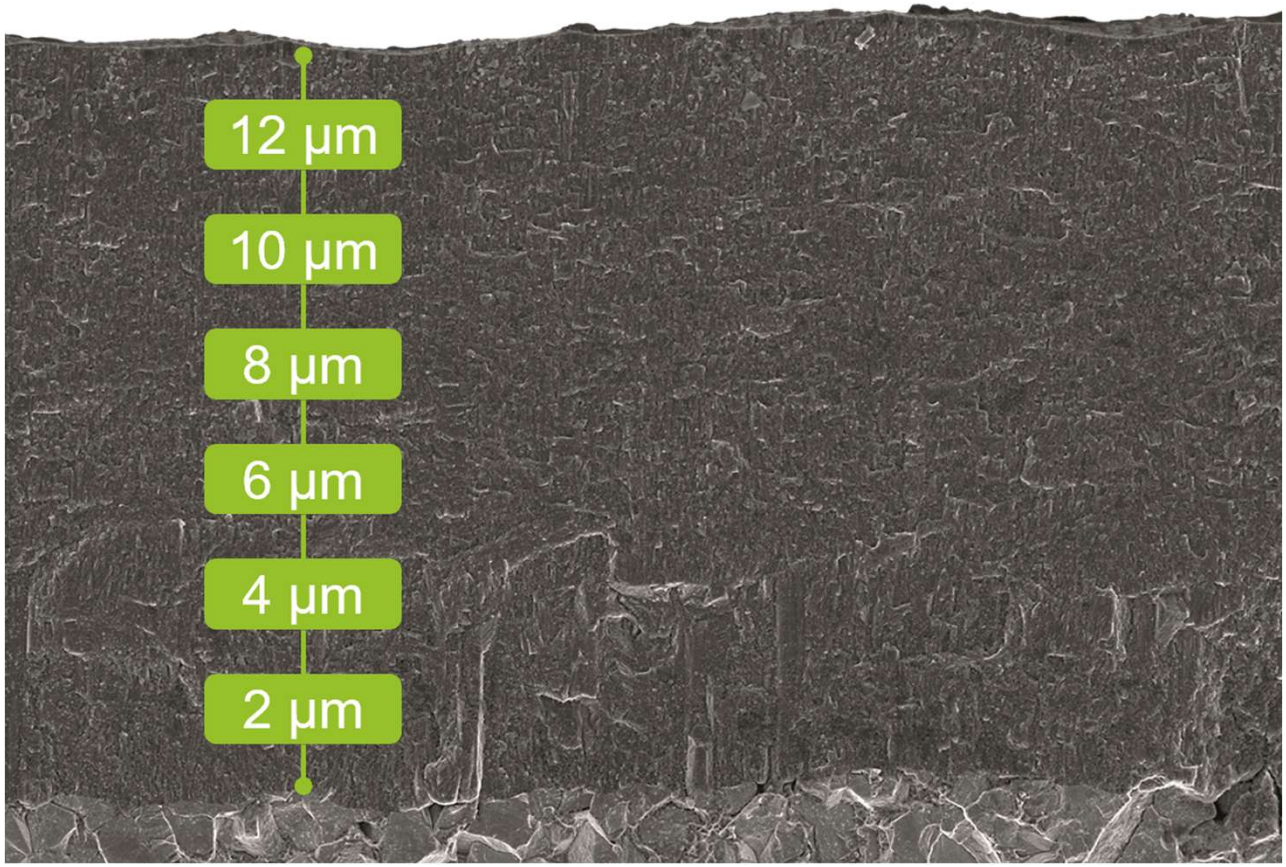




HiPIMS – dicke Schichten in Serie



HiPIMS – dicke Schichten in Serie



HiPIMS - AlTiSiN ➡ Hartbearbeitung

+ sehr hoher Si Gehalt

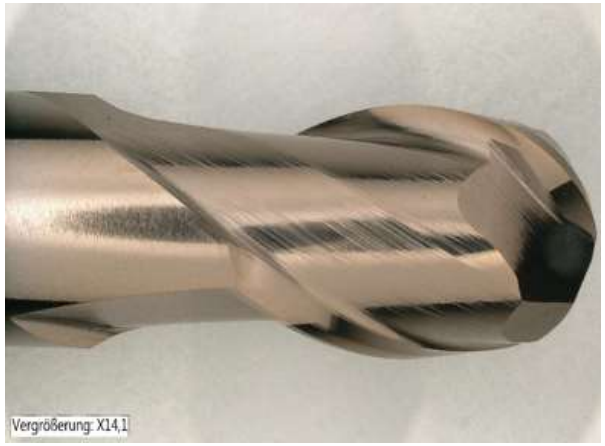
HiPIMS

+ glatt, 100% frei von Droplets
beste Haftung

+ dichte Schicht

+ perfekt angepasste Eigen-
spannungen

HiPIMS - AlTiSiN



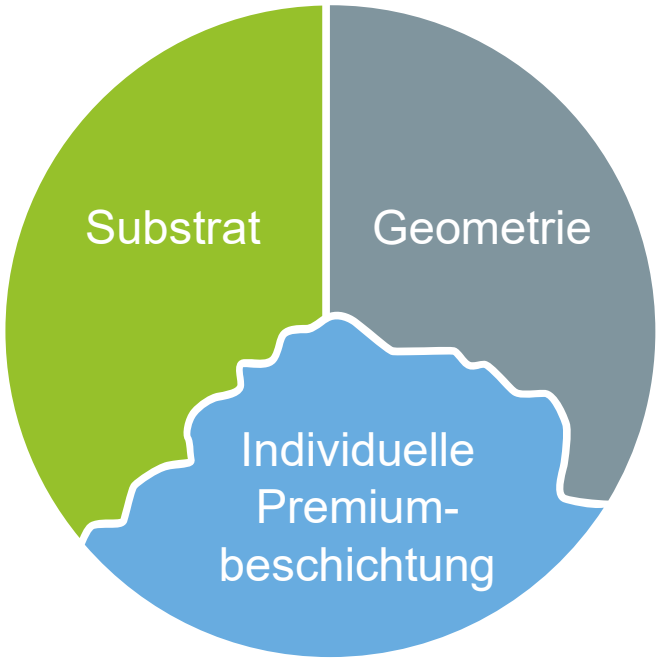
HiPIMS - angepasst an das Werkzeug

Chemische
Zusammensetzung

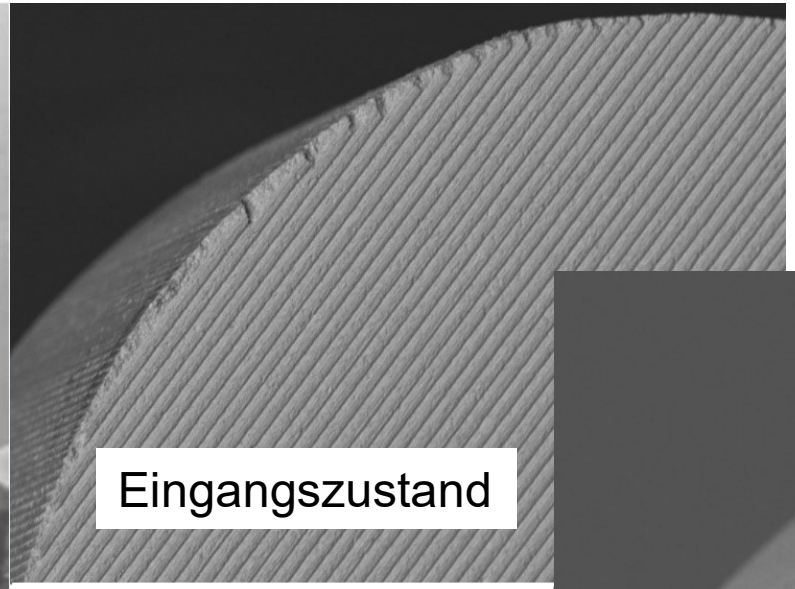
Physikalische
Eigenschaften:
HiPIMS

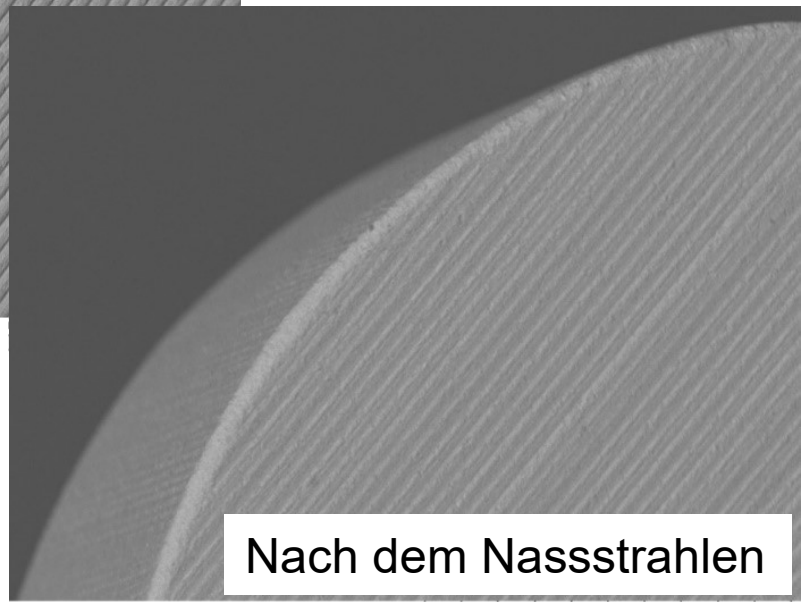
Spezifikation:
Periperieprozess

…angepasst an das Werkzeug

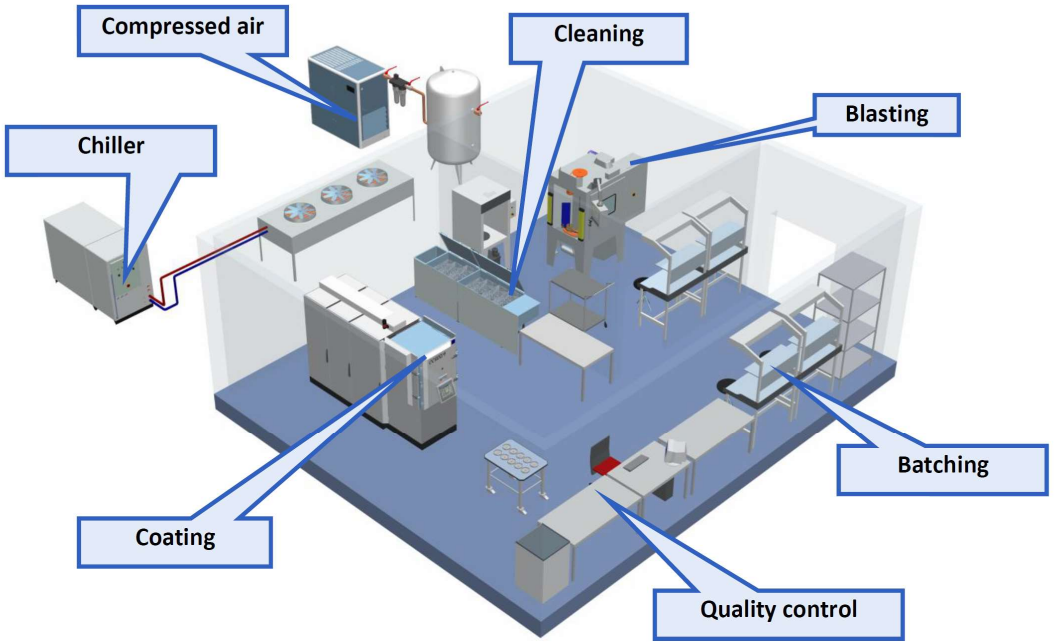


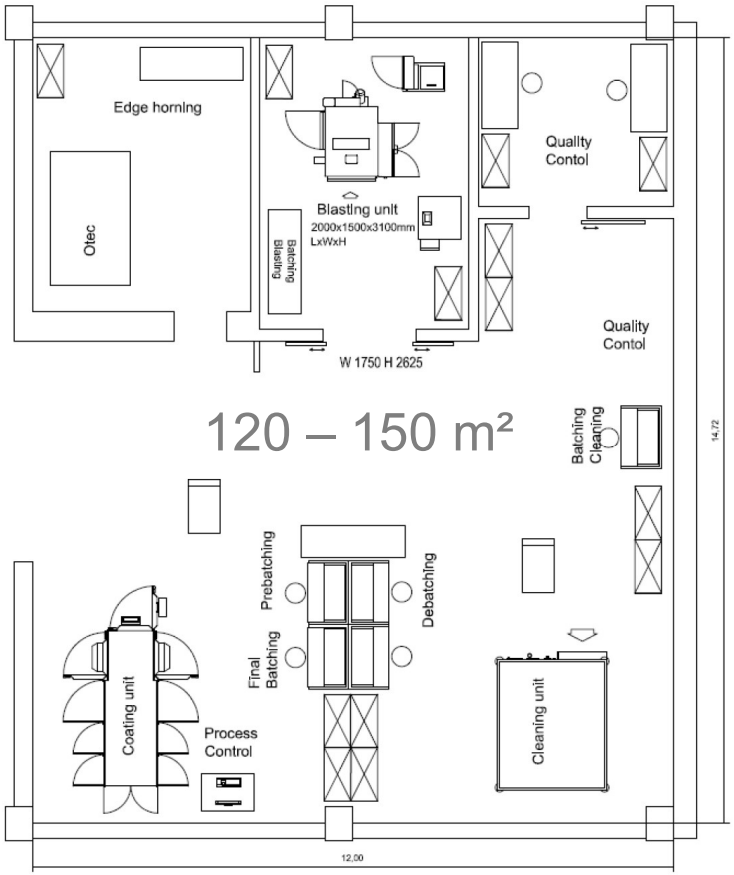
Vorbehandlung





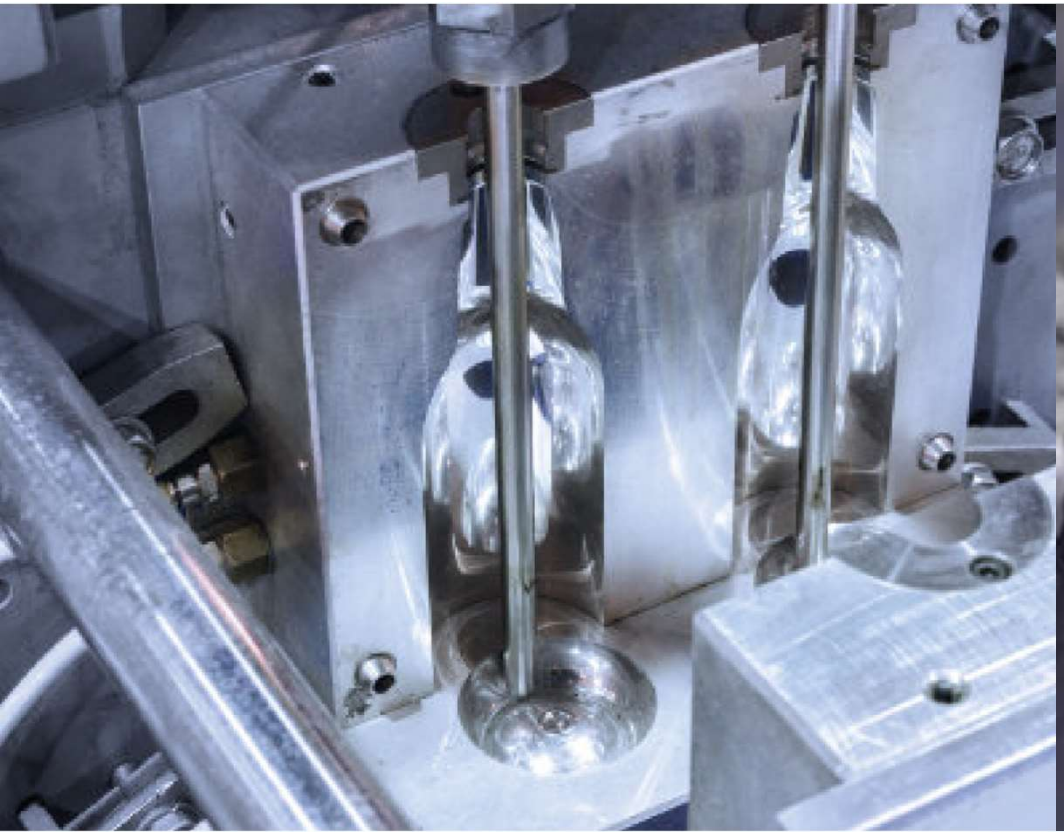
Beschichtungszentrum





Wachsende Märkte

HiPIMS - AlTiSiN

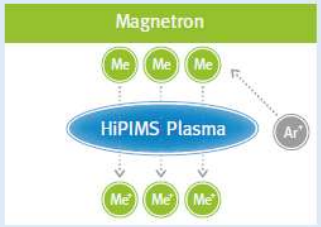


60 HRC - Formenbau

CrCo - Medizintechnik

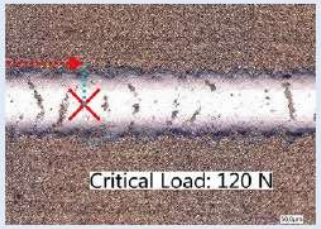
HiPIMS: Wirtschaftlichkeit

Zusammenfassung



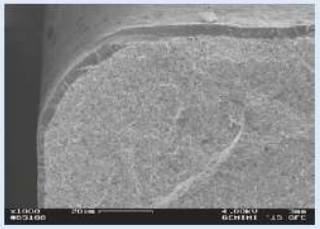
Nearly 100% metal ionization

The power peaks of HiPIMS result in an enormously dense plasma which provides an unrivalled degree of ionization to the deposited materials. The high flux of highly ionized species results in very dense and nearly amorphous coating structures.



Highest adhesion

The high metal ionization ensures the best possible coating adhesion.
A scratch load of 120 Newton is an outstanding result for InoCon® as a silicon doped and thereby very hard coating. FerroCon®, based on AlTiN, results in a scratch value of up to 130 Newton. This enables to machine the most difficult to cut materials.



Homogeneous coating all around the cutting edge

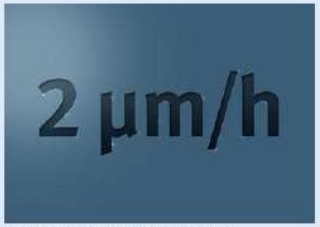
The high ionization makes the coating structure very dense and compact. Such a fine grain morphology is likewise hard and tough. Coatings grow extremely homogeneous when HiPIMS is used for the deposition.
Also, very complex tool geometries will receive approximately the same coating thickness all around the cutting edge.

Maximum flexibility

HiPIMS is a Sputter process. Almost every material can be sputtered. This means an unlimited variety of coatings through combinations of elements of the periodic system.

Perfect for micro tools

Free of defects and without antenna effects. The HiPIMS technology is also very useful for very small geometries, as it works droplet-free and without damaging or rounding the cutting edge.



Maximum profitability for pure HiPIMS coatings

The CC800® HiPIMS achieves in pure HiPIMS mode deposition rates of 2 µm/h and process times of 4–5 hours. 3 µm/h are possible when all 6 cathodes are used.

Vielen Dank für Ihre Aufmerksamkeit…