



Jožef Stefan Institute, Ljubljana, Slovenia

Hard Coatings Center



We have been depositing hard PVD coatings since 1985

TiAlSiN



Trilayer nanocomposite coating (Ti,Al,Si)N

hardness: 3800 HV
max. temp.: 1100 °C
color: brown

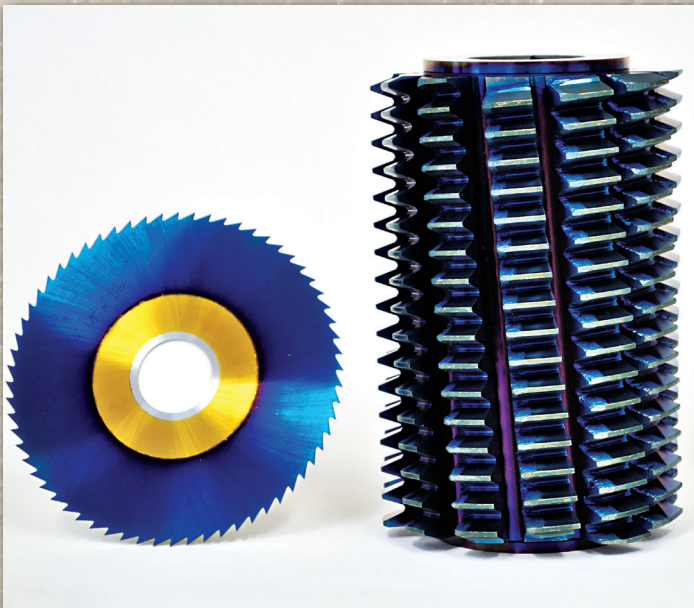
Properties

high hardness
thermally stable

Application

machining up to 70 HRC
dry machining
high-speed machining

AlTiN



Nanolayer coating AlTiN/TiN

hardness: 3500 HV
max. temp.: 1100 °C
color: blue

Properties

high hardness
thermally stable
distinct color for easier detection of wear

Application

machining up to 62 HRC
machining of high-strength materials
high-speed machining

TiAlN



Single-layer coating TiAlN

hardness: 3300 HV
max. temp.: 900 °C
color: dark violet

Properties

high hardness
thermally stable

Application

universal coating for cutting tools
machining up to 52 HRC
processing of glass fiber containing plastics
bulk forming
sheet metal forming
blanking

aCN



Double-layer coating TiAlN/a-CN

hardness: 3300 HV / 1100 HV
max. temp.: 900 °C
color: black

Properties

low friction coefficient
self-lubricating coating

Application

dry machining
machining of Al and Mg alloys
pharmaceutical, food industry

TiN



Single-layer coating TiN

hardness: 2300 HV
max. temp.: 500 °C
color: gold

Properties

basic coating
distinct gold color

Application

cutting at low speed and low feed
machining of carbon steel
plastics processing
decorative coating
bulk forming
sheet metal forming
blanking

CrN



Single-layer coating CrN

hardness: 1800 HV
max. temp.: 750 °C
color: metallic grey

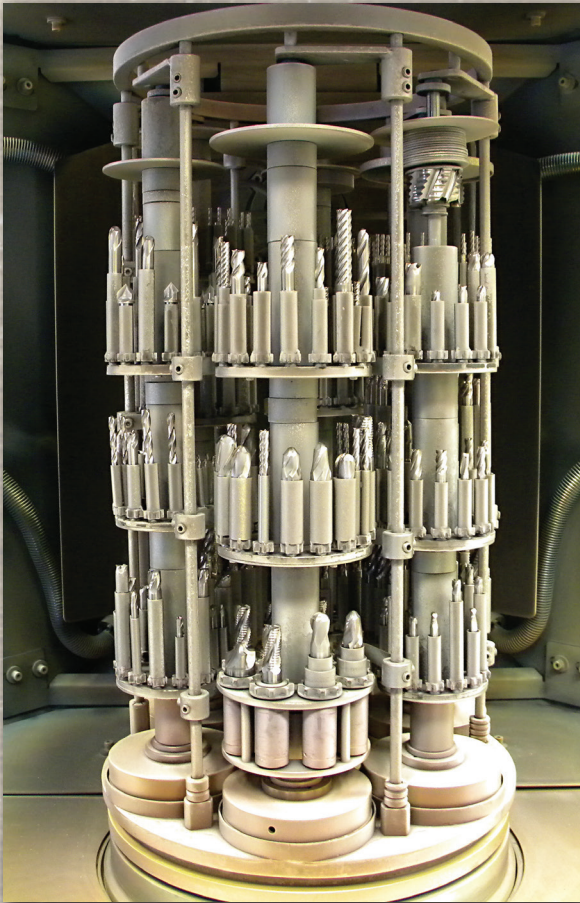
Properties

chemically inert
prevents sticking of soft materials

Application

plastics processing
machining of non-ferrous alloys
pharmaceutical, food industry
die casting, extrusion

Deposition of coatings



The coatings are deposited in three professional systems:

- Kobelco AlPocket
- CemeCon CC800/9
- Balzers BAI730

We use the following deposition techniques:

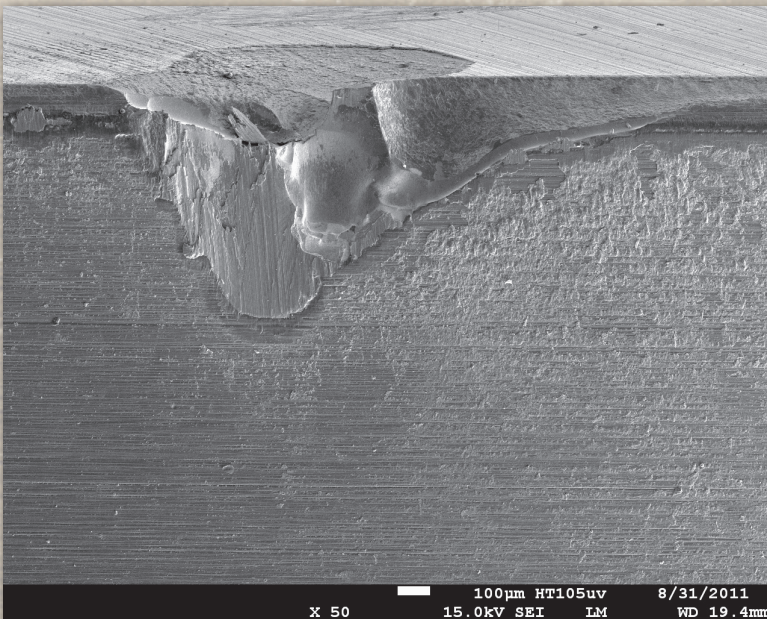
- evaporation
- sputtering
- pulsed sputtering

Coating thickness: 2–3 μm for cutting tools,
3–5 μm for forming tools.

Basic requirements:

- tool materials: cemented carbides and selected steels
- correct surface preparation
- the deposition temperature is 450 °C
- maximum tool size $\varnothing$ 400 mm $\times$ 400 mm

Analytics



We possess the most modern techniques for surface and thin film analytics:

- electron microscopy
- optical microscopy
- mechanical tests
(hardness, adhesion, wear)
- surface topography measurements
- chemical analysis

In addition to coating deposition, we also offer:

- designated professional seminars
- consulting in industrial implementation of coatings
- investigations and expert opinions
- application of joint projects
(national or international)

Advisable coating choice

CUTTING

	drilling	milling	turning	tapping	reaming
steel	TiAlN	TiAlN	TiAlN	TiN	TiAlN
	TiN		TiN		TiN
hardened steel	AlTiN	TiAlSiN	TiAlSiN	AlTiN	TiAlSiN
		AlTiN	AlTiN		AlTiN
stainless steel	TiAlN	TiAlN	TiAlN	TiAlN	TiAlN
	AlTiN	AlTiN	AlTiN	TiN	
cast iron	TiAlN	TiAlN	TiAlN	TiAlN	TiAlN
	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN
Cu alloys	CrN	CrN	CrN	CrN	CrN
Al alloys	aCN	aCN	aCN	aCN	aCN

PLASTICS PROCESSING

thermoplastics	TiN
thermosets	CrN
plastics with a lot of fillers	TiAlN

FORMING

punching, bending, forging, deep drawing, extrusion: contact the staff

All information is informative. For details, please contact the Hard Coatings Center staff.

Contacts

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