



# Security Paper

Surface treatment solutions & developments

Michele Mazzi



# Agenda

- **The story so far:** a brief summary on ESACOTE WB PUD for security paper
- **Products range:** water based PUD for durable banknote paper

# The story so far

A brief summary on ESACOTE WB PUD for security paper

## ESACOTE: WB PUD for security paper surface treatment

- ✓ Binary colloidal system based on fully reacted polyurethanes
- ✓ Anionic, non ionic and cationic solutions
- ✓ Particle size distributions between 30 nm and 200 nm
- ✓ Highly flexible film with chemical and mechanical resistances
- ✓ Compliance with latest HSE requirements
- ✓ Low VOC and VOC free grades available



## ESACOTE: Performing solutions for «durable» and «anti soil» banknotes paper

- ✓ Double folds
- ✓ Crumpling porosity
- ✓ Ink adhesion
- ✓ Water repellency
- ✓ Soil/Grease hold out
- ✓ Chemical resistances



## ESACOTE: 2K formulation based on free -NCO for long lasting performance

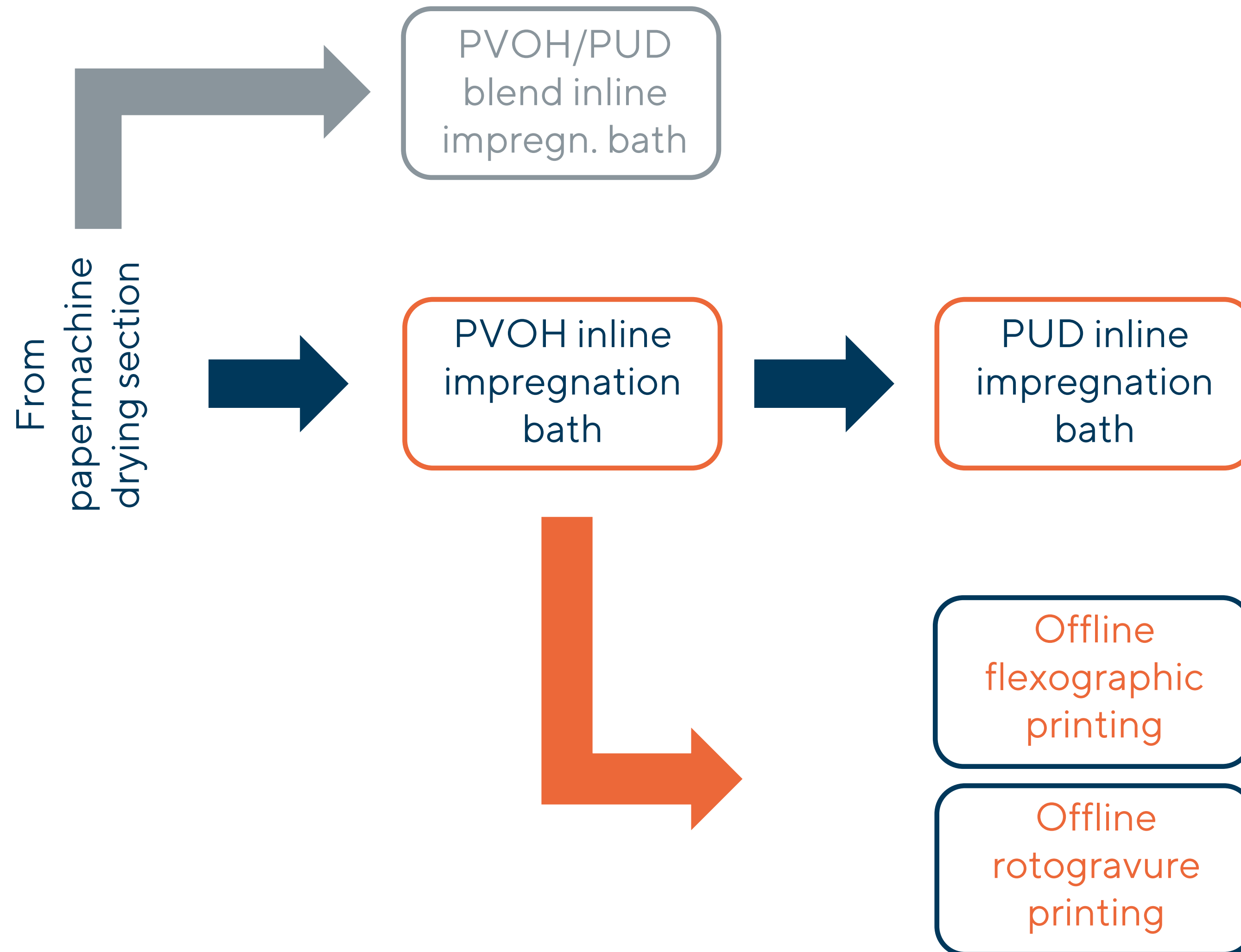
In order to enhance performance, it is important to add a crosslinker before application.

The crosslinking agent is added to WB PUD and it reacts with both carboxyl and hydroxyl groups.

Polyurea polymer is formed and inter penetrating network (IPN) takes place in the system leading to higher mechanical and chemical resistances while keeping great flexibility.

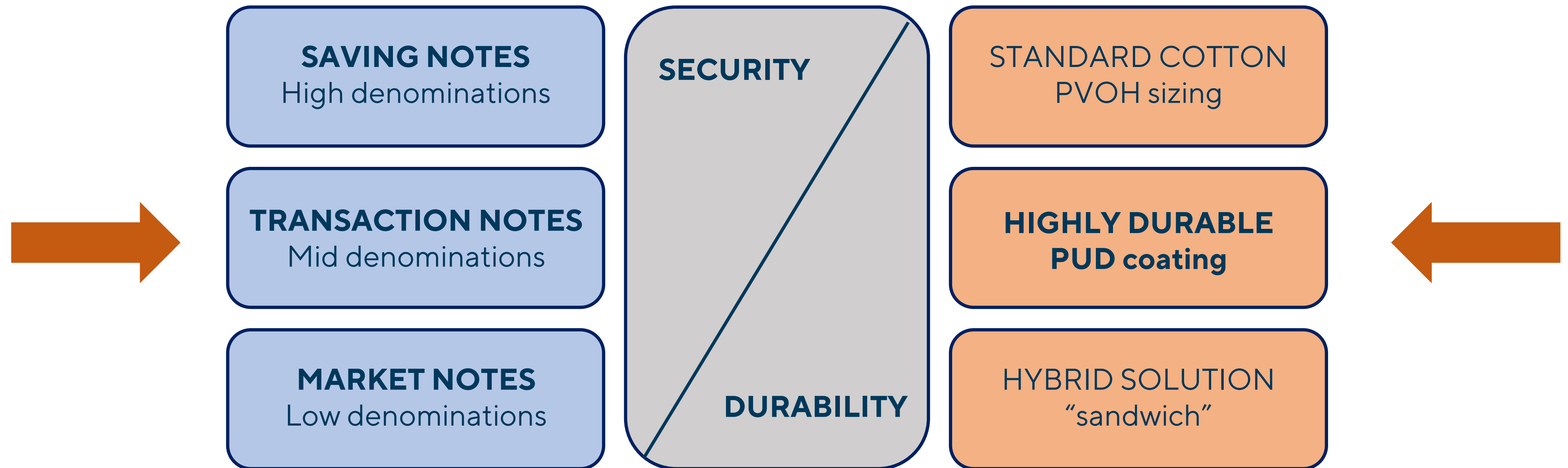


## ESACOTE: application techniques



- State of the art application is based on an inline PVOH sizing for reducing paper porosity and an offline printing step usually performed by flexo or rotogravure
- An alternative applications method could be to have both steps inline using two different impregnation baths. In this way it is possible to achieve very good performance almost equal to offline application
- It is also possible to apply in one single step blending together PVOH and PUD, however this process will reduce final performance.

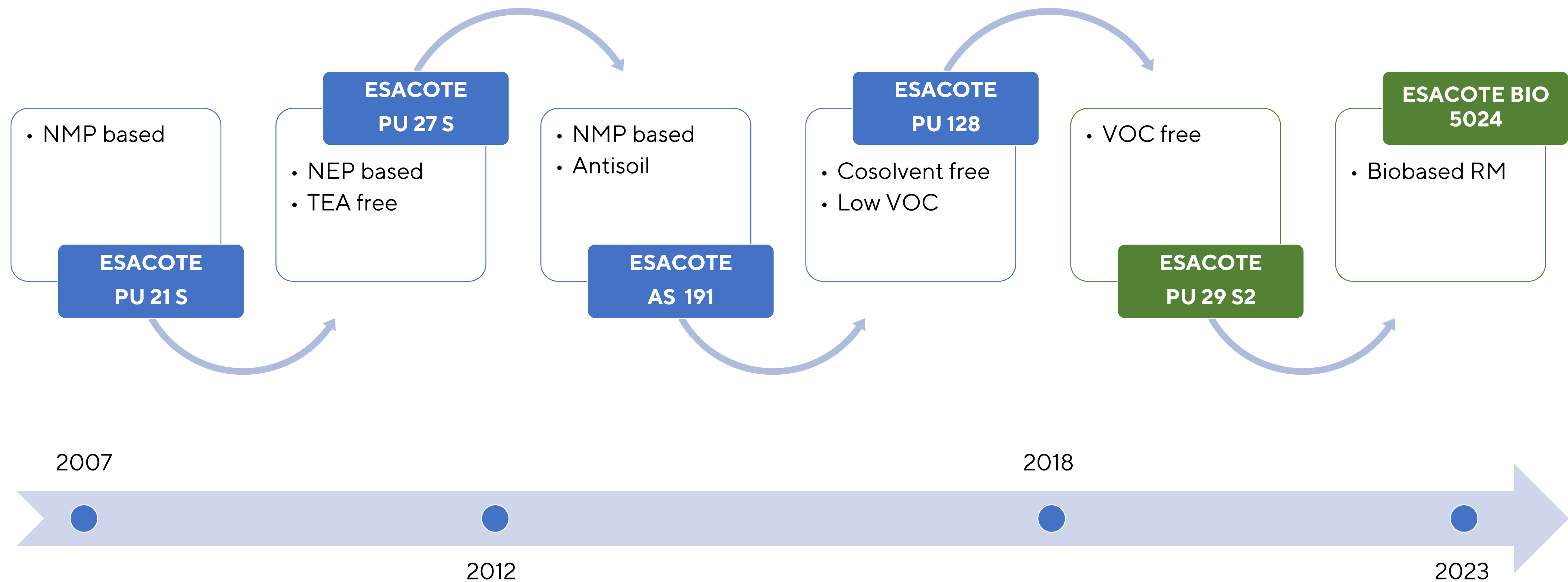
# Banknotes segmentation







# ESACOTE: the story so far



# Albizzate R&D capabilities about evaluation of surface treatments for security paper

- ✓ Surface treatment application by rod coater
- ✓ COBB evaluation (water & oil)
- ✓ Dynamic contact angle measurement (water & oil)
- ✓ Ink adhesion test
- ✓ Blocking evaluation
- ✓ Chemical resistances



# Products range

Water based PUD based for durable banknote paper



# ESACOTE® PU 128

## Chemical description

Polyurethane in aqueous dispersion.

## Main use

ESACOTE® PU 128 is an anionic aliphatic polyurethane for surface treatment.

## Typical values

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Appearance at 20 °C: Opalescent liquid

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pH (as received): 7.0 – 9.0

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Viscosity (as received, Brookfield RVT @ 25 °C, 50 rpm, mPa·s): 200 max

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Solid content (%): 31.0 – 33.0

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## Product properties

Film characteristics: transparent, medium soft and flexible.

## Applications

ESACOTE® PU 128 could be used, in formulations or alone, as surface treatment to improve mechanical and physical properties of paper.

## Storage and handling

ESACOTE® PU 128 must be stored at room temperature and protected from frost. We recommend to store it between 10° C and 35° C.

If exposed to temperature below 5°C the product is damaged and need to be disposed.

Shelf life: 12 months from the production date.

## Packaging

120 kg drums

1000 kg one way container

## Material safety

The Safety Data Sheet must be observed. It contains all relevant information about classification, labelling, transport, storage, handling and toxicology.

# ESACOTE® PU 29 S2

## Chemical description

Polyurethane in aqueous dispersion.

## Main use

ESACOTE® PU 29 S2 is an anionic aliphatic polyurethane for surface treatment.

## Typical values

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Appearance at 20 °C: Liquid emulsion

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Colour: milky

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pH (as received): 7.0 – 9.0

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Viscosity (as received, Brookfield RVT @ 25 °C, 100 rpm, mPa·s): 100 max

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Solid content (%): 29.0 – 31.0

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## Product properties

Film characteristics: transparent, medium soft and flexible. Amine and solvent free.

## Applications

ESACOTE® PU 29 S2 could be used, in formulations or alone, as surface treatment to improve mechanical and physical properties of paper.

## Storage and handling

ESACOTE® PU 29 S2 must be stored at room temperature and protected from frost. We recommend to store it between 10° C and 35° C.

If exposed to temperature below 5°C the product is damaged and need to be disposed.

Shelf life: 12 months from the production date.

## Packaging

120 kg drums

1000 kg one way container

## Material safety

The Safety Data Sheet must be observed. It contains all relevant information about classification, labelling, transport, storage, handling and toxicology.

# ESACOTE® BIO 5024 development product (DP)



## Chemical description

ESACOTE® BIO 5024 is an anionic waterborne dispersion of an aliphatic polyurethane based on polyether diols.

## Main use

ESACOTE® BIO 5024 can be used as binder for clear and pigmented coatings providing:

- high gloss and clarity,
- mechanical and water resistance,
- good balance of elasticity and hardness.

## Typical values

<b>Visual Appearance at 25 °C:</b>	opalescent liquid
<b>pH at 25°C</b>	7.5-9.5
<b>(on supplied product, ASTM E 70):</b>	
<b>Viscosity (cPs)</b>	< 600
<b>(Brookfield RVT @ 25 °C, 50 rpm spindle 2):</b>	
<b>Solid content, %:</b>	34.0-36.0

## Product properties

<b>Solvent content, %:</b>	5.5% (DPGDME)
<b>Density, g/ml</b>	~1.04
<b>Minimal film forming temperature, °C:</b>	~0
<b>Film aspect</b>	transparent, medium hard and flexible
<b>Koenig Hardness (s)</b>	~60

Please contact our sales representatives for test methods details.

## Sustainability features

ESACOTE® BIO 5024 is made with raw materials from vegetal sources, obtained from plant-derived substances.

Biobased Carbon content  $C^{14}/C_{total}$  according to ASTM D6866: **48 % ± 3**

## Storage and handling

Suggested storage condition for ESACOTE® BIO 5024 is between +5°C and +35°C. Keep the product away from frost and direct light. If stored under these conditions, ESACOTE® BIO 5024 is stable for 12 months after production date.

## Packaging

ESACOTE® BIO 5024 is available in 120 kg drums or 1000 kg intermediate bulk containers.

## Material safety

Please consult the safety data sheet of ESACOTE® BIO 5024 before its use.

## Regulatory information

In case compliance with specific regulations is required please contact our sales representatives.

# CROSSLINKER 08 LM

## Chemical description

CROSSLINKER 08 LM is a water dispersable aliphatic poly-isocyanate based product.

## Main use

CROSSLINKER 08 LM can be used as cross-linking agent for acrylic emulsions and polyurethane dispersions.

## Typical values

<b>Appearance at 25 °C:</b>	transparent liquid
<b>% NCO content on supplied product:</b>	10.4 – 12.4
<b>Viscosity (cPs) (Brookfield RVT @ 25 °C, 50 rpm spindle 3)</b>	< 700
<b>Solid content, %:</b>	69.0-71.0
<b>Free HDI:</b>	<1000 ppm

## Product properties

<b>Solvent content, % :</b>	~ 30% Propylene Carbonate
<b>Density, @ 25°C g/ml:</b>	~ 1.1

Please contact our sales representatives for test methods details.

## Storage and handling

CROSSLINKER 08 LM must be kept away from direct light, in closed containers, in dry conditions and at temperatures between +5 °C and +40°C. Since it reacts with humidity, it must be handled under nitrogen atmosphere if any repackaging is needed. If stored under these conditions, CROSSLINKER 08 LM is stable for 12 months after production date.

## Packaging

CROSSLINKER 08 LM is available in 160 kg drums or 10 kg pails.

## Material safety

Please consult the CROSSLINKER 08 LM safety data sheet before its use.

## Regulatory information

In case compliance with specific regulations is required please contact our sales representatives.

**Thank you**



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