ionbond

THE SURFACE ENGINEERS™

PVD, CVD, and PACVD Coating Technology

IHI GROUP

IHI Ltd. Company Profile

Aero Engines and Space:
Aeroengines
Rocket and Space

IHI

Realize your dreams

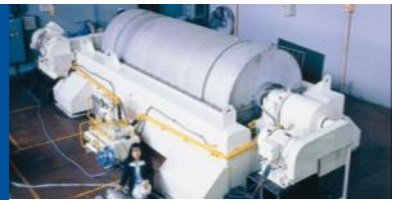
Physical Distribution Systems & Material Handling Equipment

Energy Systems:

Boilers
Gas Turbine & Engine
Nuclear Power

- Based in Tokyo, Japan,
- Multidisciplinary Engineering Group
- Sales volume 2011: CHF14 / € 11Billion
- Employees: 27,000 globally

Standard Machinery:
Compressors
Separators
Turbochargers



Storage & Process Plants:
LNG Storage & Process Terminals
Pharmaceutical Plants

Construction & Agricultural Machinery:
Cranes
Excavators

Social Infrastructure:
Bridges
(2nd Bosporus Bridge)
Dams
Tunneling Machines

Facilities & Products for Civil Use:
Parking systems
Ozone Disinfectors

Industrial Machinery:
Steel & Rolling Mills
Presses
Pulp & Paper
Heat Treatment

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Hauzer

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Ionbond Global Network – 40 Centers

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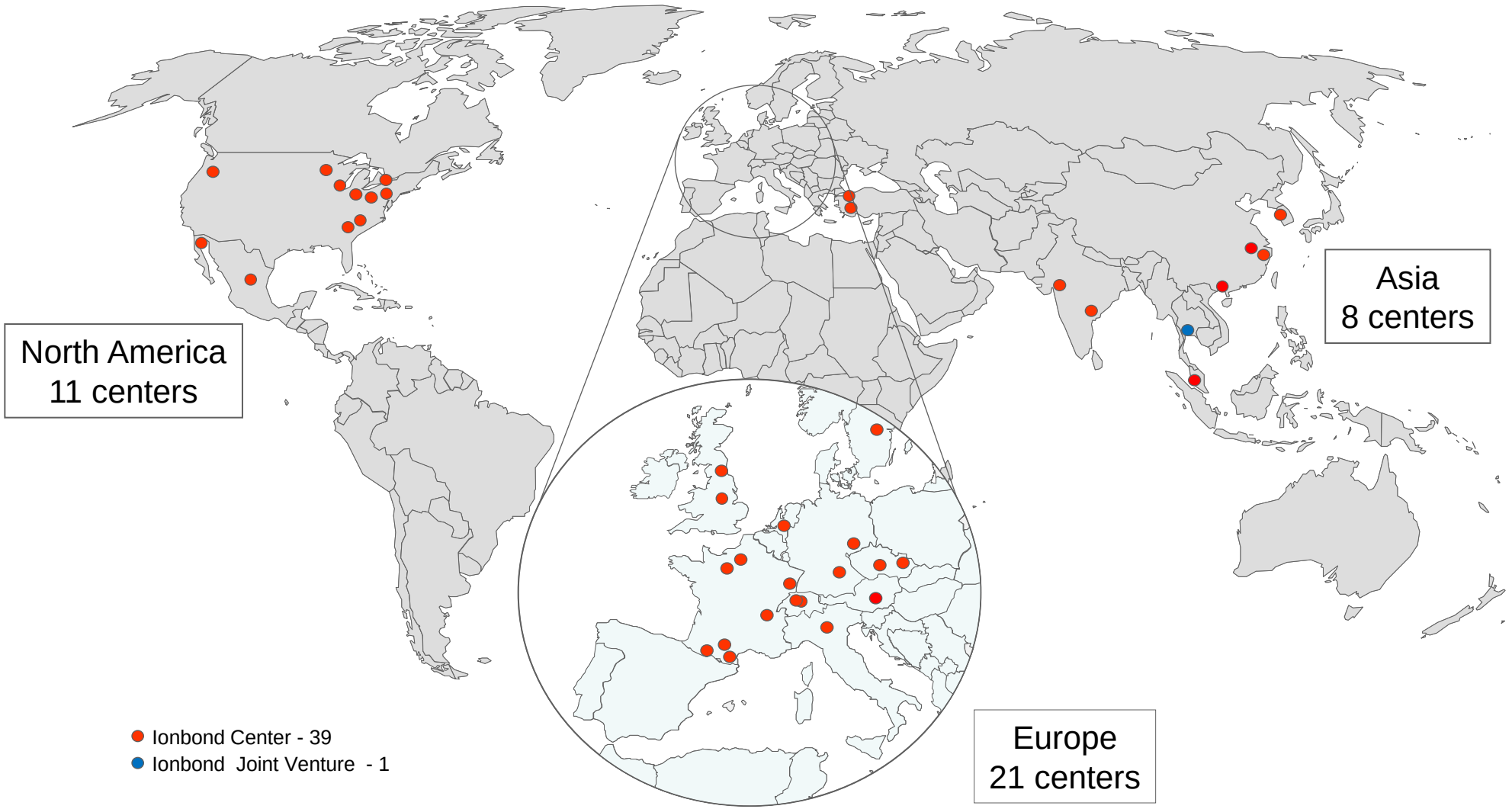

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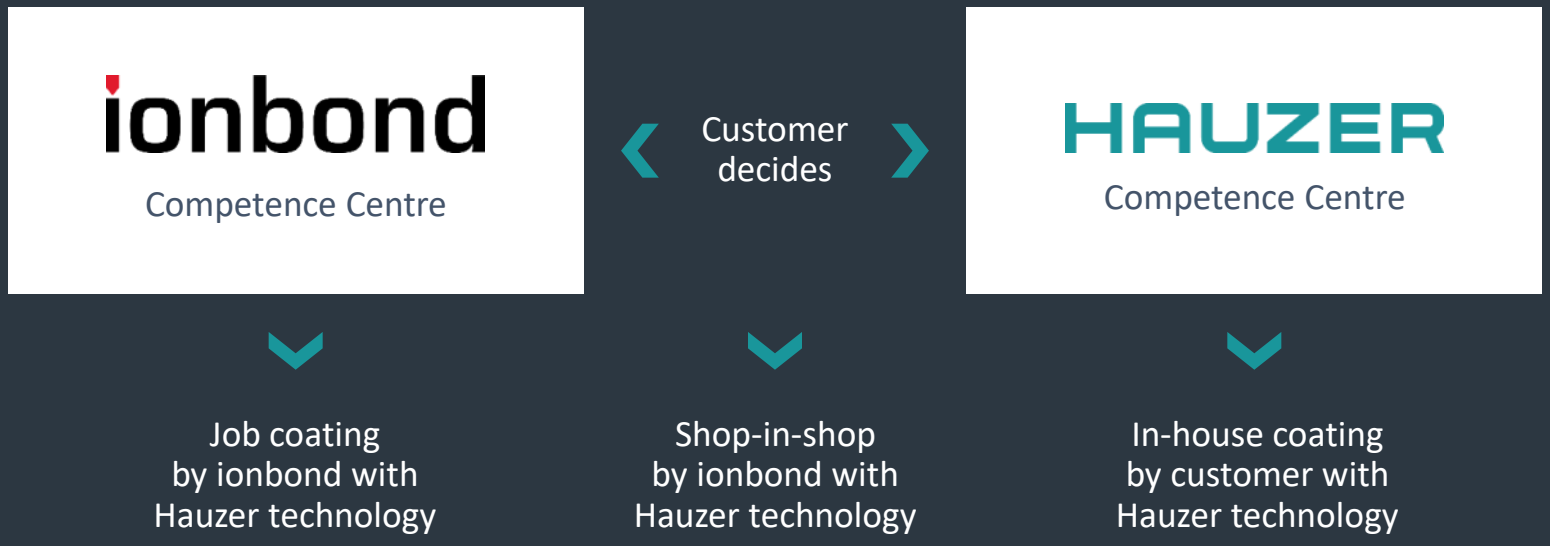
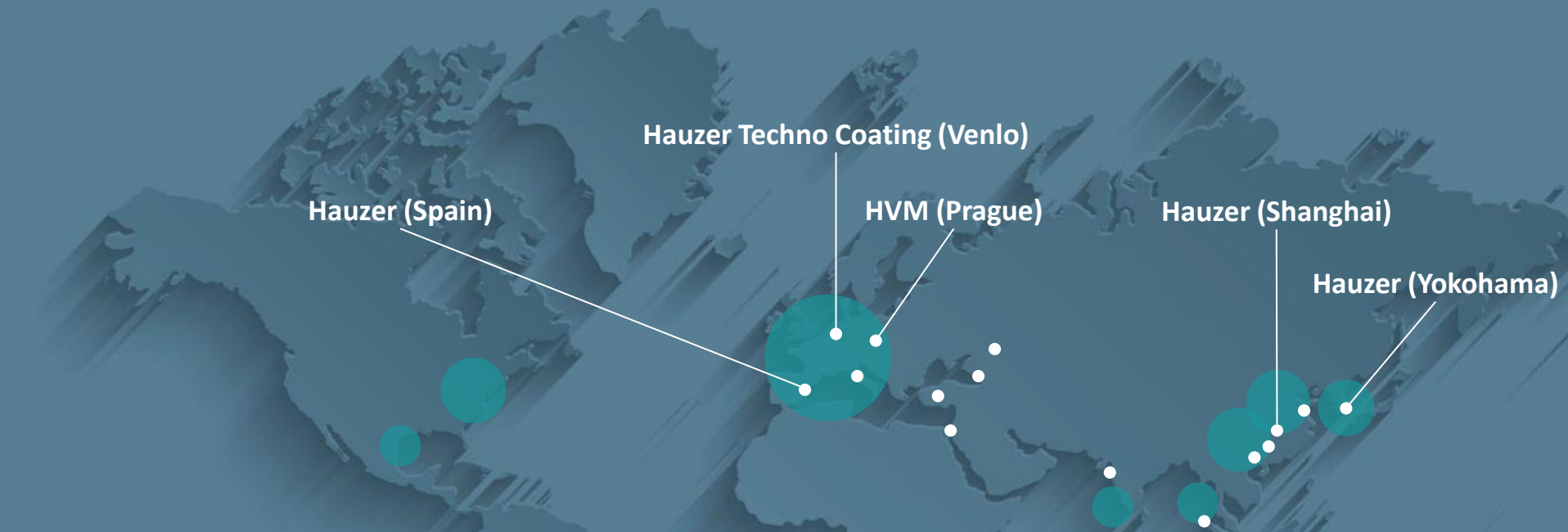
IHI GROUP BUSINESS MODEL

More choices for the customer



Combinations possible, such as in-house in headquarter and job coating in branch location

HAUZER WORLDWIDE



Hauzer Techno Coating (Venlo)

Hauzer (Spain)


HVM (Prague)


Hauzer (Shanghai)

Thin Film Coatings: Basics

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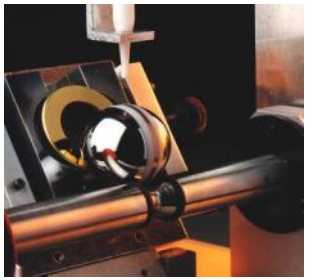
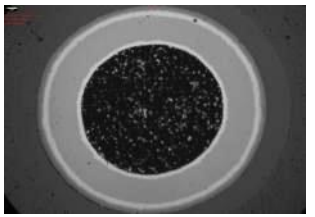
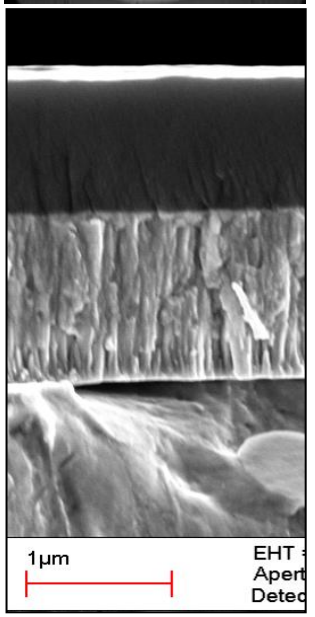
Coating thickness	0.5 … 2 … 5 …15 microns (1/20 … 1/40 of human hair)
Coating hardness	1000 … 3500 HV
Typical coating materials	Ceramics (nitrides, carbides, oxides) of Ti, Al, Cr, Zr, Si ….
	Carbon-based (diamond-like, amorphous carbon)
	Sulfites, primarily Mo or W
Deposition temperature	100…1000 C, depending on the process and coating
Deposition processes	PVD, PACVD, CVD : Batch, vacuum, plasma, temperature







- Key advantages:
  - Post-coating machining not required
  - Extremely high hardness: no need for thick deposits
  - Deposition temperature suitable for case-hardened steels
  - Environmentally sound: REACH and RoHS compliant processing

Coatings for Component Applications

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- Higher power density for modern engines
- Tribobond™ 41 Cr+a-C:H:W+a-C:H etc.
- ISO / TS 16949

- Maximum power output
- Tribobond™ 15 TiAlCrN, 43 a-C:H etc.
- Custom engineered

- Increased component lifetime, reduced friction, higher output for less input.

Coatings for Component Applications II

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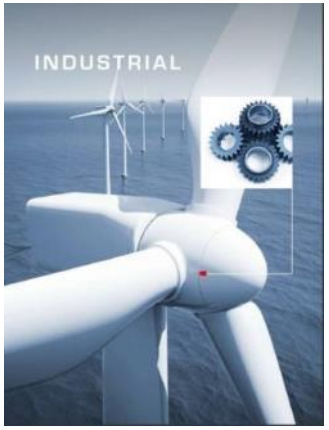

- Higher load and reduced wear
- Tribobond™ 46 CrN+a-C:H:W
- Bernex™ 32 CrC

- Reduced service cost
- Tribobond™ 01 TiN, 50 CrN, 40 a-C:H:W
- Bernex™ 66 Al
- improved lifetime
- Aerospace industry certification

- Lower maintenance requirement, higher uptime and less lubrication

Coatings for Decorative Surfaces

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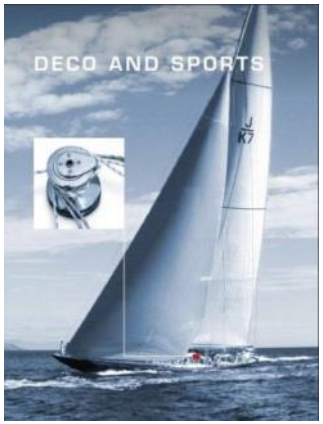
- Hard and durable decorative coatings preserve the good look for years



- Scratch and corrosion resistant
- Decobond™
- Interior and exterior goods
- Automotive

- A new standard in luxury goods
- Ionbond™ ADLC
- Watch cases and interior gear
- Fashion accessories

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Coatings for Medical Application

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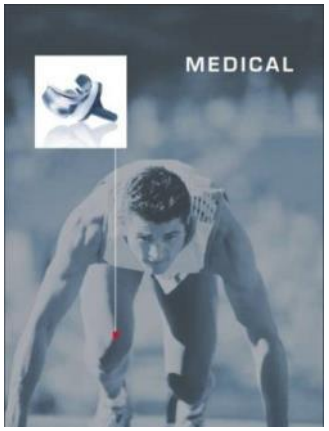

- Certified coatings for medical applications
- Medthin™ 20 AlTiN, 43, 42 a-C:H etc.
- Lower ion contamination
- Cleaner cut, color coding, reduced glare
- ISO 13485

- Medthin™ biocompatible coatings for implants, tools and instruments

Our focus in the plant Kapfenberg

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- **Job Coating Service for:**
  - Components Automotive and Industrial Segment
  - Series-Tools with the advantage to offer the biggest coating machines on the market
  - Components with the approach to have scratch resistance and decorative effects
  - Special solutions for special demands – we develop the surface solution for you!

Our focus in the plant Kapfenberg

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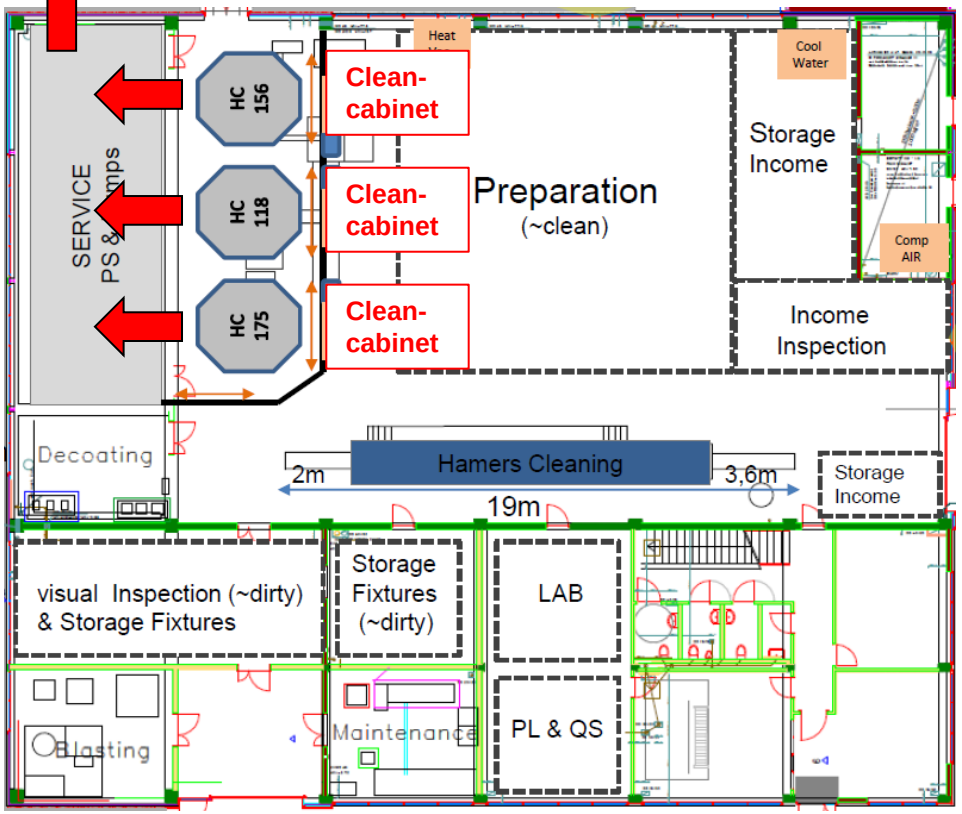
High quality standards

- >TS16949 & ISO 9001
- Reconditioned production layout according 5S respectively Kaizen.
  Therefore more transparent and powerful “In Line Production”
- Dust management, housed coating machines
- Cleanroom equipment

DUST-MANAGEMENT



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Our focus in the plant Kapfenberg

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Minimizing of Risks

- we are 100% a part of a group Venlo-Humbolec-Kapfenberg
  we use:
  - » Same Coating Equipment (HZ 1500)
  - » Same Quality System with one overhead and Quality management
  - » Same Cleaning Equipment & Technology

Best price/part

- we use the best adapted coating technology and big machines.
- That gives an unbeatable price/part in volume series.

Industrial Coating Equipment

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Hauzer-Ionbond Batch-Coater PVD/PACVD Technology

Process details

- Heating / plasma etching / coating (adhesion- / inter- / functional top layer)
- Reactive dc puls magnetron sputtering
- Cathode power density up to 13 W/cm²
- Substrate bias dc puls U = -1200 V
- 2- or 3-fold substrate rotation
- Cycle time 6 -14 h
- Coating thickness 1 – 5 µm

Coating volume

- 900 mm in diameter / 1.500 mm in height

Coatings

- a-C:H (DLC) / a-C:H:W (DLC) / CrN / Cr_2N
- TiN / ZrN / AlTiN / AlTiCrN
- Oxide Coatings Cr- / Ti- / Zr-

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PVD/PACVD Equipment

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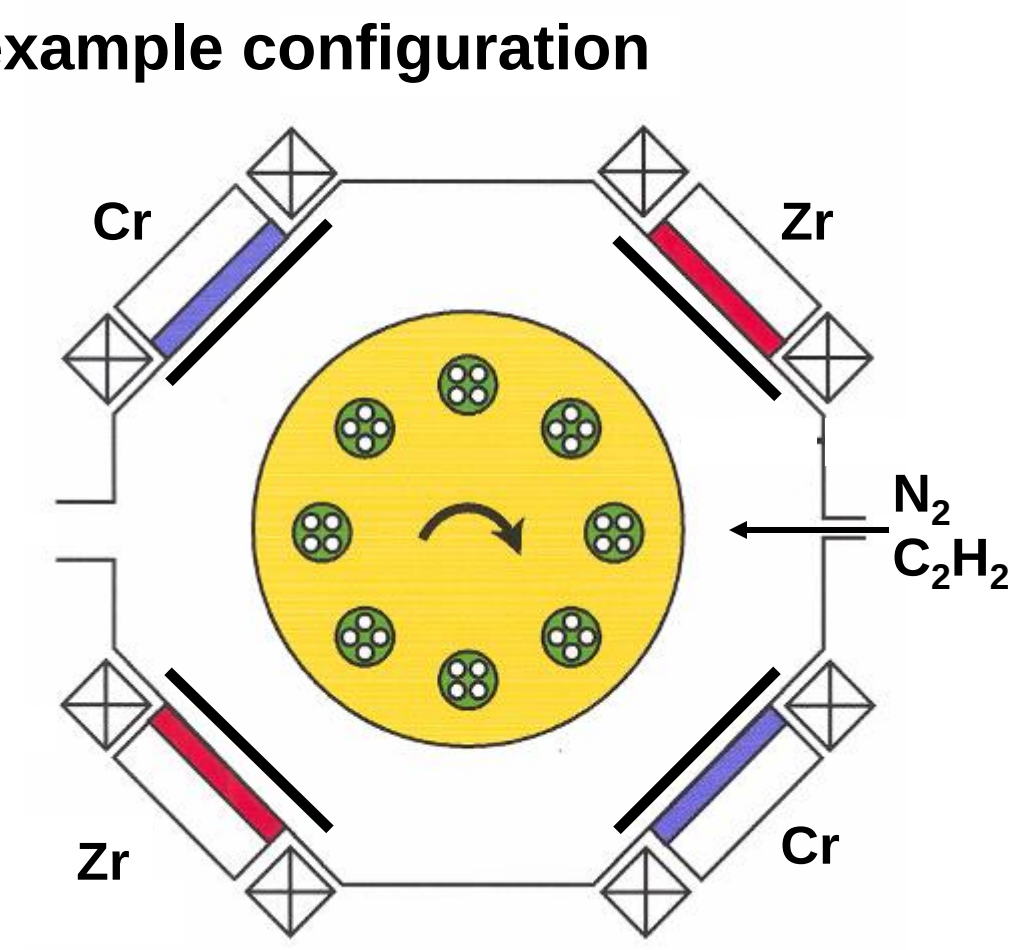
example configuration



DECORATIVE COATING

- Automotive interior & exterior parts
- Small electronic personal devices
- Sanitary hardware
- Door handles
- Jewelry/watches
- Spectacle frames

- High wear resistance
- Wide colour range

- Highly productive PVD systems
- Various coating technologies

High-End-Decorative

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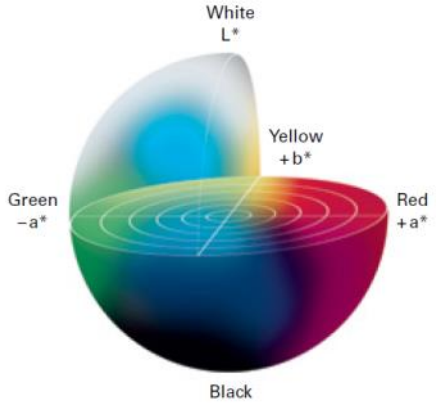
Olympic torch for
London 2012



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High-End-Decorative

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Cutlery, mainly gold and black colours

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Automotive interior/exterior

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Yachting

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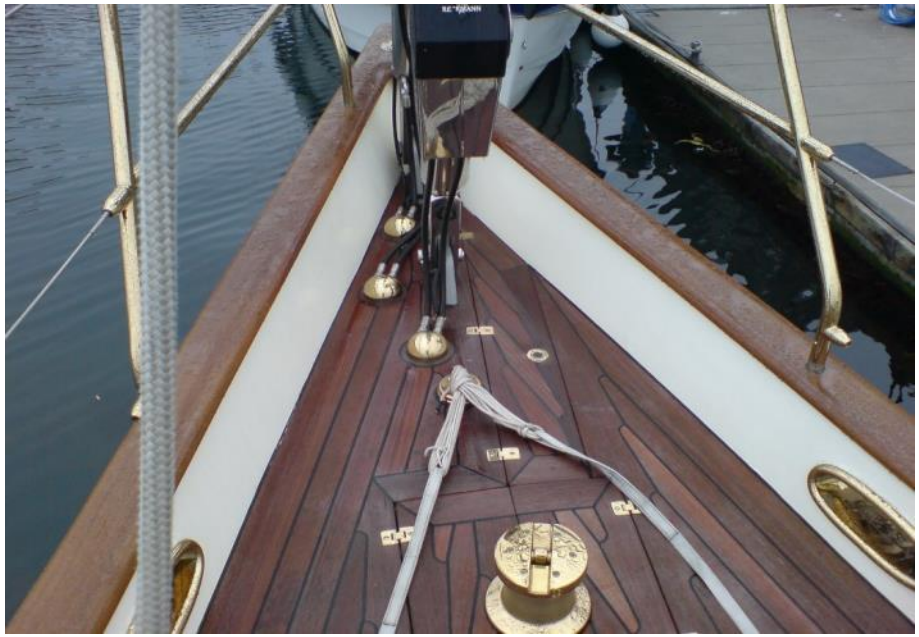

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Different colours and base materials possible

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Electro Plating prior to PVD - Coating

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- Technical reasons for electroplating:
  - **Leveling**
  - **Corrosion resistance**
  - **Support for thin ceramic hard coating (“egg shell”)**
- Typical specification:
  - **10 µm Ni + 0.2 to 0.5 µm Cr**
- Variation in Cr appearance:
  - **Shiny**
  - **Mat (additives)**
  - **Brushed (mechanical)**

Electro Plating prior to PVD - Coating

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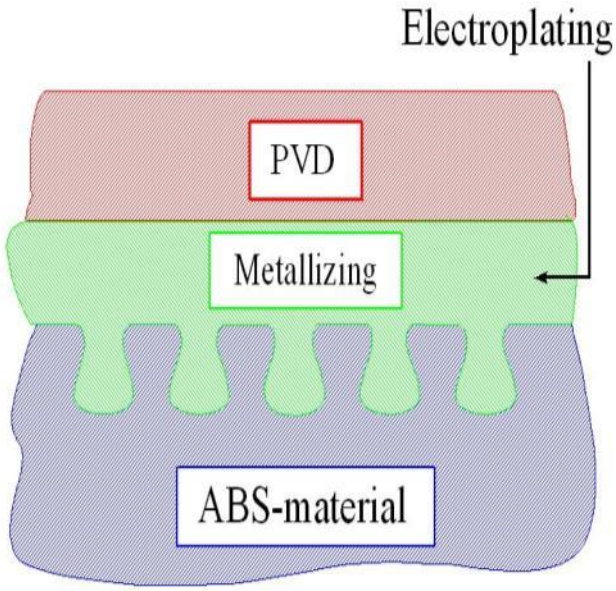
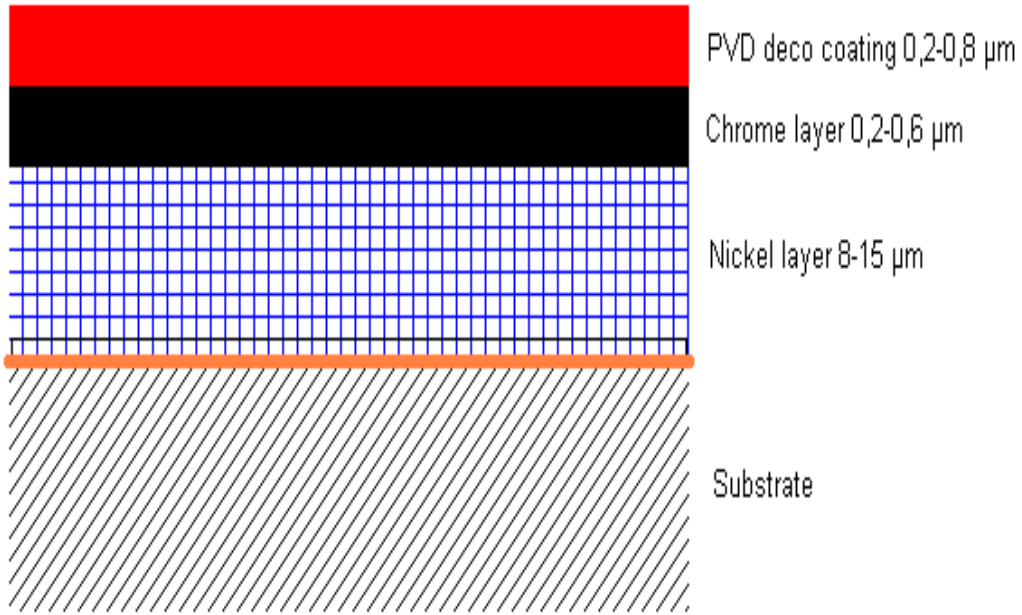
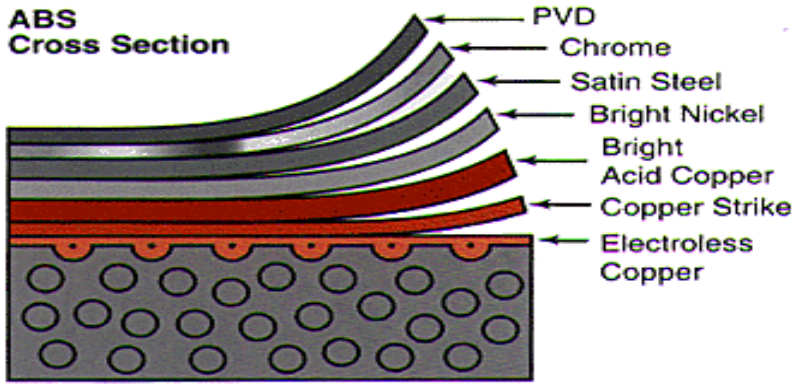
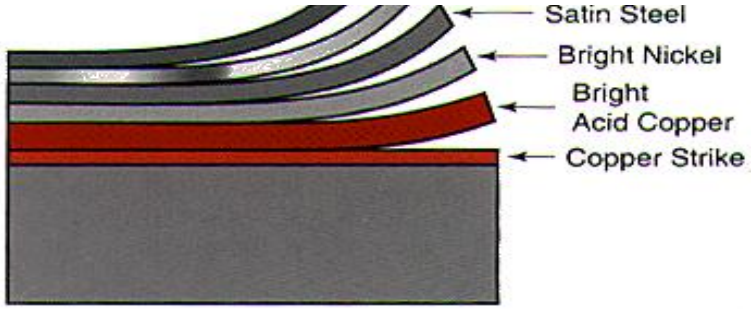




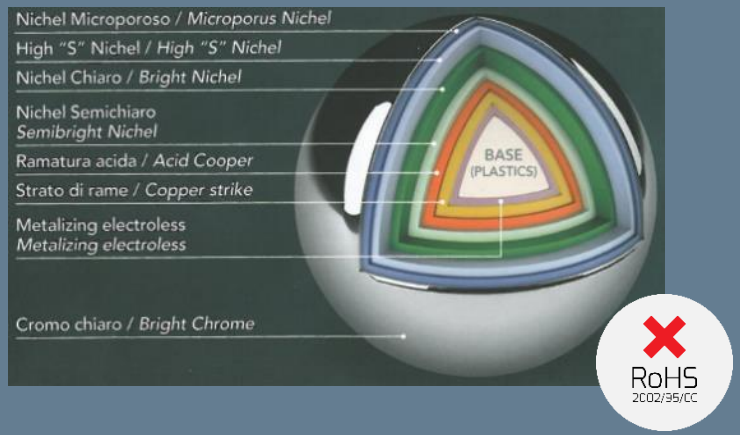




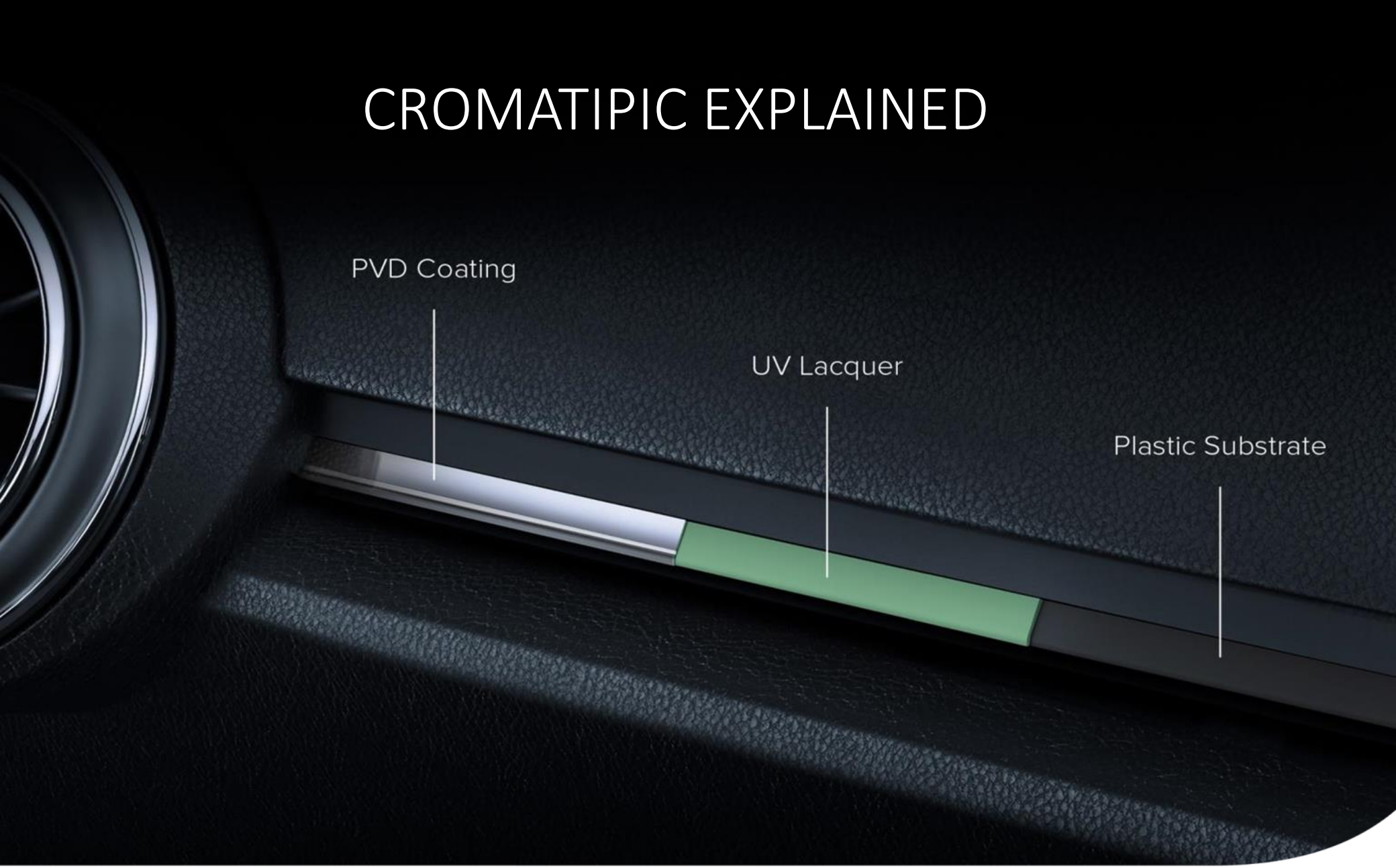
CROMATIPIC®: REPLACEMENT OF ELECTROPLATING

- There is a high market demand to replace the electroplating process. Not only by automotive market, also sanitary- and door- hardware industry.
- The use of Cr^6 will be restricted in time according to directives ROHS *(Restriction of Hazardous Substances)* EU 2002/95/EC, WEEE EU 2002/96/EC and ELV EU 2002/53/EC

For plastics CROMATIPIC® can be used as an alternative for electroplating.



CROMATIPIC EXPLAINED



ADVANTAGES

TWO LAYERS

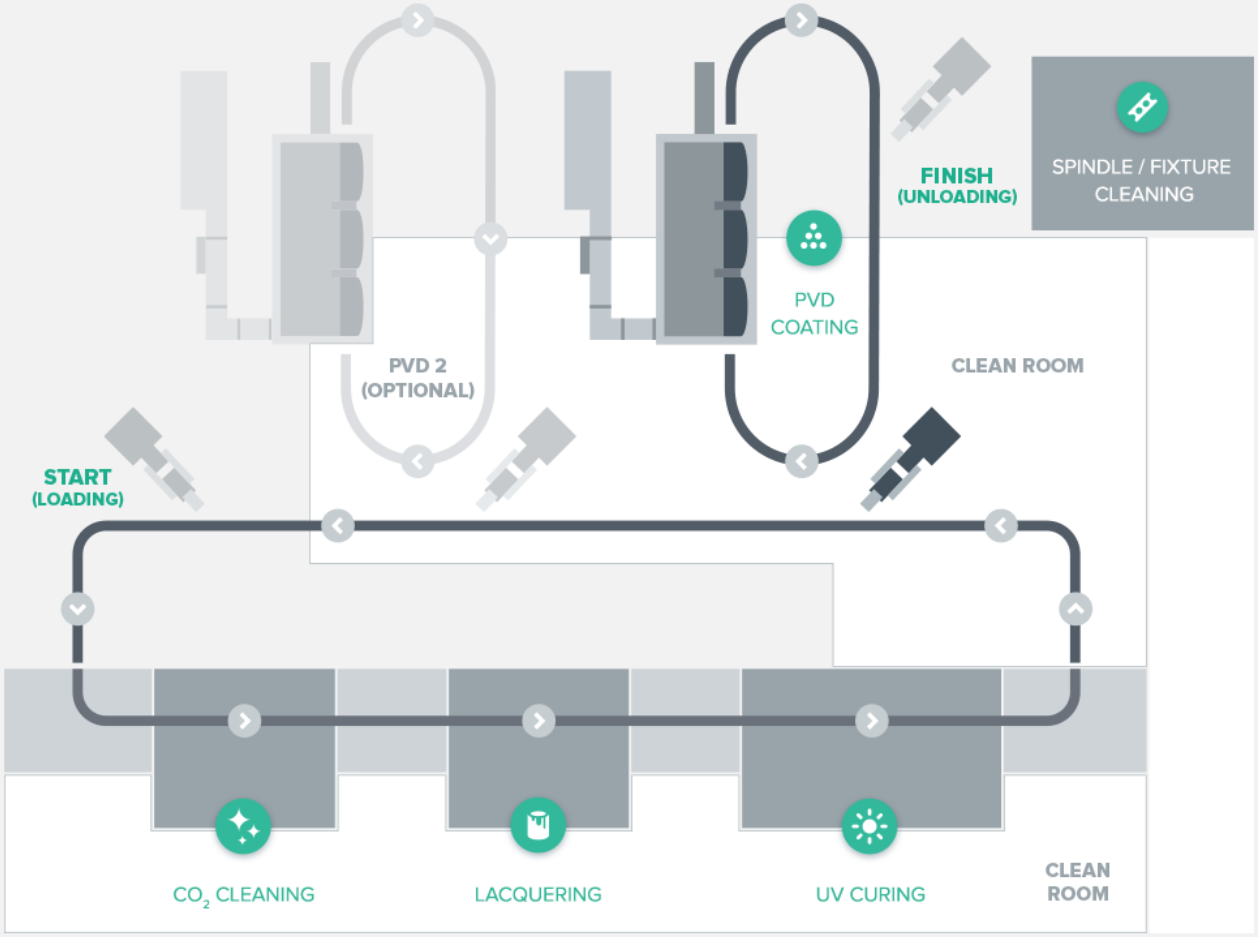
DESIGN FREEDOM

FLEXIBILITY

ECO-FRIENDLY

MANY PLASTICS

FACTORY OVERVIEW

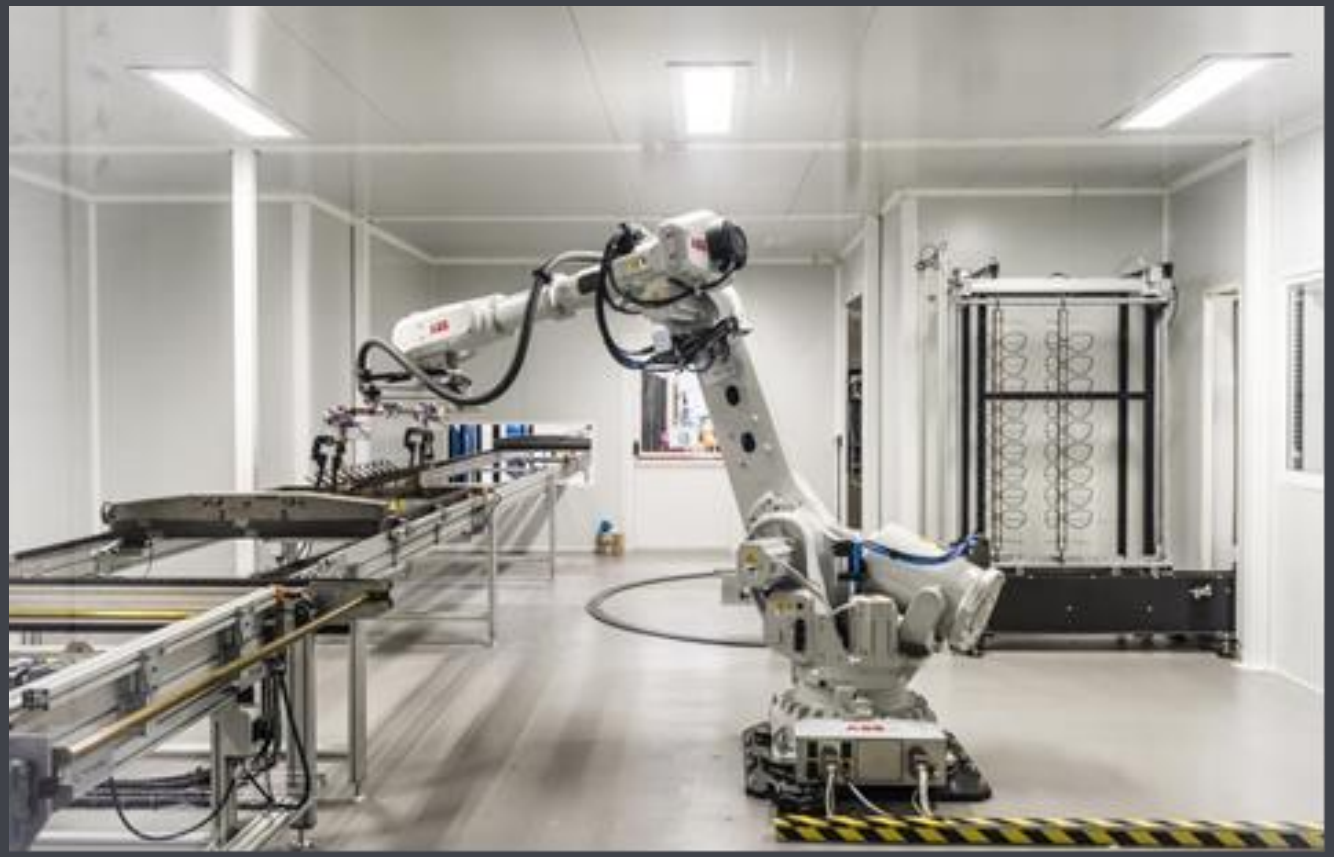


BY HAUZER

CROMATIPIC

ROBOTIZED LACQUERING STATION

TRANSFER TO PVD SYSTEM



HAUZER METALLINER®

Plasma Activation / Coating Deposition / Venting

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Thank You for your time & attention

www.ionbond.com **E-Mail: gerald.kogler@ionbond.com**