

**CIPEL ITALIA**

S.r.l.

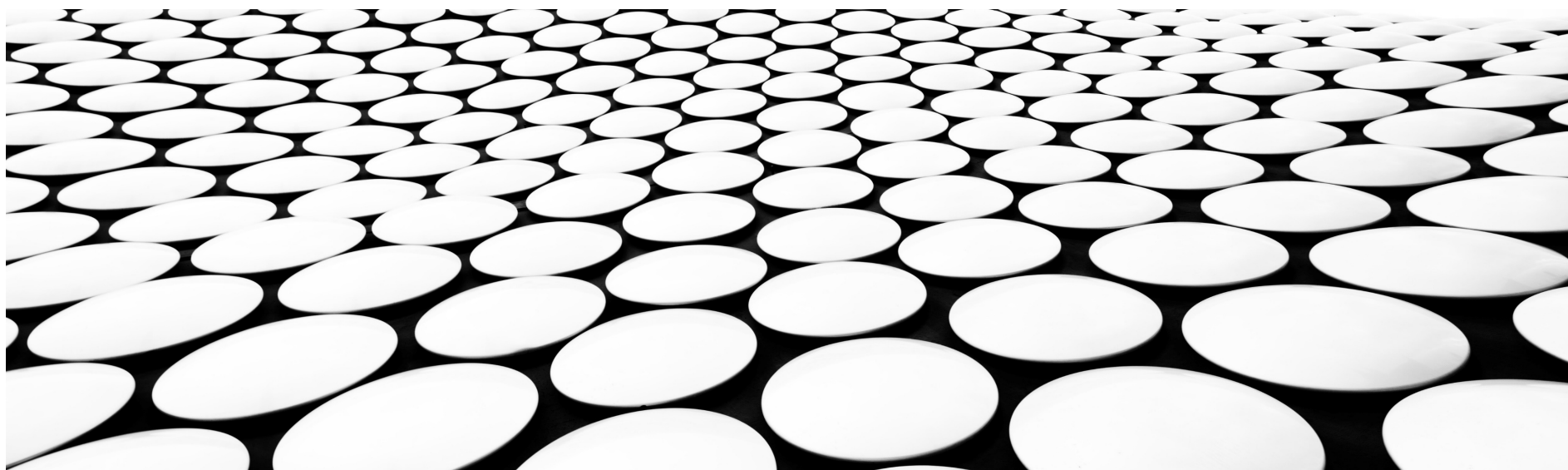
**SOLUTIONS PROVIDER FOR INDUSTRY LEADERS**

## **PCM ENHANCEMENT PRODUCTS**



**PCMI MEETING – VERONA 2025**

**GIANPIERO BOVIO**



## AGENDA

- Company Profile and Milestones
- CIPEL portfolio for Photo Chemical Machining
  - ❑ ALTIX (France): Contact exposure and Direct Imaging
  - ❑ GROWNS (China): Contact Cleaning, Dry Film Lamination, Imaging, RtR Handling
  - ❑ LUMIPLAS (Spain): Wet Processes
- ❑ CONSUMABLES



PCB



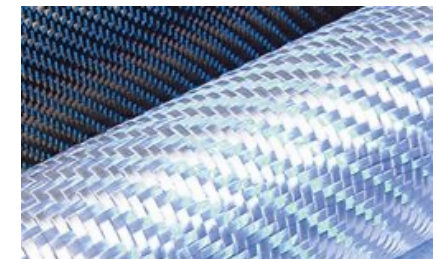
PCM



SM



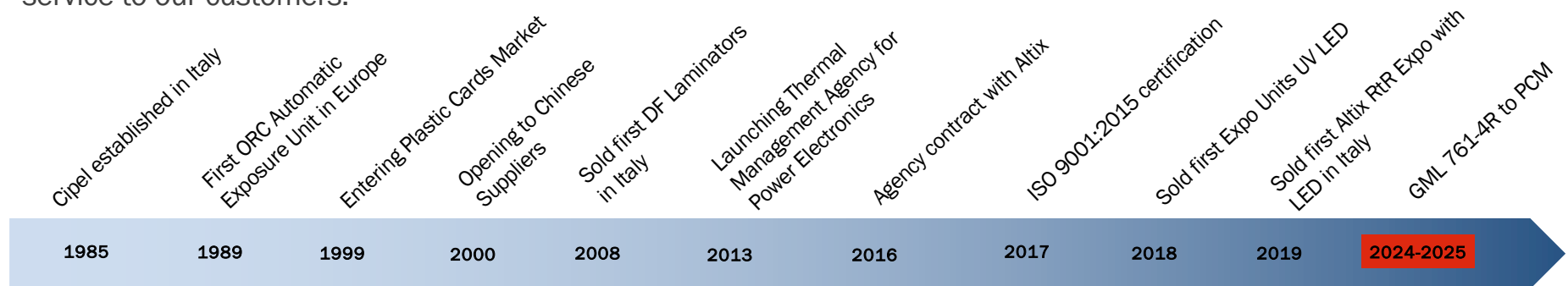
CM



## COMPANY PROFILE AND MILESTONES



- CIPEL ITALIA was established in 1985 to supply the growing PCB/PCM industries with machines and consumables.
- Since then, we have greatly expanded our products range and services to become a high-quality supplier to most professional and industrial markets.
- The expansion of our product range has established us as a prime source for components, consumables, machines in different markets as Pcb, Metal Etching, Smart Cards, Composite Laminates and Power Electronics.
- With 40 years' experience, the comprehensive and independent view on the market, we help our customers finding effective solutions to reach high quality and production targets.
- The quick reaction, a cost-effective structure and the know-how of our team assure a concrete support and full service to our customers.



# ALTIX: CONTACT EXPOSURE AND DIRECT IMAGING



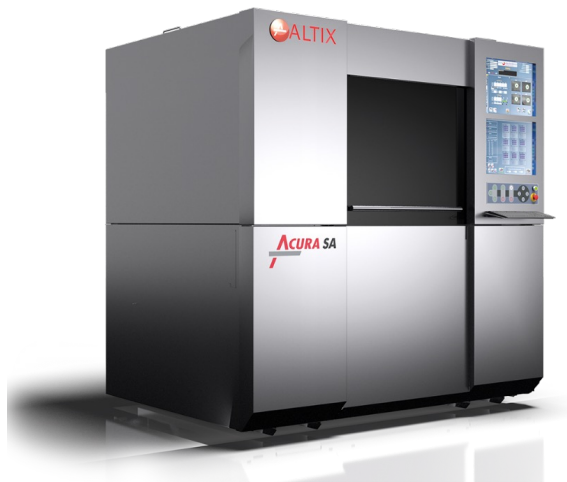
- ACURA-SA semi auto Contact Exposure LED Light - **New!**
- ACURA Premium - Full Auto Contact Exposure LED Light
- ACUREEL - RtR Full Auto Contact Exposure LED Light
- ADIX-UNO - Single Table DI - **New!**
- ADIX-DUO - Dual table DI
- ADIX RtR - DI



08/06/25



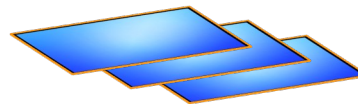
# ACURA-SA SEMI AUTO CONTACT EXPOSURE LED LIGHT – **NEW!**



**Simultaneous  
Double Sided Exposer  
(One Frame)**



**Sheet To Sheet**



**Process**

I/L (Front to Back)



Second Step Expo



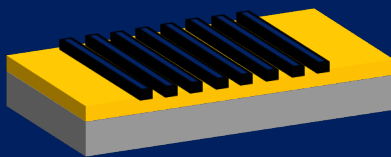
**UV Source**



## ACURA-SA SEMI AUTO CONTACT EXPOSURE LED LIGHT – **NEW!**

### High Resolution

Down to 25 $\mu$ m/25 $\mu$ m



15 $\mu$ m/15 $\mu$ m possible with Glass Mask

### Artwork to Artwork

alignment of  $\pm 5\mu$ m



Inner Layer Mode  
AW/AW

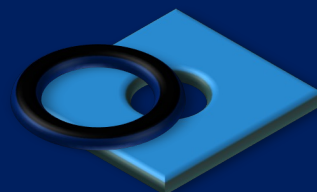
### Exposure Area

Up to 610x762mm



### Artwork to Panel

alignment of  $\pm 8\mu$ m



Second Step Expo



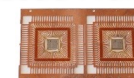
Chemical Milling



PCB / Flex



Lead Frame



Touch Panel





## Semi-Automatic Sheet to Sheet Exposure



CONTACT PRINTER



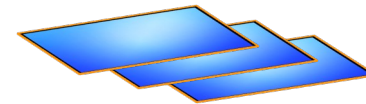
## ADIX-UNO – SINGLE TABLE DIRECT IMAGING - **NEW!**



Single Side Exposer



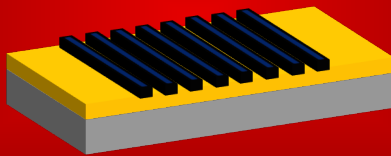
Sheet To Sheet



## ADIX-UNO – SINGLE TABLE DIRECT IMAGING - **NEW!**

### High Resolution

Down to 15 $\mu$ m



### Front to Back

alignment of  $\pm 12\mu$ m



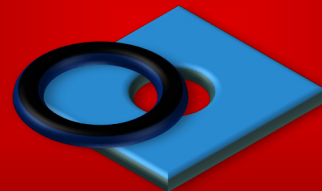
### Exposure Area

Up to 635x762mm



### Image to Panel

alignment of  $\pm 8\mu$ m



*Second Step Expo*



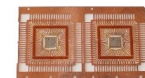
Chemical Milling



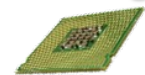
PCB / Flex



Lead Frame



Adv. Packaging



## ADIX-UNO – DESIGN



**Quality Regulation Devices:** Specifically designed chillers & pumps.



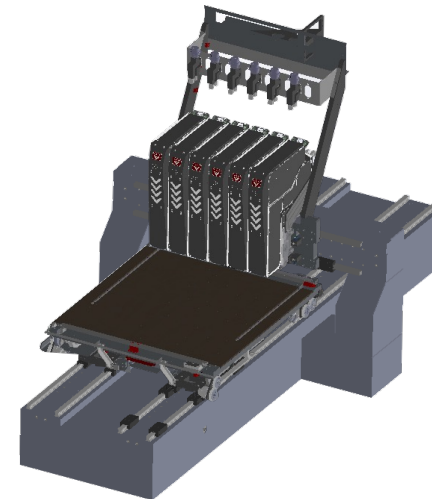
**Strict Calibrations:** Regular and precise calibrations maintain accuracy and performance over time.



**Limited Axes Movements:** Minimizing unnecessary movements reduces wear and tear, enhancing longevity.

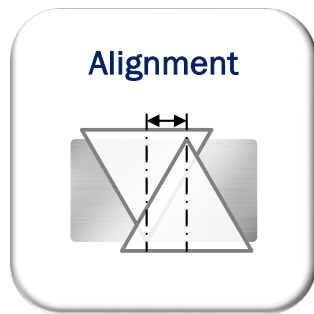


**Warm-Up Procedures:** Implementing a warm-up routine ensures optimal operating conditions and consistent results.

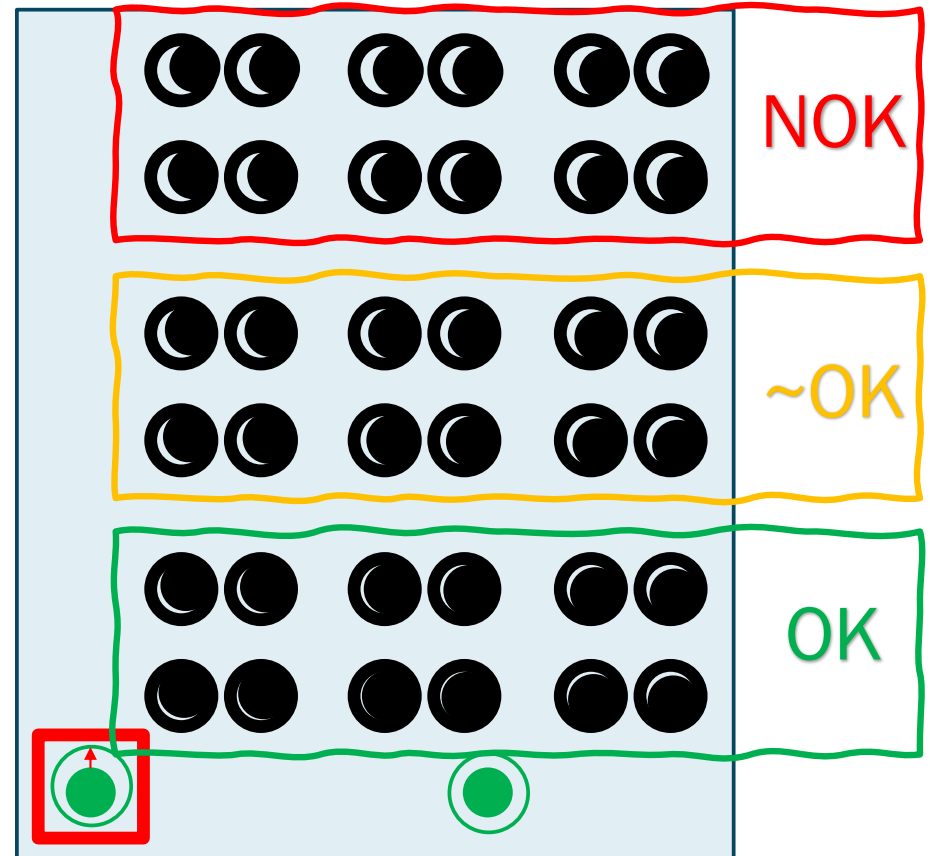




## ADIX-UNO | FRONT TO BACK ALIGNMENT

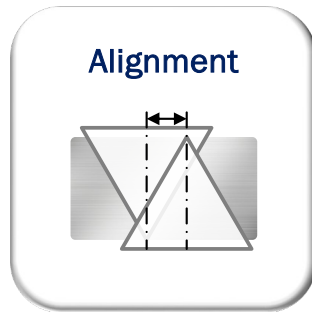


**Alignment uniformity with 2 marks**



**Misalignment**

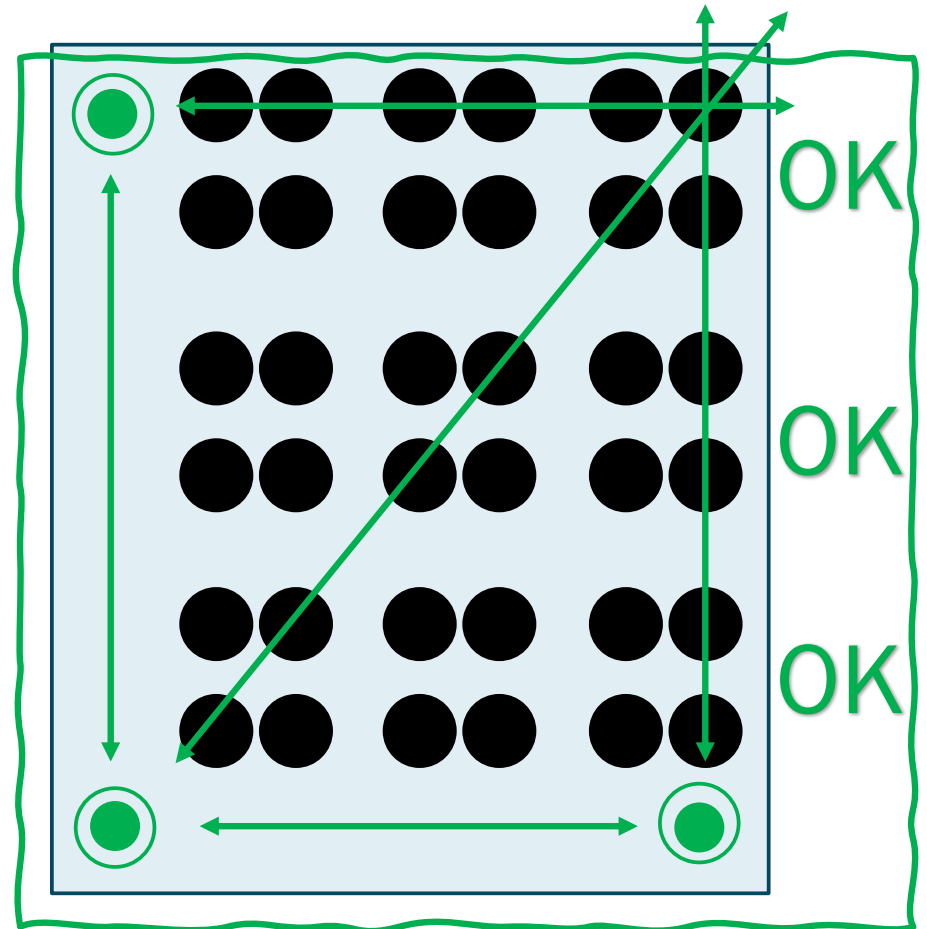
## ADIX-UNO | FRONT TO BACK ALIGNMENT



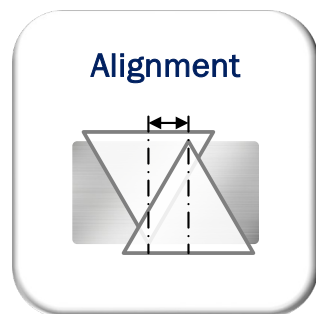
**Alignment uniformity with 3 marks**  
**Appropriate distance between marks**



**Find the best compromise between target positions and panel sizes**

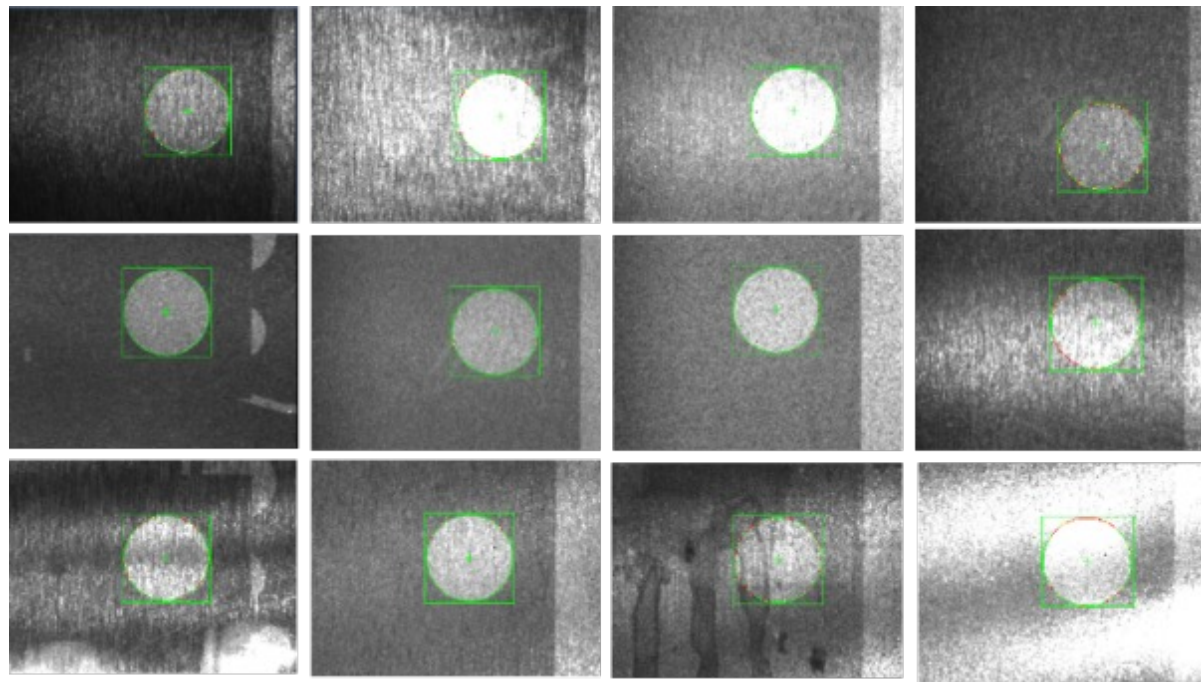


## ADIX-UNO | TARGET DETECTION



### PCM Materials.....

Alloy 600	Cu	Molybdenum
AlloyX 750	Elgiloy	Nickel
Aluminum	Kovar	Tungsten
Steel	Niobium	Titanium
Blue Steel	Invar	Brass
Be Cu	Inconel	.....

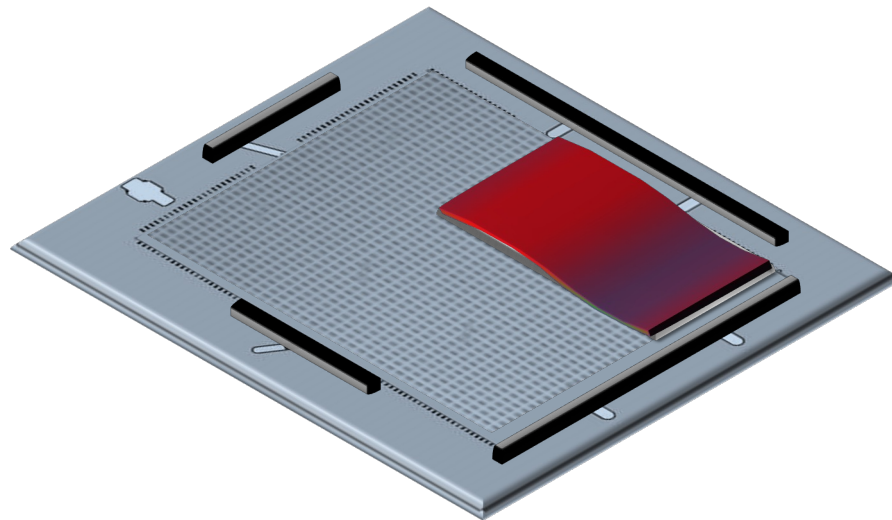
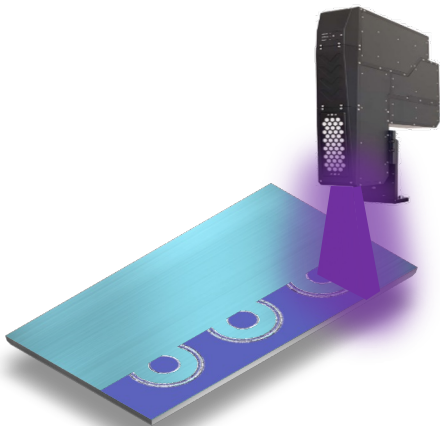
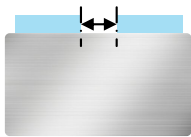


### Parameters can influence the video detection:

- Chemical micro etch preparation
- Various material + Dry Film
- Brightness and light reflection

## ADIX-UNO | CLAMPING SYSTEM

Resolution



**Clamping System**



## GROWNS: CONTACT CLEANING | LAMINATION | IMAGING



- Contact Cleaning Units (Clean Machines) ✓
- Manual Dry Film Laminator (Sheet to Sheet) ✓
- RtR Dry Film Laminator (Roll to Roll)
- Roll to Roll Handlings Units for Wet/Dry Processes (Winders / Unwinders)
- Glass/Mylar frame Manual Exposure Units, with UV Led Scan bar and multiple Wavelengths ✓



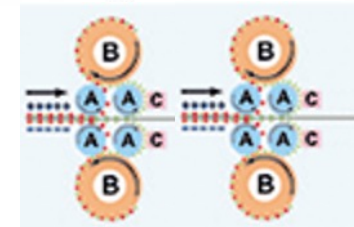
## PROCESS: CONTACT CLEANING



- GPC Magnetic Drive - Stand Alone or In-Line configuration
- 650 or 760 mm standard width (larger widths available on demand)
- 4 or 8 polymeric rubber rollers for superior surface cleaning

### ADVANTAGES:

- + Minimizes Pinholes & Defects in Photoresist Lamination.
- + GPC can be used after DF Lamination prior Imaging.
- + Anti mylar peeling function is available on all models as standard.





## PROCESS: CONTACT CLEANING

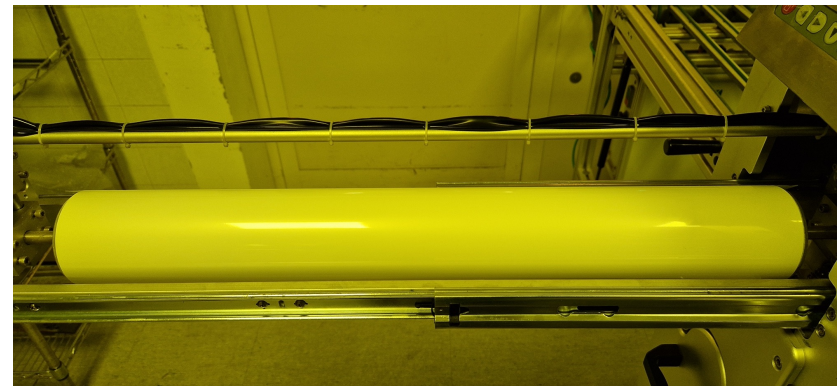


- **Without cleaning rollers:** Scrap rates can be **10% to 15%** due to contamination-related defects.
- **With cleaning rollers:** Scrap rates typically drop to **1% to 5%**, depending on process optimization.
- **GPC** can remove particles down to around **0.5 microns**, and depending on selected rollers adhesiveness, even **sub-micron particles** ( $\sim 0.2\text{--}0.3\ \mu\text{m}$ ).

- Adhesive before and after 200 plates cleaning

**Note:** Adhesive Rolls Pictures in Plates surface preparation line (degreasing/microetching) before Dry Film Lamination

- Courtesy of Chimimetal S.r.l.-



## PROCESS: DRY FILM LAMINATION



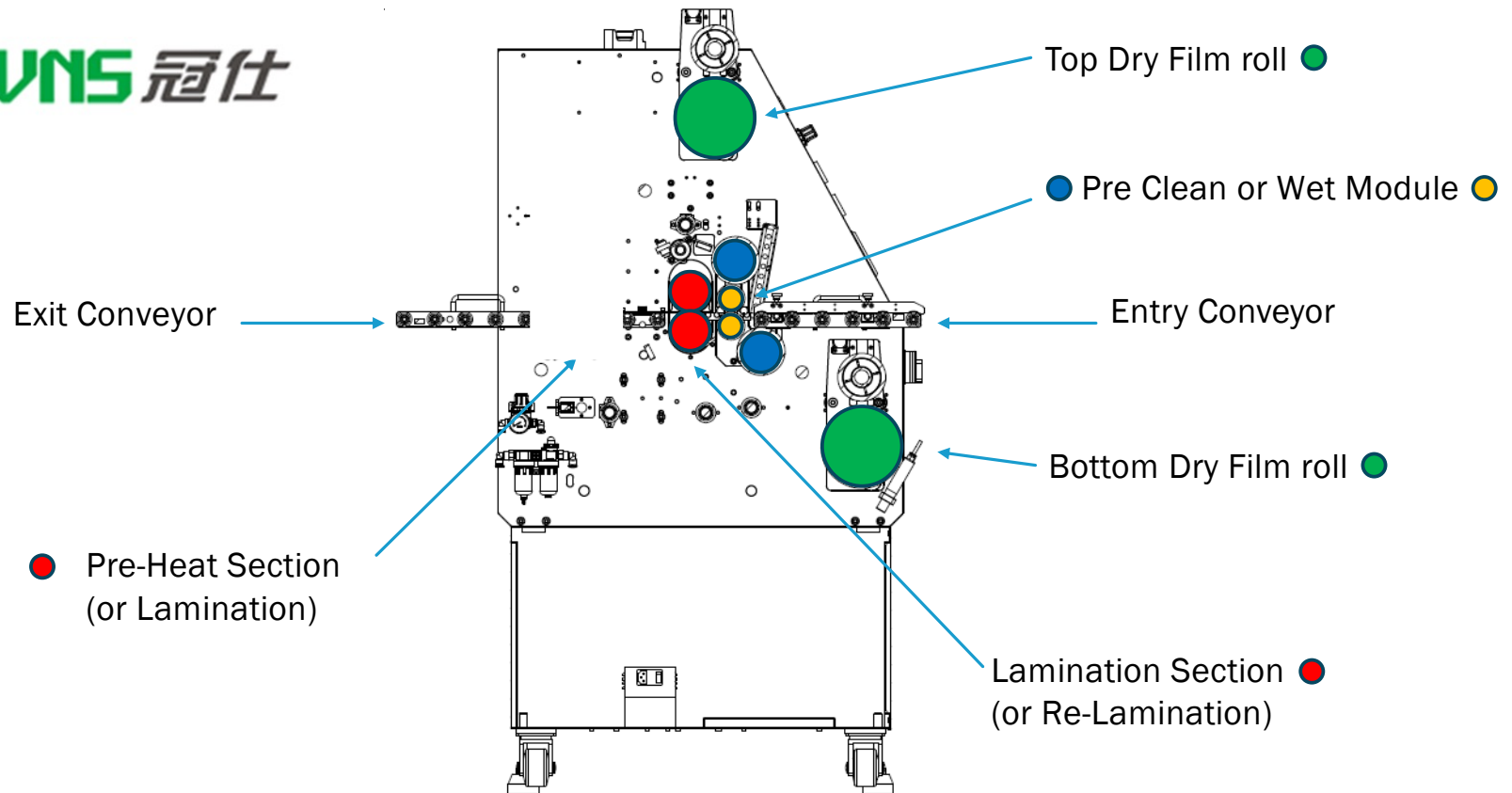
- Manual Dry Film Laminator GML 631-761-2R (Sheet to Sheet)
  - Cleaning Module prior Lamination
  - Wet Module prior Lamination
  - Integrated Pre-Heating 4R Model
    - Adjustable lamination pressure (pneumatic)
    - Electronic Dry Film tensioning
    - Macro & Micro adjustment for Dry Films alignment top to bottom
    - 3" Pneumatic expansion shafts "tile-type"
    - IR Contactless Temperature control + PID
    - Touch Panel HMI with multiple languages



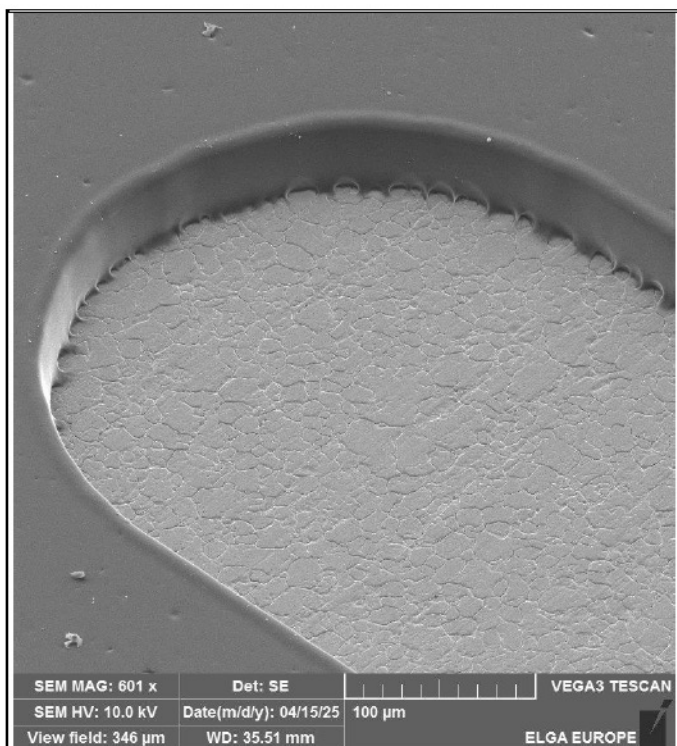
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## PROCESS: DRY FILM LAMINATION 4R MODEL

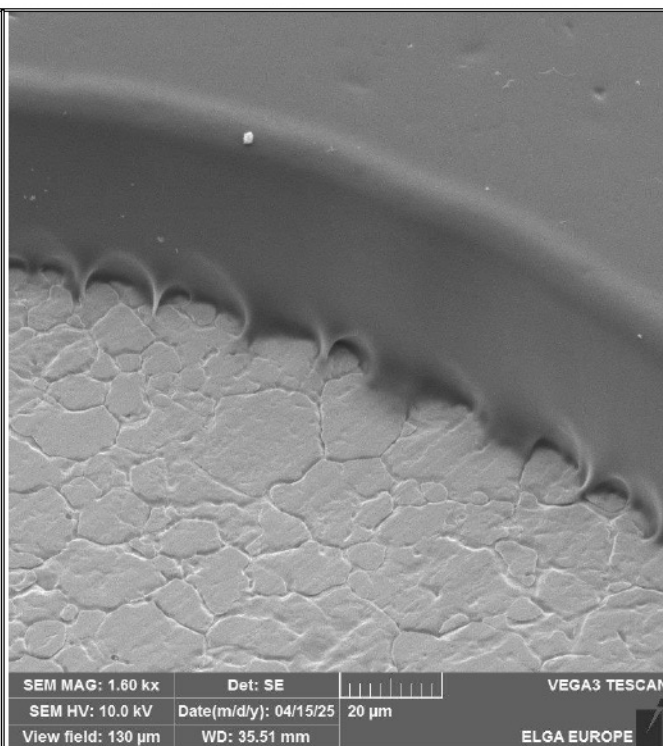
GROWNS 冠仕



## LAMINATION ENHANCEMENT FEATURES: PRE HEAT & WET MODULE



Overview



Dry Film Sidewall Detail

### Process Parameters:

DF: Laminar E9215

Thickness: 40µ

Temp.: 100°C

Speed: 1,2 mt/min

Process: Standard

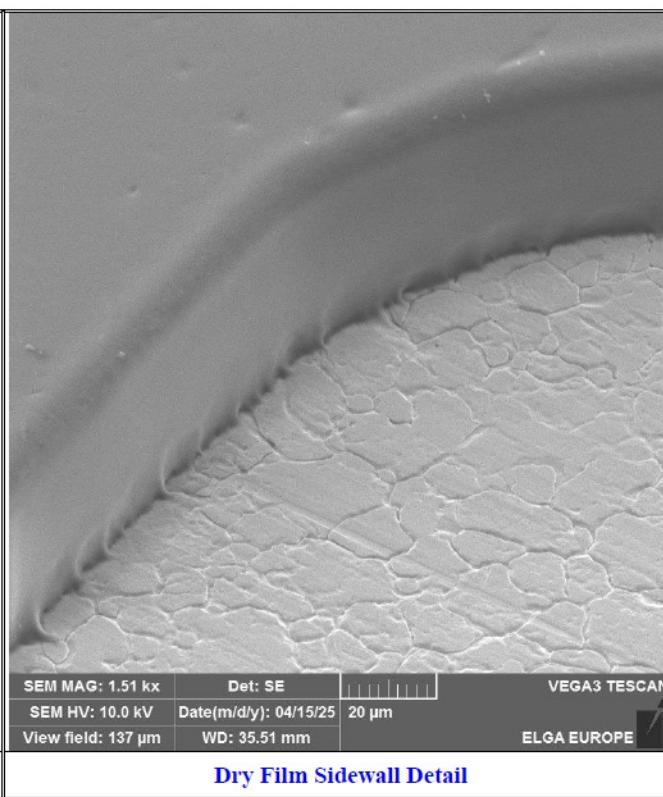
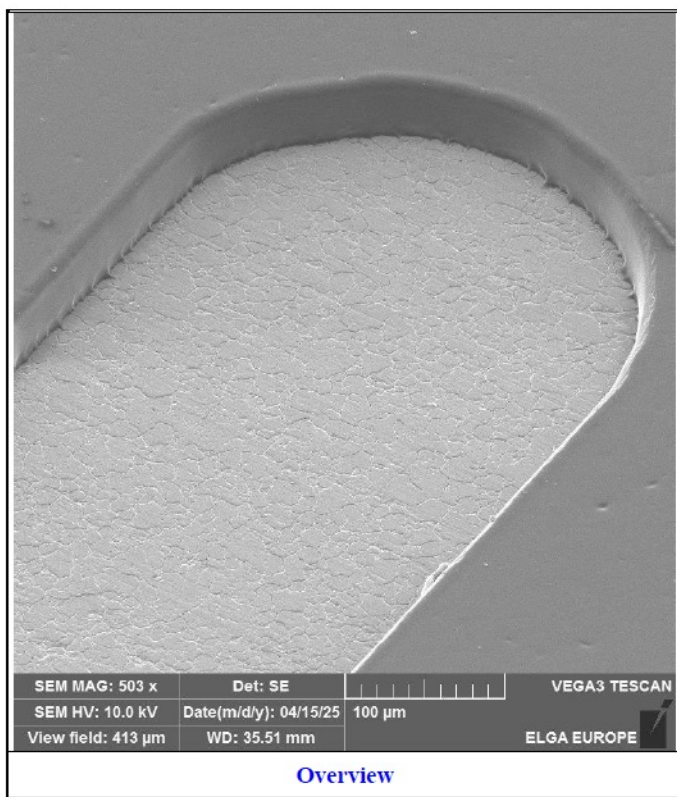
Material: SS 400 grit

**Elga Europe**

- Courtesy of Elga Europe S.r.l. & Chimimetal S.r.l.-

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## LAMINATION ENHANCEMENT FEATURES: PRE HEAT & WET MODULE



**Process Parameters:**  
DF: Laminar E9215  
Thickness: 40µ  
Temp.: 100°C  
Speed: 1,2 mt/min  
Process: Wet Lam  
Material: SS 400 grit

**Elga Europe**

- Courtesy of Elga Europe S.r.l. & Chimimetall S.r.l.-

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## PROCESS: DRY FILM LAMINATION



**Why Wet Lamination Improves Adhesion:** Wet lamination introduces a very thin layer of water between the dry film and the metal surface. This offers several advantages:

- **Better Surface Conformity:** water helps the dry film better flow into the microscopic valleys and peaks of the metal surface, improving mechanical interlocking.
- **Reduced Trapped Air Bubbles:** minimizes air entrapment at the interface, which is a major cause of poor adhesion or delamination.



**Quantitative Improvement:** The degree of adhesion improvement isn't always expressed in absolute numerical terms (like N/cm), but studies and field measurement reports show:

- **Peel strength** can increase by **30–100%** compared to dry lamination, depending on the film and substrate used.
- **Yield and process reliability** (e.g., under high-pressure rinsing or etching) are significantly improved, especially on rough or oxidized metals like copper or stainless steel.
- **Defect rates** such as blistering, delamination, or film lifting are greatly reduced.



## PROCESS: DRY FILM LAMINATION



### Adhesion vs Surface Roughness (Ra) for Dry Films on Metal Plates

Surface Roughness (Ra, $\mu\text{m}$ )	Typical Surface	Dry Lamination Peel Strength (N/cm)	Wet Lamination Peel Strength (N/cm)
0.05–0.1	Polished stainless steel	0.2 – 0.4	0.4 – 0.6
0.2–0.3	Polished copper, aluminum	0.6 – 0.9	1.0 – 1.5
0.5–0.8	Brushed or micro-etched metal	1.0 – 1.4	1.8 – 2.2
1.0–1.5	Roughened copper (RA foil)	1.2 – 1.6	2.0 – 2.5
>2.0	Grit-blasted or etched	Variable (may damage film)	Variable (good, if surface is clean)

## PROCESS: DRY FILM LAMINATION



### Comparison: Wet vs Dry Lamination for Imaging

Aspect	Dry Lamination	Wet Lamination
Air entrapment	Common, esp. on rough surfaces	✓ Greatly reduced
Contact uniformity	May vary (edge lift, bubbles)	✓ Uniform, close contact
Imaging resolution (practical)	Moderate to high (with good setup)	✓ High (better reproduction of fine lines)
Line edge roughness	Higher (due to light scattering)	✓ Lower (cleaner development)
Feature fidelity (<50 µm)	May degrade	✓ Improved

PCM users report **sharper edges**, **better aspect ratios**, and **reduced undercut** after etching when wet lamination is used.

## PROCESS: MANUAL DRY FILM IMAGING – UV LED



### ■ Manual Exposure GMED series

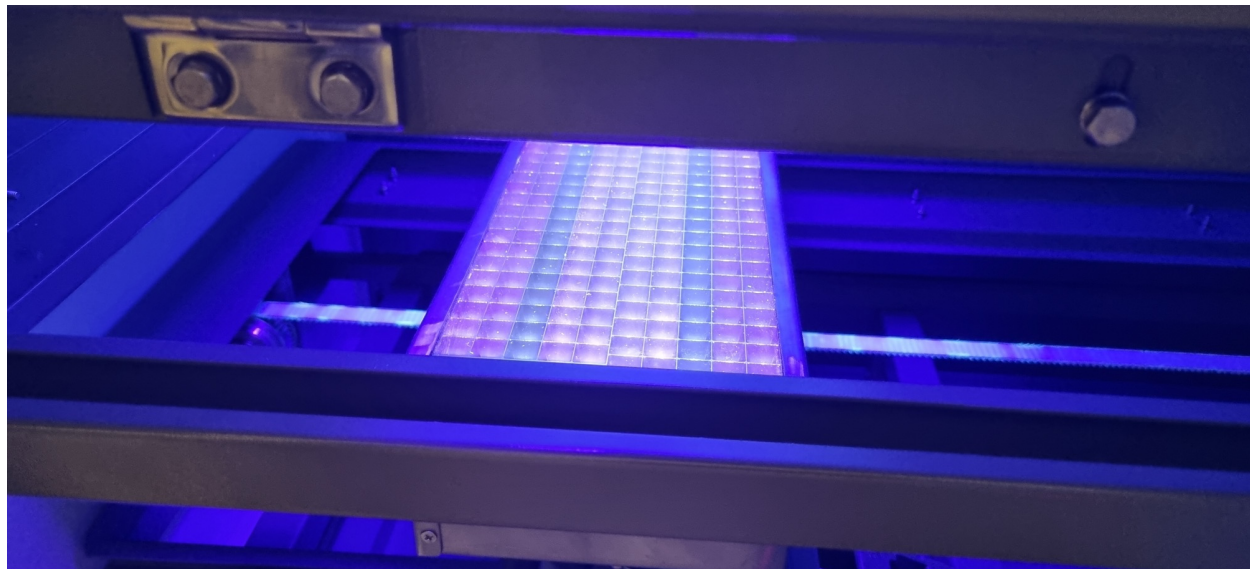
- UV-LED Source with up to 4 w/ 365~385~395~405 nm
- Collimation angle: ~ 6°
- Exposure mode: scan type with 5 or 10 led rows
- Total 1,000 LED (500 per side)
- Cooling system: external chiller (supplied)
- 2 glass-mylar frames 650x900 mm (useful area)
- Resolution: L/S 50  $\mu$  (with Dry Film  $\leq$  25 $\mu$ )
- Frames cooling: forced air (no external air needed)
- Energy control: adjustable LED power and scan speed.
- Machine control with Touch Screen HMI and PLC
- HMI Language: English/Italian/Chinese (other languages available on demand)
- Power supply: 220VAC, 50 Hz, 30A



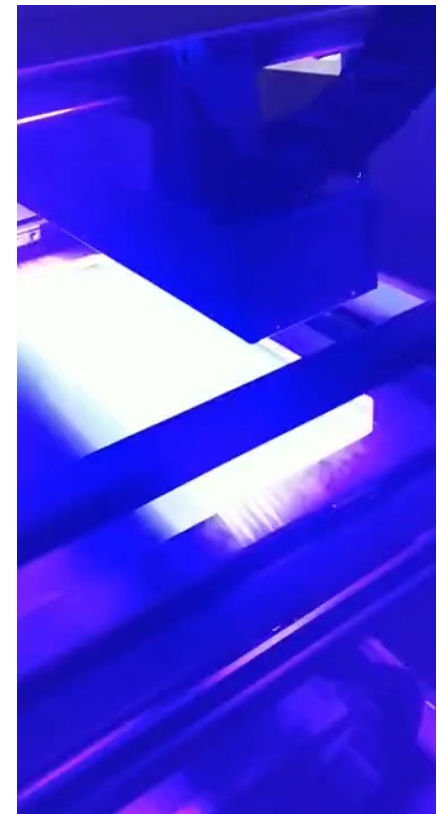
## PROCESS: MANUAL DRY FILM IMAGING – UV LED

**GROWNS** 冠仕

- UV-LED Source with 3 wl 365~385~395 nm
- UV-Sensor 350nm 35 mW/cm<sup>2</sup>
- UV-Sensor 420 nm 130 mW/cm<sup>2</sup>



- UV-LED Scan Bar

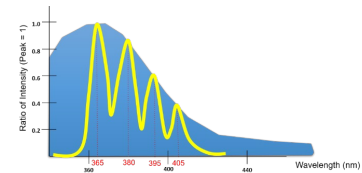


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## PROCESS: MANUAL DRY FILM IMAGING – UV LED



- Process Advantages offered by GMED series:
  - UV-LED Source with up to 4 wl 365~385~395~405 nm (with adjustable UV intensity 0-100%)
  - Collimation angle: ~ 6° for higher definition with low dust related issues
  - Resolution: L/S 50  $\mu$  (with Dry Film  $\leq 25\mu$ )
  - Exposure mode: scan type with 5 or 10 led rows : suitable for high energy imaging even with double lamination
  - Cooling system: external chiller (supplied) : no heat is transferred to artworks, no dimensional variations
  - Large standard frames available (650 x 900 mm – 650 x 1.200 mm – 650 x 1.500 mm, wider models on demand)
  - Low power consumption: at least 3 times lower compared to conventional 5kw lamps (about 3kW vs 10-12kW)



## PROCESS: DEVELOPING – ETCHING – STRIPPING



Lumiplus machinery is a company **with more than 30 years** of experience dedicated to manufacturing and providing **the best solutions** regarding wet processing machinery.

Lumiplus is the benchmark of the Spanish market and is **present in more than 25 other countries**, that's why the net of representatives can give support and guarantee technical assistance all over the world.

PCM installations in Spain, USA, France, UK, Czech Republic

- Developing
- Etching
- Stripping
- Conveyor systems: Industry tends to produce more complex sheets and that involves producing thinner panels. That's why Lumiplus produces machines to process panels starting from 0,025 up to 7 mm and conveyors for in-line processes (reel-to-reel), such as flexible film.





## PROCESS: DEVELOPING LINES

■■■Lumiplas





## PROCESS: ETCHING LINES

■■■Lumiplas



## PROCESS: STRIPPING LINES

■■■Lumiplas





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## CONSUMABLES



- Adhesive Waste Pads and Cleaning Rollers
- Adhesive Walk Mats for clean rooms
- Replacement Adhesive Rolls for Contact Cleaning Units (Clean Machines)
- PU coated nylon Gloves for clean and easy handling in clean rooms (palm fit and top fit)
- PVA sponge rollers for wet process units
- Embossed Mylar for manual exposure units

## CONSUMABLES: ADHESIVE PAD & MATS

### CLEANING PRODUCTS



**CLEANING ROLLERS**

**ADHESIVE WASTE PADS**

### WHITE OR BLUE TACKY WALK MATS



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## CONSUMABLES: GLOVES



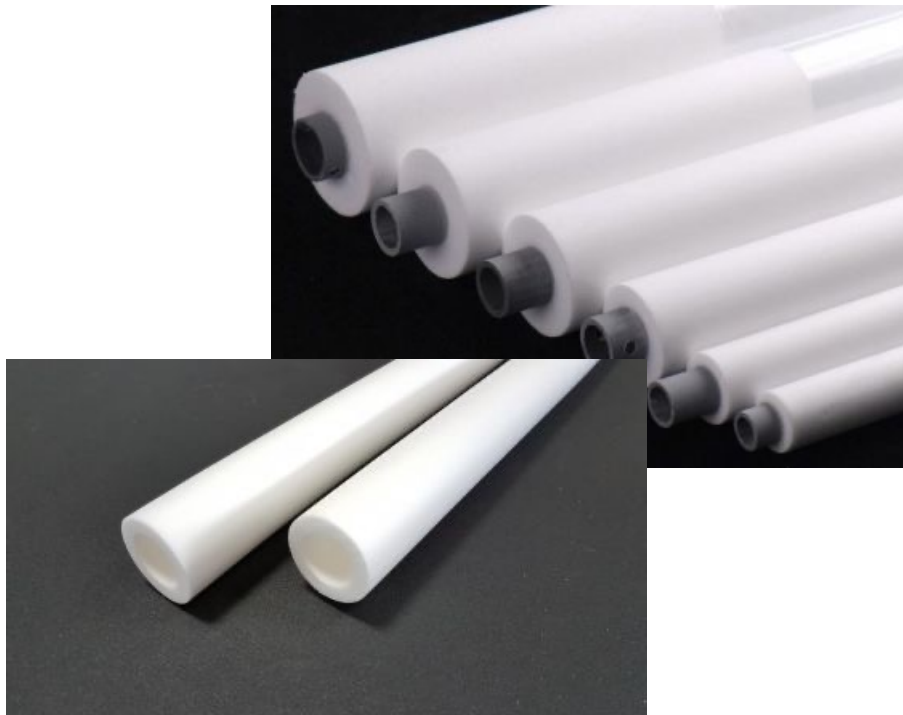
### WHITE NYLON PU COATED GLOVES - PALM OR FINGERTIPS



## CONSUMABLES: PVA ROLLERS & EMBOSSED MYLAR



### PVA ROLLERS (SUPPORTED / UNSUPPORTED)

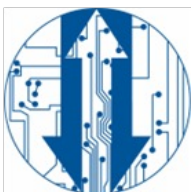


### EMBOSSED MYLAR FOR MANUAL EXPO



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**SOLUTIONS PROVIDER FOR INDUSTRY LEADERS**

## **PCM ENHANCEMENT PRODUCTS**



**PCMI MEETING – VERONA 2025**

**GIANPIERO BOVIO**

**THANK YOU !**

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