Coatema company presentation

29/11/2023

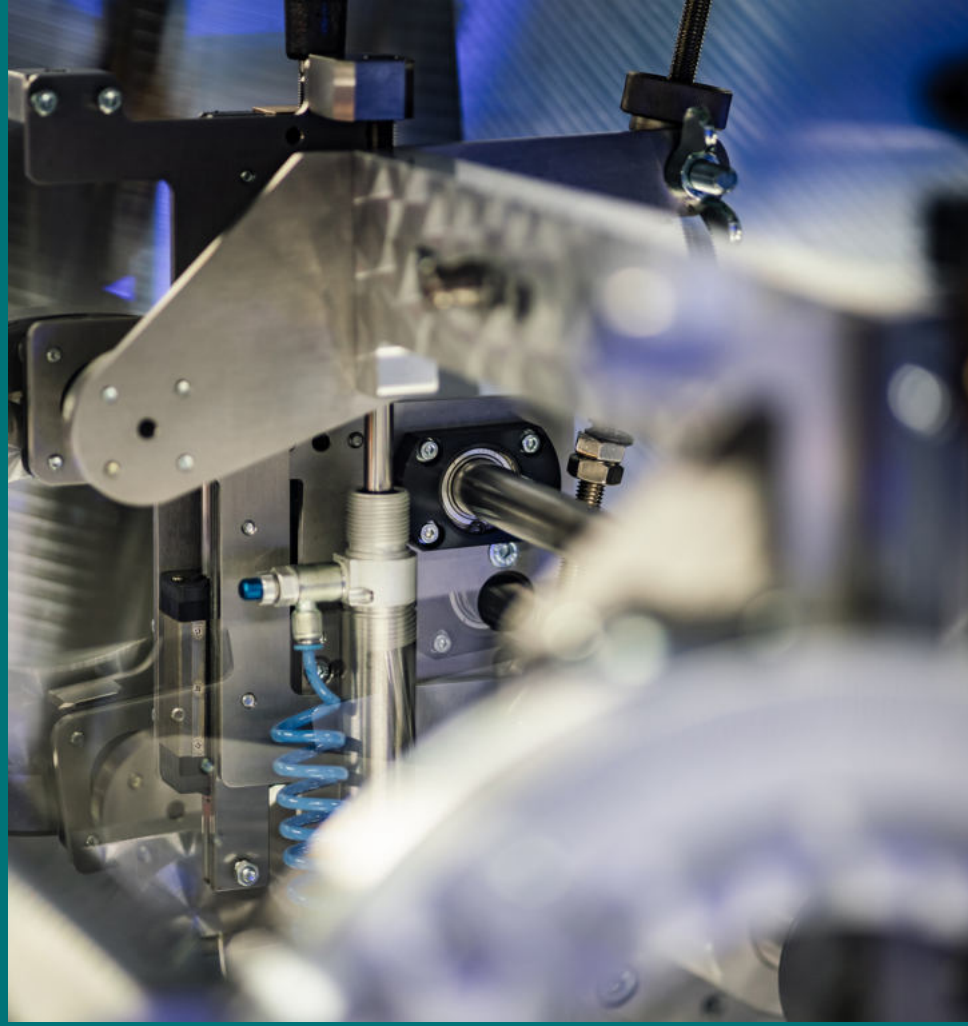
MEMBER OF ATH

Agenda

1. Introduction
2. Our markets
3. Equipment
4. R&D centre
5. Contact

1.

Introduction

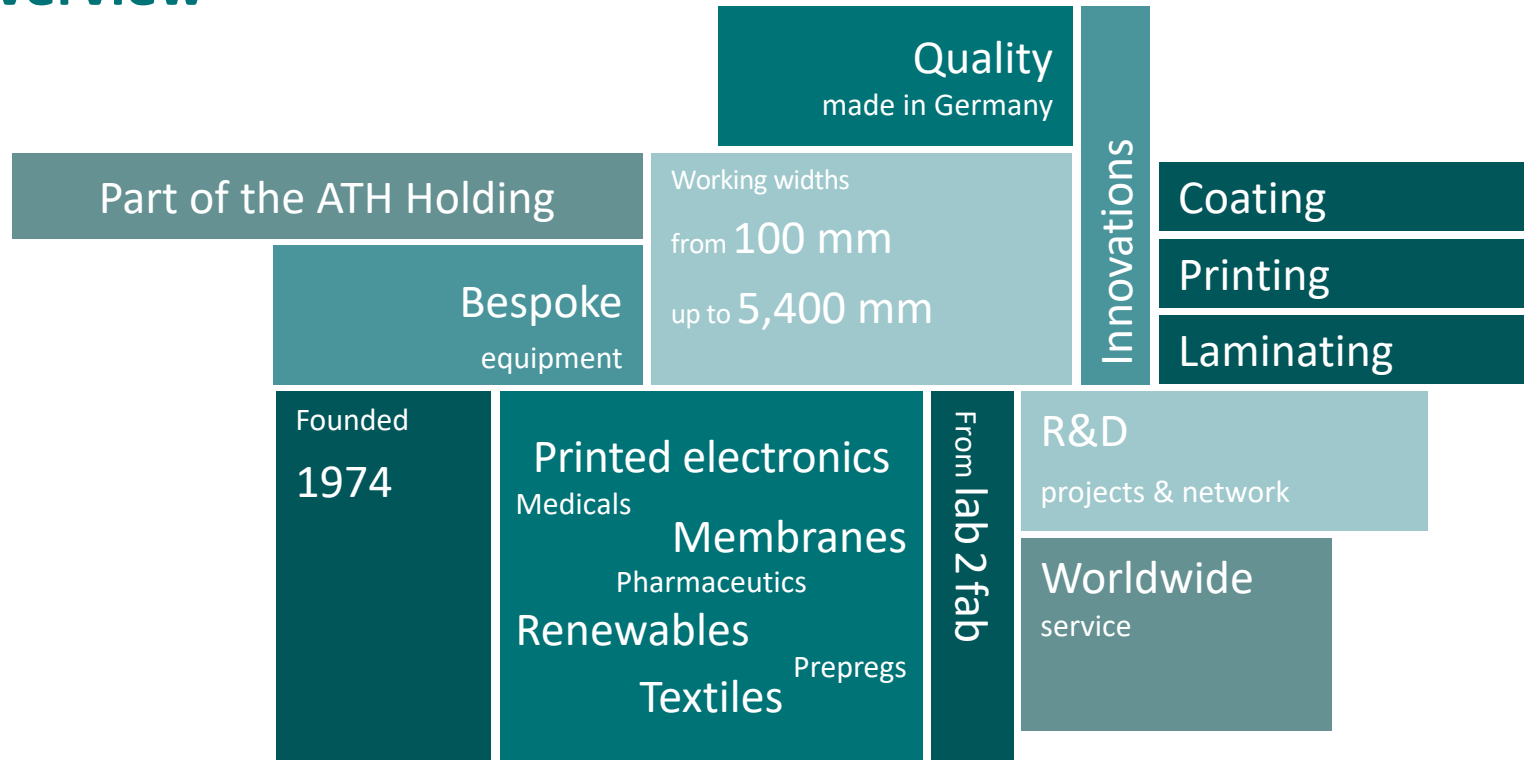


Thomas Kolbusch, Director Sales, Marketing, Technology, VP

Thomas Kolbusch

COATEMA Coating Machinery GmbH

Overview


Quality
made in Germany
Innovations
Part of the ATH Holding
Working widths
from 100 mm
up to 5,400 mm
Coating
Printing
Laminating
Bespoke
equipment
Founded
1974
Printed electronics
Medicals
Membranes
Pharmaceutics
Renewables
Prepregs
Textiles
From lab 2 fab
R&D
projects & network
Worldwide
service

Group of companies

ALTONAER
TECHNOLOGIE
HOLDING

KROENERT

- ✓ Founded 1903
- ✓ Approx. 200 employees
- ✓ Located in Hamburg

DRYTEC

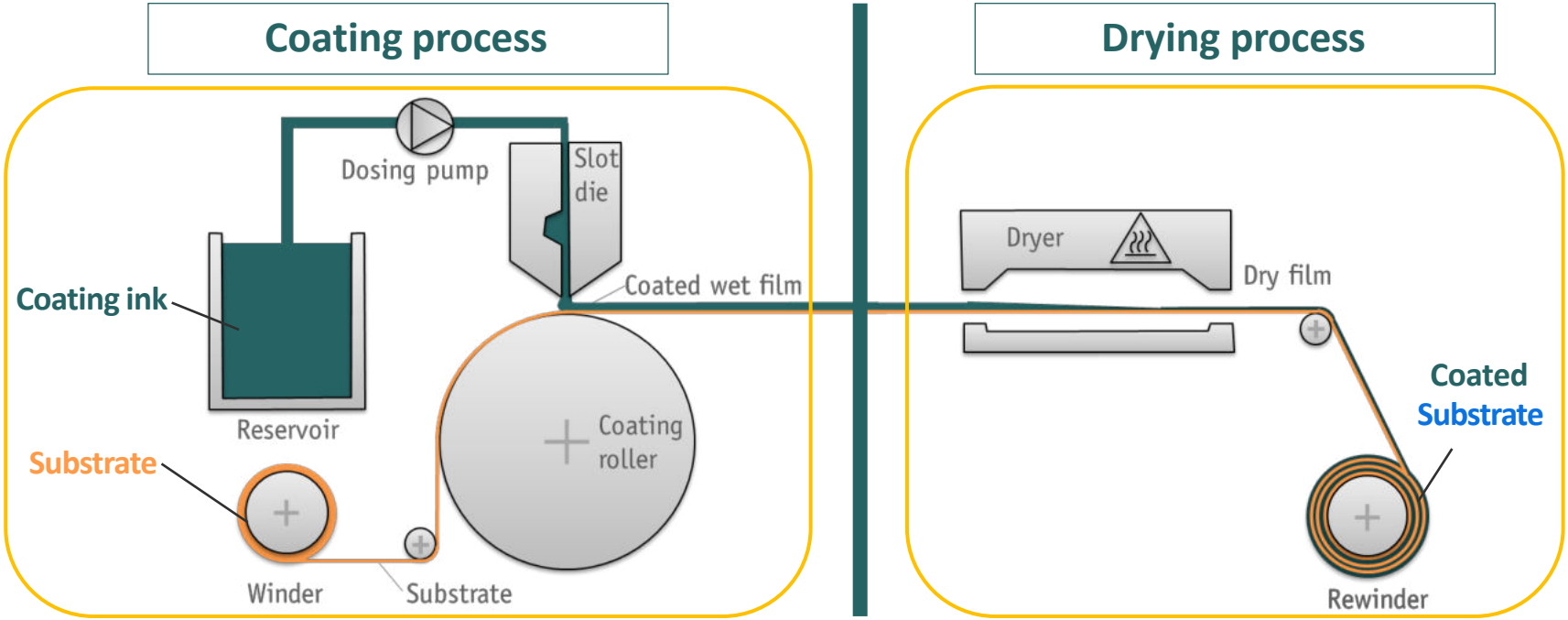
- ✓ Founded 1995
- ✓ Approx. 50 employees
- ✓ Located in Norderstedt

Coatema®
Coating Machinery GmbH

- ✓ Founded 1974
- ✓ Approx. 50 employees
- ✓ Located in Dormagen

Represented worldwide

Upscaling – R2R lab scale production into fab



Coatema equipment platform strategy for lab2fab

Lab

- ✓ State-of-the-art research and development equipment
- ✓ Sheet-to-sheet to roll-to-roll systems

Pilot Production

- ✓ Proven electrolyzer and fuel cell coating and laminating equipment
- ✓ Highest-quality pilot product lines enable stable pilot production and reduce cost
- ✓ Scaling laboratory equipment to enable pilot production

Production

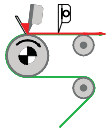
- ✓ Full-scale production line for electolyzers
- ✓ Elevating our in-depth roll-to-roll equipment to fully scale production and further reduce adoption cost

Coating parameters

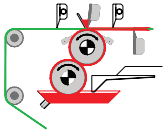
Coating chemistry	Coating processes	Process control	Drying
✓ Rheology	✓ Coating systems	✓ Process layout	✓ Convection drying
✓ Viscosity	✓ Single or multilayer coatings	✓ Tension control system	✓ Contact drying
✓ Viscoelasticity	✓ Direct coatings	✓ Material guiding system	✓ Infrared drying
✓ Type of solvents	✓ Transfer (indirect) coatings	✓ Inline parameter control	✓ Sintering
✓ Solid content	✓ Substrate speed	✓ Quality control	✓ NIR
✓ Van der Waals force	✓ Layer thickness		✓ High frequency
✓ Sheer ratio	✓ Coating accuracy		✓ UV crosslinking systems
✓ Adhesion/Cohesion			

Substrate	Pretreatment	Environment	Finishing
✓ Surface tension	✓ Corona	✓ Humidity	✓ Calendaring
✓ Dimension stability	✓ Plasma	✓ Temperature	✓ Embossing
✓ Surface structure	✓ Cleaning	✓ Inert conditions	✓ Slitting
✓ Contact angle			

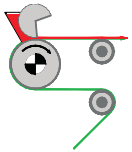
Coating systems



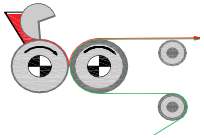
Knife system



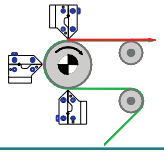
Double side coating system



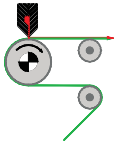
Commabar system



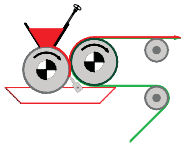
Reverse commabar system



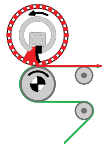
Slot die system



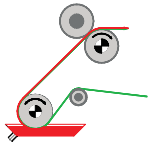
Curtain coating system



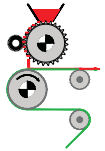
Case knife system



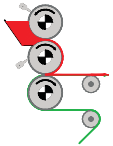
Rotary screen system



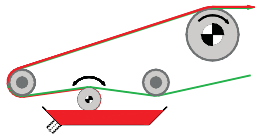
Dipping system (Foulard)



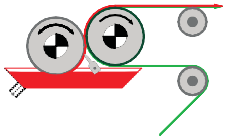
Powder scattering system



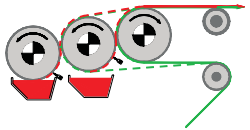
Reverse roll coating system



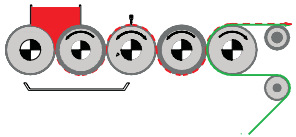
Micro roller coating system



2-roller coating system

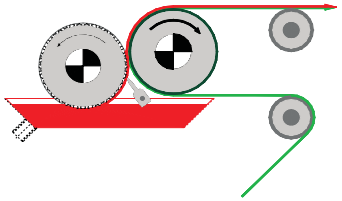


3-roller combi coating system

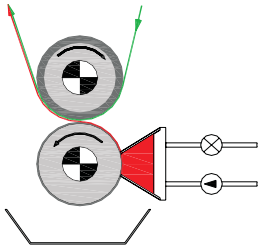


5-roller coating system

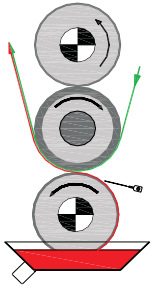
Printing systems



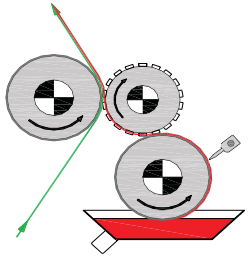
Engraved roller system



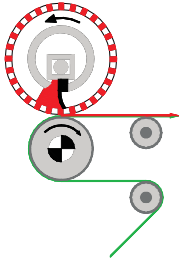
Gravure roller system



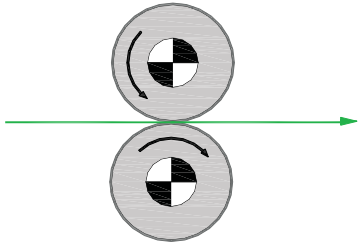
Gravure indirect system



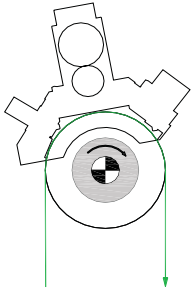
Flexography system



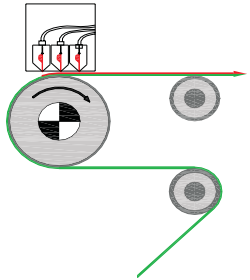
Rotary screen system



Hot embossing system



Nanoimprint system

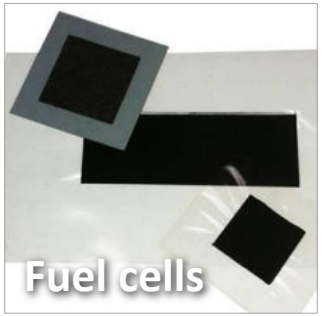


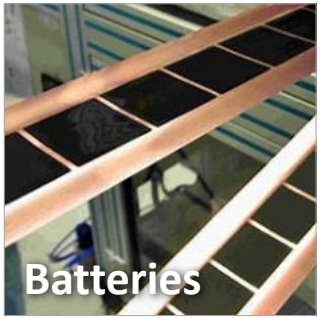
Inkjet system

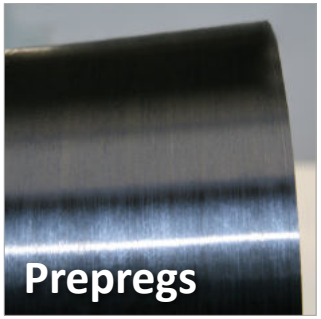
2.

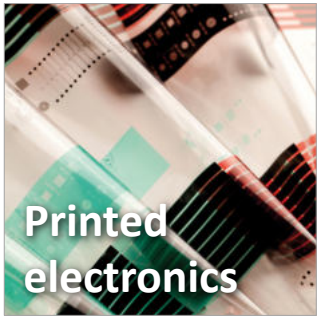
Our markets

Our markets









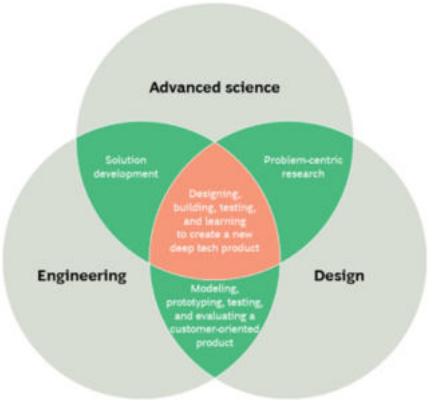
Actual system proven in operational environment

Basic principles observed

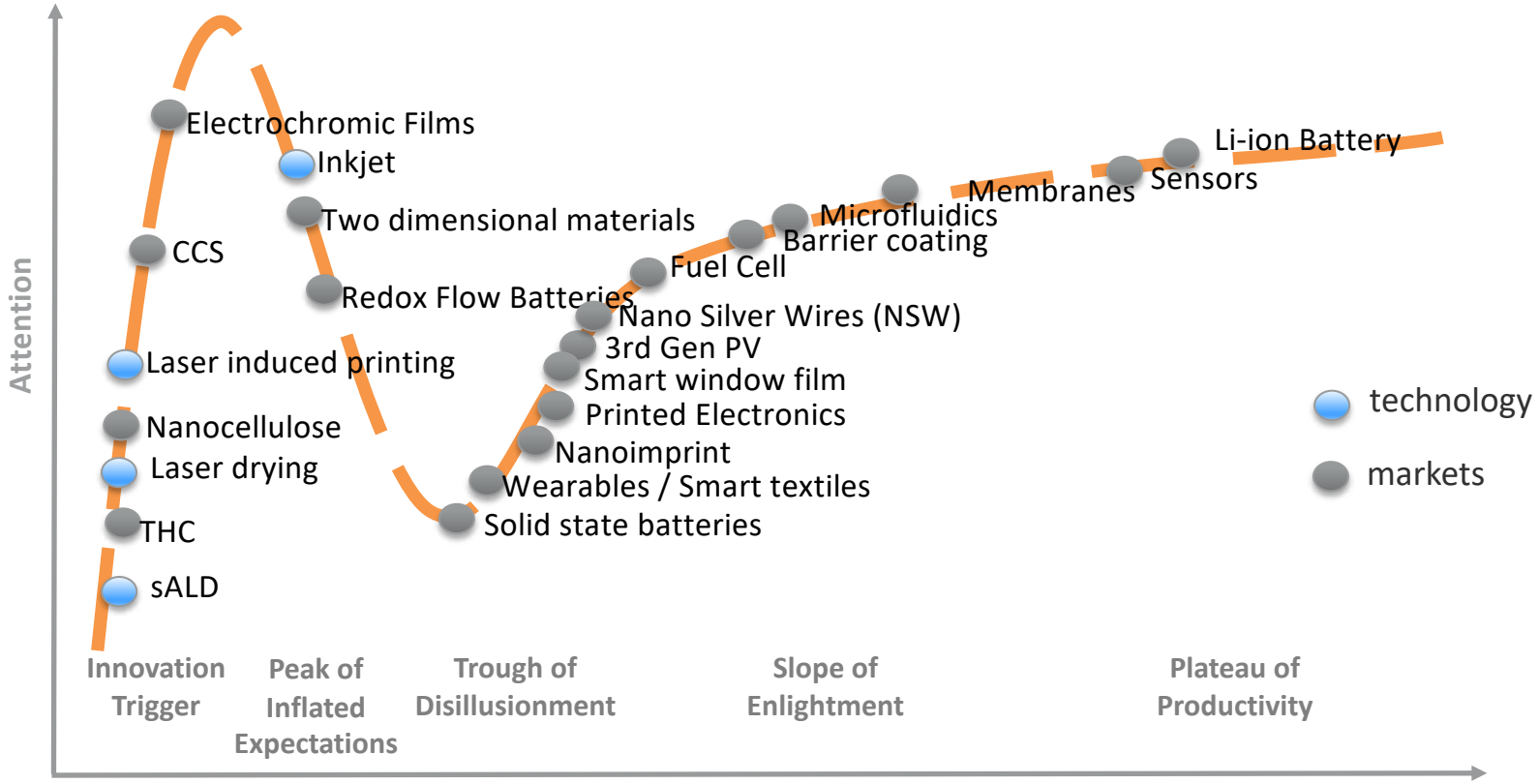
Coatema is the tech enabler for deep tech – what is Deep Tech?

- ✓ …companies founded on a scientific discovery or meaningful engineering innovation. (Swati Chaturvedi, 2015)
  - ✓ This is where you're asking, „Aren't all technology companies founded on these principles?" Partly yes, but mostly no. Most technology companies these days are built on business model innovation or offline to online business model transition using existing technology. Take Uber for example – Uber is built on the concept of a „sharing economy" – a business model innovation enabling individuals to share existing resources. https://www.linkedin.com/pulse/so-what-exactly-deep-technology-swati-chaturvedi/
- ✓ Deep Tech has been around a very long time- just not called deep tech.
- ✓ Deep Tech can be relative: **important to take societal perspective**
- ✓ Time horizon long, impact large, disruptive to target industry, eco system - large
- ✓ Current list of Deep Tech areas often includes:

- ✓ Advanced manufacturing
- ✓ Advanced materials
- ✓ Artificial intelligence
- ✓ Biotechnology
- ✓ Blockchain
- ✓ Energy
- ✓ Food and agriculture
- ✓ Photonics and electronics
- ✓ Quantum computing
- ✓ Transportation/ mobility



Our markets


Attention
Electrochromic Films
Inkjet
Two dimensional materials
CCS
Redox Flow Batteries
Laser induced printing
Nanocellulose
Laser drying
THC
sALD
Fuel Cell
Nano Silver Wires (NSW)
3rd Gen PV
Smart window film
Printed Electronics
Nanoimprint
Wearables / Smart textiles
Solid state batteries
Microfluidics
Barrier coating
Membranes
Sensors
Li-ion Battery
technology
markets
Innovation Trigger
Peak of Inflated Expectations
Trough of Disillusionment
Slope of Enlightment
Plateau of Productivity

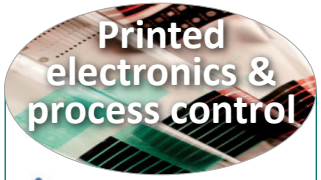
Coatema focus areas

- Green Hydrogen
- Fuel Cells
- Batteries
- Solar

- Sustainability
- Digital fabrication
- Printed electronics
- The next thing

R&D centre – our customers

R&D projects overview 2022 – 2023

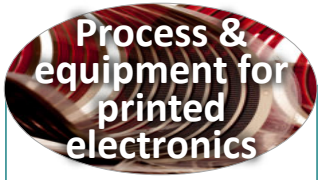


REAL NANO

In-line and real-time digital nano-characterization for flexible organic electronics

NOUVEAU PROJECT

The NOUVEAU project will develop solid oxide cells (SOCs) with innovative La- and PMG-free electrode materials

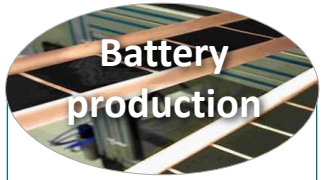


FLEX2ENERGY
AUTOMATED MANUFACTURING PRODUCTION LINE FOR IPVS

R2R production line for OPV solar with integrated backend

ENP

Development of near-field electro hydrodynamic nanowire printing



IDEEL

Implementation of laser drying processes for lithium-ion battery production

SOLiD

R2R process optimization for solid state batteries

pepLAT

Plasmonically enhanced photocatalysis for wastewater treatment

RetroWin

R2R Process and machinery development for retrofit window films for lower production costs

WATER PROOF

The WaterProof project aims at developing an electrochemical process that converts CO_2 emission

FLEX FUNCTION 2 SUSTAIN

Creating an open-innovation testbed for sustainable packaging

Flex2Energy project

FLEX2ENERGY

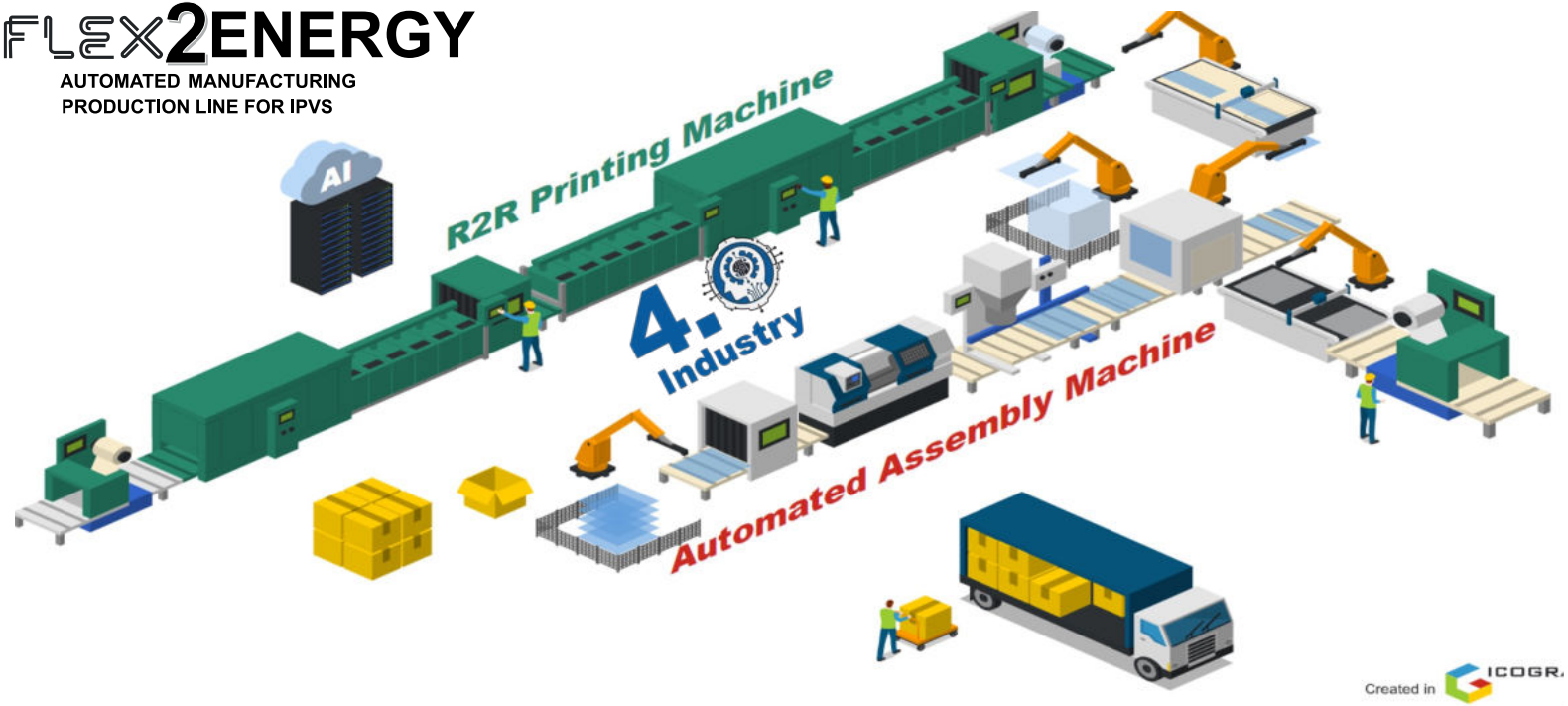
AUTOMATED MANUFACTURING
PRODUCTION LINE FOR IPVS

European Commission

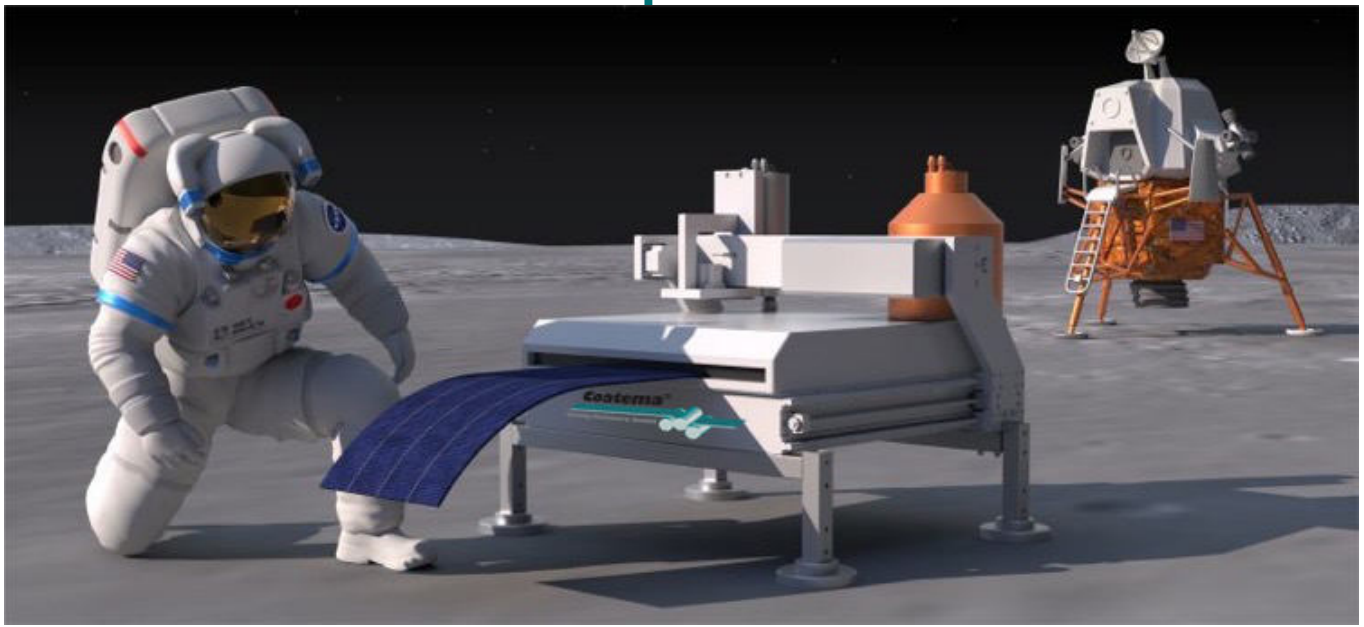
Flex2Energy project – Consortium partners

Flex2Energy project

FLEX2ENERGY
AUTOMATED MANUFACTURING
PRODUCTION LINE FOR IPVS



3rd Gen solar technology
The vision from NASA – perovskite on the moon



What would it take to manufacture Perovskite Solar Cells in space? | ACS Energy Letters

Source: Author: Lindsey Mc Millon-Brown

3.

Equipment

S2S

Lab

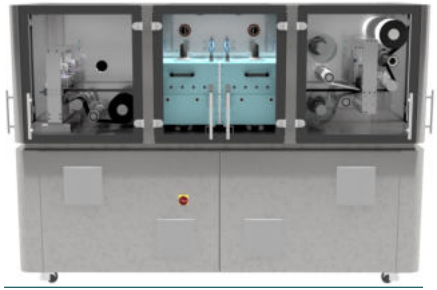
Test Solution

Easycoater

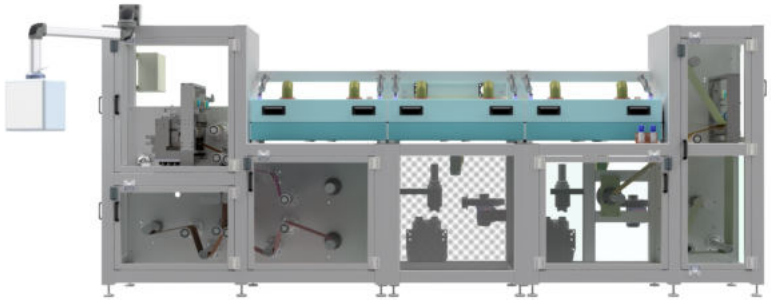
Easycoater Evolution

R2R lab systems

Lab



Test Solution R2R

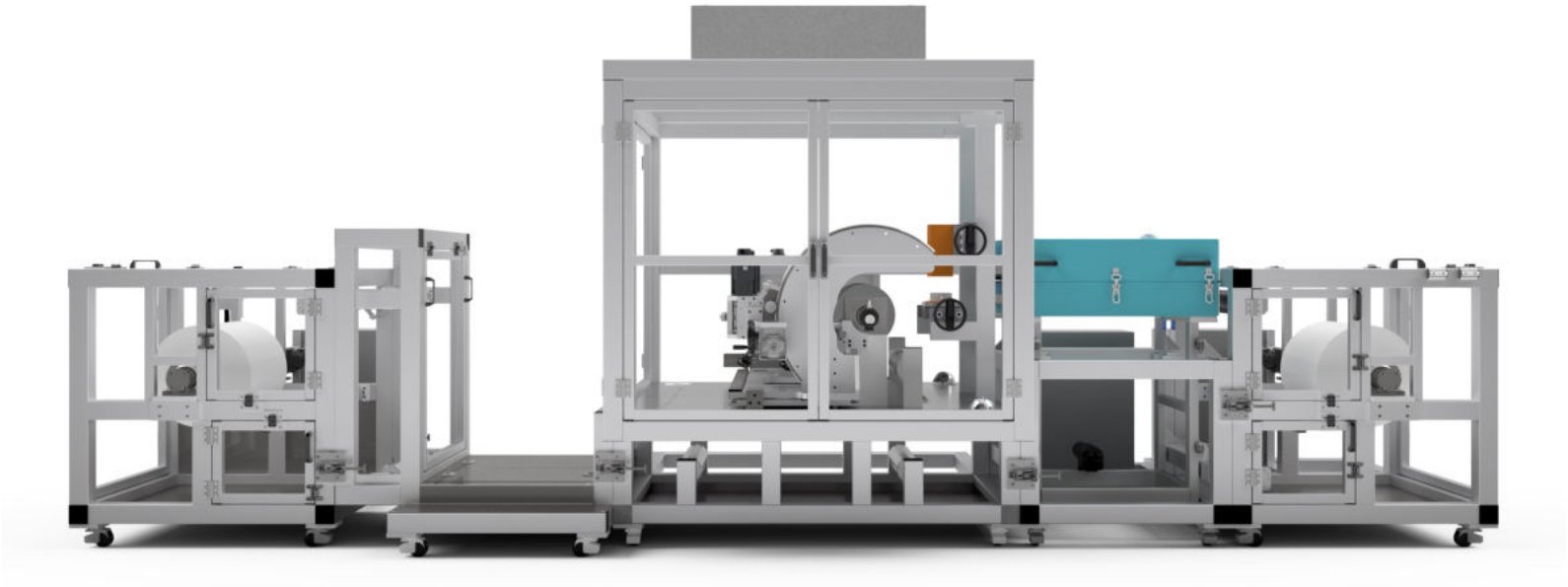


Basecoater R2R

Smartcoater R2R

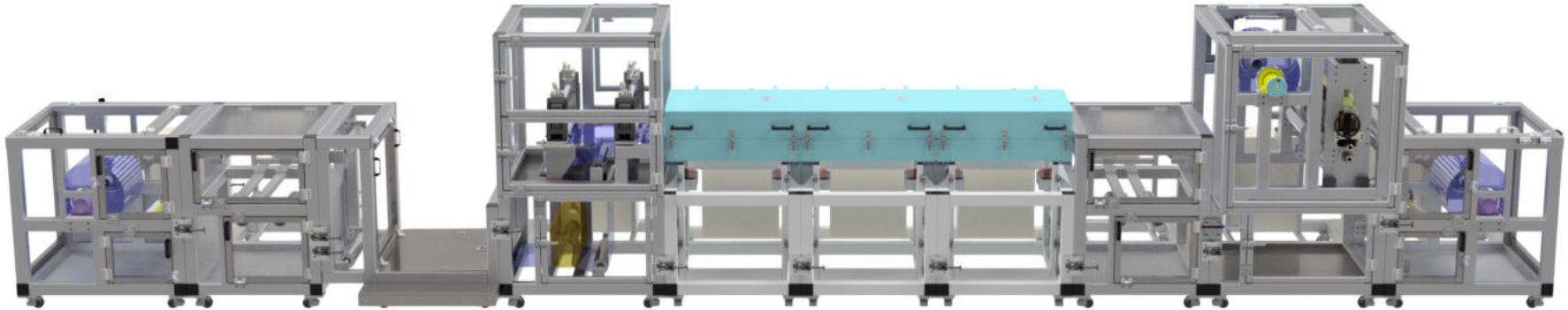
The Click&Coat™

Pilot

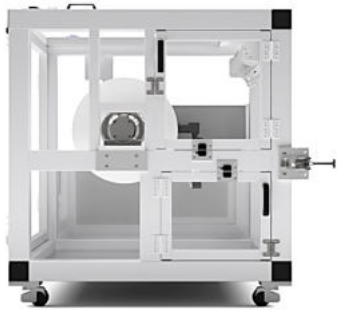


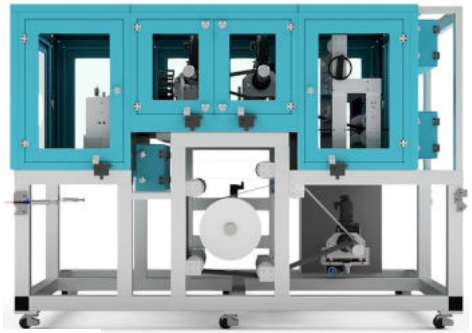
The Click&Coat™

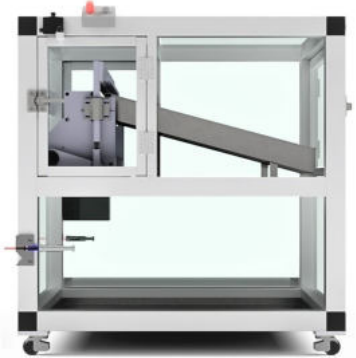
Pilot



The Click&Coat™ single modules

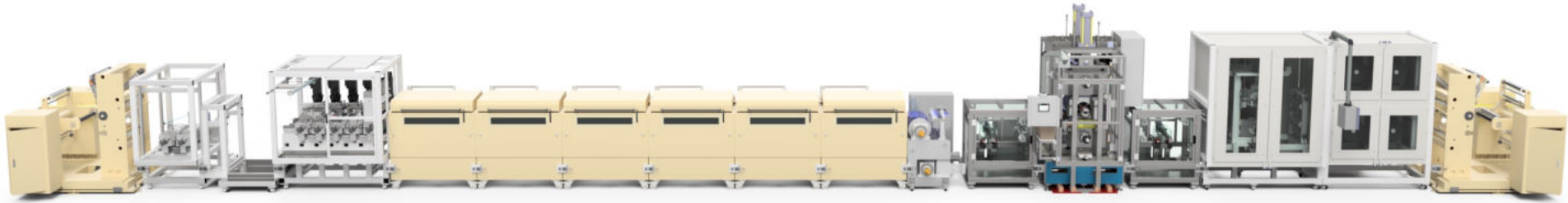





The Click&Coat™ in production scale in the R&D centre

Production



The Click&Coat™ in production scale

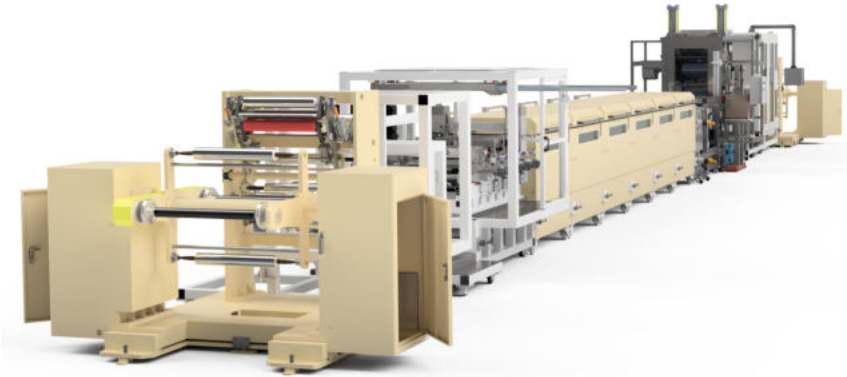
The Click&Coat™ in production scale

Production

Production lines

Production

Production lines



Production lines

Bespoke equipments

Custom made

Printed oleds

Optical film

Composite fibres

4.

R&D centre

R&D power houses

KROENERT – Drytec – Coatema

- ✓ R&D space: 2 000 m²
- ✓ R&D units: 15
- ✓ From R2R to S2S
- ✓ Working width: 100 mm to 1 300 mm
- ✓ Operation speed: 0.1 to 1 610 m/min.
- ✓ 15 parallel public funded R&D projects
- ✓ R&D staff: 25

Product portfolio:

- ✓ Basic research, process- and productdevelopment
- ✓ Product improvement
- ✓ Trainings and conferences

R&D centre KROENERT & DRYTEC

R&D centre Coatema

R&D centre USP

Process development
- ✓ Feasibility study
- ✓ Ink – process study
- ✓ Process analysis
- ✓ Slot die coating simulations
- ✓ Proof of concept
- ✓ Small scale prototype

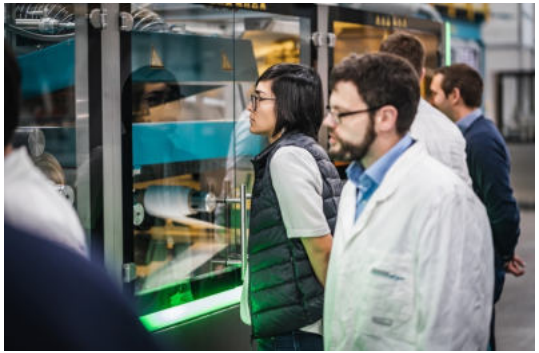
Test production
- ✓ Prototyping
- ✓ Near to market testing
- ✓ TRL evaluation
- ✓ Training of staff

Education
- ✓ Coating conference
- ✓ Partner trainings
- ✓ Education of students
- ✓ Workforce training

Development of custom-made design for equipment
- ✓ Prototyping
- ✓ Proof of concept

Public funded research projects know-how
- ✓ German funded
- ✓ Horizon 2020
- ✓ Global 2+2 projects
- ✓ B2B projects

Coatema coating symposium for 23 years



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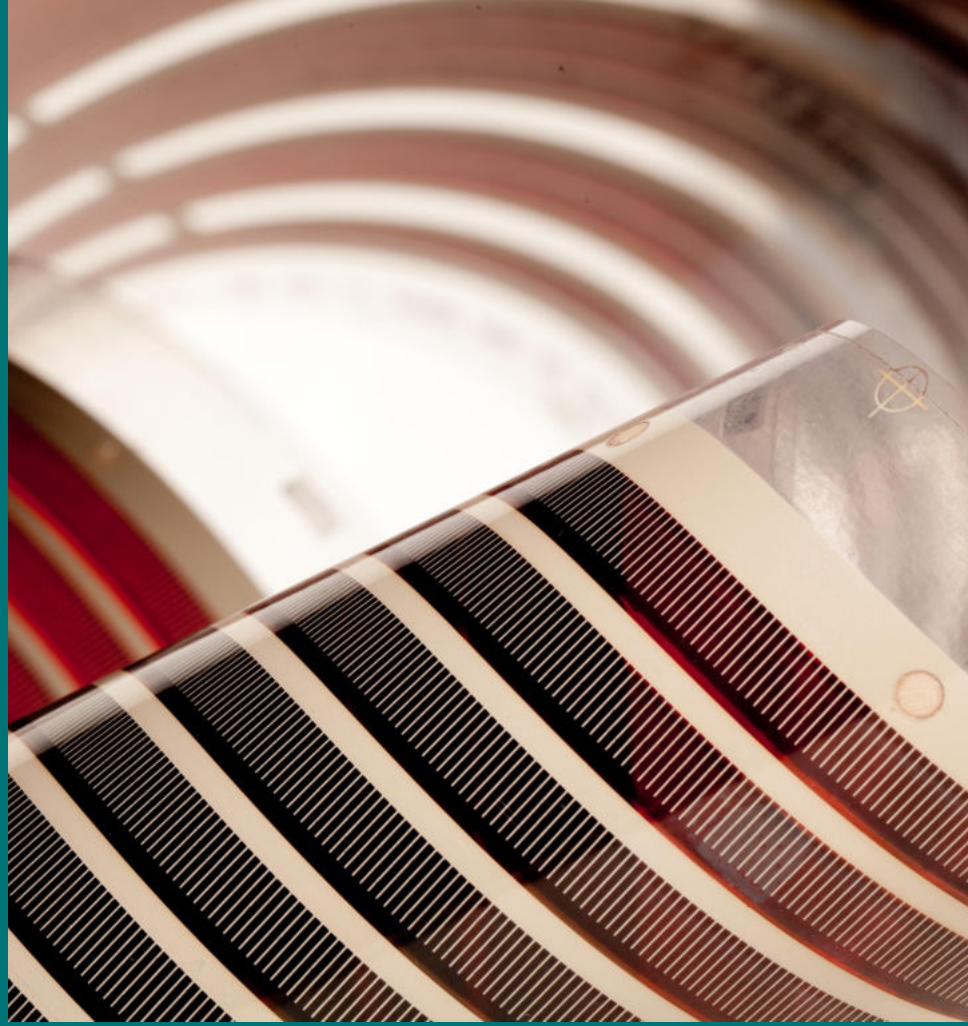
Contact



Do not hesitate to contact us!

Anything missing?

Let us know and we will make it happen!

Our R&D centre is worldwide the most versatile centre for coating, printing and laminating.

Sales department:
sales@coatema.de

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Thank you

Roseller Straße 4 ▪ 41539 Dormagen ▪ Germany
T +49 21 33 97 84 - 0 ▪ info@coatema.de

www.coatema.com

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