

NEW TYPE OF CVD COATING

BÜTTNER LTD



PROPERTIES AND ADVANTAGES OF CVD COATINGS

The new type of CVD coatings form thicker layers (8-10 microns) that adhere better to surfaces through chemical bonding, thereby increasing wear resistance and strength. The extreme hardness of the coatings can reach up to 3000 HV per layer, which is outstanding performance, especially when viewed in terms of nano-hardness measurement.

CVD coatings, such as titanium nitride (TiN) or titanium carbide (TiC), are ideal for coating tools and components where increased hardness (2000-3000 HV) and wear and corrosion resistance are of paramount importance. CVD technology involves introducing layer-forming gases at a temperature of nearly 1000 °C in a vacuum, where they react chemically with each other to create the desired coating.

OUR DEVELOPED COATINGS

1. TiC CVD coating

Properties:

- Colour: Dark grey
- Hardness: 3500 - 3800 HV
- Maximum application temperature: 400°C
- Coefficient of friction with steel (dry): 0.40

Advantages:

- High hardness
- Good corrosion resistance
- Heat resistance
- Good chemical resistance

Recommended areas of application:

- Punching, cutting and bending operations
- Machining, milling and drilling operations
- Deep drawing operations



Figure 1 TiC CVD coated tool

2. TiC/TiN CVD coating

Properties:

- Colour: Gold
- Hardness: 2400 HV
- Maximum application temperature: 450°C
- Coefficient of friction with steel (dry): 0.30

Advantages:

- High hardness
- Excellent corrosion resistance
- Heat resistance
- Excellent wear resistance
- Excellent chemical resistance

Recommended applications:

- Punching, cutting and bending operations
- Machining, milling and drilling operations
- Deep drawing operations



Figure 2 TiC/TiN CVD coated tool

3. TiC/TiN/TiBN CVD coating

Properties:

- Colour: Dark grey
- Hardness: 2800 HV
- Maximum application temperature: 650 °C
- Coefficient of friction with steel (dry): 0.3

Advantages:

- High hardness
- Excellent resistance to oxidation
- Heat resistance
- Excellent wear resistance
- Increased strength compared to TiC CVD coating

Recommended areas of application:

- Cutting, milling and drilling operations
- Machining of titanium alloys



COMPARISON OF THE PROPERTIES OF CVD COATINGS

Coating	TiC	TiC/TiN	TiC/TiN/TiBN
Specification			
Colour	Dark grey	Gold	Dark grey
Hardness	3500 HV	2400 HV	2800 HV
Max. application temperature	400°C	450°C	650 °C
Coefficient of friction with steel (dry):	0,40	0,30	0,30
Advantage			
High hardness	X	X	X
Corrosion resistance	X	XX	XX
Heat resistance	X	X	X
Wear resistance	X	XX	XX
Chemical resistance	X	XX	X
Strength	X	XX	XXX
Recommended areas of application			
Punching, cutting, bending operations	X	X	
Cutting, milling, drilling operations	X	X	X
Deep drawing operations	X	X	
Machining of titanium alloys			X

CVD COATING SERVICE

CVD coatings have unique properties that can significantly improve the performance and service life of tools. The most important advantages include a significant improvement in the sliding properties of active elements, increased wear resistance and the elimination of cold welding, all of which contribute to a more efficient and longer service life for tools and components.

Coating the inserts of aluminium die-casting tools also offers the possibility of significantly increasing the service life of the tools. CVD coatings resist stresses and microcracks caused by thermal and pressure fluctuations, greatly increasing the durability and efficiency of tools.

CVD coatings used in the injection moulding of abrasive, glass fibre-reinforced plastic parts further increase the service life of the tools, up to 5-10 times. These coatings are not only suitable for treating mould surfaces, but also for treating the extruder screws of injection moulding machines due to their excellent wear resistance.

Finally, CVD treatment of carbide cutting tools also offers significant advantages. The service life of the tools increases by up to 3-5 times, and they can be re-coated after sharpening, ensuring a longer service life and more economical operation.

From 1 March 2024, CVD coating will be available as a new service at Büttner Ltd.



BÜTTNER COAT-300 CVD COATING EQUIPMENT

We have developed our coating equipment, which is capable of semi-automatic operation. During implementation, we considered not only chemical aspects, but also technical and technological solutions in order to achieve new, innovative practical results.

General Features

- **Operating temperature:** 800-1000°C
- **Carbonitrides produced:** TiC, TiN, TiBN
- **Temperature control:** Equipped with a new fine control circuit, ensuring accurate and stable operation
- **Gas control:** We have built a separate flow meter control circuit for each gas to ensure precise layer formation



Figure 3 Büttner Coat-300 CVD coating equipment

Main components:

1. Control Unit:

- Dosing of coating gases and operation of equipment controls
- Process control and monitoring

2. Operating unit with heating jacket:

- Coating formation using an introduced gas mixture
- Electric CLO type heating jacket with 5 controlled zones

3. End gas treatment unit:

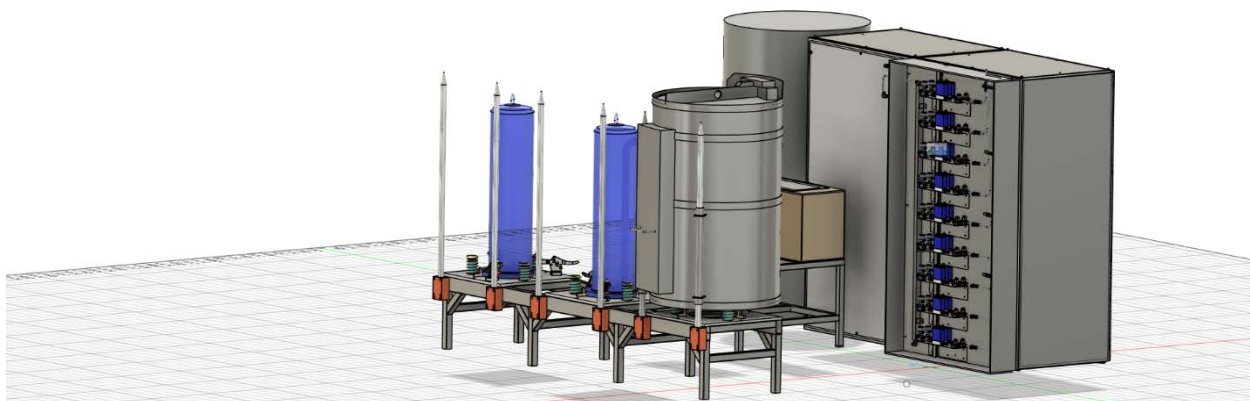
- Cooling and neutralisation of gas mixture leaving the process unit
- Made of corrosion-resistant steel

4. Gas supply and feed unit:

- Gas supply to the control unit
- Pressure regulators ensure accurate gas supply

5. Cooling circuit unit:

- Cooling of the end gas treatment unit
- Ensuring efficient and stable operation





Detailed specifications

Operating space (reactor):

- Useful volume: d300 x 620 mm
- Overall dimensions: d350 x 850 mm
- Material: Heat-resistant steel
- Weight: 69 kg

Heating jacket:

- Power: 28 KW
- Voltage/Frequency/Current: 3*400V/50 HZ/64 A
- Max. working temperature: 1100°C
- Weight: 250 Kg

Control unit:

- Cabinet dimensions: 800 x 1200 x 2000 mm
- Weight: 97 kg

End gas treatment and neutralisation unit:

- Dimensions: 400 x 1200 x 800 mm
- Weight: 95 kg
- Material: Corrosion-resistant steel / PP

Evaporator unit:

- Dimensions: 250 x 250 x 400 mm
- Weight: 25 kg
- Material: Corrosion-resistant steel

Gas supply and feed unit:

- Input pressure: 200 bar
- Output pressure: 0.5-6 bar
- Max. liquid delivery pressure: 2.5 bar

Extraction system:

- Pipe length: 8 m
- Maximum volume flow: 400 m³/h

Special features and functionalities

The special feature of the new CVD coating is that it can coat the layer with various alloying elements to optimise it. The machine handles this process automatically at the system level, enabling the creation of multi-component layers that result in better mechanical, physical and surface properties. What makes it unique is the custom design and manufacture of the end gas treatment and evaporator control units.