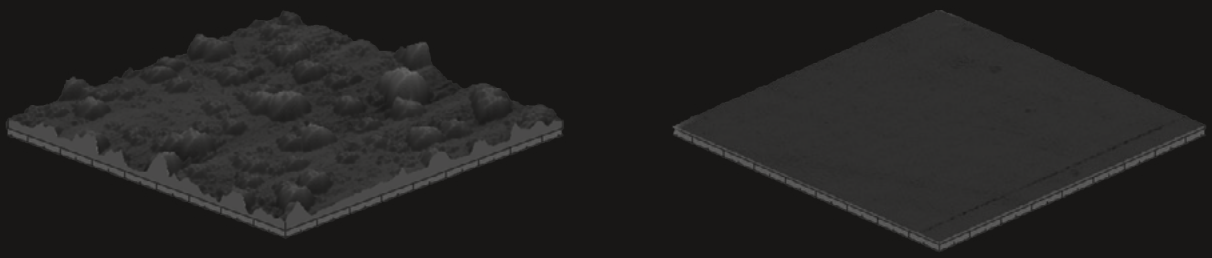
Coatings

PLATIT Coating Intelligence

- Coating guide
- Coating properties
- Signature Coatings



PLATIT® π - Series

				Turning	Milling			Gear cutting					Sawing		Drilling		Deep hole drilling	Reaming	Broaching	Tapping	
	WORKPIECE MATERIAL			Inserts	Inserts	Shank tools	Micro tools	Hobs	Pinion cutting	Skiving	Fly cutters, stick blades		Saw blades	Band saws	Drilling	Micro tools				Taps, thread cutters	Tap forming, thread forming
1	Steels unalloyed < 1000 N/mm²	Dry	A	nACo	ALL4	ALL4	AlCrN	ALL4	ALL4	ALL4	TiXCo4		AlTiCrN	nACo	AlTiN	AlTiN	AlTiN	nACo	TiN	TiN	TiCN
			B	AlTiN	BorAC	BorAC	--	BorAC	BorAC	AlCrN	AlTiCrN		AlTiN	TiAlCN	TiXCo3	TiXCo3	TiXCo3	TiXCo3	TiCN	TiCN	CrTiN
		Wet	A	nACo	AlTiCrN	AlTiCrN	AlCrN	AlTiCrN	AlTiCrN	AlTiCrN	TiXCo4		AlTiCrN	nACo	AlTiN	AlTiN	AlTiN	nACo	TiN	TiN	TiCN
			B	AlTiN	ALL4	ALL4	--	ALL4	ALL4	ALL4	AlTiCrN		AlTiN	TiAlCN	TiXCo3	TiXCo3	TiXCo3	TiXCo3	TiCN	TiCN	CrTiN
2	Steels unalloyed > 1000 N/mm²	Dry	A	nACo	ALL4	ALL4	AlCrN	ALL4	ALL4	ALL4	TiXCo4		AlTiCrN	nACo	AlTiN	AlTiN	AlTiN	nACo	AlTiN	TiN	TiCN
			B	AlTiN	BorAC	BorAC	--	BorAC	BorAC	AlCrN	AlTiCrN		AlTiN	TiAlCN	TiXCo3	TiXCo3	TiXCo3	TiXCo3	TiCN	TiCN	CrTiN
		Wet	A	nACo	AlTiCrN	AlTiCrN	AlCrN	AlTiCrN	AlTiCrN	AlTiCrN	TiXCo4		AlTiCrN	nACo	AlTiN	AlTiN	AlTiN	nACo	AlTiN	TiN	TiCN
			B	AlTiN	ALL4	ALL4	--	ALL4	ALL4	ALL4	AlTiCrN		AlTiN	TiAlCN	TiXCo3	TiXCo3	TiXCo3	TiXCo3	TiCN	TiCN	CrTiN
3	Steels hardened < 55 HRC	Dry	A	TiXCo4	TiXCo4	TiXCo4	TiXCo3	--	--	TiXCo4	--		nACo	nACo	TiXCo3	TiXCo3	--	nACo	--	--	--
			B	nACo	nACo	nACo	--	--	--	ALL4	--		AlTiN	AlTiN	nACo	nACo	--	TiXCo3	--	--	--
		Wet	A	TiXCo4	TiXCo4	TiXCo4	TiXCo3	--	--	TiXCo4	--		nACo	nACo	TiXCo3	TiXCo3	--	nACo	--	--	--
			B	nACo	nACo	nACo	--	--	--	ALL4	--		AlTiN	AlTiN	nACo	nACo	--	TiXCo3	--	--	--
4	Steels hardened > 55 HRC	Dry	A	TiXCo3	TiXCo3	TiXCo3	TiXCo3	--	--	TiXCo4	--		--	--	TiXCo3	TiXCo3	--	--	--	--	--
			B	PSiX	PSiX	PSiX	--	--	--	BorAX	--		--	--	--	--	--	--	--	--	--
		Wet	A	PSiX	PSiX	PSiX	TiXCo3	--	--	TiXCo4	--		--	--	--	--	--	--	--	--	--
			B	nACo	nACo	nACo	--	--	--	BorAX	--		--	--	--	--	--	--	--	--	--
5	Stainless steel	Dry	A	nACo	nACo	nACo	nACo	--	--	--	--		AlTiN	nACo	AlTiN	AlTiN	AlTiN	nACo	--	TiN	TiCN
			B	AlTiN	AlTiN	AlTiN	--	--	--	--	--		TiAlCN	TiAlCN	TiXCo3	TiXCo3	TiXCo3	TiXCo3	--	TiCN	CrTiN
		Wet	A	PSiX	PSiX	PSiX	nACo	--	--	--	--		AlTiN	nACo	AlTiN	AlTiN	AlTiN	nACo	--	TiN	TiCN
			B	AlTiN	AlTiN	AlTiN	--	--	--	--	--		TiAlCN	TiAlCN	TiXCo3	TiXCo3	TiXCo3	TiXCo3	--	TiCN	CrTiN
6	Stainless steel > 45 HRC	Dry	A	TiXCo3	TiXCo3	TiXCo3	TiXCo3	--	--	--	--		--	--	AlTiN	AlTiN	AlTiN	nACo	--	TiN	--
			B	nACo	PSiX	PSiX	--	--	--	--	--		--	--	TiXCo3	TiXCo3	TiXCo3	TiXCo3	--	TiCN	--
		Wet	A	TiXCo3	TiXCo3	TiXCo3	TiXCo3	--	--	--	--		--	--	AlTiN	AlTiN	AlTiN	nACo	--	TiN	--
			B	TiAlCN	PSiX	PSiX	--	--	--	--	--		--	--	TiXCo3	TiXCo3	TiXCo3	TiXCo3	--	TiCN	--
7	Superalloys Ni-based	Dry	A	nACoX	nACoX	BorAX	TiXCo3	--	--	--	--		AlTiCrN	AlTiCrN	TiXCo4	--	--	--	--	TiCN	--
			B	AlTiN	ALL4	ALL4	--	--	--	--	--		AlTiN	AlTiN	nACoX	--	--	--	--	TiAlCN	--
		Wet	A	nACoX	nACoX	BorAX	TiXCo3	--	--	--	--		AlTiCrN	AlTiCrN	TiXCo4	--	--	--	--	TiCN	--
			B	AlTiN	ALL4	ALL4	--	--	--	--	--		AlTiN	AlTiN	nACoX	--	--	--	--	TiAlCN	--
8	Superalloys Ti-based	Dry	A	nACo	nACo	nACo	nACo	--	--	--	--		AlTiCrN	AlTiCrN	TiXCo3	--	--	--	--	TiCN	--
			B	--	nACRo	nACRo	nACRo	--	--	--	--		AlTiN	AlTiN	AlTiN	--	--	--	--	TiAlCN	--
		Wet	A	nACo	nACo	nACo	nACo	--	--	--	--		AlTiCrN	AlTiCrN	TiXCo3	--	--	--	--	TiCN	--
			B	--	nACRo	nACRo	nACRo	--	--	--	--		AlTiN	AlTiN	AlTiN	--	--	--	--	TiAlCN	--

A primary recommendation
B secondary recommendation

	WORKPIECE MATERIAL			Turning	Milling			Gear cutting					Sawing		Drilling		Deep hole drilling	Reaming	Broaching	Tapping	
				Inserts	Inserts	Shank tools	Micro tools	Hobs	Pinion cutting	Skiving	Fly cutters, stick blades		Saw blades	Band saws	Drilling	Micro tools				Taps, thread cutters	Tap forming, thread forming
9	Cast iron	Dry	A	nACo	nACo	nACo	nACo	– –	– –	– –	– –		– –	– –	TiXCo3	– –	– –	TiXCo3	– –	TiCN	– –
			B	AlTiN	AlTiN	AlTiN		– –	– –	– –	– –		– –	– –	nACo	– –	– –	nACo	– –	TiAlCN	– –
		Wet	A	nACo	nACo	nACo	nACo	– –	– –	– –	– –		– –	– –	TiXCo3	– –	TiN	TiXCo3	– –	TiCN	– –
			B	AlTiN	AlTiN	AlTiN		– –	– –	– –	– –		– –	– –	nACo	– –	TiCN	nACo	– –	TiAlCN	– –
10	Aluminum Si > 12%	Dry	A	nACRo	nACRo	nACRo	nACRo	– –	– –	– –	– –		nACRo	nACRo	nACRo	nACRo	– –	– –	– –	TiCN	– –
			B	TiB2	TiB2	TiB2	TiB2	– –	– –	– –	– –		ALL4	ALL4	TiB2	TiB2	– –	– –	– –	TiAlCN	– –
		Wet	A	nACRo	nACRo	nACRo	nACRo	– –	– –	– –	– –		nACRo	nACRo	nACRo	nACRo	– –	– –	– –	TiCN	– –
			B	TiB2	TiB2	TiB2	TiB2	– –	– –	– –	– –		ALL4	ALL4	TiB2	TiB2	– –	– –	– –	TiAlCN	– –
11	Aluminum Si < 12%	Dry	A	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –		DLC3: Cr + taC/aC	ZrN	TiB2	TiB2	– –	– –	– –	TiCN	TiN
			B	TiB2	TiB2	TiB2	TiB2	– –	– –	– –	– –		ZrN		TiB2	ZrN	– –	– –	– –	TiB2	ZrN
		Wet	A	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –		DLC3: Cr + taC/aC	ZrN	TiB2	TiB2	– –	– –	– –	TiCN	TiN
			B	TiB2	TiB2	TiB2	TiB2	– –	– –	– –	– –		ZrN		TiB2	ZrN	– –	– –	– –	TiB2	ZrN
12	Copper	Dry	A	CrN	CrN	CrN	CrN	– –	– –	– –	– –		CrN	CrN	TiAlCN	– –	– –	TiXCo3	– –	TiCN	TiN
			B	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	– –	– –	– –	– –		– –	– –	CrN	– –	– –	nACo	– –	TiAlCN	ZrN
		Wet	A	CrN	CrN	CrN	CrN	– –	– –	– –	– –		CrN	CrN	TiAlCN	– –	– –	TiXCo3	– –	TiCN	TiN
			B	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	– –	– –	– –	– –		– –	– –	CrN	– –	– –	nACo	– –	TiAlCN	ZrN
13	Bronze, brass	Dry	A	CrN	CrN	CrN	CrN	– –	– –	– –	– –		CrN	CrN	TiAlCN	– –	– –	TiXCo3	– –	TiCN	TiN
			B	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	– –	– –	– –	– –		– –	– –	CrN	– –	– –	nACo	– –	TiAlCN	ZrN
		Wet	A	CrN	CrN	CrN	CrN	– –	– –	– –	– –		CrN	CrN	TiAlCN	– –	– –	TiXCo3	– –	TiCN	TiN
			B	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	DLC2: CrN + aC:H:Si	– –	– –	– –	– –		– –	– –	CrN	– –	– –	nACo	– –	TiAlCN	ZrN
14	Plastic	Dry	A	– –	– –	DLC3: Cr + taC/aC	– –	– –	– –	– –	– –		– –	– –	TiXCo3	– –	– –	– –	– –	– –	– –
			B	– –	– –	TiB2	– –	– –	– –	– –	– –		– –	– –	DLC2: CrN + aC:H:Si	– –	– –	– –	– –	– –	– –
		Wet	A	– –	– –	DLC3: Cr + taC/aC	– –						– –	– –	– –	– –	– –	– –	– –	– –	– –
			B	– –	– –	TiB2	– –						– –	– –	– –	– –	– –	– –	– –	– –	– –
15	Graphite	Dry	A	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –		– –	– –	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –	– –
			B	– –	– –	– –	– –	– –	– –	– –	– –		– –	– –	BorAX	BorAX	– –	– –	– –	– –	– –
		Wet	A	TiXCo4	TiXCo4	TiXCo4	TiXCo3	– –	– –	– –	– –		– –	– –	BorAX	BorAX	– –	– –	– –	– –	– –
			B	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –		– –	– –	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –	– –
16	Carbon fiber reinforced polymer	Dry	A	– –	– –	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –		DLC3: Cr + taC/aC	– –	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –	– –
			B	– –	– –	TiXCo4	TiXCo3	– –	– –	– –	– –		– –	– –	TiXCo3	TiXCo3	– –	– –	– –	– –	– –
		Wet	A	– –	– –	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –		DLC3: Cr + taC/aC	– –	TiXCo3	TiXCo3	– –	– –	– –	– –	– –
			B	– –	– –	TiXCo4	TiXCo3	– –	– –	– –	– –		– –	– –	DLC3: Cr + taC/aC	DLC3: Cr + taC/aC	– –	– –	– –	– –	– –
17	Wood	Dry	A	– –	DLC2: CrTiN + aC:H:Si	DLC2: CrTiN + aC:H:Si	– –	– –	– –	– –	– –		DLC2: CrTiN + aC:H:Si	– –	DLC2: CrTiN + aC:H:Si	– –	– –	– –	– –	– –	– –
			B	– –	CrN	CrN	– –	– –	– –	– –	– –		CrN	– –	TiXCo3	– –	– –	– –	– –	– –	– –
		Wet	A	– –	DLC2: CrTiN + aC:H:Si	DLC2: CrTiN + aC:H:Si	– –	– –	– –	– –	– –		DLC2: CrTiN + aC:H:Si	– –	– –	– –	– –	– –	– –	– –	– –
			B	– –	CrN	CrN	– –	– –	– –	– –	– –		CrN	– –	– –	– –	– –	– –	– –	– –	– –

A primary recommendation / B secondary recommendation

Coating guide

		Fine blanking	Punching	Injection molding		Forming, embossing	Deep drawing	Extrusion
TOOL MATERIAL				**Plastic**	**Aluminum**			
HSS	A	AlCrN	AlCrN	--	--	CrN	ALL4	ALL4
	B	BorAC	ALL4	--	--	--	AlCrN	AlCrN
Carbide	A	AlCrN	AlCrN	--	--	--	--	--
	B	BorAC	ALL4	--	--	--	--	--
Steels unalloyed	A	--	--	CrN	AlTiCrN	--	--	--
< 1000 N/mm²	B	--	--	TiN	nACRo	--	--	--
Steels unalloyed	A	--	--	CrN	AlTiCrN	--	--	--
> 1000 N/mm²	B	--	--	TiN	nACRo	--	--	--
Steels hardened	A	AlCrN	AlCrN	CrN	AlTiCrN	CrN	ALL4	ALL4
< 55 HRC	B	BorAC	ALL4	TiN	nACRo	--	AlCrN	AlCrN
Steels hardened	A	AlCrN	AlCrN	CrN	AlTiCrN	CrN	ALL4	ALL4
> 55 HRC	B	BorAC	ALL4	TiN	nACRo	--	AlCrN	AlCrN
Aluminum Si	A	--	--	CrN	--	CrN	--	--
> 12%	B	--	--	TiN	--	TiN	--	--
Aluminum Si	A	--	--	--	--	CrN	--	--
< 12%	B	--	--	--	--	TiN	--	--
Copper	A	--	--	--	--	CrN	--	--
	B	--	--	--	--	TiN	--	--
Bronze, brass	A	--	--	--	--	CrN	--	--

A primary recommendatio
B secondary recommendation

		Machine parts[1]	Medical components			Tribology	Decorative materials
WORKPIECE MATERIAL			Medical implants	Surgical, dental instruments	Anti-bacterial medical components		
Steels unalloyed < 1000 N/mm²	A	--	--	--	--	DLC2: CrN + a-C:H:Si	--
	B	--	--	--	--	DLC3: Cr + ta-C/a-C	--
Steels unalloyed > 1000 N/mm²	A	--	--	--	--	DLC2: CrN + a-C:H:Si	--
	B	--	--	--	--	DLC3: Cr + ta-C/a-C	--
Steels hardened < 55 HRC	A	CrTiN	--	--	--	DLC2: CrN + a-C:H:Si	--
	B	--	--	--	--	DLC3: Cr + ta-C/a-C	--
Steels hardened > 55 HRC	A	CrTiN	--	--	--	DLC2: CrN + a-C:H:Si	--
	B	--	--	--	--	DLC3: Cr + ta-C/a-C	--
Stainless steel	A	--	--	DLC2: CrN + a-C:H:Si	ZrN	DLC2: CrN + a-C:H:Si	Custom
	B	--	--	DLC3: Cr + ta-C/a-C	Cr2N	DLC3: Cr + ta-C/a-C	--
Stainless steel > 45 HRC	A	--	--	--	--	DLC2: CrN + a-C:H:Si	Custom
	B	--	--	--	--	DLC3: Cr + ta-C/a-C	--
Superalloys Ni-based	A	--	--	--	--	DLC2: CrN + a-C:H:Si	--
Superalloys Ti-based	A	--	Ti2N	DLC3: Cr + ta-C/a-C	--	DLC2: CrN + a-C:H:Si	--
	B	--	ZrN	DLC2: CrN + a-C:H:Si	--	--	--
Cast iron	A	CrN	--	--	--	--	--
Aluminum Si < 12%	A	CrN	--	--	--	--	--
Copper	A	--	--	--	ZrN	--	Custom
	B	--	--	--	Cr2N	--	--
Bronze, brass	A	--	--	--	ZrN	--	Custom
	B	--	--	--	Cr2N	--	--
Plastic	A	--	--	--	ZrN	--	Cr2N
	B	--	--	--	Cr2N	--	Custom

A primary recommendatio
B secondary recommendation

[1] in abrasive and corrosive environment such as gears, water pumps, tool holders

Coating properties

Overview

		Color	Nano-hardness [GPa] by Fisher Nanoindentor	Coating thickness [µm]	Coefficient of friction [µ] PoD (at RT, 50% humidity)	Max. service temperature [°C]
1	**TiN**	Gold	24 – 26	1 – 10	0.4	600
2	**TiCN**	Grey	36 – 38	1 – 3	0.25	450
3	**TiAlN**	Violet grey	36 – 38	1 – 5	0.5	700
4	**TiAlCN**	Red violet	34 – 36	1 – 5	0.25	450
5	**AlTiN**	Blue grey	36 – 38	1 – 5	0.6	900
6	**CrN**	Silver	21 – 23	1 – 10	0.5	700
7	**CrTiN**	Satin silver	28 – 30	1 – 10	0.4	700
8	**ZrN**	White gold	21 – 23	1 – 5	0.4	550
9	**AlCrN**	Grey	36 – 38	1 – 5	0.5	900
10	**AlTiCrN**	Grey	36 – 38	1 – 5	0.5	900
11	**ALL4**	Grey	36 – 38	1 – 5	0.5	900
12	**nACo**	Blue violet	39 – 41	1 – 4	0.4	1200
13	**nACRo**	Grey	39 – 41	1 – 4	0.5	1100
14	**TiXCo3**	Copper	42 – 44	1 – 4	0.4	900
15	**TiXCo4**	Grey	42 – 44	1 – 4	0.4	900
16	**PSiX**	Red brown	42 – 44	1 – 4	0.4	1100
17	**BorAC**	Grey	38 – 40	1 – 5	0.5	900
18	**BorAX**	Copper	42 – 44	1 – 4	0.4	1100
19	**TiB2**	Satin silver	32 / 38	1 – 5	0.4	600
20	**WC/C**	Dark grey	15 – 18	1 – 3	0.1 – 0.2	300
21	**DLC1: TiCN + a-C:H:Me**	Anthracite	36 / 20	1 – 3	0.1 – 0.2	400
22	**DLC1: nACRo + a-C:H:Me**	Anthracite	39 / 20	1 – 3	0.1 – 0.2	400
23	**DLC2: TiN + a-C:H:Si**	Anthracite	> 25	1 – 3	0.1 – 0.2	400
24	**DLC2: CrN + a-C:H:Si**	Anthracite	> 25	1 – 3	0.1 – 0.2	400
25	**DLC2: CrTiN + a-C:H:Si**	Anthracite	> 25	1 – 3	0.1 – 0.2	400
26a	**DLC3: Cr + ta-C/a-C in Pi411**	From rainbow colors to anthracite	45 – 50	0,3 – 1	0.1	450
26b	**DLC3: Cr + ta-C/a-C in PL711**	Anthracite	> 30	1 – 2	0.1	450
27	**nACoX**	Dark grey	30 – 32	4 – 10	0.5	1200

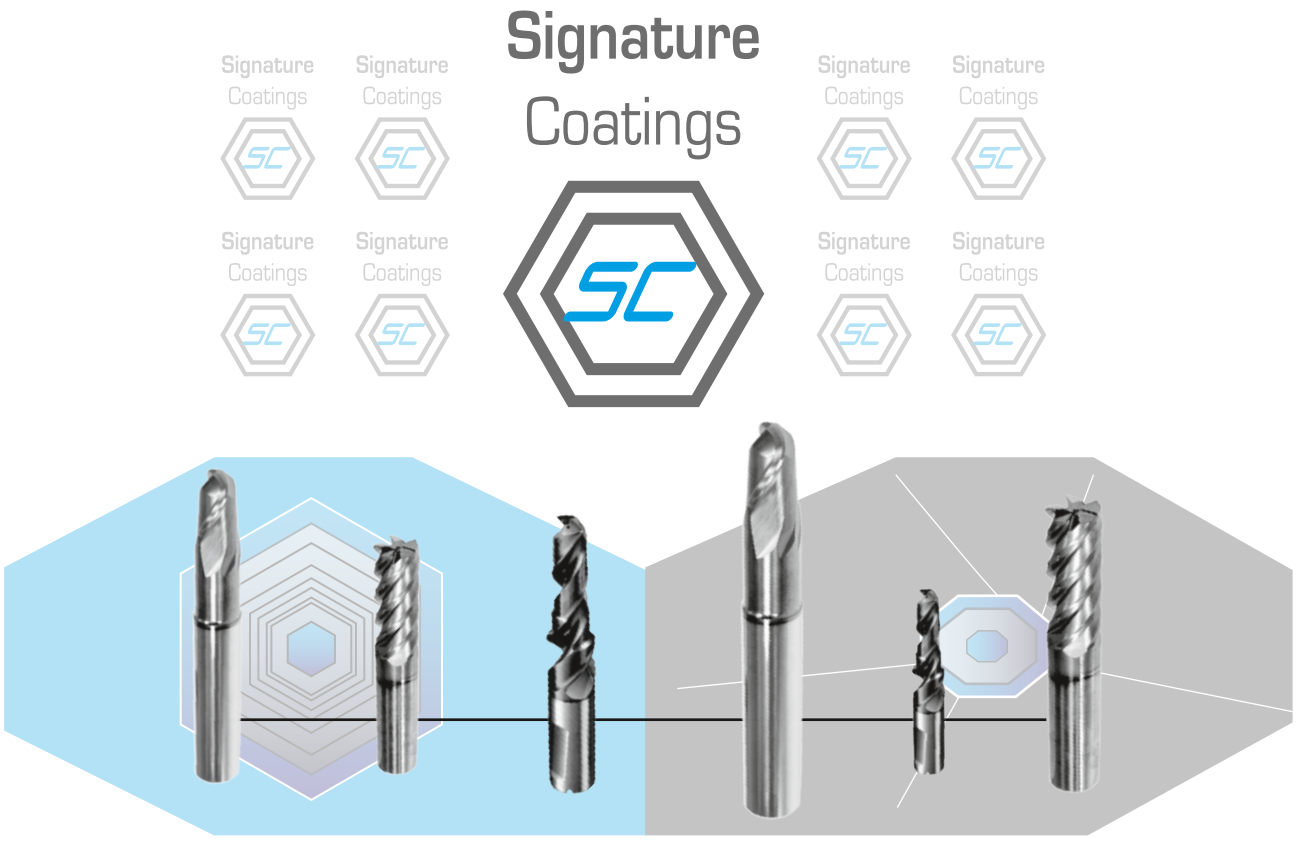
The given physical values may vary for different coating structures (mono-, gradient-, multi- and nanolayers).

Signature Coatings

Overview

PLATIT's Signature Coatings are exclusively developed by our R&D teams using the unique features of the PLATIT technology. They combine years of experience and know-how in the field of coating development with the latest technical innovations.

Our Signature Coatings promise the highest performance for their dedicated applications in the field of cutting, forming and tribological components. PLATIT customers can differentiate themselves from competitors and stand out from the market standard with the deposition of Signature Coatings.



nACo

COMPENDIUM 62

Universal nanocomposite for milling and drilling C-steels

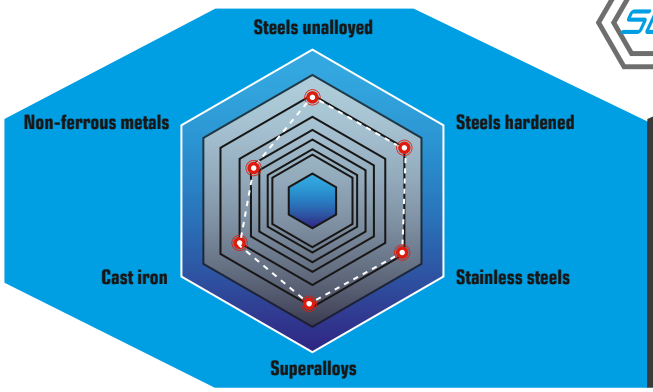
nACo is one of PLATIT's best-known coating brands. It has proven itself on the market for over 20 years. nACo is an AlTiSi-based nanocomposite coating and performs best in the field of milling and drilling C-steels. The use of nACo provides excellent adhesion and good performance even for more unusual applications such as milling with coated ceramic tools and CBN tools.

Highlights:

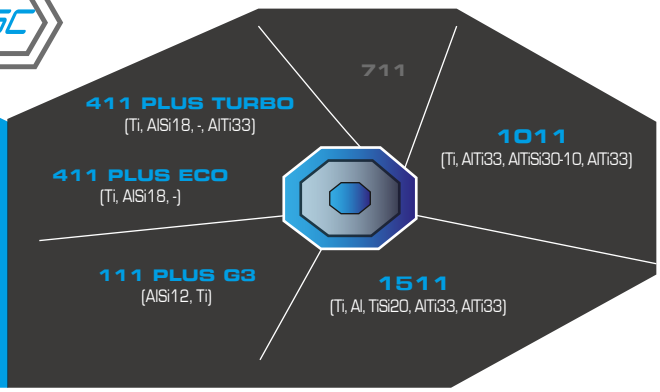
- Nanocomposite with Si content
- High temperature stability
- Good hardness
- Reduces adhesion to cutting-edges
- Versatile application possibilities

Signature Coatings

Characteristics in cutting

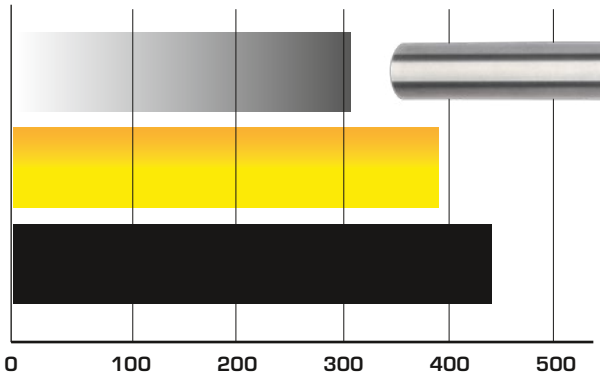


Coating units and cathode configurations

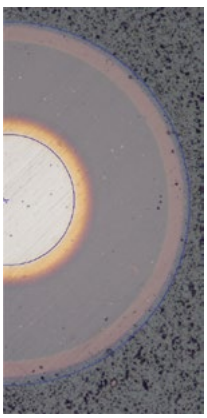


Milling in SUS316 with solid carbide end mill D4:

Wear Vb [µm] after 480 milling operations



Tool: solid carbide end mill; D4; z = 4; cutting length = 6 mm
Workpiece material: SUS316
Coolant; ap = 0.1 mm; ae = 4 mm; vc = 100 m/min; n = 8000 rpm; fz = 0.0625 mm/z; f = 0.2500 mm/rot; vf = 2000 mm/min
Source: Chinese tool manufacturer



Calo 3 layers

AlTi(Si)N is deposited on a TiN adhesion layer

Specifications

Color	blue violet	**Nano-hardness [GPa]**	39 - 41	**Coating thickness [µm]**	1 - 4
				Max. service temperature [°C]	1200
Coefficient of friction [µ] PoD (at RT, 50 % humidity)		0.4		**Coating temperature [°C]**	400 - 500

TiXCo coatings

TiXCo3 and TiXCo4

As our hardest nanocomposite, TiXCo3 is especially suitable for hard machining. It can be used at very high temperatures and is therefore suitable for finishing processes in milling and drilling. TiXCo3 also provides excellent performance for finishing turbine parts.

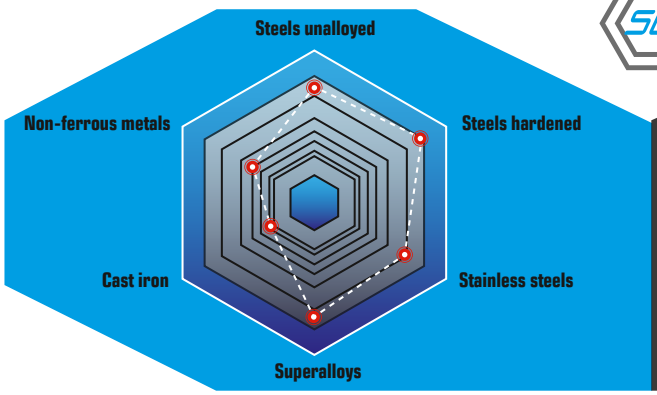
TiXCo4 is used for broadband applications.

Highlights:

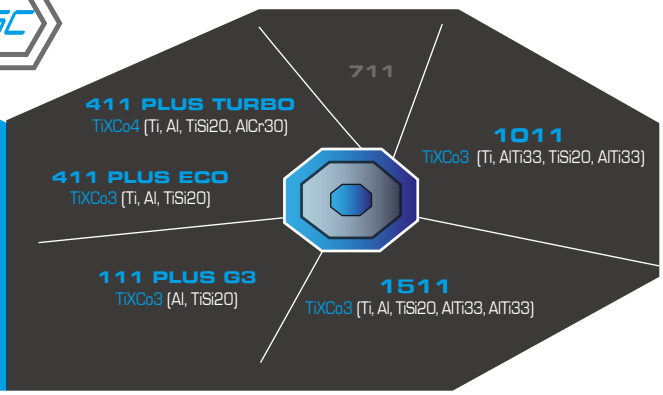
- TiXCo3:
  - High surface quality
  - Extremely hard and very wear-resistant
  - For super-hard machining
- TiXCo4:
  - Wide range of application and use

Signature Coatings

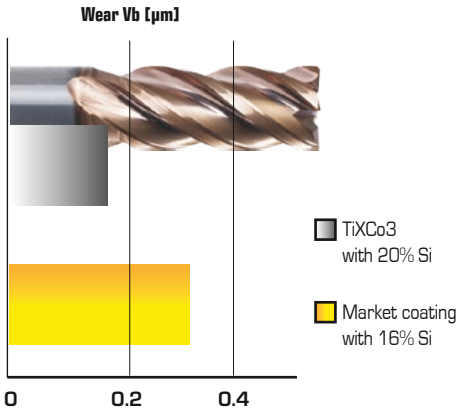
Characteristics in cutting



Coating units and cathode configurations

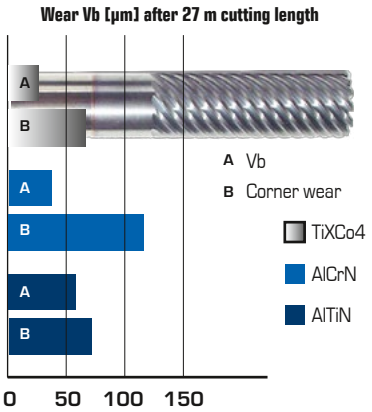


Milling in X210Cr13 with solid carbide end mill D6:

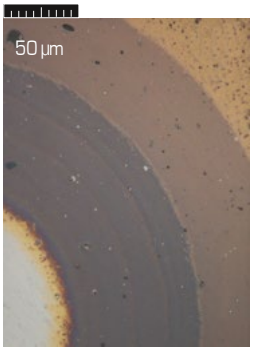


Tool: solid carbide end mill; D6
Workpiece material: X210Cr13; 1.2080; 64 HRC
Cooling: dry air, 5 bar; ap = 0.09 mm; ae = 0.06 mm;
n = 16 820 rpm; f = 0.1 mm/rot
Source: South Korean tool manufacturer

Milling in SKD61 with solid carbide end mill D8:



Tool: solid carbide end mill; D8
cutting length = 27 m
Workpiece material: SKD61; 54 HRC
Emulsion; ap = 4 mm; ae = 0.03 mm; vc = 100 m/min
Source: Chinese tool manufacturer



Calo 3 layers

TiXCo3: TiN -> AlTi(Si)N -> TiSiN
TiXCo4: TiN -> AlCrTi(Si)N -> TiSiN

Specifications

Color	copper with TiXCo3 grey with TiXCo4	**Nano-hardness [GPa]**	42 - 44	**Coating thickness [µm]**	1 - 4
				Max. service temperature [°C]	900
		Coefficient of friction [µ] PoD (at RT, 50 % humidity)	0.4	**Coating temperature [°C]**	450 - 500

ALL4

Generic coating for cutting and forming

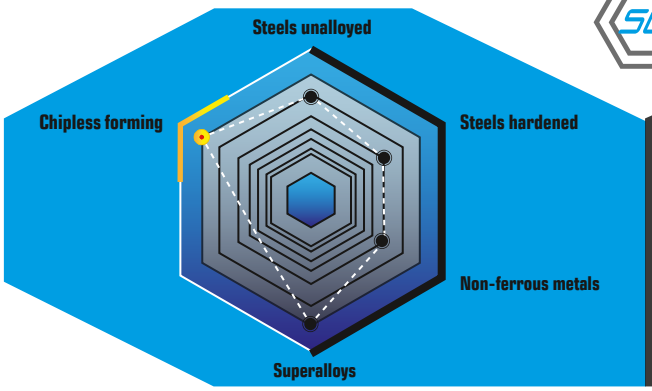
ALL4 is an AlCrTiN universal coating. It covers a wide range of applications as well as workpiece materials. The coating is particularly suitable for materials that are difficult to machine.

Highlights:

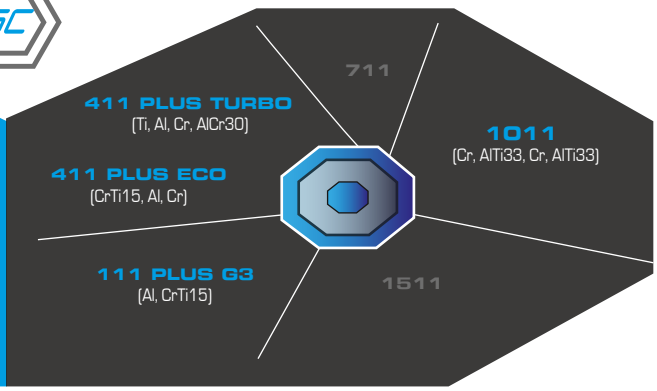
- Covers many application processes in cutting and forming
- Suitable for different workpiece materials
- Very wear-resistant at high temperatures
- Heat-resistant and tough

Signature Coatings

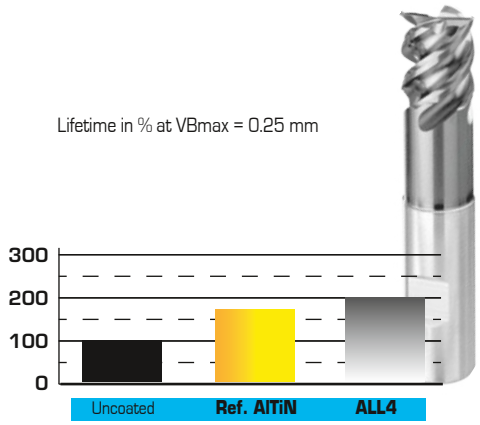
Characteristic in cutting + chipless forming



Coating units and cathode configurations

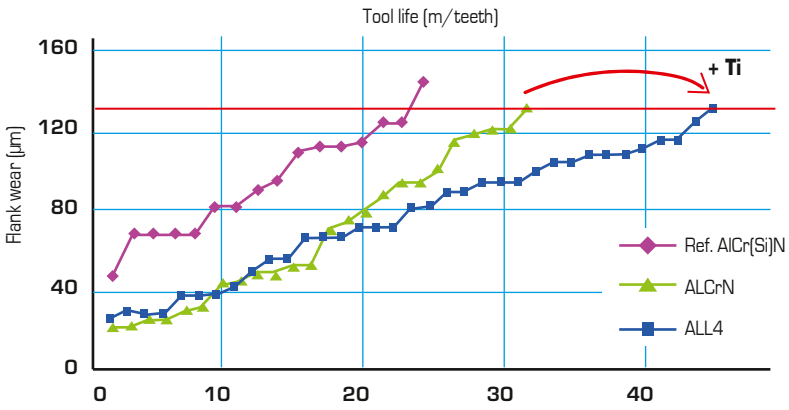


Milling in Inconel 718:



Tool: roughing cutter; D10 x 22 / R1
Workpiece material: Inconel 718 (200 mm x 200 mm x 36 mm)
KSS: B-Cool 9665; ap = 12 mm (2x); ae = 0.1 mm; vc = 90 m/min; fz = 0.21 mm
Post-treatment: drag grinding / wet blasting
Source: GFE, Germany

Flank wear with HSS hob in 20 MnCr 5:



Tool: HSS hob; D90
Workpiece material: 20 MnCr 5
Coolant air; mn = 2.3 mm; vc = 150 m/min; fa = 1.69 mm/rot; zo = 5
Max. chip thickness hcu = 0.347 mm
Source: IFQ Magdeburg

Specifications

Color	grey	**Nano-hardness [GPa]**	36 - 38	**Coating thickness [µm]**	1 - 5
		Coefficient of friction [µ] PoD (at RT, 50 % humidity)	0.5	**Max. service temperature [°C]**	900
				Coating temperature [°C]	400 - 500

TiB2

SPUTTER COATING FOR ALUMINUM MACHINING

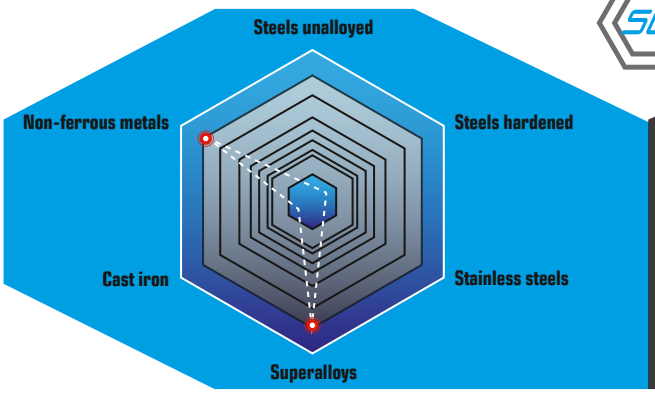
TiB2 is one of the most efficient PLATIT SPUTTER coatings. With a SCIL® configuration (SPUTTERED Coating Induced by Lateral Glow Discharge) nano-hardness of 32 GPa is achieved, which can be increased to 38 GPa with a hybrid LACS® configuration (Lateral ARC with central SPUTTERING). That means Ti alloys can be machined as well.

Highlights:

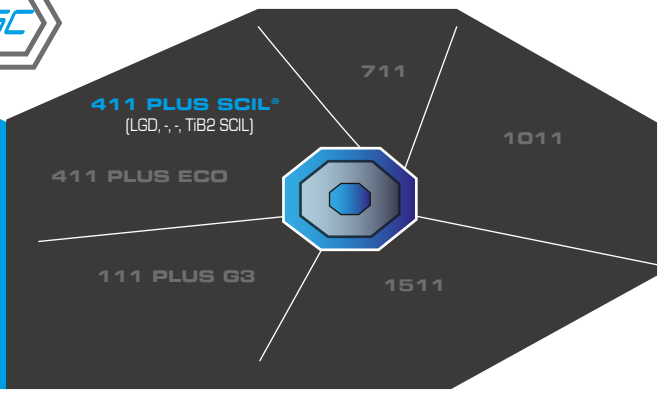
- Universal applications in aluminum
- Available in two versions: SPUTTERED SCIL® or hybrid LACS® coating
- Reduces adhesion to cutting-edge
- Increased wear-resistance

Signature Coatings

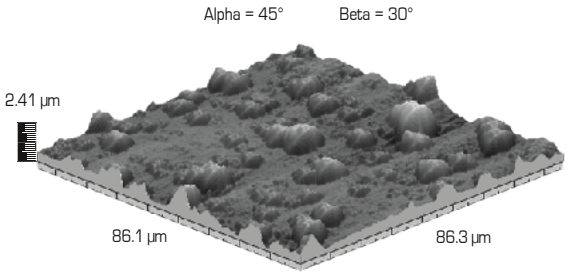
Characteristics in cutting



Coating units and cathode configurations

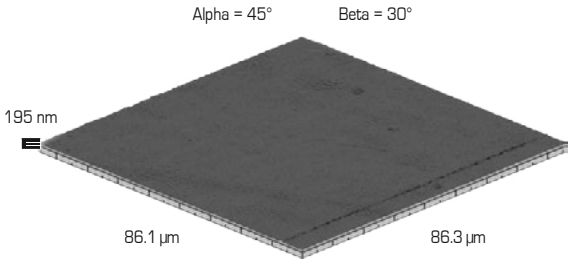


Comparison of the roughness of coatings for aluminum machining:



ZrN

Coated with Pi411 with hybrid LACS® configuration



TiB2

Coated with Pi411 with SCIL® configuration

Measured with AFM on a carbide test piece, same scale

Specifications

Color	satin silver	**Nano-hardness [GPa]**	32 - 38	**Coating thickness [µm]**	1 - 5
				Max. service temperature [°C]	600
Coefficient of friction [µ] PoD (at RT, 50 % humidity)	0.4			**Coating temperature [°C]**	200 - 400

BorAC

COMPENDIUM 62

SPECIALIST FOR HIGHLY DEMANDING MACHINING

BorAC is PLATIT's selected hybrid LACS® coating with simultaneous ARC and SPUTTER processes. BorAC consists of a boron-doped AlCrN protective coating, which is especially suitable for crack inhibition and thus for high-speed applications such as transmission and gear cutting tools. BorAC delivers top performance under high loads, especially in gear hobbing and roughing (dry and wet).

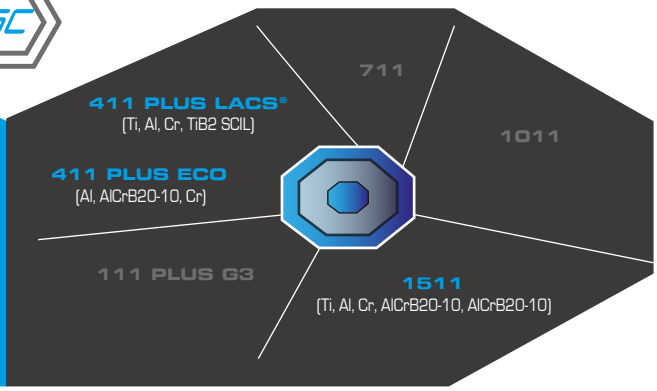
Highlights:

- Hybrid LACS® Coating
- Low coating residual stress
- Crack-resistant
- Minimizes crater wear

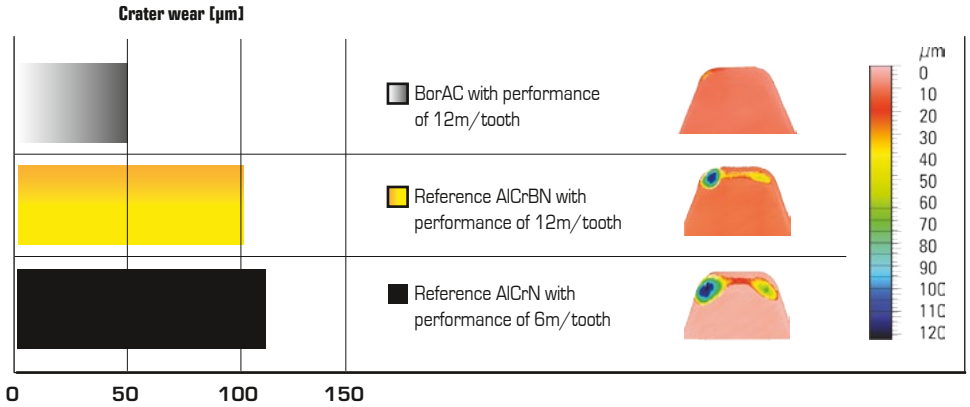
Signature Coatings

Example: HSS hobs

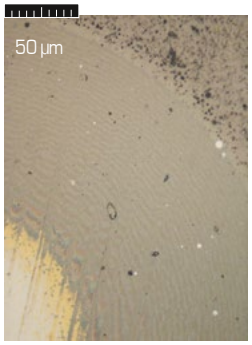
Coating units and cathode configurations



Effect of boron doping on crater wear in hobs:



Tool: HSS hob; D100
Workpiece material: 20 MnCr 5
Cooling air; mn = 4 mm; vc = 220 m/min, fa = -6.4 mm/rot
Max. chip thickness hcu = 0.24 mm
Source: IFQ Magdeburg



Calo 3 layers

CrN adhesion layer -> AlCrN -> AlCrBN

Specifications

Color	grey	**Nano-hardness [GPa]**	38 - 40	**Coating thickness [µm]**	1 - 5
		Coefficient of friction [µ] PoD (at RT, 50 % humidity)	0.5	**Max. service temperature [°C]**	900
				Coating temperature [°C]	400 - 500

PSiX

COMPENDIUM 62

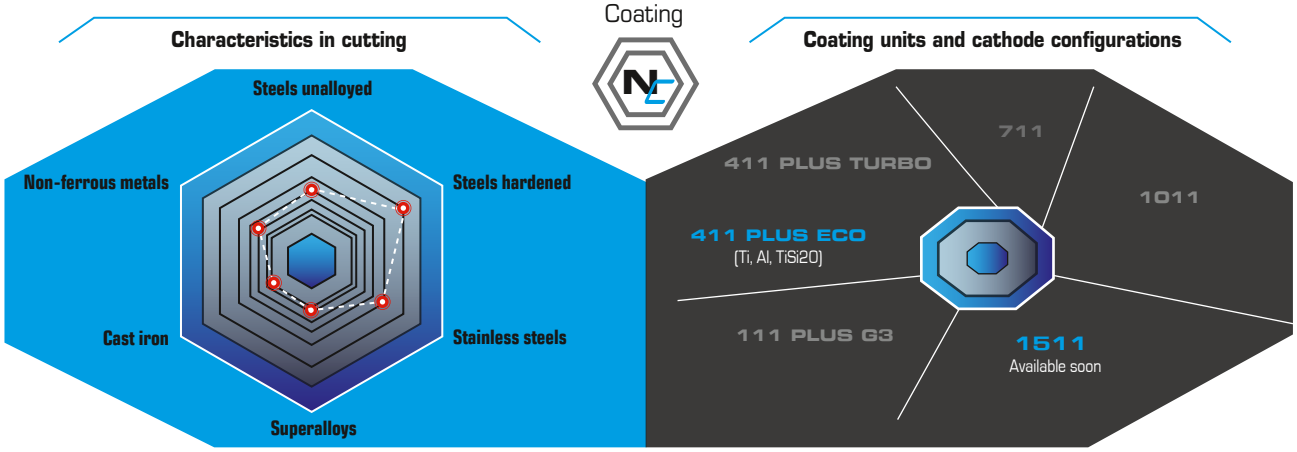
Universal hard machining coating

PSiX is a new PLATIT nanocomposite coating with a super-hard top layer. PSiX is based on TiXCo3 but has a silicon-free AlTiN base. Therefore, the aluminum content of PSiX is higher, which increases the coating's thermal stability. The coating is temperature-optimized and therefore excellent for hard machining processes like finishing and roughing.

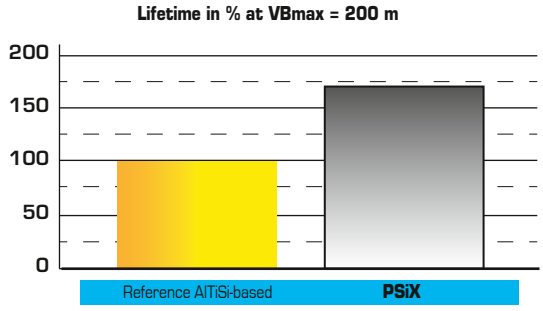
Highlights:

- Thermal stability
- Temperature-optimized
- Low coating residual stress

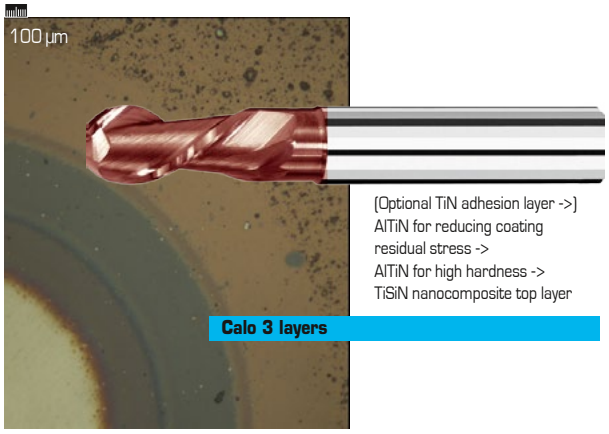
New
Coating



Ball nose end mill in 61 HRC:



Tool: ball nose end mill; D10
Workpiece material: 1.2379; 61 HRC
ap = 0.2 mm; ae = 0.5 mm; vc = 182 m/min; fz = 0.14 mm
Source: GFE, Germany



Specifications

Color	red brown	**Nano-hardness [GPa]**	42 - 44	**Coating thickness [µm]**	1 - 4
				Max. service temperature [°C]	1100
		Coefficient of friction [µ] PoD (at RT, 50 % humidity)	0.4	**Coating temperature [°C]**	450 - 500

ta-C

Solution for graphite machining and for non-ferrous metals

ta-C belongs to the PLATIT DLC3 hydrogen-free coating generation with over 50 % sp3 content. The high sp3 bond fraction results in a higher density, hardness (at ambient and elevated temperature), thermal stability, oxidation resistance, residual stress and lower thermal conductivity. Depending on the application from micro-tools to components, ta-C can be deposited by the PLATIT Pi411 or PL711 coating units.

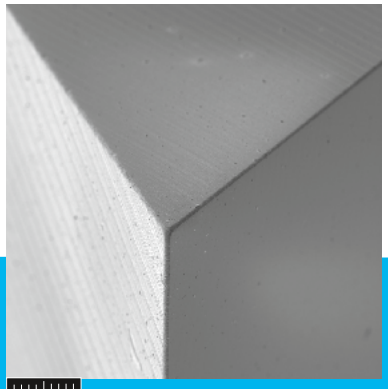
Highlights:

- Over 50 % sp3 content
- High density and hardness
- Thermal stability
- Oxidation resistance
- High residual stress
- Low thermal conductivity

New Coating

Coating unit 411 **Cathode configuration** LGD, -, Cr, C SCIL		**Coating unit 711** **Cathode configuration** Cr, C
ta-C + a-C (over 50 % ta-C)	**Composition**	ta-C + a-C (up to 50 % ta-C)
Tools	**Main application**	Components
SPUTTERING	**Process**	SPUTTERING
From rainbow colors to anthracite	**Color**	Anthracite
0.3 - 1	**Coating thickness [µm]**	1 - 2
350 - 450	**Young`s modulus [GPa]**	350 - 450
45 - 50	**Nano-hardness [GPa]**	> 30
Ra ~ 0.06 µm Rz ~ coating thickness	**Roughness**	Ra ~ 0.02 µm Rz ~ coating thickness
~ 0.1	**Coefficient of friction [µ] PoD (at RT, 50 % humidity)**	~ 0.1
450	**Max. service temperature [°C]**	450
< 150	**Coating temperature [°C]**	180 - 250
CFRP composite material	**Workpiece material**	Steel

DLC3 coated endmill under scanning electron microscope:



100 µm

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