

*„At the speed of light“*



**“An innovative approach to repair composites”**

Martin S. Krull Head of R&D



## Agenda

- | Introduction: Who is Bergolin?
- | Market analysis
- | Exploring new ideas
- | The wonderful world of radiation curing
- | Extension of the service season
- | Curing indicator
- | BergoLED Speed Resin
- | BergoLED Speed Putty



Specialized in Developing  
and Producing  
High-Quality Coating Systems

Founded in 1909

Headquarters in Osterholz-Scharmbeck, Germany

100 Employees

Turnover 25 Mio. € p.a.

Output of approx. 4.000 t p.a.

# Headquarters in Osterholz-Scharmbeck, Germany



**Company Ground**  
46.000 m<sup>2</sup>

**Covered Area**  
27.000 m<sup>2</sup>

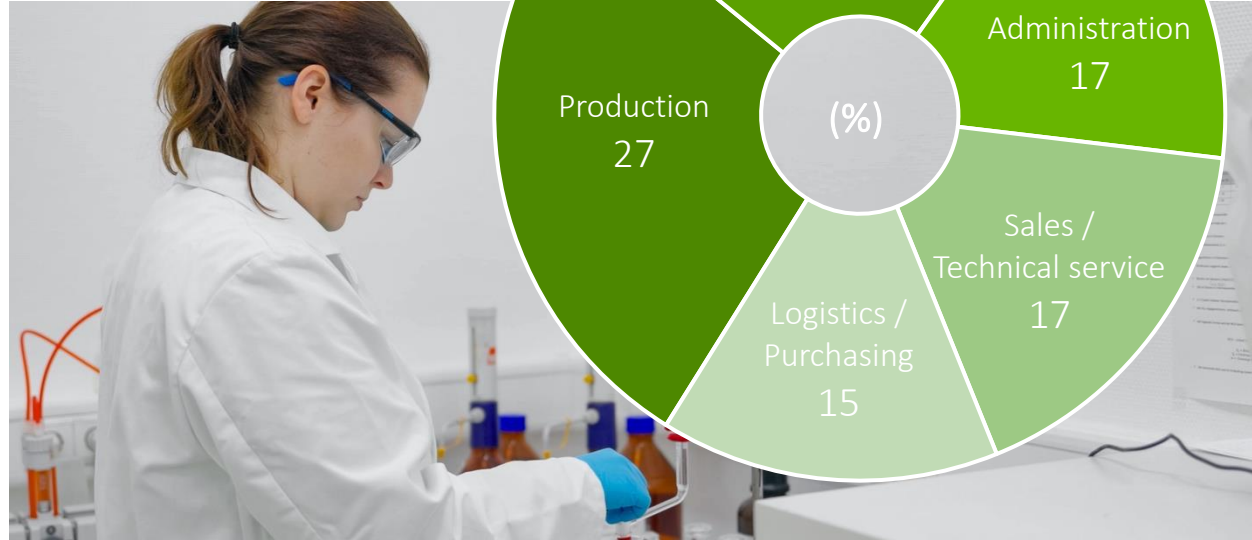
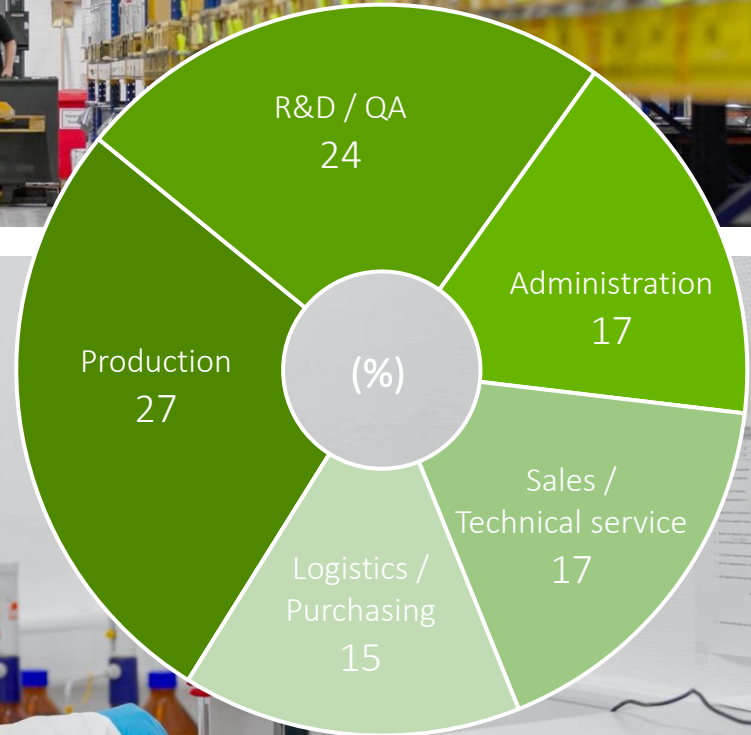
**Floor Space**  
12.600 m<sup>2</sup>



# Our Team



100 Employees





- | Automotive
- | FRP-Composites
- | Machinery and Plants
- | Construction and Agricultural Machinery
- | UV Coatings for Films and Mineral Substrates



- | Tanks and Containers
- | Separator
- | Waterworks, Weirs and Pipes for Water Applications
- | Deck Coverings in Shipbuilding
- | Freight Cars

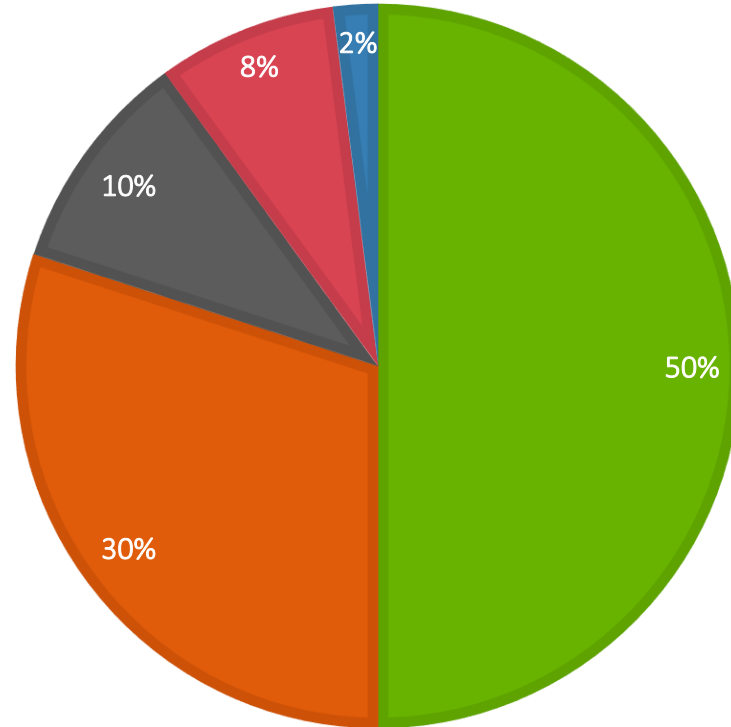


- | Wind Turbines  
(Nacelles & Rotor Blades)
  - | OEMs
  - | Components
  - | Repair & Maintenance
- | Mobility  
(Automotive, Shipbuilding)
- | Construction  
(Protective Structures, Tanks & Pipes)
- | Sports & Leisure

# Market analysis – Percentage breakdown of rotor blade repairs



■ FRP damages ■ Erosion damages ■ Aerodynamic updates ■ Topcoat ■ Structure repair

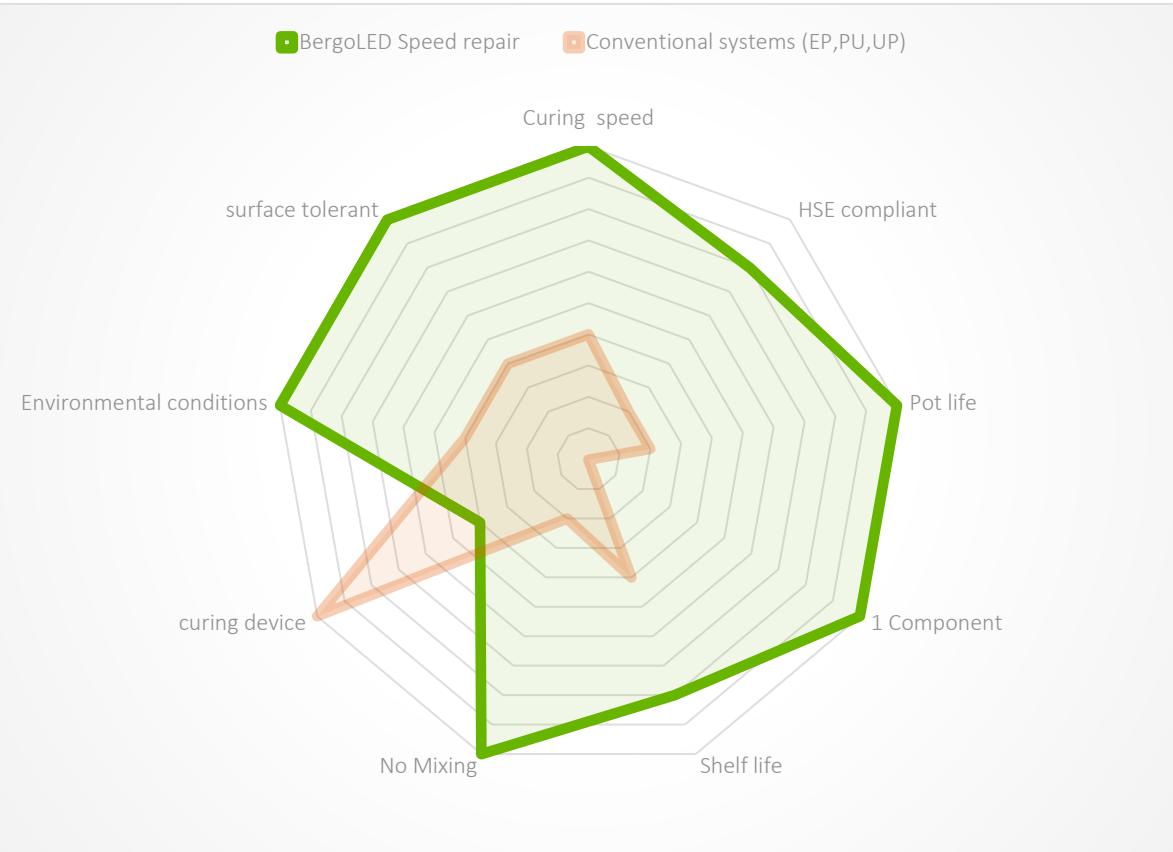




## Exploring New Ideas

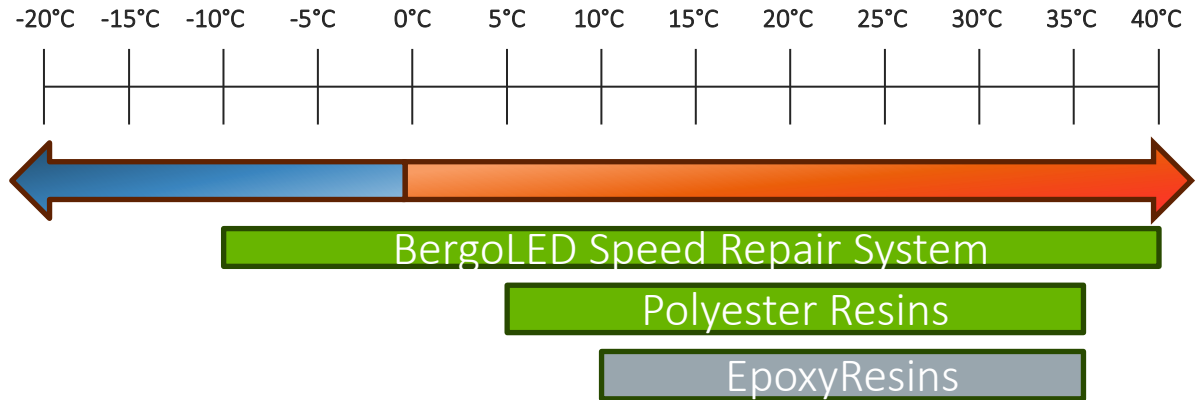
- | Over 20 years of experience in composite coating (>150,000 coated rotor blades)
- | Continuous growth in wind turbine repair at approximately 10% annually (for us, 30% annually), with potential in Europe of around 5 million €
- | Idea: Transferring the demanding requirements of wind power to other sectors.
- | For example: Repair of yachts, motorhome components, nacelles for wind turbines, and canal recovery
- | Smart solutions in high demand
- | Replacement of polyesters / epoxy's as conventional repair materials
- | 1-Component products
- | The only option: radiation curing, but not in the 'conventional way'

# The wonderful world of radiation curing - a comparison

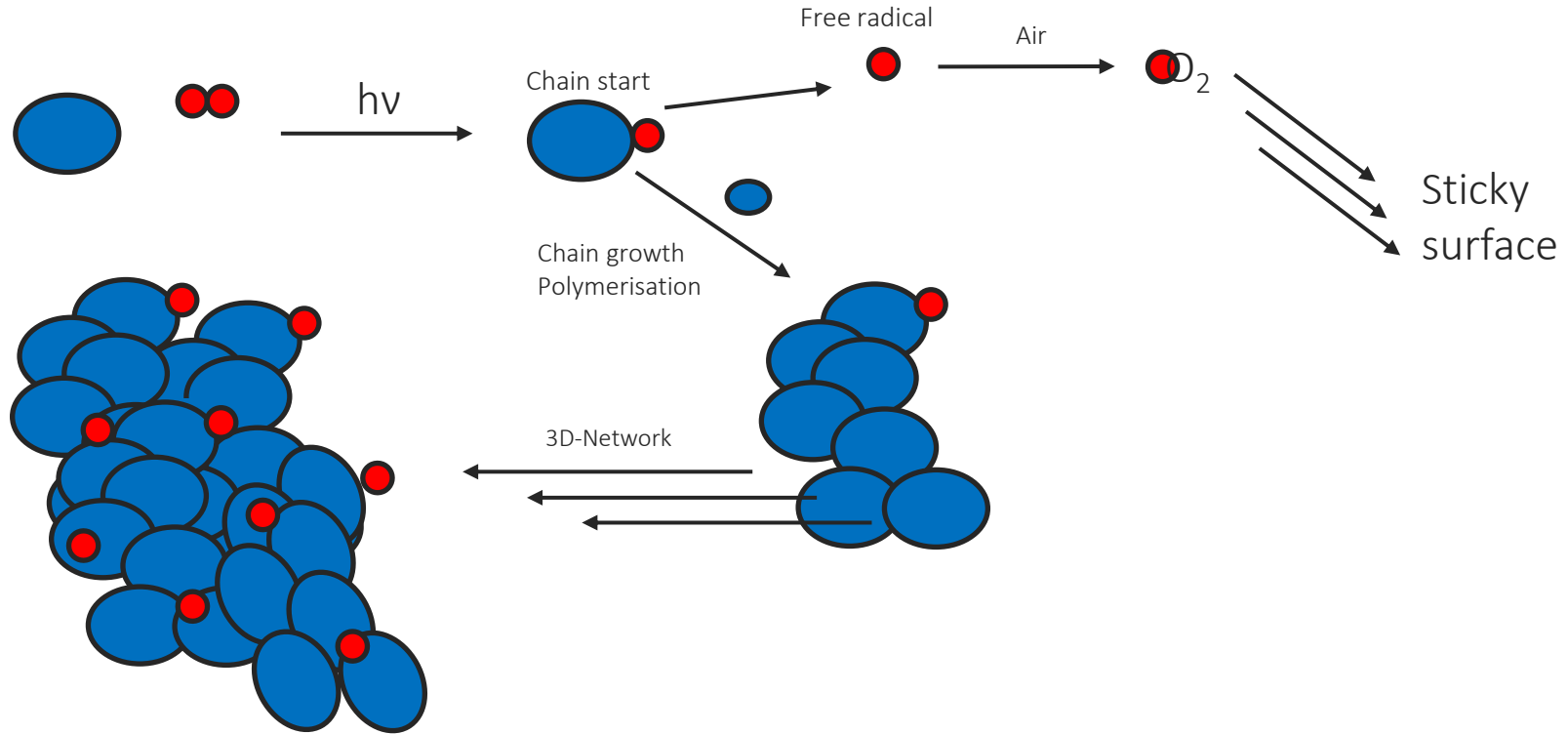


- ✓ Extension of the service season
- ✓ Independent of external weather conditions

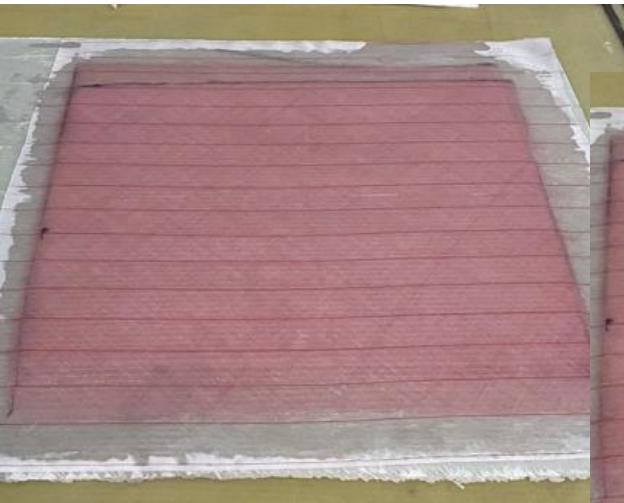
# Extension of the service season



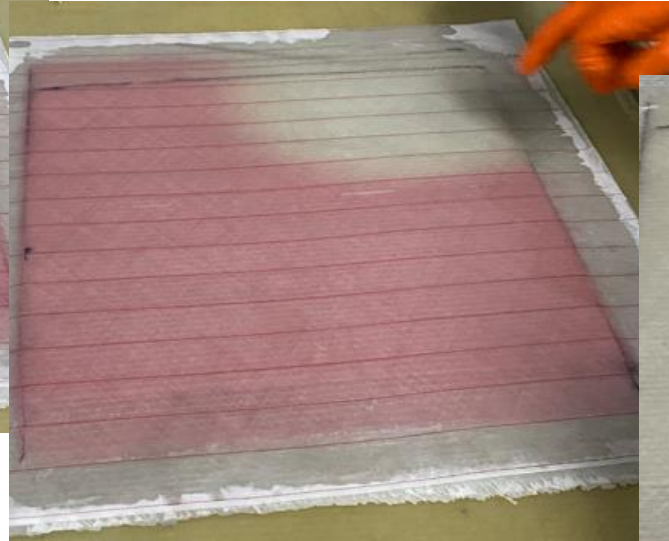
# The wonderful world of radiation curing – Polymerization mechanism



# The wonderful world of radiation curing – Curing indicator



1. After application



2. Start curing

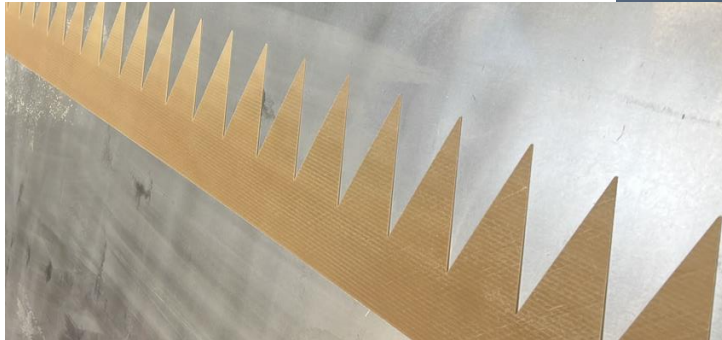
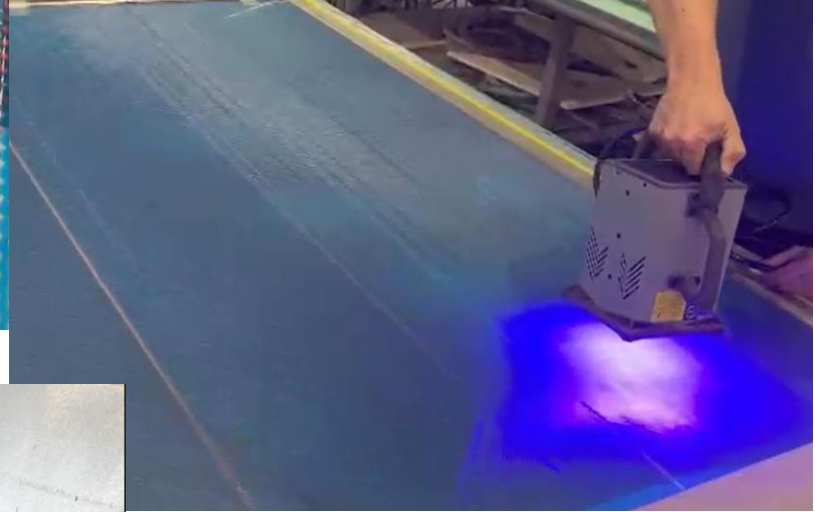
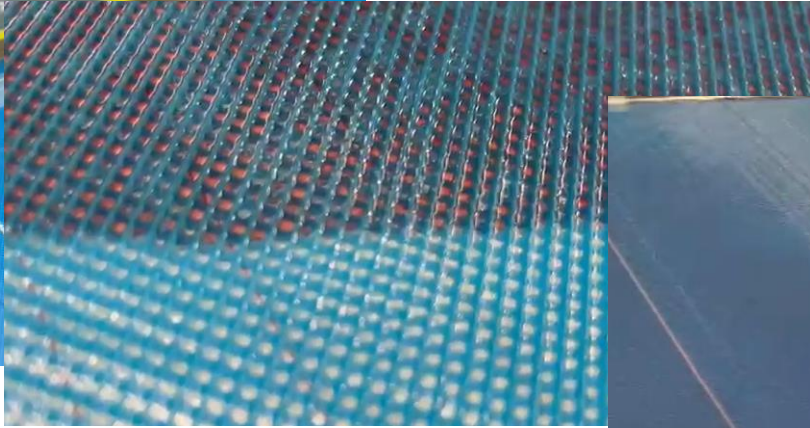
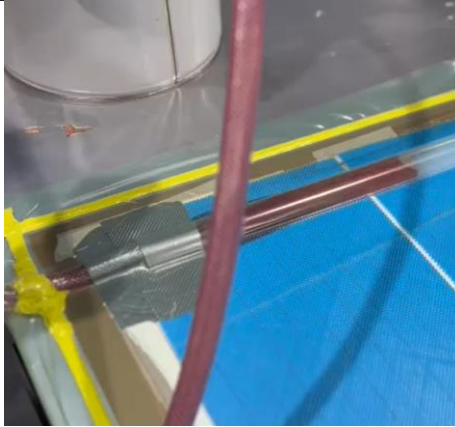


3. Completely cured

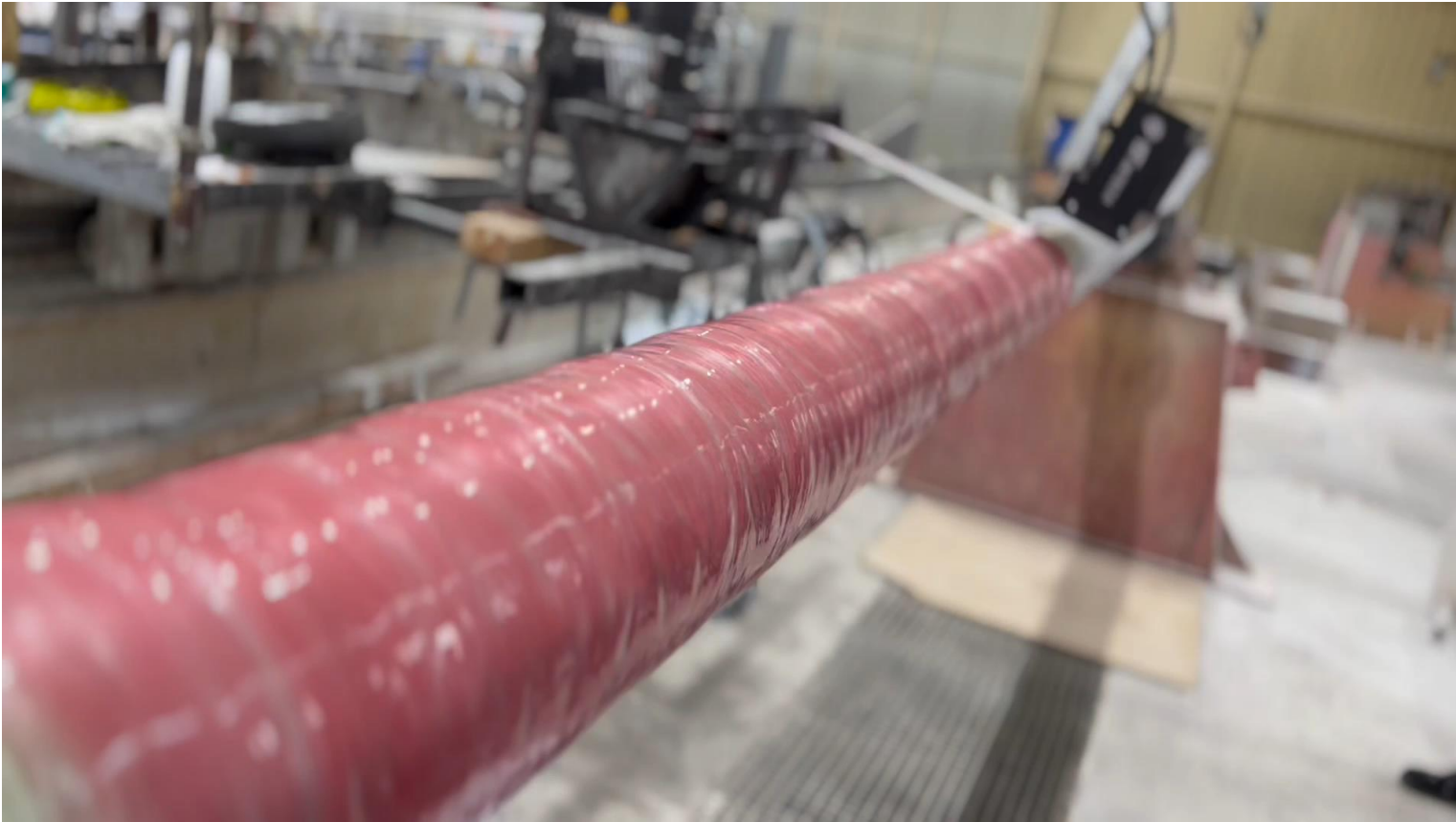
# BergoLED Speed Repair Resin – Process in the field (*lamination*)



# BergoLED Speed Repair Resin – Industrial process (RTM)



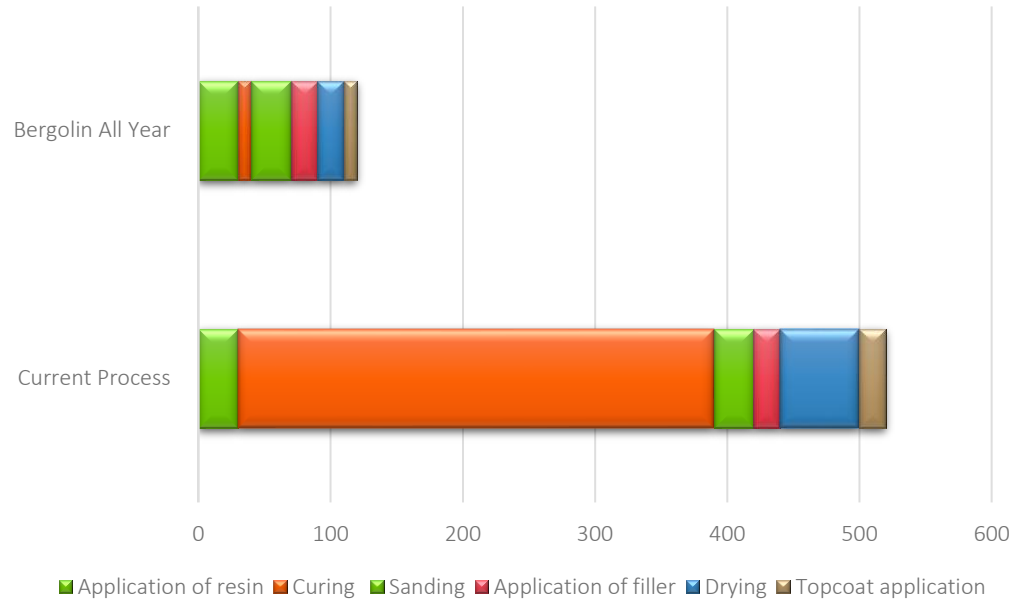
# BergoLED Speed Repair Resin – Industrial process (*winding*)



# Market analysis – Process times in comparim with conventional resins

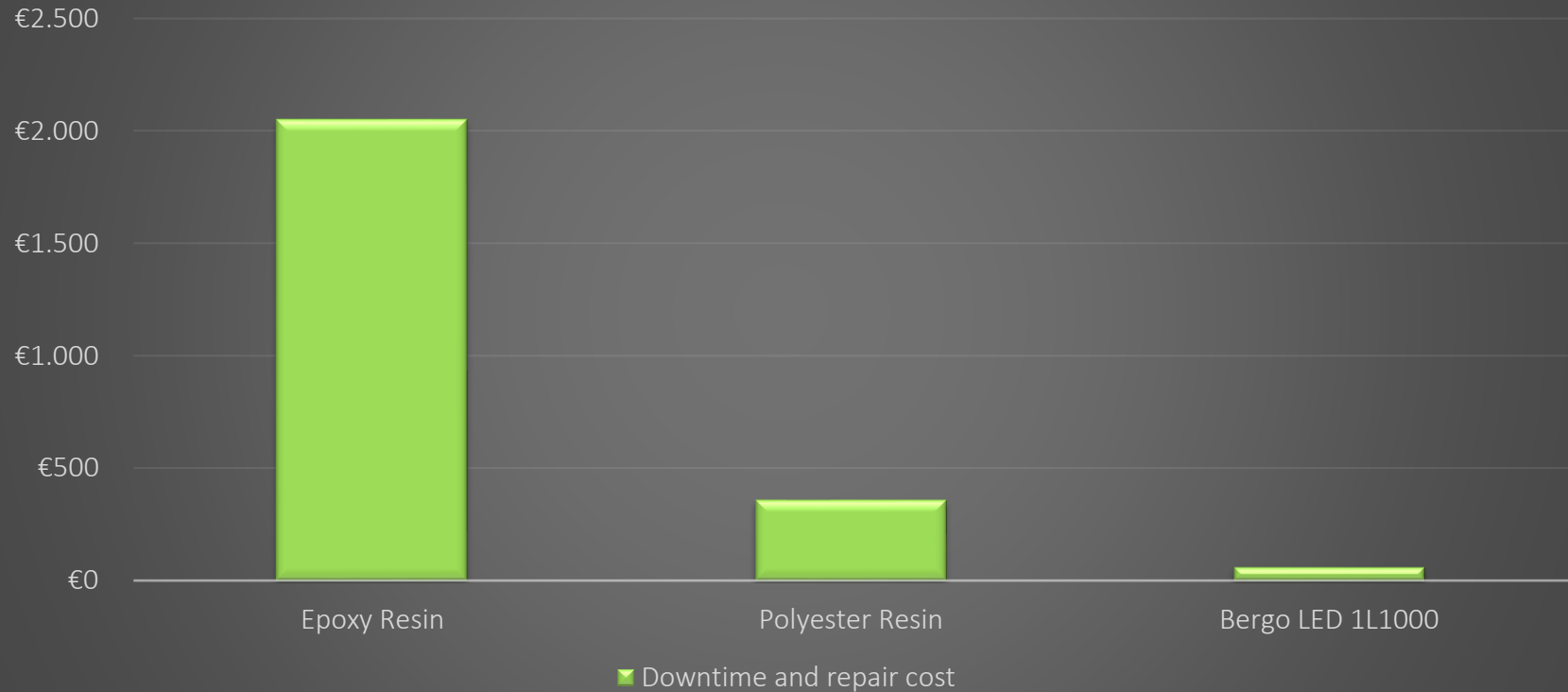


	Lamination	Curing 360 min (by heat 80°C)	Grinding	Putty application	Curing	Topcoat application	Sum:
<b>Conventional Epoxy resin</b>	30 min		30 min	20 min	60 min	20 min	520 min
<b>Bergolin Speed Repair</b>	30 min	10 min	30 min	20 min	10 min	10 min	110 min





## Comparison of the cost for FRP Repair



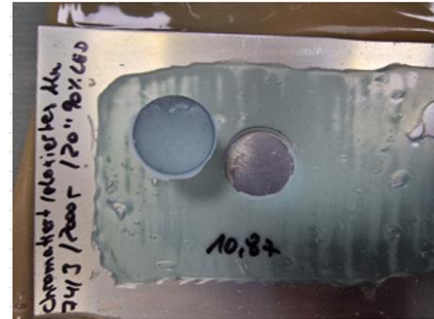
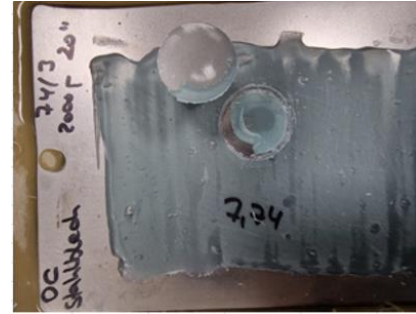
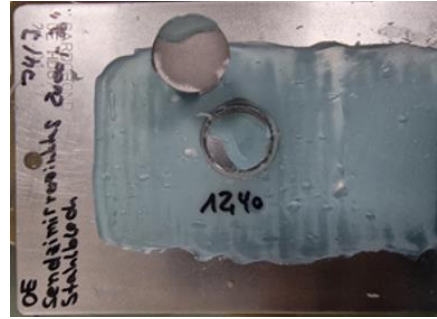
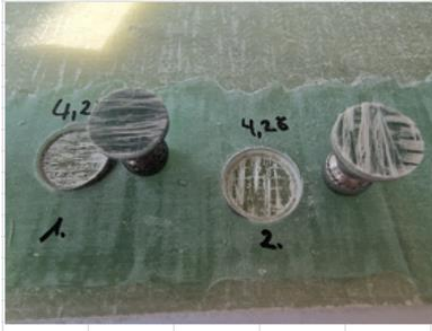
# BergoLED Speed Repair Putty – Field study



# BergoLED Speed Repair Putty - Advantages



Adhesion properties: Polyester FRP / Epoxy FRP, Plastics (ABS), metallic surfaces





MODERN „EASY-TO-USE“  
REPAIR SYSTEMS



REPAIR OF DAMAGES IN  
THE COATING



REPAIR OF DAMAGES IN  
THE FRP SUBSTRATE



APPLICATION IN ALMOST  
ALL WEATHER  
CONDITIONS

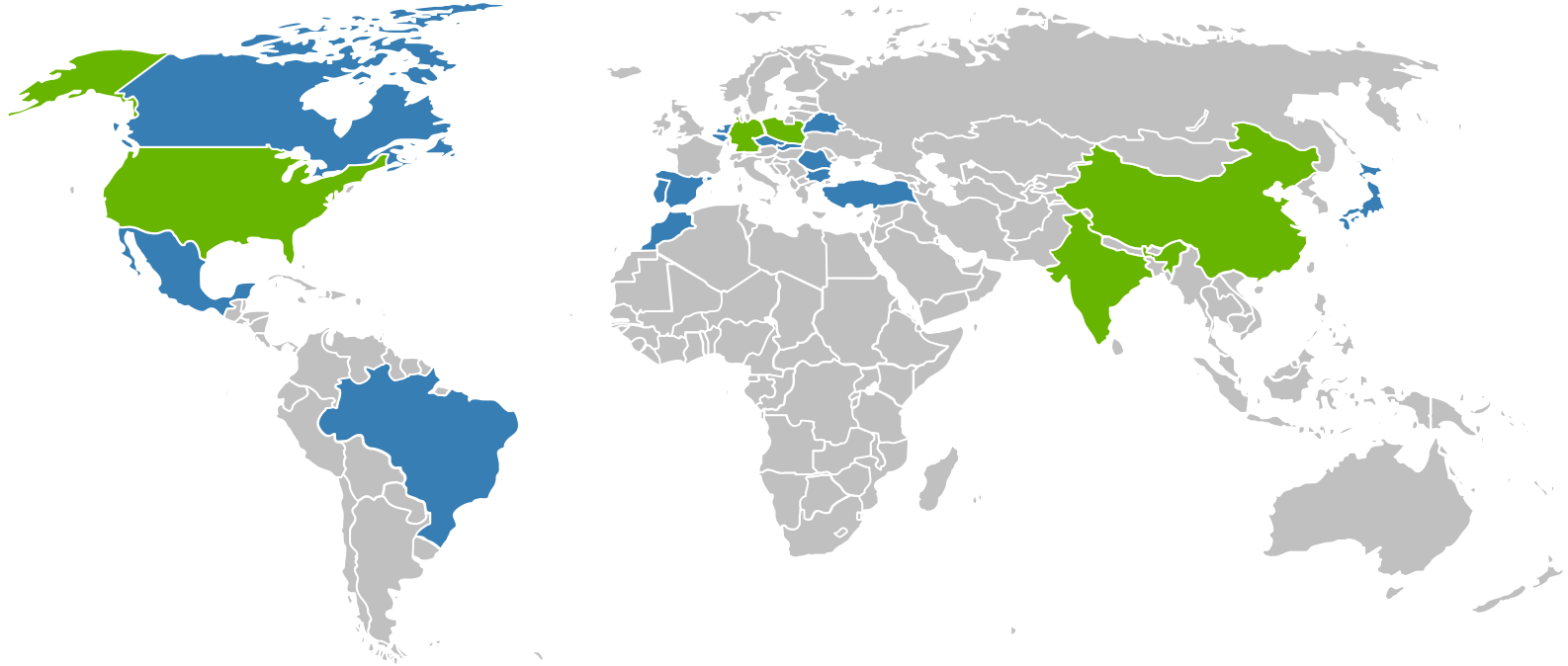


100% SOLID SYSTEMS  
(STYRENE FREE)



## What comes next?

- | Approval of the Class program – DNVGL-CP-0089
- | The first service teams are launching this season with LED-curable putty
- | Developing of a radiation-curable topcoat for composite material finishing
- | Seeking pilot customers interested in utilizing our resin for production purposes



**Bergolin offices** (Germany [HQ], Poland, USA, China und India)

**Markets** (Canada, Mexico, Brasilia, Marocco, Portugal, Spain, Belgium, Netherlands, Czech Republic, Slovakia, Romania, Bulgaria, Belarus, Turkey, Japan)

# Thank you very much for your attention!

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