411

Ultra Flexible Unit

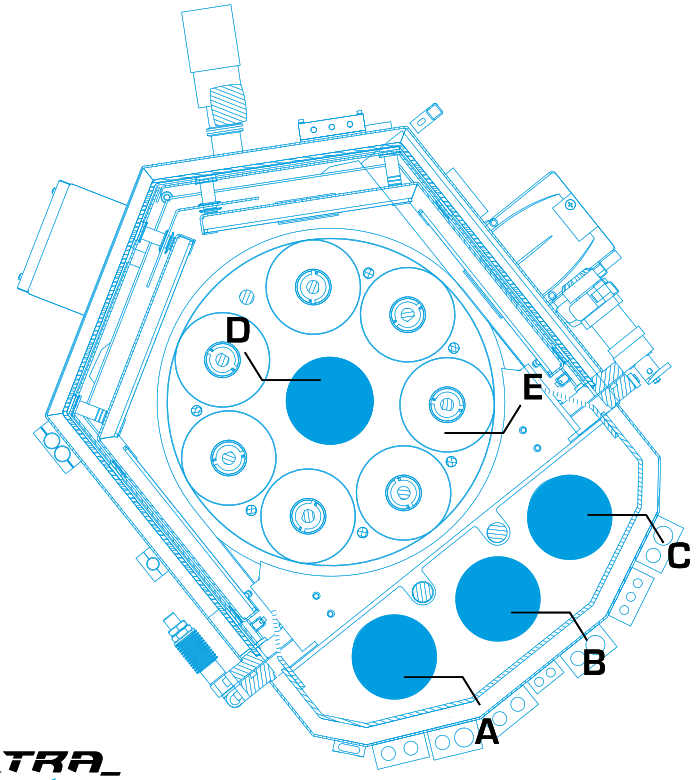
AR

PLATIT® 11 - Series

411 Ultra Flexible Unit

The broad variety of configuration options as well as the flexibility made possible by the rotating cathodes allows for the development of customer-specific top-performance coatings. Thus, this coating unit addresses the needs of customers who are seeking maximum flexibility with a full range of coating technologies easily accessible in one machine.

A LARC® Cathode
B LARC® Cathode
C LARC® Cathode
D CERC®/SCIL® Cathode
E Carousel



411 ULTRA Flexible

Modular HiEnd Hybrid

Due to its modular design and the range of available technologies, the Pi411 PLUS is the world's most flexible coating unit. Its basic configuration as an ARC unit with three rotating cathodes inside the door can be modularly upgraded on-site with an ARC or SPUTTER central cathode as well as with PECVD and OXI processes. Unique to this unit is also the availability of LACS® hybrid technology, which allows for the simultaneous deposition of coatings using both ARC and SPUTTER technology.

Options for Pi411 PLUS

ECO: Basic configuration with 3 × LARC® (LAteral Rotating Cathode) inside the door for ARC deposition

PECVD (DLC2): For a-C:H:Si coatings

TURBO: ECO + CERC® (Central Rotating Cathode) with ARC technology to increase productivity and allow for highly complex coatings

OXI: For oxide coatings in a corundum structure

AR

SCIL® (SPUTTERED Coating Induced by Lateral Glow Discharge): High-performance SPUTTERING from the central cathode

Hybrid LACS®: Simultaneous ARC and SPUTTER processes with LARC® inside the door and a central SCIL® cathode

Targets	**Hybrid**	**Signature**	**Cycle**	**Max. Load**	**Solution**	**Service**
3 – 4	LACS®	Coatings	≥ 5 h	200 kg	Turnkey	Worldwide

411 Ultra Flexible Unit

Sample cathode configurations

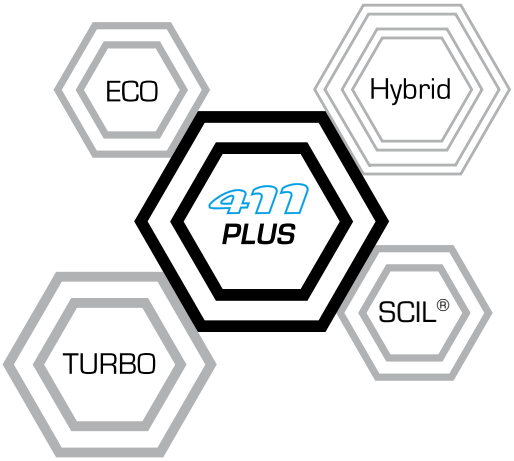
ECO

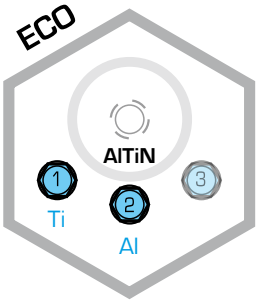
TURBO

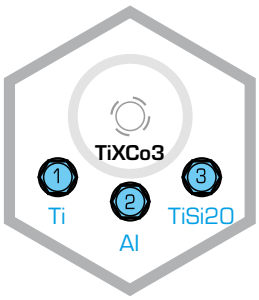
SCIL®

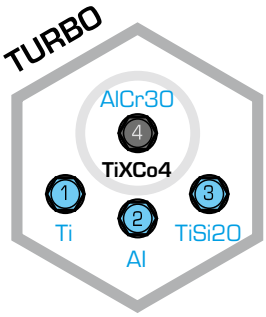
HYBRID

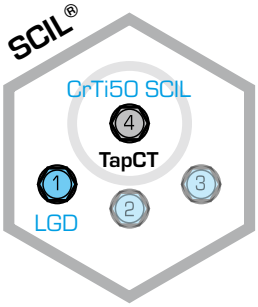
Modular HiEnd Hybrid

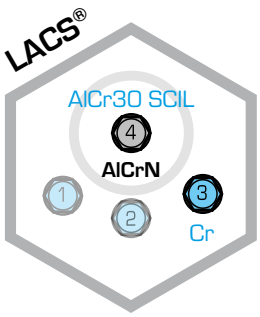












ULTRA_ Flexible

411 Ultra Flexible Unit

Specifications

Etching technologies applied:
- LGD® (Lateral Glow Discharge)
- Plasma etching with argon, glow discharge
- Metal ion etching (Ti, Cr)

Load and cycle times:
- Max. coating volume: ø 540 × H 500 [mm]
- Max. coating height with defined coating thickness: 414 mm
- Max. load: 200 kg

4–5 batches / day for*:

Shank tools (2 µm):	ø 8 × 70 [mm]	504 pcs.	5–6 h
Inserts (3 µm):	ø 12 × 4 [mm]	4,788 pcs.	6–7 h
Hobs (4 µm):	ø 80 × 180 [mm]	14 pcs.	7–8 h
Hobs (4 µm):	ø 80 × 100 [mm]	56 pcs.	7–8 h

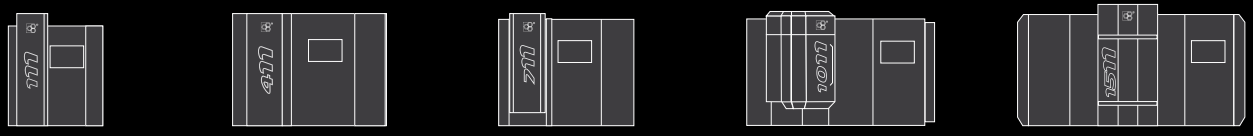
* Average cycle times in an ongoing production with max. number of cathodes in use.

Modular carousel systems:
- 1 to 14 axes

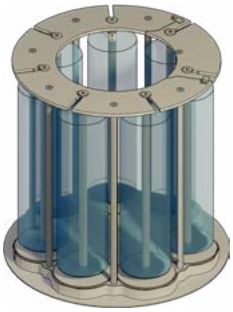
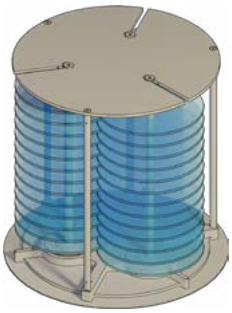
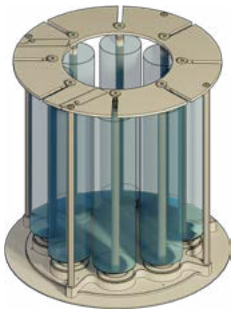
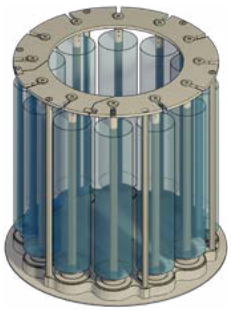
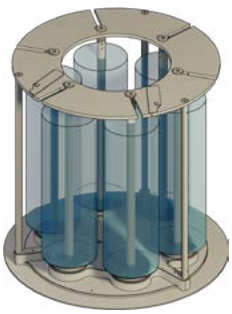
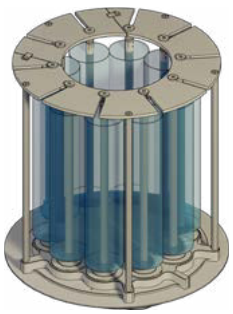
Software:
- Simple use and maintenance
- PLATIT SmartSoftware (PC and PLC system)
- Modern control system with touch screen
- Data recording and real-time display of process parameters and flow
- Manual and automatic process control
- Remote diagnostics and maintenance

Machine dimensions:
- Footprint: W 2,950 × D 1,900 × H 2,400 [mm]

11-SERIES ACCESSORIES



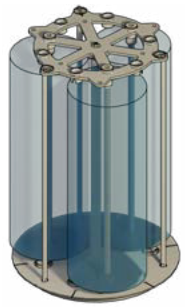
Carousels

	111	411		
Max. coatable height	498 mm	500 mm		
				
	Single rotation D ≤ 355 mm	**Single rotation** D ≤ 500 mm for saw blades, D ≤ 460 mm for molds & dies	**4 asymmetric axes** D3 ≤ 183 mm, D1 ≤ 250 mm	**7 axes for triple rotation for gearboxes** D ≤ 143 mm
				
	4 axes for continuous triple rotation for gearboxes D ≤ 143 mm	**3 axes for saw blades with overlap** D ≤ 285 mm	**4 / 8 axes** D4 ≤ 215 mm / D8 ≤ 115 mm	**6 / 12 axes** D6 ≤ 145 mm / D12 ≤ 100 mm
				
	10 axes for continuous double rotation D ≤ 77 mm	**3 / 6 axes** D3 ≤ 220 mm / D6 ≤ 150 mm	**5 / 10 axes** D5 ≤ 175 mm / D10 ≤ 94 mm	**14 axes** D ≤ 85 mm

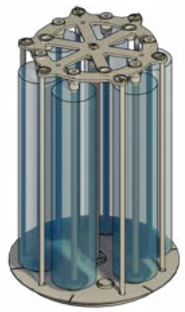
Exemplary illustrations

711

805 mm



3 axes for kicker
D ≤ 270 mm



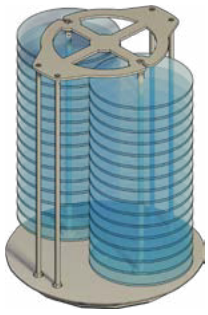
6 axes for kicker or gearboxes
D ≤ 150 mm

9 axes for kicker
D ≤ 95 mm

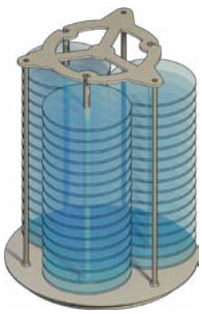
1011

805 mm

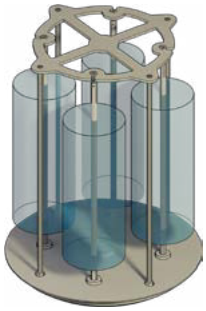
Single rotation
D ≤ 700 mm



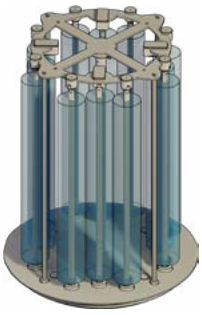
2 axes for saw blades with overlap
D ≤ 450 mm



3 axes for saw blades
D ≤ 420 mm with overlap,
D ≤ 250 mm without overlap



4 axes for kicker
D ≤ 270 mm



4 / 8 / 12 axes for kicker
D ≤ 170 mm

10 axes for gearboxes
D ≤ 143 mm

Holders

Disc with gears

Gearbox with triple rotation

Quad gearbox for quad rotation

Loading capacities

Pi111

Tool type	Tool diameter	Tool length	Satellites	Discs / satellite	Holders / disc	Tools / holder	Tools / disc	Tools / batch	Holder type
Shaft Tool	6 mm	50 mm	4	4	5	9	45	720	G
	6 mm	50 mm	4	4	8	4	32	512	D
	6 mm	50 mm	4	4	18	1	18	288	A
	8 mm	60 mm	4	4	18	1	18	288	A
	10 mm	70 mm	4	4	18	1	18	288	A
	20 mm	100 mm	4	3	12	1	12	144	A
Insert	12 mm	4 mm	4	38	18	1	684	2,736	C
Hob	80 mm	100 mm	4	4	1	1	1	16	F
	75 mm	100 mm	10	4	1	1	1	40	F

Pi411

Tool type	Tool diameter	Tool length	Satellites	Discs / satellite	Holders / disc	Tools / holder	Tools / disc	Tools / batch	Holder type
Shaft Tool	6 mm	50 mm	7	4	5	9	45	1,260	G
	6 mm	50 mm	7	4	8	4	32	896	D
	6 mm	50 mm	7	4	18	1	18	504	A
	8 mm	60 mm	7	4	18	1	18	504	A
	10 mm	70 mm	7	4	18	1	18	504	A
	20 mm	100 mm	7	3	12	1	12	252	A
Insert	12 mm	4 mm	7	38	18	1	684	4,788	C
Hob	80 mm	100 mm	7	4	1	1	1	28	F
	80 mm	100 mm	14	4	1	1	1	56	F

PL711

Tool type	Tool diameter	Tool length	Satellites	Discs / satellite	Holders / disc	Tools / holder	Tools / disc	Tools / batch	Holder type
Shaft Tool	6 mm	50 mm	6	5	5	9	45	1,350	G
	6 mm	50 mm	6	6	8	4	32	1,152	D
	6 mm	50 mm	6	6	18	1	18	648	A
	8 mm	60 mm	6	5	18	1	18	540	A
	10 mm	70 mm	6	5	18	1	18	540	A
	20 mm	100 mm	6	4	12	1	12	288	A
Insert	12 mm	4 mm	6	38	18	1	684	4,104	C
Molds & dies	160 mm	130 mm	3	4	1	1	1	12	F
Sliding parts with DLC2	25 × 10 mm	130 mm	3	4	4	1	4	48	F

PL1011

Tool type	Tool diameter	Tool length	Satellites	Discs / satellite	Holders / disc	Tools / holder	Tools / disc	Tools / batch	Holder type
Shaft Tool	6 mm	50 mm	4	7	15	4	60	1,680	E
	6 mm	50 mm	4	7	42	1	42	1,176	B
	8 mm	60 mm	4	7	36	1	36	1,008	B
	10 mm	70 mm	4	6	30	1	30	720	B
	20 mm	100 mm	4	5	23	1	23	460	B
Insert	12 mm	4 mm	4	2 × 35	42	1	1470	11,760	C
Hob	140 mm	100 mm	10	6	1	1	1	60	F
	80 mm	100 mm	12	6	1	1	1	72	F

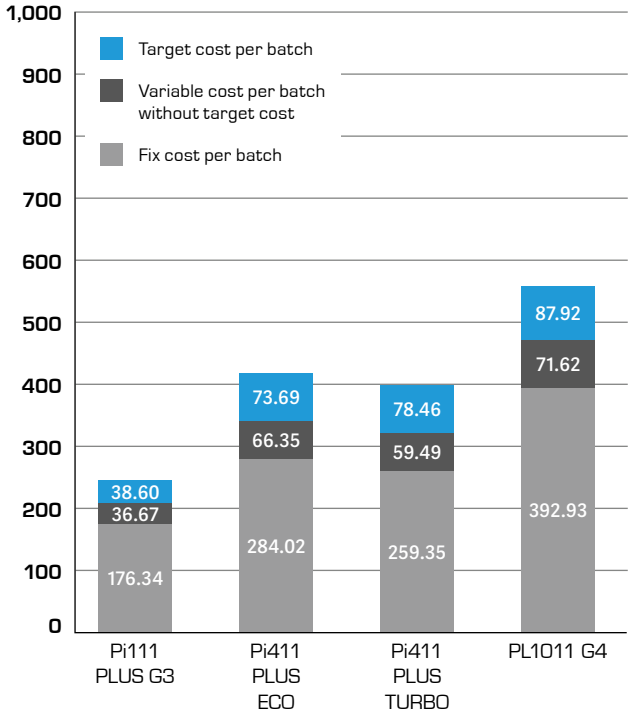
Holder type:
A Tool in a sleeve, driven by a gearbox
B Tool in a sleeve, driven by a kicker
C Insert with a hole, speared on a rod
D Tool in a revolver, driven by a gearbox
E Tool in a revolver, driven by a kicker
F Hob on a satellite / rod
G Tool in a sleeve, driven by a quad gearbox

Process cost comparison

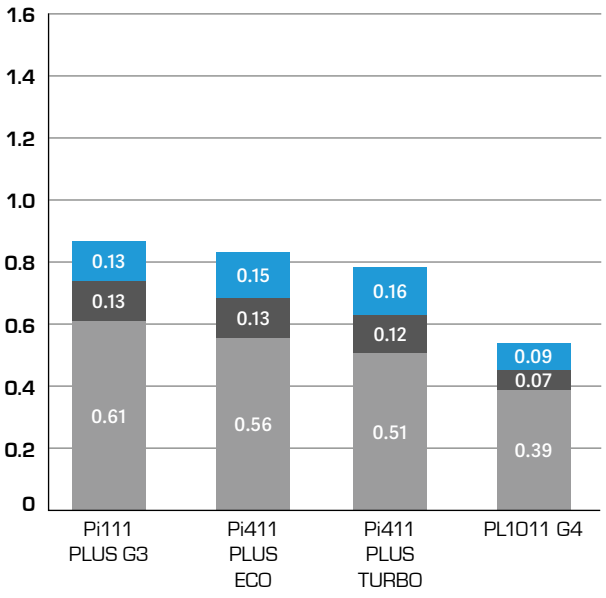
When calculating an investment in a PVD coating turnkey system, there are several variables to be taken into consideration. On this page we give you further insights about how fixed and variable costs add up for different PLATIT coating systems. We are using the case of a German SME coating 10 × 70 mm shank tools with three different coatings – AlTiN, Omnis and TiXCo3.

The diagram on the right visualizes that the majority of the batch costs of a PVD system are determined by the fixed costs. The main cost drivers are depreciation costs for the investment and the personnel costs for the operators. The variable costs, on the other hand, typically amount to less than one sixth of the total operating costs. In particular, the cost of the targets account for only 15–20 % of the total cost per batch.

Cost per batch [CHF]:



Cost per tool [CHF]:



The diagram on the left visualizes the breakdown of cost per tool in different PLATIT coating systems. As it is shown in the diagram, the cost per tools decrease significantly in large-sized PVD coating units due to scale effects.

Target cost per tool

Variable cost per tool (without target cost)

Fixed cost per tool

Detailed case description:
German tool manufacturer, 10 × 70 mm shank tools
Coatings: AlTiN (40 %), Omnis (40 %), TiXCo3 (20 %)
Costs included:
Fixed costs: Investment in PVD system incl. production accessories, depreciation (8 years, 240 working days per year), operator wages, rent and maintenance
Other variable costs: energy and chemicals

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COMPENDIUM

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