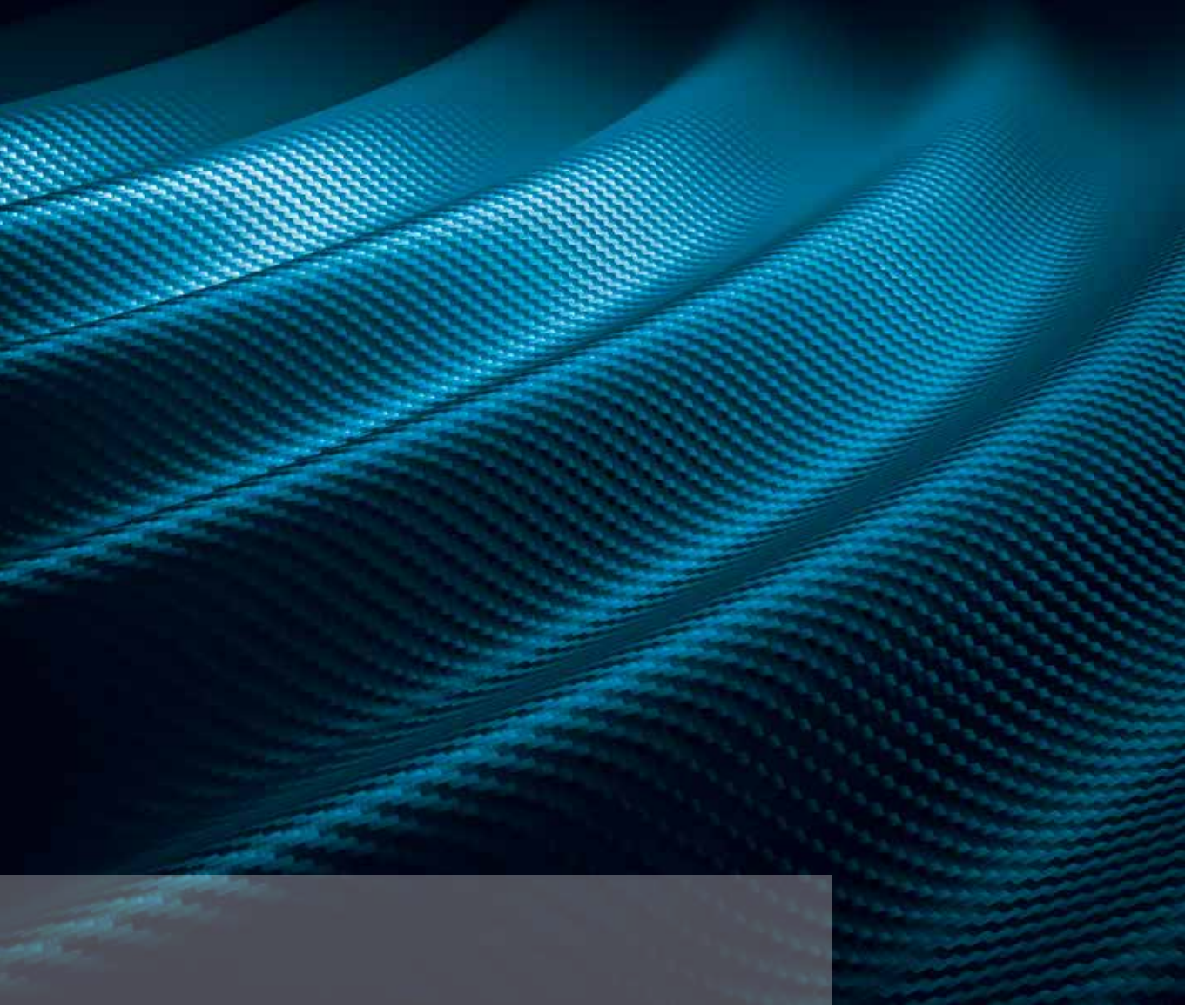


NO LIMITS IN DESIGN

VAP® Components

EFW COMPOSITE SOLUTIONS

A company of ST Engineering and Airbus

DID YOU KNOW ...

that one VAP component of EFW

CONSISTS OF UP TO **50** INDIVIDUALLY ORIENTED REINFORCEMENT FABRICS

6,000 VAP COMPONENTS ARE PRODUCED AT EFW PER YEAR

that VAP components are characterized by

HIGHEST PERFORMANCE AND QUALITY AT LOW TOOLING INVESTMENT

EFWs VAP components can be

OPERATED IN A WIDE TEMPERATURE RANGE FROM - 60°C TO OVER 150°C

VAP components are

AN IMPORTANT PART OF THE AIRBUS A350'S STRUCTURAL BACKBONE

EFW AT A GLANCE

OUR 4 BUSINESS UNITS

COMPOSITE SOLUTIONS

Certified Production Organization DE.21G.0005

MAINTENANCE REPAIR AND OVERHAUL

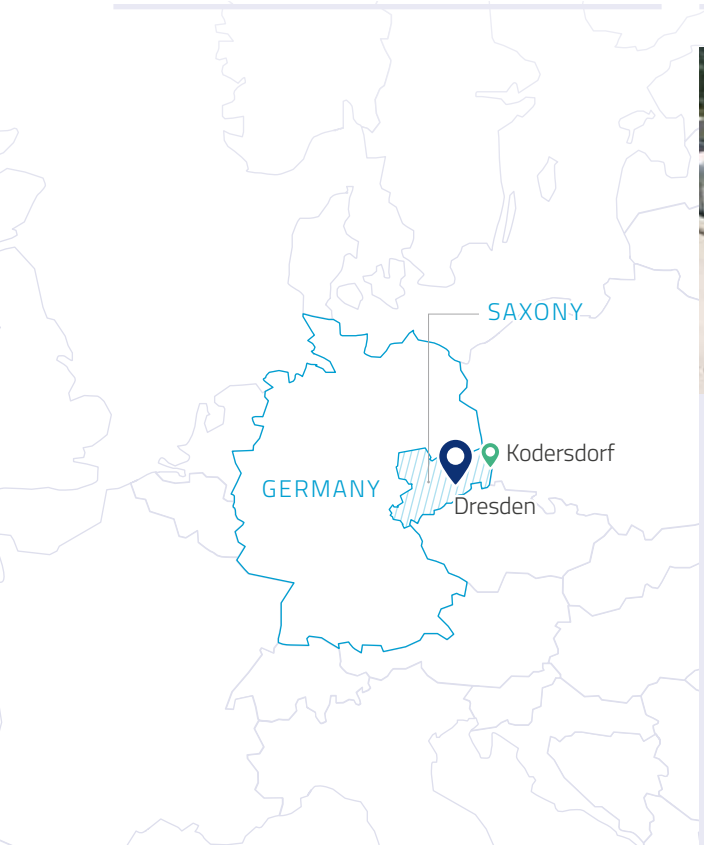
Certified Maintanance Organization DE.145.0040

FREIGHTER CONVERSION

Certified Maintanance Organization DE.145.0040

ENGINEERING SERVICES

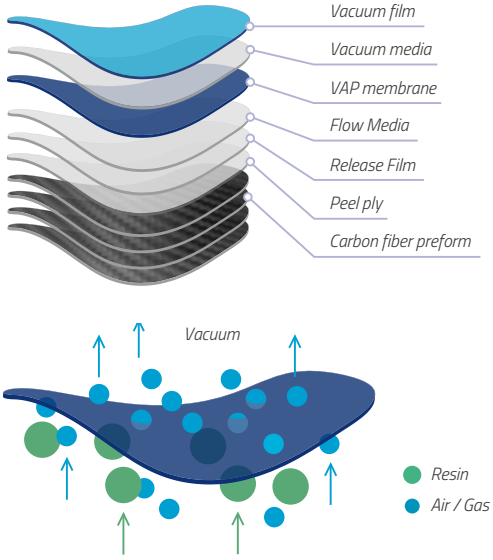
Certified Design Organization EASA.21J.054



- Based in Dresden, Germany
- 1,700 employees
- Revenues of € 300 million
- A company of ST Engineering (55 %) and Airbus (45 %)
- Experience in aviation and transportation industry in Dresden since 1955
- 2 additional production sites in Kodersdorf, Germany: acosa and CCI-A

VAP® COMPONENTS

LAY-UPS



NEXT GENERATION TECHNOLOGY

EFW's VAP® components are resin-infiltrated structural parts manufactured under vacuum conditions.

The process is characterized by the use of an advanced, flexible semi-permeable membrane system. During the resin infiltration process, small-molecular air and gas inclusions are removed efficiently.

In this way, the technology allows key process parameters to be precisely controlled.

All process steps are designed to maximize the fiber volume content and performance of EFW's VAP components.

ADVANTAGES OF VAP® COMPONENTS

Performance Components with Highest Internal and External Quality

- Highest degree of design freedom
- Simplified production of large and complex components
- Adjustable fiber volume content and minimal porosities
- High process reliability
- Cost efficient implementation and flexible product modification
- Highest component quality

VARIOUS APPLICATIONS

Aviation

Space & Defense

Transportation & Automotive

Yachting

Sports equipment

Medical purposes

Architecture

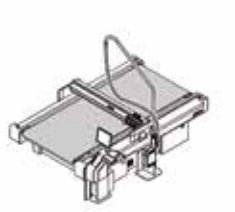
Energy

MANUFACTURING CAPABILITIES

LAY-UP & CUTTING

Automated laying and cutting machine

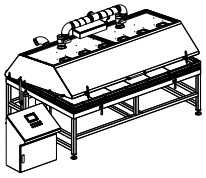
- Lay-up and CNC cutting of structural materials



3D FORMING

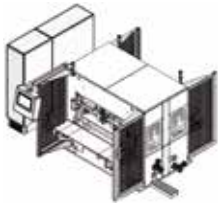
Vacuum membrane press

- Integrated heating hood
- Active heating and cooling system



Adaptive 3D preform press

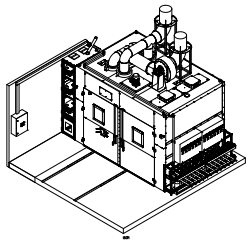
- Active material guidance
- Active heating and cooling system



RESIN INFUSION & CURING

Hot air furnace

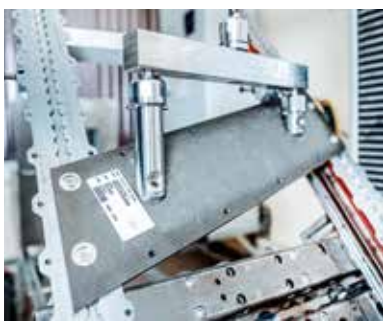
- Automated resin dosing
- VAP® infusion and curing



- Entire value chain due to engineering and manufacturing services
- Cost optimized production of a wide range of component sizes and quantities
- Full process monitoring and in-house quality control
- Highest component quality

REFINING & TESTING METHODS

- Tooling
- 5-axis CNC machining
- Surface protection and finishing
- 3D measurement
- Static & dynamic testing
- Non-destructive testing



PRODUCT PORTFOLIO

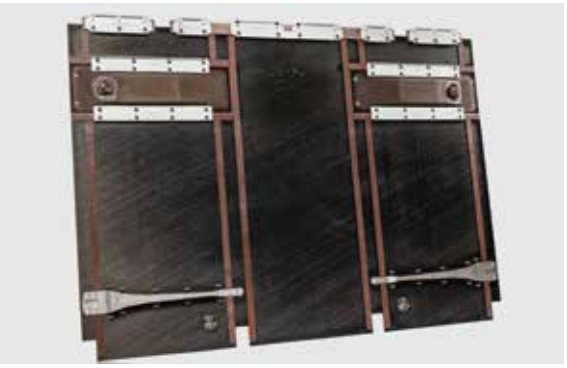
Component families

Topology optimized components

Integrative 3D structures

Curved stiffening structures

APPLICATION IN AVIATION



The A350 combines passenger comfort, cutting edge technology, unique industrial process and environmental sustainability.

- Used in floor-grid independent flexible high load areas in aircraft cabin
- Considerable increase in flexibility of cabin layout
- Maintenance free for at least 20 years
- ~ 50 % cheaper than comparable components made of titanium

CUSTOMER BENEFITS

EFW covers the entire value-added chain in composite manufacturing.

MAIN REASONS TO BUY OUR PRODUCTS

- **30 years of experience** in composite manufacturing
- **Complex** geometries
- High level of **functional integration**
- **Wealth of knowledge** and **deep expertise**
- **Highest product quality** and **product performance**
- **Cost optimized** production

GET AN IMPRESSION OF OUR CAPABILITIES

Manufacturing of near net shape reinforcement structures

Precision work during assembly of VAP beams into floor panels

Sequential setup of the automated resin infusion process

High precision quality assurance

EFW COMPOSITE SOLUTIONS

A company of ST Engineering and Airbus

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