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Novel powder coating press-cure application technologies

Robert Vierhout

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Covestro (Netherlands) B.V.

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Covestro – Outline

Covestro – Trends in powder coatings

Low temperature cure	Uralac® Easycure Uralac® Ultra	Cure 150-160 °C Cure <130 °C
Outdoor durability	Superdurable Hyperdurable	3 years Florida 10 years Florida
Corrosion	Uralac® Corres	Saltspray/cyclic
Matte systems	Dry-blend matte OSM OSM Dead matte	30 gloss units 30 gloss units <10 gloss units
Sustainability	Reduction of carbon footprint Alternative raw materials	

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Covestro – Introduction

	Traditional powder coatings	Traditional powder coatings for HSS	Powder In-Mould coatings	ImFuse®
Substrate	Metal (aluminium, steel)	**Heat sensitive substates**	**Composites**	**Heat sensitive substates**
Chemistry	HAA, Hybrid, TGIC, others	Hybrid or radical cure (UV/thermal)	**Radical cure (thermal)**	**Radical cure (thermal)**
Geometry	3D shapes	3D shapes	3D shapes	Flat stock
Cure temperature	160-200°C	130-160°C	130-160°C	130-180°C
Cure time	10-20 minutes	3-5 minutes	3-5 minutes	0,5-2 minutes
Condition	Convection oven (heated air)	IR/UV oven	Direct heat (press surface)	Direct heat (press surface)

Covestro – Heat sensitive substrates

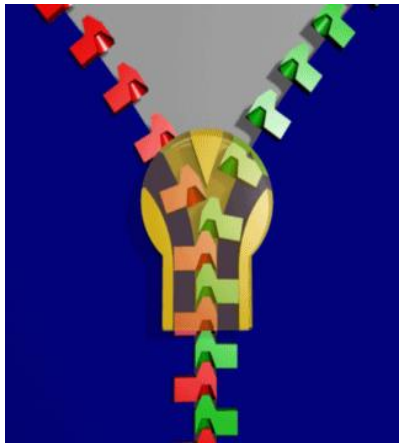
New application areas for powder coatings

- MDF (Medium density fiberboard) Furniture
- PB (Particle board) Furniture
- OSB (Oriented strain board) Building and construction
- Plywood Furniture / Building and Construction
- Veneered wood Furniture / Flooring
- Gypsum Building and Construction
- Fiber cement boards Building and Construction
- …

Covestro – Chemistry

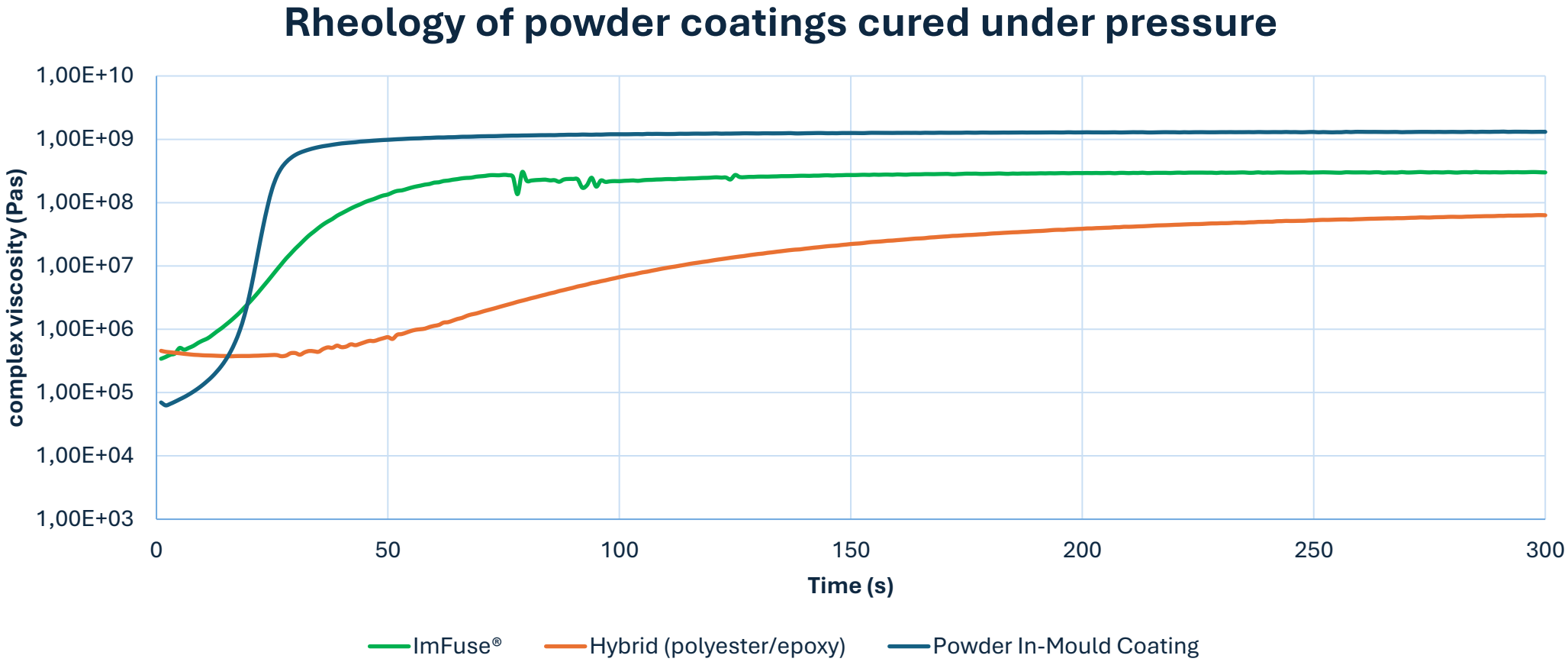
Powder In-Mould Coatings & ImFuse®

- Two component binder system based on maleic / vinyl ether chemistry
- Unsaturated polyester resin
  - Durability & hardness
- Vinyl ether urethane crosslinker
  - For flexibility & low melt viscosity
- Free radical initiation system
  - thermal + UV



Covestro – Chemistry

Powder In-Mould Coatings & ImFuse®



Covestro


Powder Coating Introduction
Powder In-Mould Coatings
ImFuse® Powder Coatings
Conclusion & Discussion

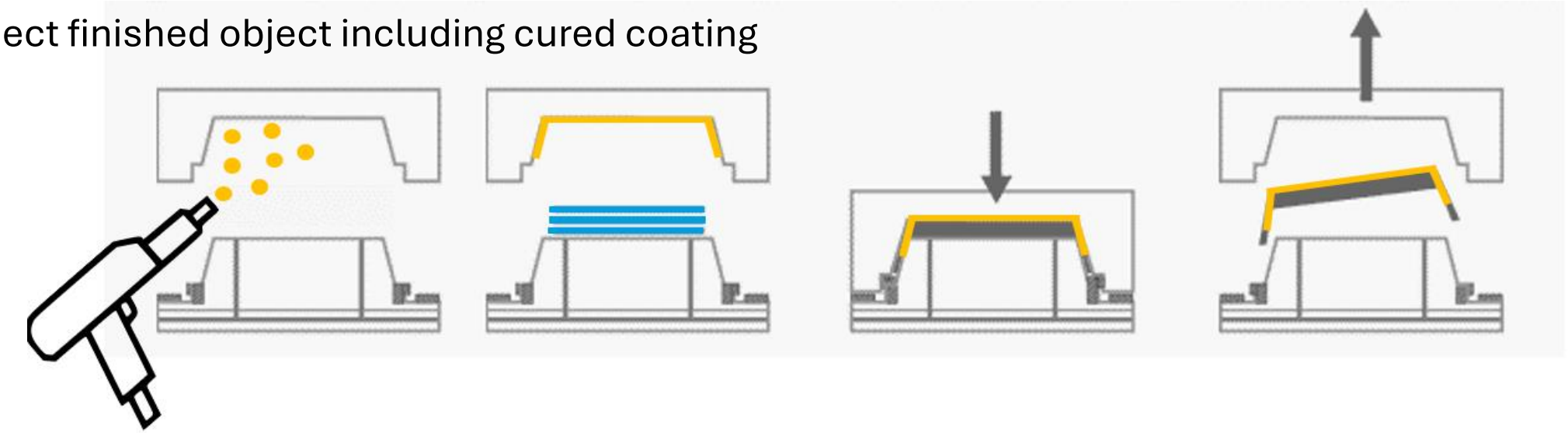
Covestro – Powder In-Mould Coatings

- **SMC:** Sheet Moulding Compound
- Lightweight
- High structural strength
- Design friendly

Covestro – Powder In-Mould Coatings

Application method

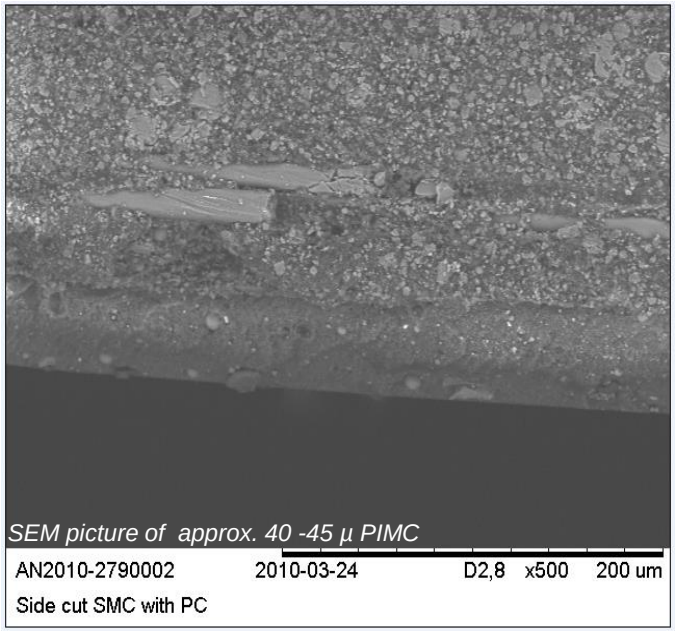
1. Apply powder coating to hot mould surface (130-160 °C)
2. Place SMC in the press (pre-cure of powder coating on the mould)
3. Press cycle of SMC and powder coating (3 minutes)
4. Eject finished object including cured coating



Covestro – Powder In-Mould Coatings

Coating properties (1)

- Excellent adhesion of coating to SMC



Covestro – Powder In-Mould Coatings

Coating properties (2)

- Barrier properties:

  Strong reduction of rest volatile organic compounds emitting at elevated temperature (VDA 278)

Substrate	VOC @ 90°C (mg/m^2)[1]	FOG @ 120°C (mg/m^2)[1]
Standard SMC	170	182
PIMC coated SMC	5	28

Covestro internal generated data

- Anti graffiti properties:

  No perceptible change in color, gloss & hardness after cleaning with anti graffiti solvents

Covestro – Powder In-Mould Coatings

Summary

- Integrated painting technology
  - Simplified process compared to post painting 3D composites
  - Good adhesion to substrate
  - Excellent coating properties

Covestro


Powder Coating Introduction
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ImFuse® Powder Coatings
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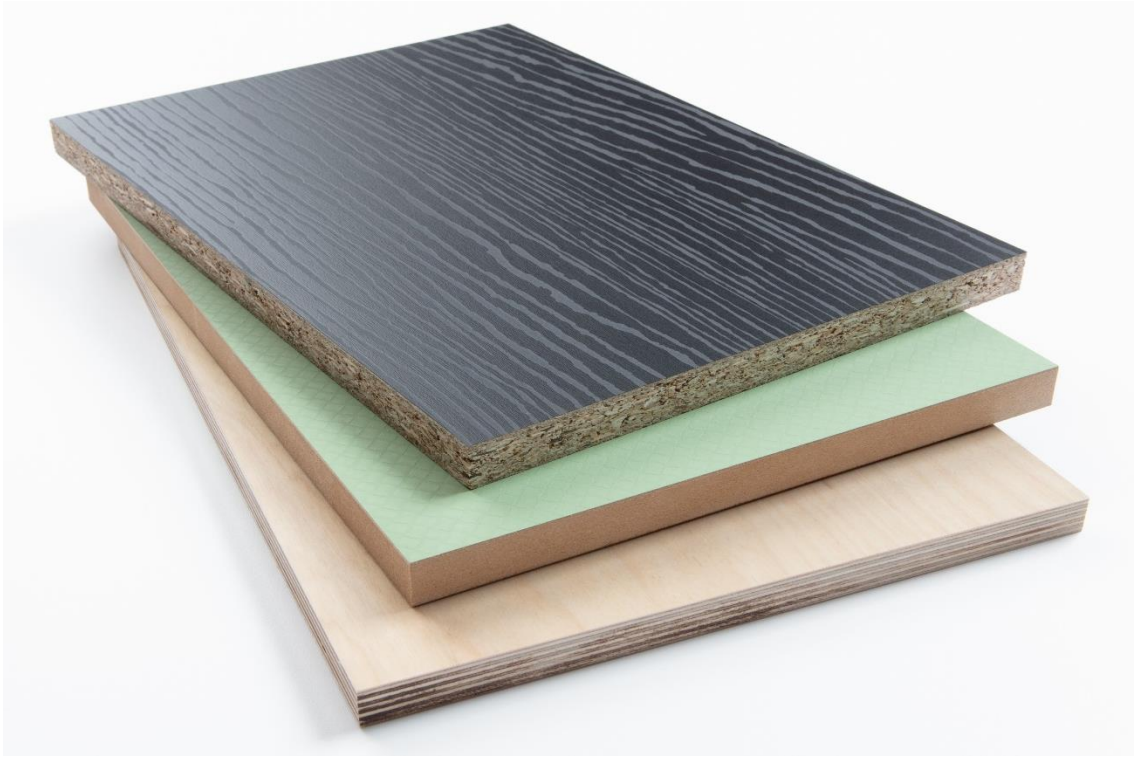
Covestro – ImFuse®

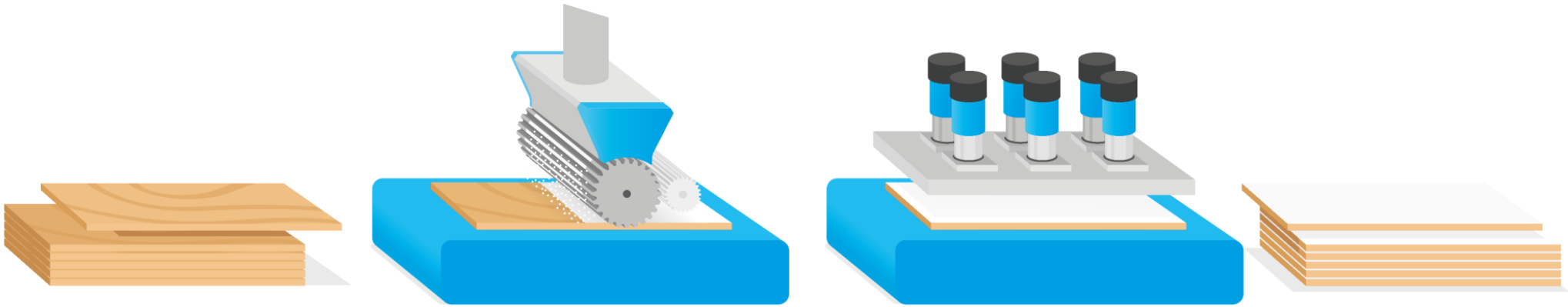
A new hot press cure technology, combined with radical curing powder paints

- Fast cure cycles/high production speed
- A lower heat impact on the substrate
- Great aesthetics, good flow or decorative
- Valuable properties, such as hardness and chemical resistance



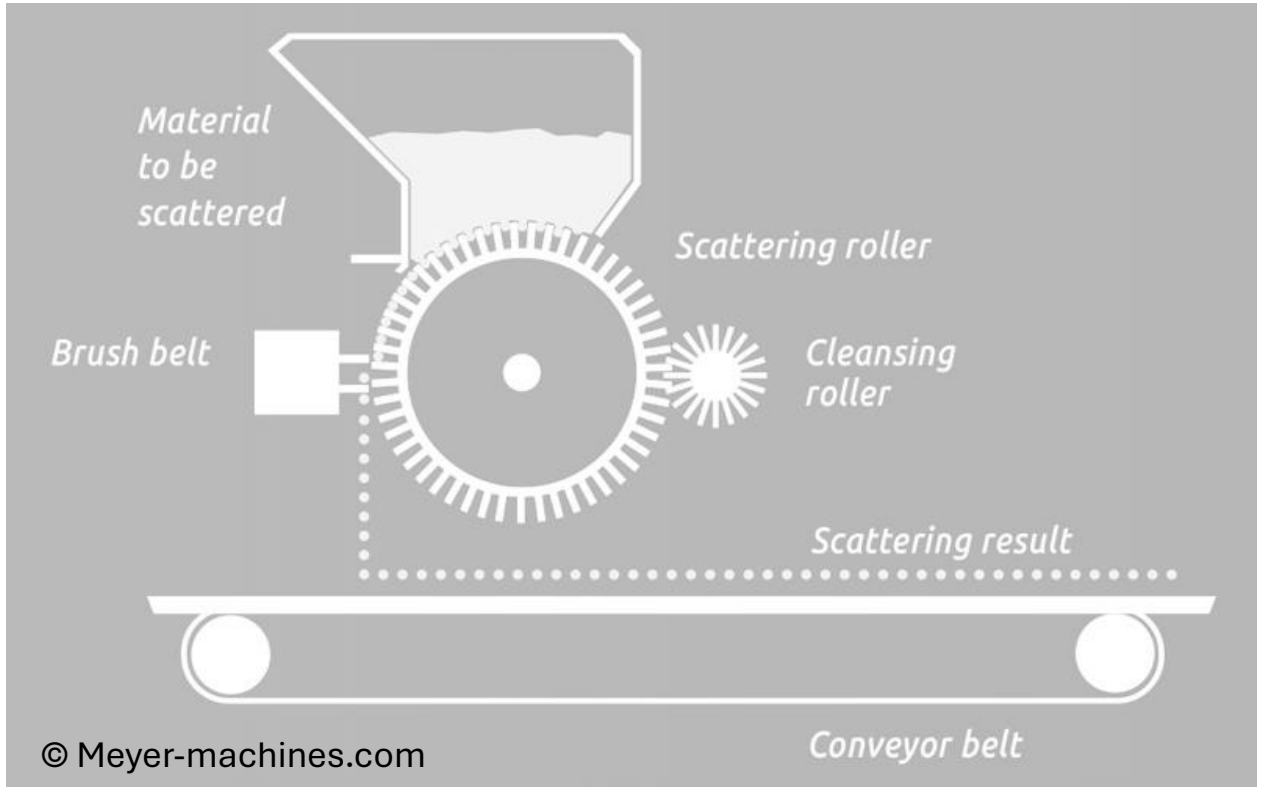
Covestro – ImFuse®

Process



Covestro – ImFuse®

Application method



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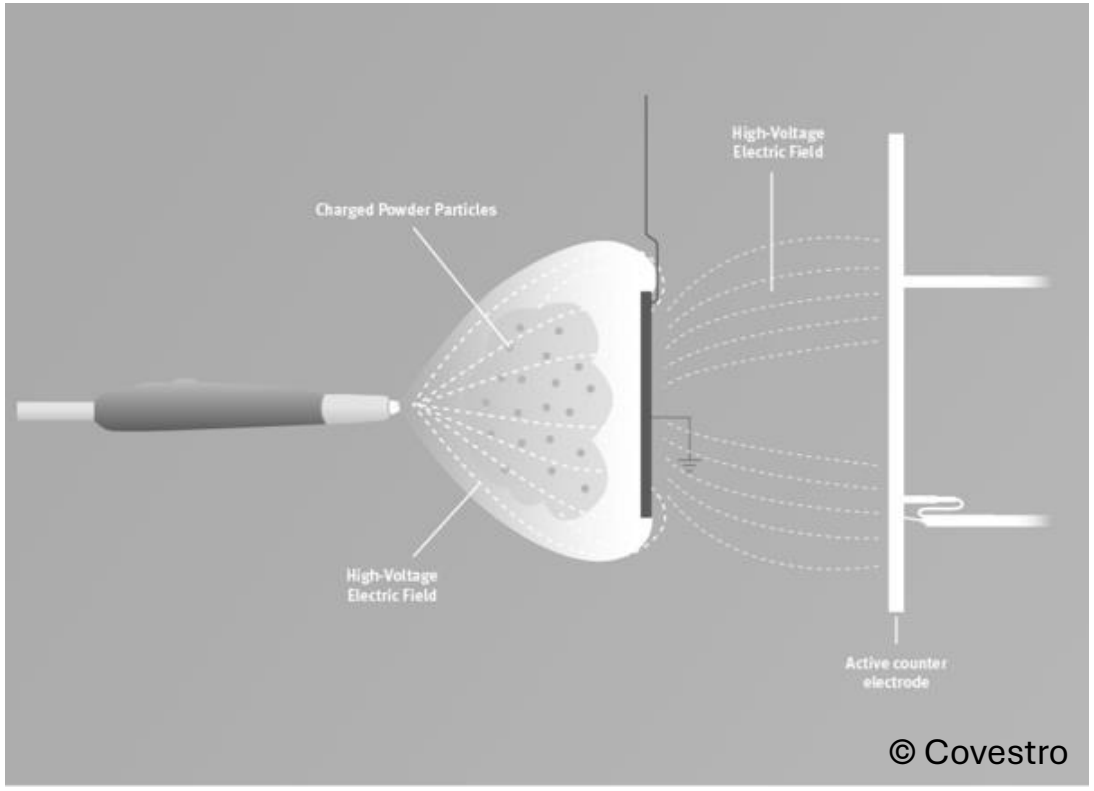

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Covestro – ImFuse®

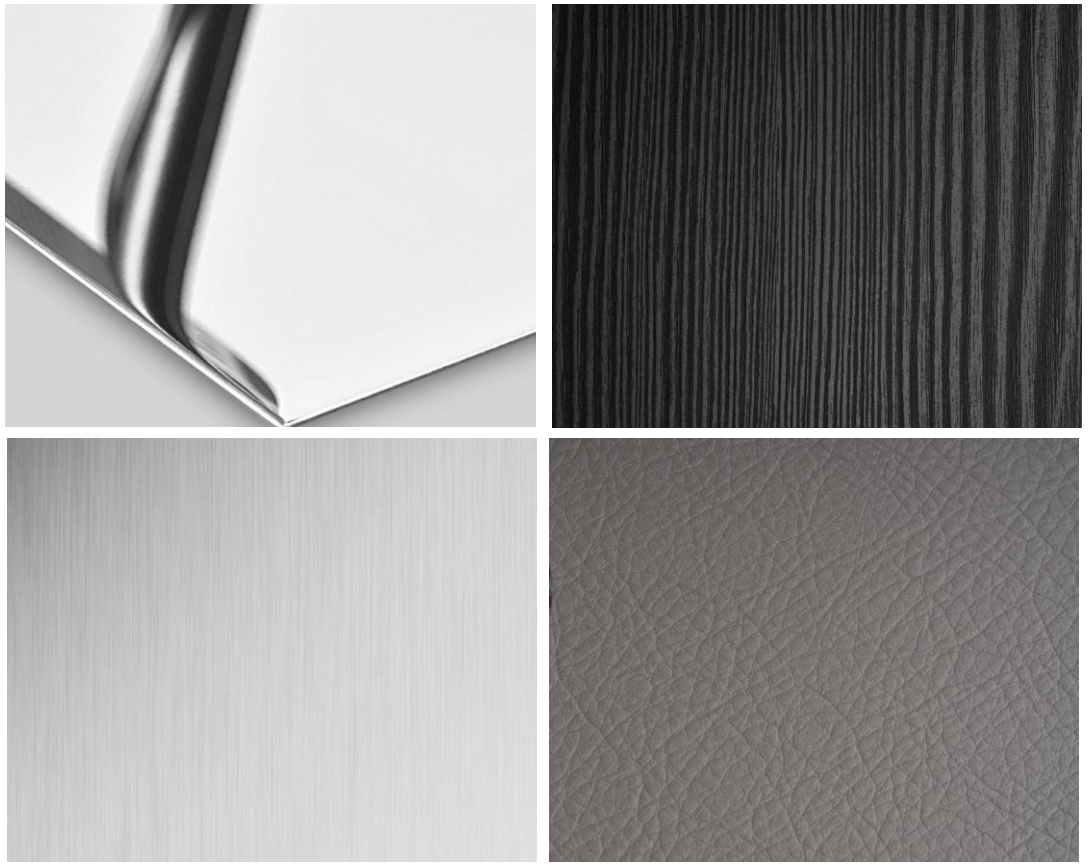
Pressing and curing

Appearance determined by mould surface

- (decorative) aluminum or metal mould
- (decorative) release papers
- release foils

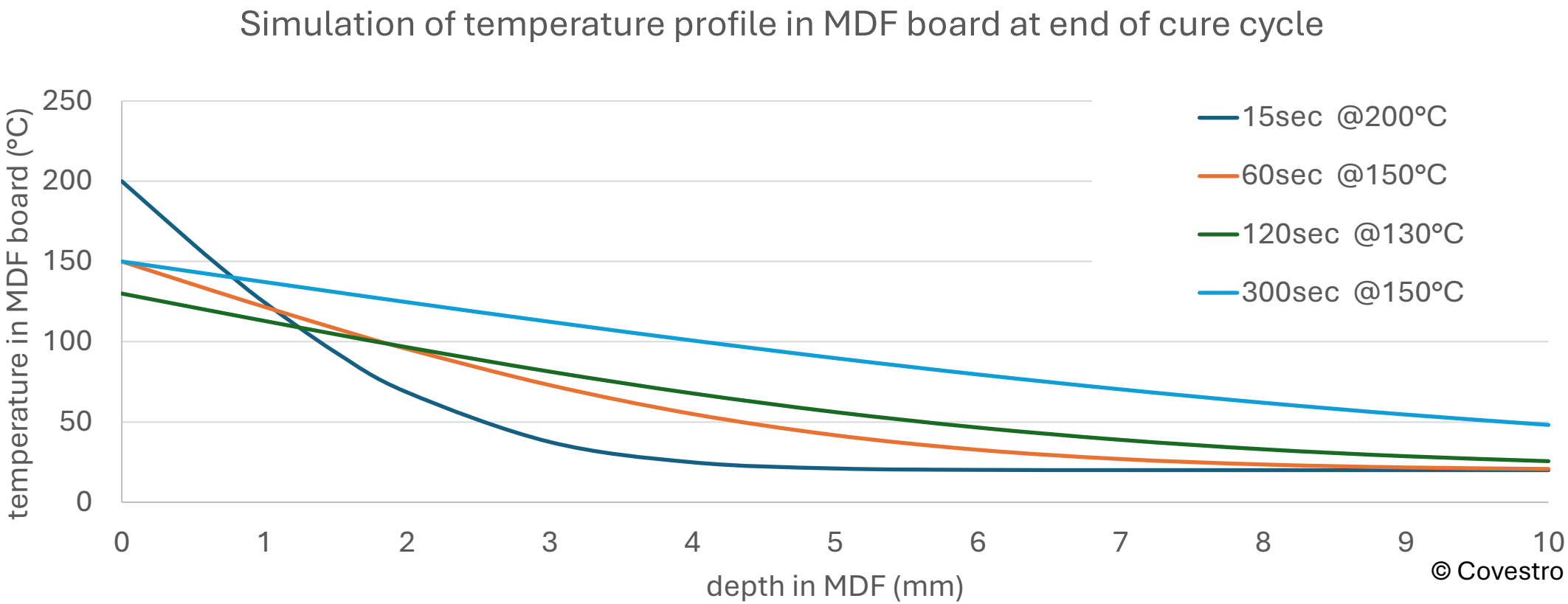
Additional release properties by

- internal release in coating formulation
- (semi) permanent release agent on mould



Covestro – ImFuse®

Low temperature cure versus speed



Covestro – ImFuse®

Coating properties

ImFuse® performance for furniture market		
Panel type		Medite MDF 18mm
Coating		ImFuse® powder coating
Cure	ImFuse® process	1’ 150 °C
Mechanical and physical properties		
Scratch resistance	ISO 4586-2 (Pass>2N)	Pass
König hardness	DIN 53157 (Pass>140 s.)	205 s.
Impact test	ASTM D6643	10 IP
Nail scratch resistance	(1-5, 5 = best)	4
Adhesion, Gitterschnitt	ISO 2409 (Gt 0-5, 0 = best)	Gt 0
Wet heat resistance	EN 12721 @ 85°C (Pass >4)	5
Dry heat resistance	EN 12722 @ 140°C (Pass >4)	4 (slight yellowing)

Covestro internal generated data

Covestro – Outline

Covestro – Powder In-Mould Coatings & ImFuse®

Summary

Powder In-Mould Coating

- Simplified coating process for 3D structures
- Saves process and handling steps
- Excellent chemical resistance
- Good adhesion to substrate

ImFuse®

- Horizontal application for flat surfaces
- One layer solution
- Flexibility in design
- Fast curing at low temperatures

Thank you for your attention!

For further information, please reach out to

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or visit

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