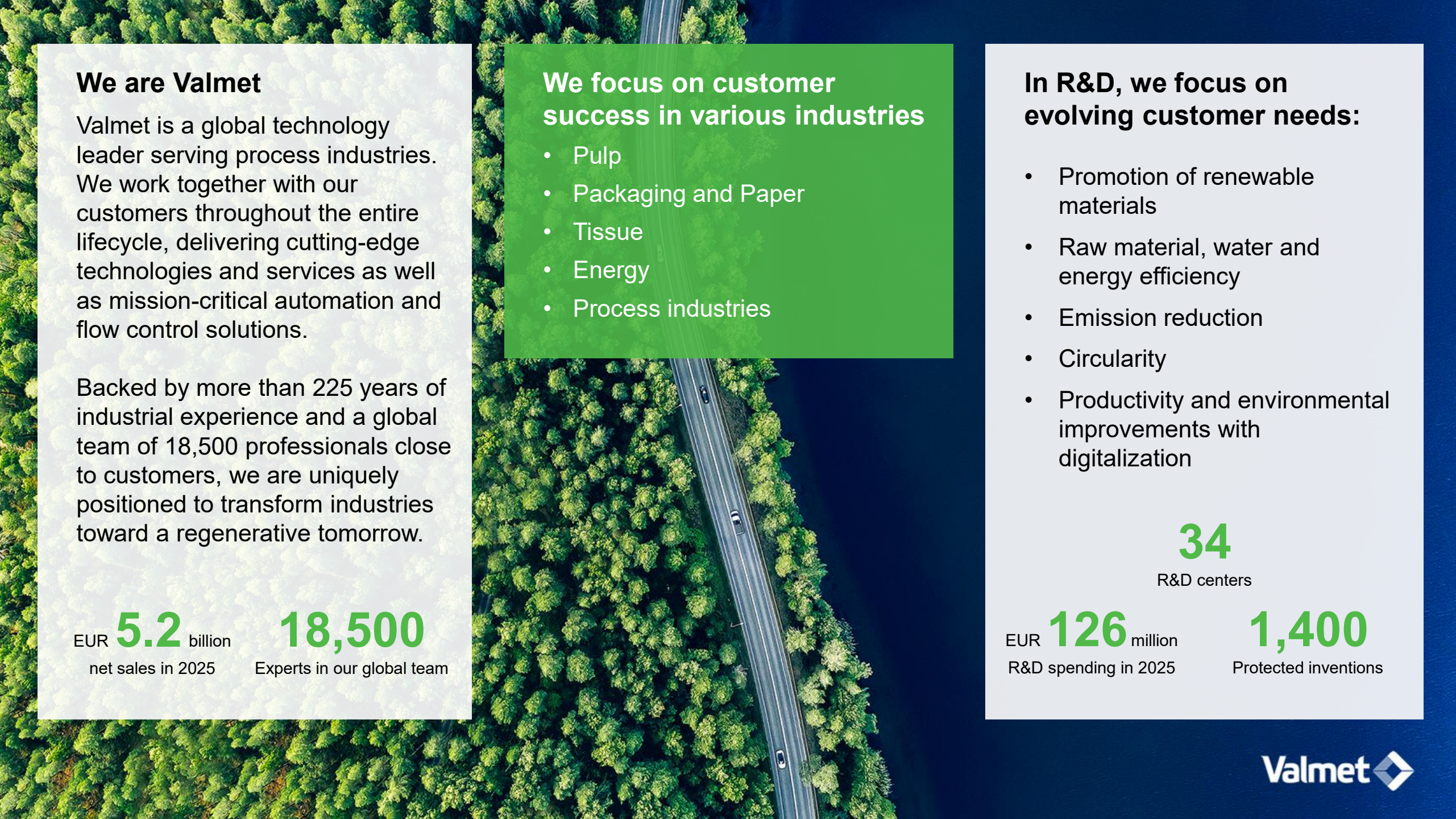


Fiber layering with injection foam forming process

Juho Pyrrö, Head of Valmet 3D Fiber
juho.pyrro@valmet.com
Tel. +358 50 323 2124



We are Valmet

Valmet is a global technology leader serving process industries. We work together with our customers throughout the entire lifecycle, delivering cutting-edge technologies and services as well as mission-critical automation and flow control solutions.

Backed by more than 225 years of industrial experience and a global team of 18,500 professionals close to customers, we are uniquely positioned to transform industries toward a regenerative tomorrow.

EUR **5.2** billion
net sales in 2025

18,500
Experts in our global team

We focus on customer success in various industries

- Pulp
- Packaging and Paper
- Tissue
- Energy
- Process industries

In R&D, we focus on evolving customer needs:

- Promotion of renewable materials
- Raw material, water and energy efficiency
- Emission reduction
- Circularity
- Productivity and environmental improvements with digitalization

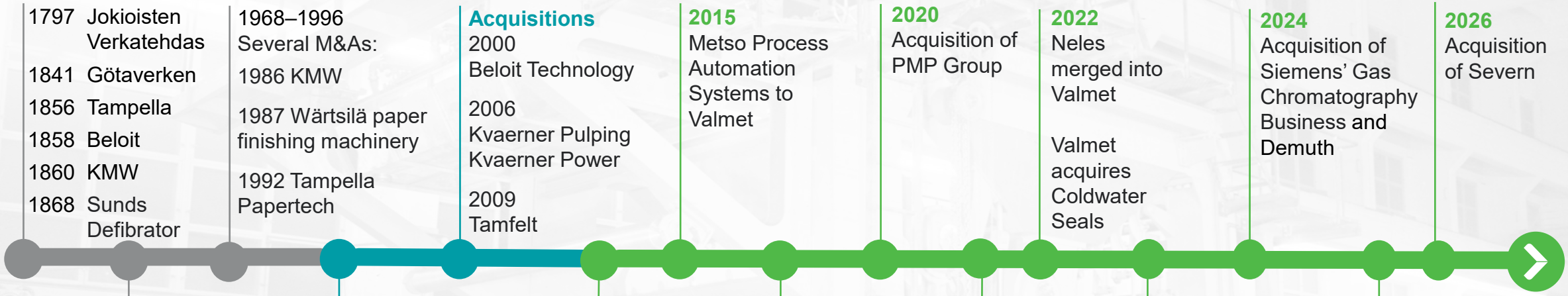
34
R&D centers

EUR **126** million
R&D spending in 2025

1,400
Protected inventions

Valmet

Our journey – progress built on over 225 years of industrial history



Valmet

LEAD THE WAY

Transforming industries towards a regenerative tomorrow

BIOMATERIAL SOLUTIONS & SERVICES

ADVANCING CIRCULARITY

- Seamless lifecycle approach to grow in services and technology
- Continuous innovation with customers, leading the way towards circularity
- Relentless drive for product cost competitiveness

PROCESS PERFORMANCE SOLUTIONS

UNLOCKING RESOURCE EFFICIENCY

- Leading lifecycle value, reliability and customer experience
- Customer-focused innovation and strategic portfolio expansion
- Growth in high-quality technologies and digital capabilities in mission-critical solutions



STRATEGY FUNDAMENTALS

Customer success **Lifecycle commitment** **Global competitiveness** **Accountability**

VALUES

Customers **Excellence** **Renewal** **People**

We are a global technology company, our success is driven by our people



18,500
employees

>110
service centers

> 70
production units



Valmet

How did we get here?

2020 2021 2022 2023 2024 2025 2026 2027

Pre-study | Demo line investment | Technology development | Market testing

Valmet

Metsä Muoto

Demo line started

Pre-engineering of the first commercial plant

Pre-commercial sales of end products

Market entry

Saleable production

The first commercial investment







Picture on the right: example of Muoto® products

Next step in competitiveness against plastic packaging

Valmet 3D Fiber technology

Novel technology developed for high-capacity molded fiber production

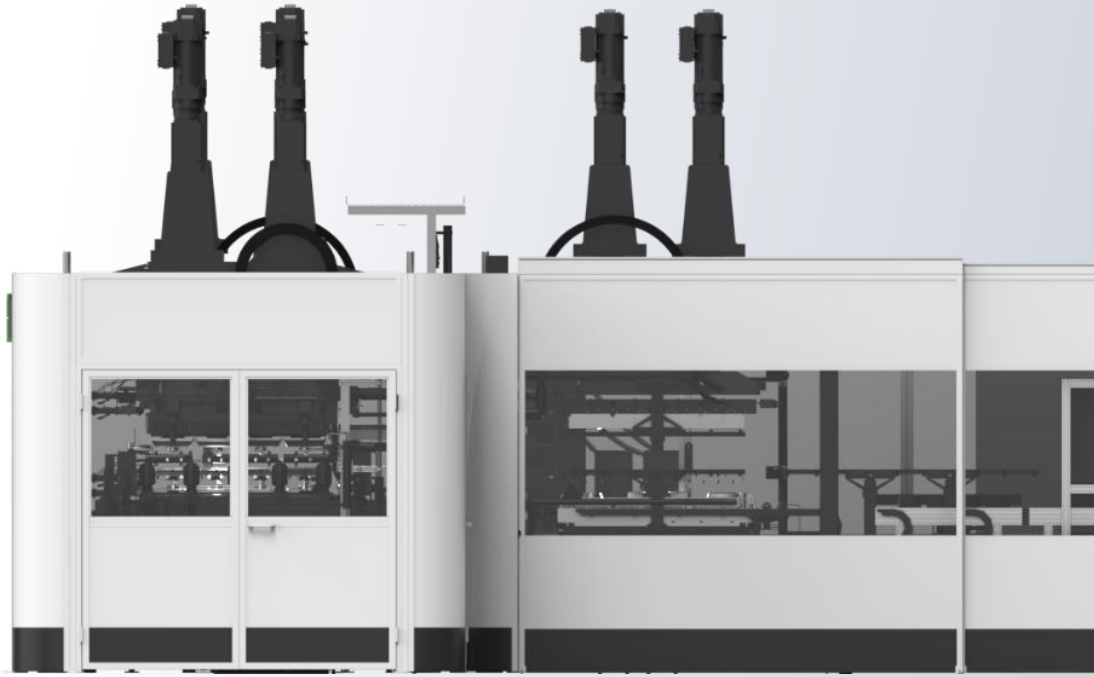
- End-to-end solution to stock preparation to automatic packing of end products
- Unique fiber layering technology that utilizes injection foam forming

Cost- and quality-competitive with plastic alternatives

- Precision-made, rigid, smooth and light-weight products
- High capacity, automation and resource efficiency deliver cost competitiveness with small machine footprint

Built for high volumes

- 7-10 second cycle time
- Up to 170 million products per machine per year, aiming for more



From pilot-scale innovation to industrial production available for all customers

Deep fiber expertise and industrial-scale proof

- Co-development with Metsä Group, one of Europe's largest forest industry groups
- Joint demo plant in Äänekoski, Finland for industrial-scale production

First commercial production line on the way

- For Metsä Group’s mill in Äänekoski, Finland
- Nominal capacity more than 100 million products per year

Technology is now available for all Valmet customers

- Testing and piloting possibilities at demo plant also available



© Valmet | Juho Pyrrö / Fiber layering with injection foam forming

Valmet 3D Fiber technology

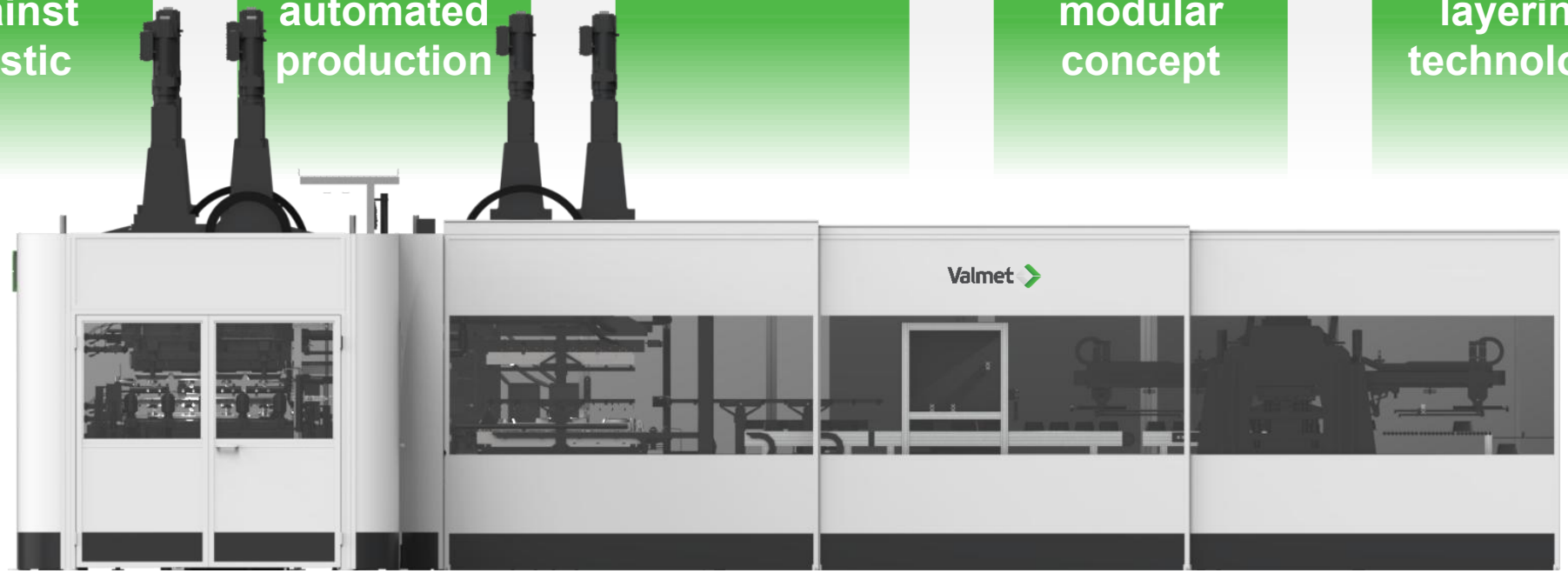
Competitive against plastic

Highly automated production

High output

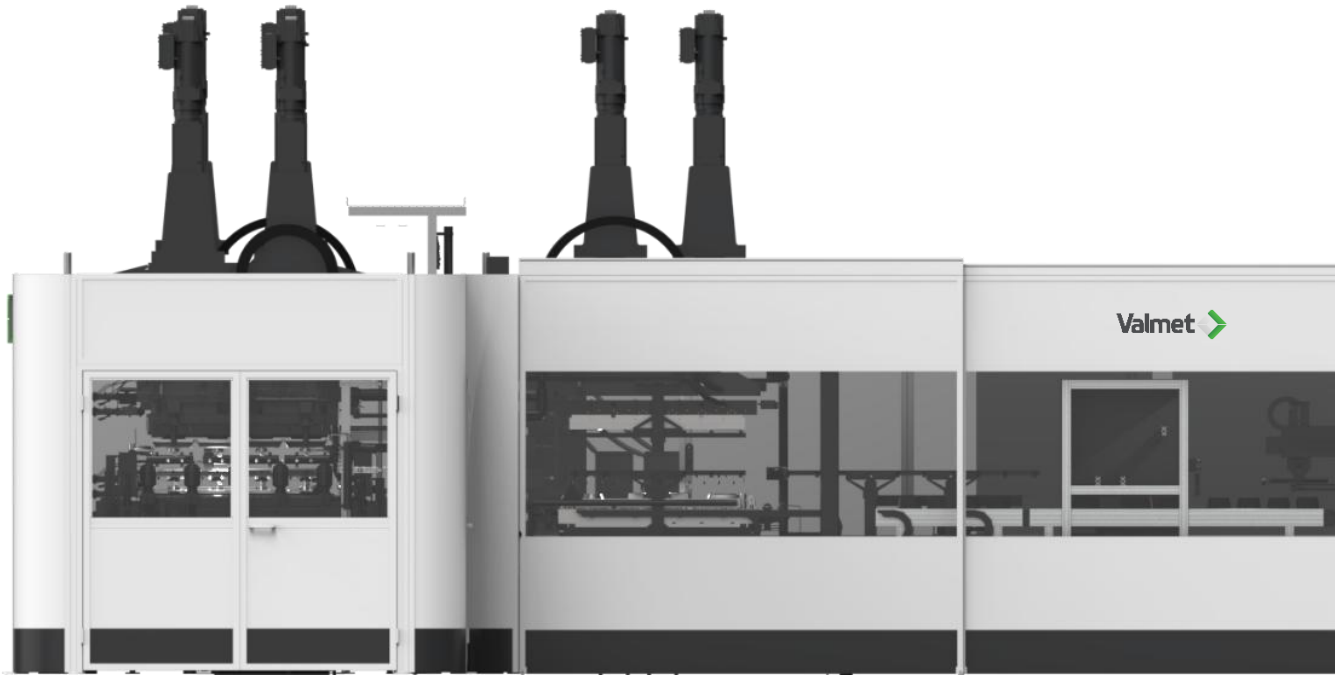
Flexible, modular concept

Unique fiber layering technology



Valmet 3D Fiber | Process flow

End to end solution



STOCK PREPARATION	INJECTION FOAM FORMING	DRYING	BARRIER	QMS	CUT, STACK & PACK
WET END			DRY END		
VALMET DNA					

Valmet 3D Fiber line specifications



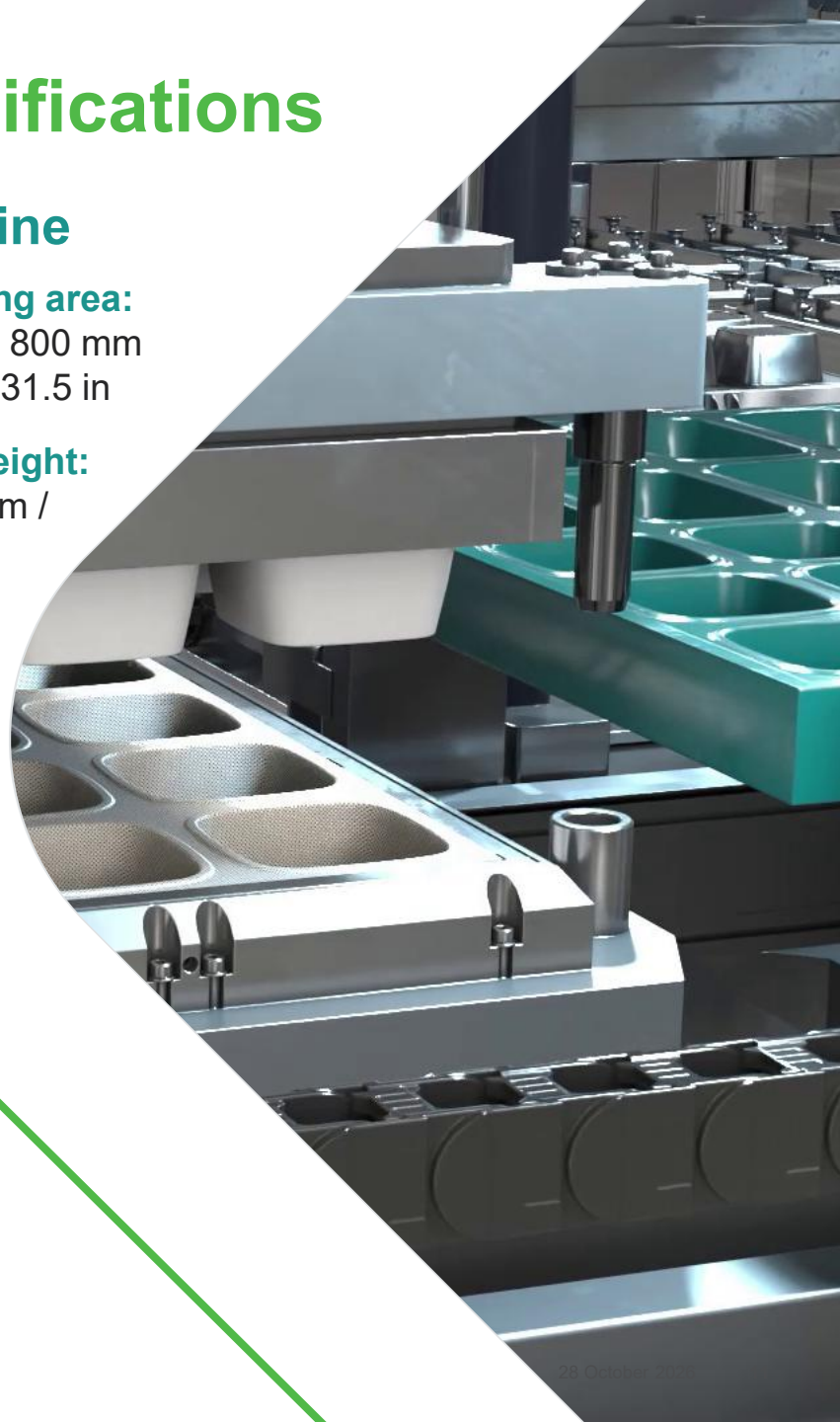
The first commercial line

Design capacity:
50-100 million items/year

Forming area:
1200 x 800 mm
47 x 31.5 in

Cycle time:
7-10 s

Product height:
Up to 80 mm /
3.15 in



High production line

Design capacity:
80-170 million items/year

Forming area:
1230 x 1350 mm
48.5 x 53 in

Cycle time:
7-10 s

Product height:
Up to 100 mm /
3.95 in

Injection foam forming process



Valmet



Benefits of fiber layering

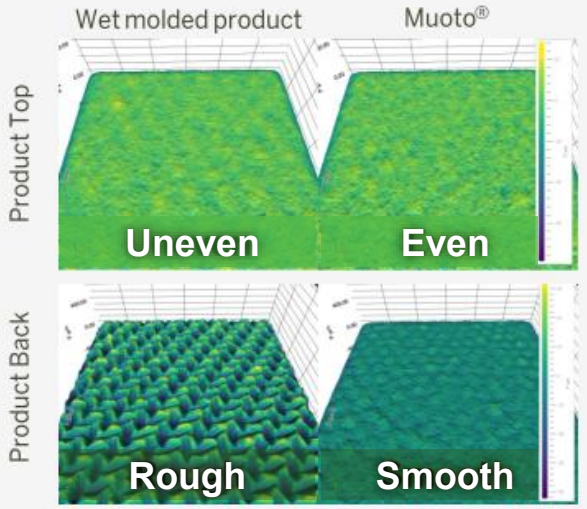


Valmet

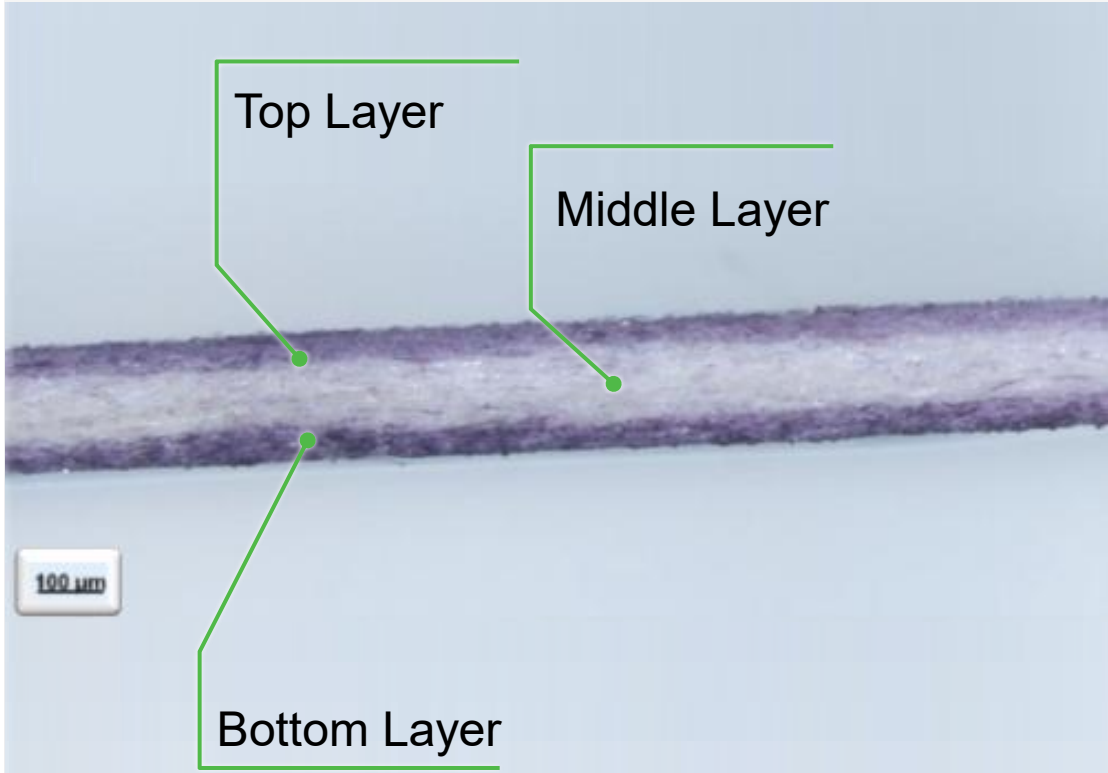
Benefits and value of fiber layering

The right fiber and functionality in the right layer:

- Maximizing performance
- Minimizing weight
- Minimizing cost



3D surface topography measured with Spectro2profiler.



Courtesy of Metsä Spring

Effects on the end product

- **Lightweighting, up to 30-50 % weight reduction**
  - Even formation with higher consistency
  - Layer structure for improved stiffness
  - Flexible packaging designs increasing rigidity
- **Cost reduction**
  - Lower fiber consumption & capability to use lower cost fibers in the middle or back
  - Refined pulp only for the functional layers; energy savings, productivity gains
    - Total electricity consumption 35-45% lower compared to traditional wet forming[1]
  - Chemistry where it is needed; even 80% chemical savings
  - Closed water loops for chemical and fiber savings
- **Higher quality**
  - Low porosity, high smoothness surface
  - Low thickness variation
  - Excellent basis weight control



© Valmet

Valmet 3D Fiber 320 gms vs. 400 gsm for trad. MFP

Lightweighting benefits

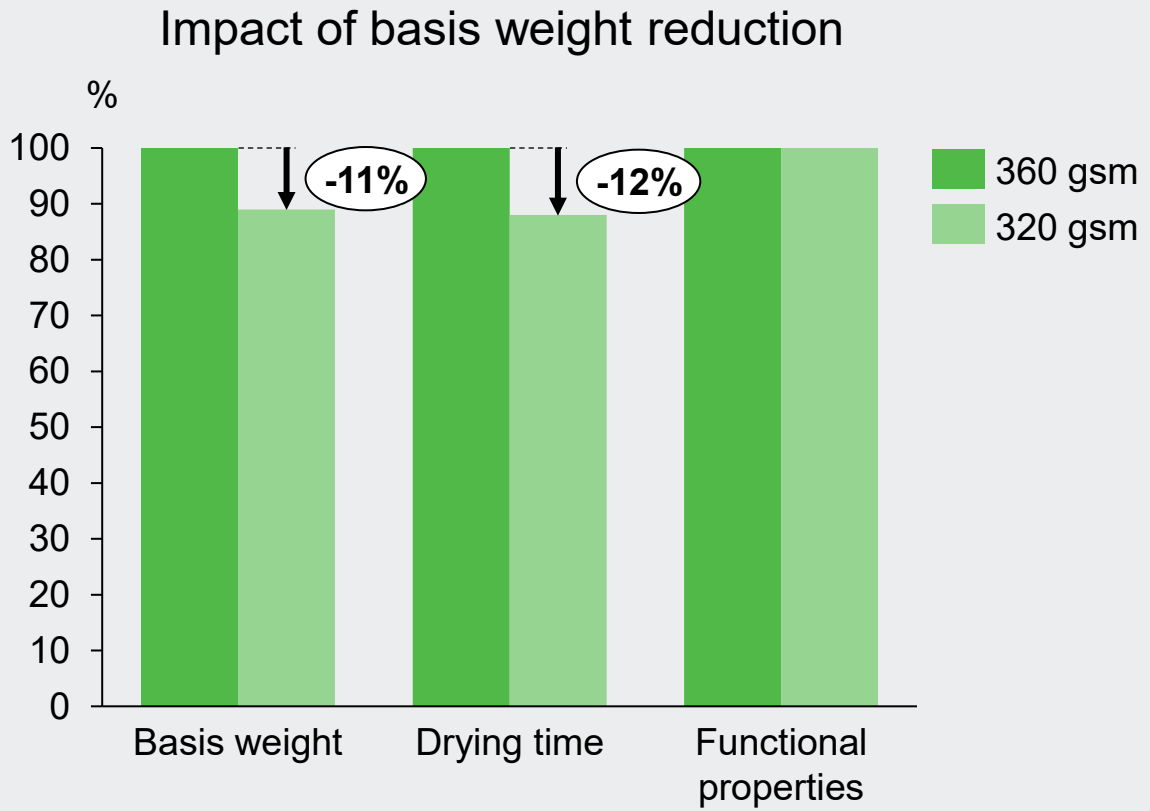
Reduced fiber consumption and faster drying while maintaining product properties

11% reduction
in raw material consumption

12% shorter drying time,
enabling higher production capacity

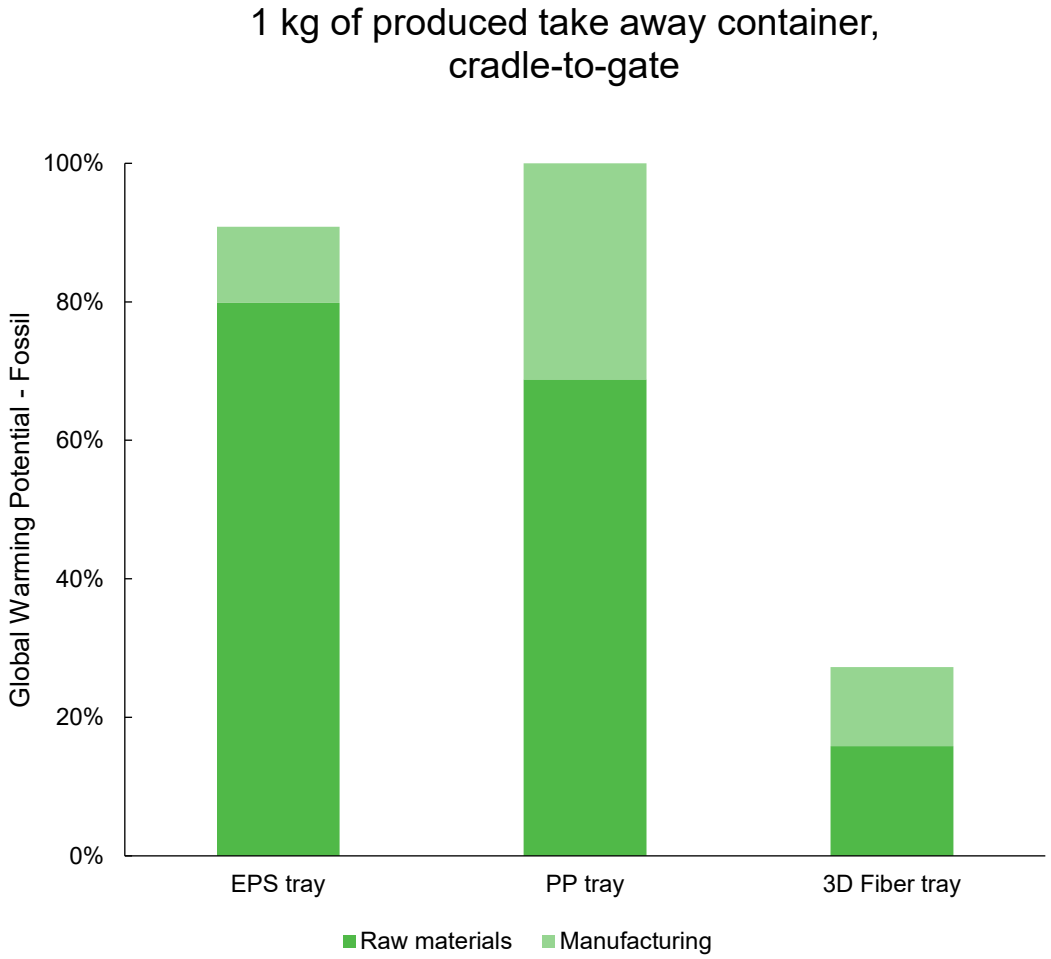
Lower energy consumption
in the drying process

Product functional properties maintained



Comparative study on take-away food trays

3D Fiber tray performs the best of the alternatives in CO_2 footprint comparison



	EPS tray ($kgCO_2e$)	PP tray ($kgCO_2e$)	3D Fiber tray ($kgCO_2e$)
Raw materials & supply chain	3.49	3.01	0.69
Manufacturing	0.48	1.36	0.50
Total impact (GWP fossil)	3.97	4.38	1.19

- Study compared the climate impact of 3D Fiber tray to two most commonly used plastic alternatives
- Forming of the 3D Fiber product uses 100% fossil-free energy, resource efficient production, water circulation

Study conducted in accordance with ISO 14040 and ISO 14044; not verified by a third party nor intended for public comparative assertions. Results are self-declared, market- and context-specific. Study results are indicative and subject to change; assumptions, estimations, and modelling choices apply.

For more information about Valmet 3D Fiber technology, please contact:

Juho Pyrrö

Head of 3D Fiber, Valmet

Email: juho.pyrro@valmet.com

Phone: +358 50 323 2124

Thank you!

Valmet


Valmet