

# PL<sup>111</sup> for Tools and Machine Components



Source: Fullandi, Shenzhen, China

Machines with 2 sputtering cathodes, DC and HIPIMS modes  $\varnothing 550 \times 500$  mm coatable volume. Many moving parts in the machinery and automotive industries do not need extra hard coatings. The most important requirements are:

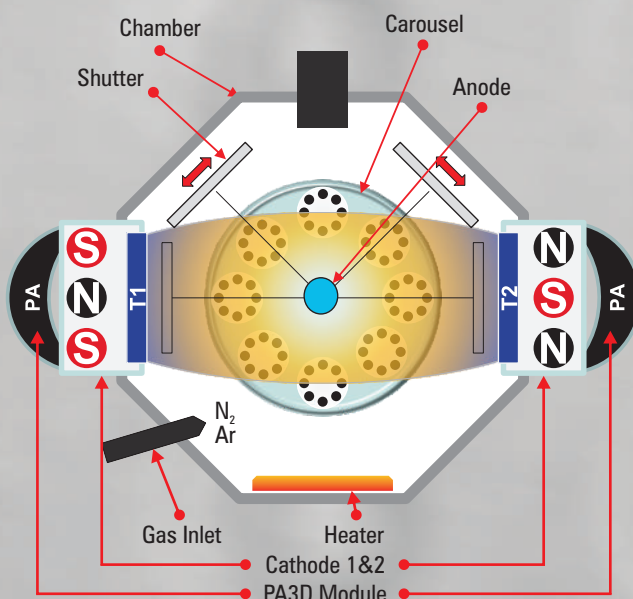
- Extremely high smoothness, and
- very low coefficients of friction.

## Work Modes

- Monoblock sputtered (DC or HIPIMS) coatings (TiN, CrN) with very low roughness ( $S_a < 20$  nm)
- DLC (Diamond Like Coating) coatings with a very thin sputtered CrN or TiN adhesion layer ( $\sim 200$  nm) plus
  - DLC<sup>2</sup> (SCILVlc<sup>2</sup>®)
    - with silicon doped amorphous carbon with hydrogen (a-C:H:Si)
    - by a PECVD process from gases
  - or DLC<sup>3</sup> (ta:C®)
    - by a sputtering process (DC or HIPIMS)
    - from carbon targets

## Hardware

- Footprint: W3300 x D2300 x H2400 mm
- Internal chamber size: W820 x D820 x H1100 mm
- Loading volume:  $\varnothing 500 \times H500$  mm
- Coatable volume:  $\varnothing 500 \times H450$  mm
- Max. load: 400 kg



## Advanced Sputtering Technology

- PA3D Module to generate an ionized focus plasma into the carousel
- Two planar cathodes (with the standard sizes of the PL1011)
- DC or HIPIMS sputtering, coatable volume  $\varnothing 550 \times 700$  mm

## Top quality coating

- good hardness (24 - 40 GPa)
- excellent surface finish ( $S_a$  down to 20 nm)
- excellent adhesion

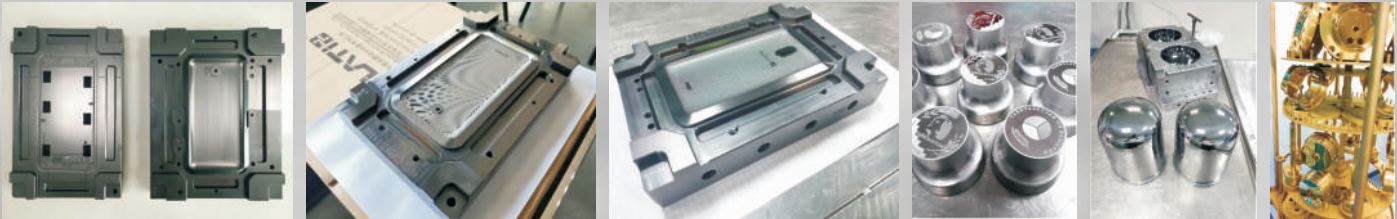
## Industry targeting

- cutting tools for non-ferrous machining application
- molds and dies, general engineering parts
- protection of cavities
  - against corrosion
  - against scratches
- sliding parts
  - reduction of friction coefficient ( $\sim 0.1$  against steel)
  - running dry

# Applications with High Surface Quality

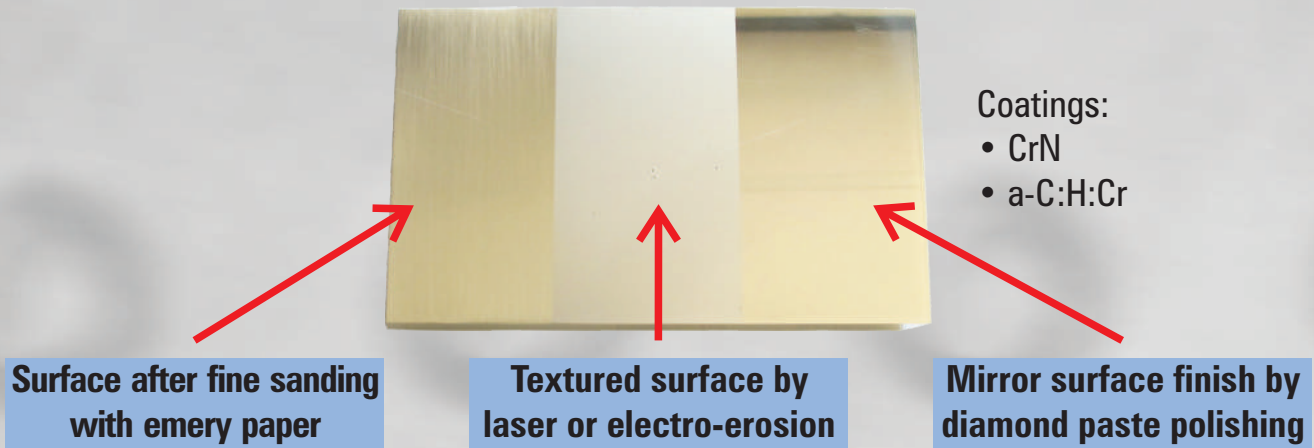
## Mold Inserts & Optical Mold Inserts

These applications are only possible, because of the excellent surface quality of the coating deposited by the *PL<sup>211</sup>*



## Mold Surfaces with Three Different Treatments

The high surface quality of three common used polishing treatment won't be reduced by the coating of the *PL<sup>211</sup>*

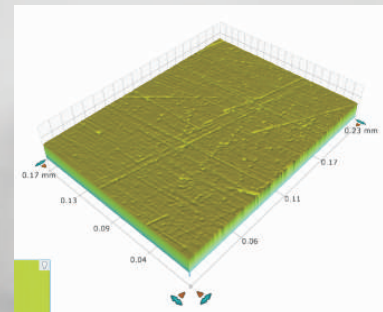
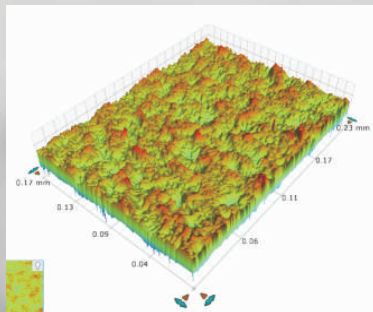
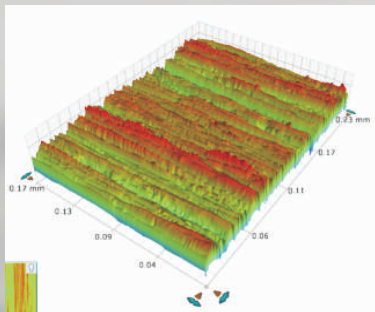


Surface after fine sanding with emery paper

Textured surface by laser or electro-erosion

Mirror surface finish by diamond paste polishing

## Surface Finish Before Coating



	Sa (µm)	Sz (µm)		Sa (µm)	Sz (µm)		Sa (µm)	Sz (µm)
Before	0.25 ±0.03	2.4 ±0.53	Before	0.15 ±0.01	2.4 ±0.4	Before	0.012 ±0.001	0.37 ±0.03
Coated	0.24 ±0.045	3.2 ±0.4	Coated	0.14 ±0.07	2.4 ±0.12	Coated	0.011 ±0.001	0.31 ±0.06

## Surface Finish After Coating

## Keeping High Surface Quality after Coating

