

PVD / PACVD / CVD



ADVANCED METAL
TECHNOLOGIES

COATING CENTRE

ABOUT US

VÚHŽ is a commercial-trade company profited from successful activities of a former research institute since 1948. The company consists of 6 divisions with various focuses. Their products and services find application in domestic and foreign market especially in automotive, engineering and metallurgical industry.

Coating centre is a part of VÚHŽ since 1994.

All three of the most requested technologies are available under one roof – PVD, CVD and PACVD. It offers also plasma nitriding before and after coating.

VÚHŽ Coating centre is specialized in these activities:

- coating of machinery parts
- coating of shearing and machining tools
- coating of forming tools
- coating of tools and moulds for plastic materials processing
- coating of tools and moulds for non-ferrous metals processing

BENEFITS OF COATING TECHNOLOGIES

PVD

- large range of coatings (chemical composition, thickness)
- low coating temperature (from 180 °C)
- large range of coated materials (steels, non-ferrous metals, hard metals)
- DLC layers with low coefficient of friction for tools a machinery parts coating

CVD

- very good resistance to wear and adhesion of the coating
- possibility of coating of cavities and holes (through and impassable)
- bigger thickness of coatings in comparison to other technologies

PACVD

- significant stick reducing of processing material
- possibility of coating of cavities and holes (through and impassable)
- lower coating temperature in comparison to CVD

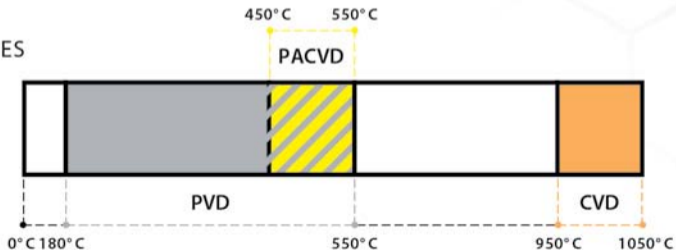
PVD COATING

Coating	Micro-hardness HV 0.025	Thickness (µm)	Friction coefficient	Coating temperature (°C)	Working temperature (°C)	Colour	Type	Delivery time
BASICCOMP	2500	1 - 6	0,4	300 - 600	600	golden	TiN	3 days
STANDARDCOMP	3000	1 - 4	0,4	do 600	600	bronze	TiCN	5 days
ALUCOMP	2500 - 3500	1 - 6	0,4	do 600	900	mauve	AlTiN	3 days
SPEEDCOMP	2500 - 3500	1 - 8	0,4	do 600	800	mauve	TiAlN	3 days
PRESSCOMP	1500 - 2500	1 - 10	0,4	350 - 450	700	silver-grey	CrN	5 days
MULTICOMP	2500 - 3500	2 - 6	0,4	do 600	800	golden	TiN/TiAlN	3 days
DLC COMP	2000 - 4000	1 - 3	0,05 - 0,15	180 - 300	350	black	a-C:H	3 days
DLC SILLCOMP	1500 - 2500	1 - 5	0,02 - 0,1	180 - 300	450	black	Si-DLC	by agreement
HLF COMP	2300	1 - 5	0,2	500	350	dark grey	DLC	by agreement
MAXCOMP	2300	1 - 5	0,2	180 - 300	350	dark grey	W-C:H	by agreement
HOTCOMP	3500	1 - 6	0,5	do 600	1500	copper	TiSiN	10 days
UNICOMP	3000	1 - 6	0,35	do 600	1100	grey	AlCrN	5 days
ZIRCOMP	1800	1 - 4	0,5	500	550	white-gold	ZrN	by agreement
FORMCOMP	1600 - 2000	2 - 6	0,5	200 - 450	do 600	silver-grey	Cr ₃ N	by agreement
VANCOMP	1900 - 2200	2 - 6	0,4 - 0,6	450	do 900	silver-grey	CrVN	by agreement

PACVD A CVD COATING

Coating	Micro-hardness HV 0.025	Thickness (µm)	Friction coefficient	Coating temperature (°C)	Working temperature (°C)	Colour	Type	Delivery time
NANOCOMP	2500 - 3200	2 - 3	0,4 - 0,5	520	800	yellow-grey	TiB ₂	3 days
NANOCOMP ULTRA	3200 - 4400	1 - 3	0,5	520	750	steel-grey	TiBC	by agreement
BORCOMP	3000 - 3400	2 - 4	0,4 - 0,5	do 600	800	grey	TiBN	by agreement
CVD HARD	3000 - 4000	1 - 20	0,5 - 0,6	1000	600	gold	TiCN	10 days

COATING TEMPERATURES



BASICCOMP

TiN

APPLICATION

- basic coating for cutting tools
- tools for cold punching and forming
- processing of materials of low hardness

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
2500	1 - 6	0,4	150 - 600	600	golden



PVD

3
days

PVD

STANDARDCOMP

TiCN

APPLICATION

- cutting and shearing tools
- less stressed pressing tools



5
days

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
3000	1 - 4	0,4	do 600	600	bronze

ALUCOMP

AlTiN

APPLICATION

- universal coating for machining
- HSS tools with high thermal load: drilling, turning, cold machining
- higher resistance to oxidation than TiAlN

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
2500 - 3500	1 - 6	0,4	do 600	900	mauve



PVD

SPEEDCOMP

TiAlN

APPLICATION

- cutting tools for high cutting speeds
- milling and drilling of cast iron and cast steel
- injection moulding of plastic materials
- HSS tools for high thermal loads
- dry machining
- moulds for pressing of sheets



BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
2500 - 3500	1 - 8	0,4	do 600	800	mauve

PRESSCOMP

CrN

APPLICATION

- moulds for cold forming and pressing
- food-processing industry
- moulds and nozzles for injection moulding of plastic materials (particularly with contents of Cl, F, etc.)
- machinery components



BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
1500 - 2500	1 - 10	0,4	150 - 450	700	silver-grey

MULTICOMP

TiN/TiAlN

APPLICATION

- coating of trimming dies

PVD



5
days

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
2500 - 3500	2 - 6	0,4	do 600	800	golden

PVD/PACVD

DLC COMP

a-C:H

APPLICATION

- coating of Al moulds for pressing of rubber
- food processing industry
- application with high requirements to good slide characteristics at high resistance to abrasion
- reduced consumption of lubricants
- prevention of sticking of the processed material



BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
2000 - 4000	1 - 3	0,05 - 0,15	160 - 300	350	black

DLC SILLCOMP

Si-DLC

APPLICATION

- parts for automotive industry
(components of compression ignition oil engines)
- sliding and roller elements
- elimination of friction losses



PVD/PACVD



by agreement

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
1500 - 2500	1 - 5	0,02 - 0,1	160 - 300	450	black

HLF COMP

DLC

APPLICATION

- non-ferrous metal machining
- sliding and rolling parts



PVD



by agreement

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
2300	1 - 5	0,2	500	350	dark grey

MAXCOMP

W-C:H

APPLICATION

- sliding and rolling parts



by agreement

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
2300	1 - 5	0,2	150 - 300	350	dark grey

HOTCOMP

TiSiN

APPLICATION

- tools for hot machining processes
- processing of very hard materials



BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
3500	1 - 6	0,5	do 600	1500	copper

PVD

UNICOMP

AlCrN

APLIKACE

- die casting of non-ferrous metals
- machining of high strength materials



BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
3000	1 - 6	0,35	do 600	1100	grey

ZIRCOMP

ZrN

APPLICATION

- machining and forming of aluminium alloys, plastics and metals



PVD



by agreement

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
1800	1 - 4	0,5	500	550	white-gold

PVD

FORMCOMP

Cr₂N

APPLICATION

- moulds for injection moulding
- moulds for forming of plastics and rubbers
- tools for cold forming



by agreement

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
1600 - 2000	2 - 6	0,5	200 - 450	do 600	silver-grey

VANCOMP

CrVN

APPLICATION

- moulds for die casting of non-ferrous metals
- cutting tools



PVD

BASIC PROPERTIES



by agreement

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
1900 - 2200	2 - 6	0,4 - 0,6	450	do 900	silver-grey

NANOCOMP

TiB₂

APPLICATION

- die casting of non-ferrous metals
- moulds, cores, inserts, pouring chambers
- moulds for injection moulding
of plastic materials
- coating of grinding rollers
- coating of through and impassable cavities
- coating of components of complicated
shapes with narrow slots



BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
2500 - 3200	2 - 3	0,4 - 0,5	520	800	yellow-grey

NANOCOMP ULTRA

TiBC

APPLICATION

- cutting tools
- pressing tools for cold pressing
- deep drawing

PACVD



by agreement

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
3200 - 4400	1 - 3	0,5	520	750	steel grey

BORCOMP

TiBN

APPLICATION

- tools subjected to high mechanical stresses
- forming, pressing, cutting, cold bending
- die casting of non-ferrous metals



PACVD



by agreement

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
3500	4	0,5	do 600	800	grey

CVD

CVD HARD

TiCN

APLIKACE

- tools subjected to extremely high mechanical stresses
- forming, pressing, cutting, cold bending
- forming of tubes
- coating of trimming dies



10
days

BASIC PROPERTIES

Micro-hardness HV 0.025	Thickness (μm)	Friction coefficient	Coating temperature ($^{\circ}\text{C}$)	Working temperature ($^{\circ}\text{C}$)	Colour
4500	1 - 10	0,5 - 0,6	1000	600	golden

COATING EQUIPMENT



PVD

Maximal
mass

250 kg

Maximal
diameter

500 mm

Maximal
height

500 mm



PVD

Maximal
mass

1000 kg

Maximal
diameter

650 mm

Maximal
height

850 mm

COATING EQUIPMENT



PACVD

Maximal
mass

Maximal
diameter

Maximal
height

1250 kg

700 mm

1100 mm



CVD

Maximal
mass

Maximal
diameter

Maximal
height

15 kg

220 mm

500 mm

COMPLEX SERVICES OF THE VÚHŽ COATING CENTRE

Modification of tools prior to coating

- cleaning line
- polishing of tools and moulds – for selected instruments also after coating
- micro shot blasting
- tumbling

Plasma deep nitriding of tools prior to coating

Coating by CVD, PA CVD and PVD technologies

Removal of coatings

- We remove all types of coatings, including CVD coatings without damaging of the base material.

Quality control of applied coatings

Transport

- collection and distribution of tools

Guidance at selection of an optimum coating

Research and development

- VÚHŽ a.s. develops new coating procedures and new types of coatings. Development is solved within the frames of numerous international or national projects.
- In the case of special customer's requirements we develop special technological procedures.

QUALITY CONTROL

We use for determination of properties of the coatings the accredited laboratories of VÚHŽ a.s., which can make measurements of the following characteristics:

- thickness of layers
- adhesion of layers to the surface
- roughness
- hardness and micro-hardness
- evaluation of layers structure
- determination of chemical composition of coatings, including elemental profiles in a transient layer coating / parent material
- evaluation of tools geometry and surface

Laboratories and testing shops of the VÚHŽ a.s. collaborate closely with the Regional Materials Science and Technology Centre. The detached working site - Laboratory for surface analyses and corrosion, which operate in the VÚHŽ a.s., facilities, is equipped with cutting edge instrumentation for surface and profile analyses.

COATING ANALYSIS



SCANNING ELECTRON
MICROSCOPE
QUANTA 450 FEG



OPTICAL EMISSION SPECTROMETER
WITH EXCITATION BY GLOW
DISCHARGE LECO GDS-850A



ADVANCED METAL
TECHNOLOGIES

VUHŽ CONSISTS OF 6 DIVISIONS WITH VARIOUS FOCUSES

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