



# ICAF

International Committee  
on Aeronautical Fatigue  
and Structural Integrity

## New Trends in Materials & Processes

Elke Hombergsmeier, Airbus | 30.06.21

# New Trends in Materials & Processes

- Overall Drivers for Aeronautic Products
- Materials & Process Trends
  - Metal Technologies
  - Organic Technologies
- Sustainable Solutions & Technologies
- Challenges for Materials & Processes

# Overall Ambitions of Aeronautic Products and Materials & Processes Drivers



Increase Performance of next generation Aircraft



Reduce Cost to increase competitiveness



Contribute to Industrial Ambition for future Aircraft



Environmental Substance Compliance & Data,  
Sustainable Solutions & Technology



De-risk Supply Chain, Aeronautic Attractiveness



Digitalization & SMART Standards

Short-term

Long-term

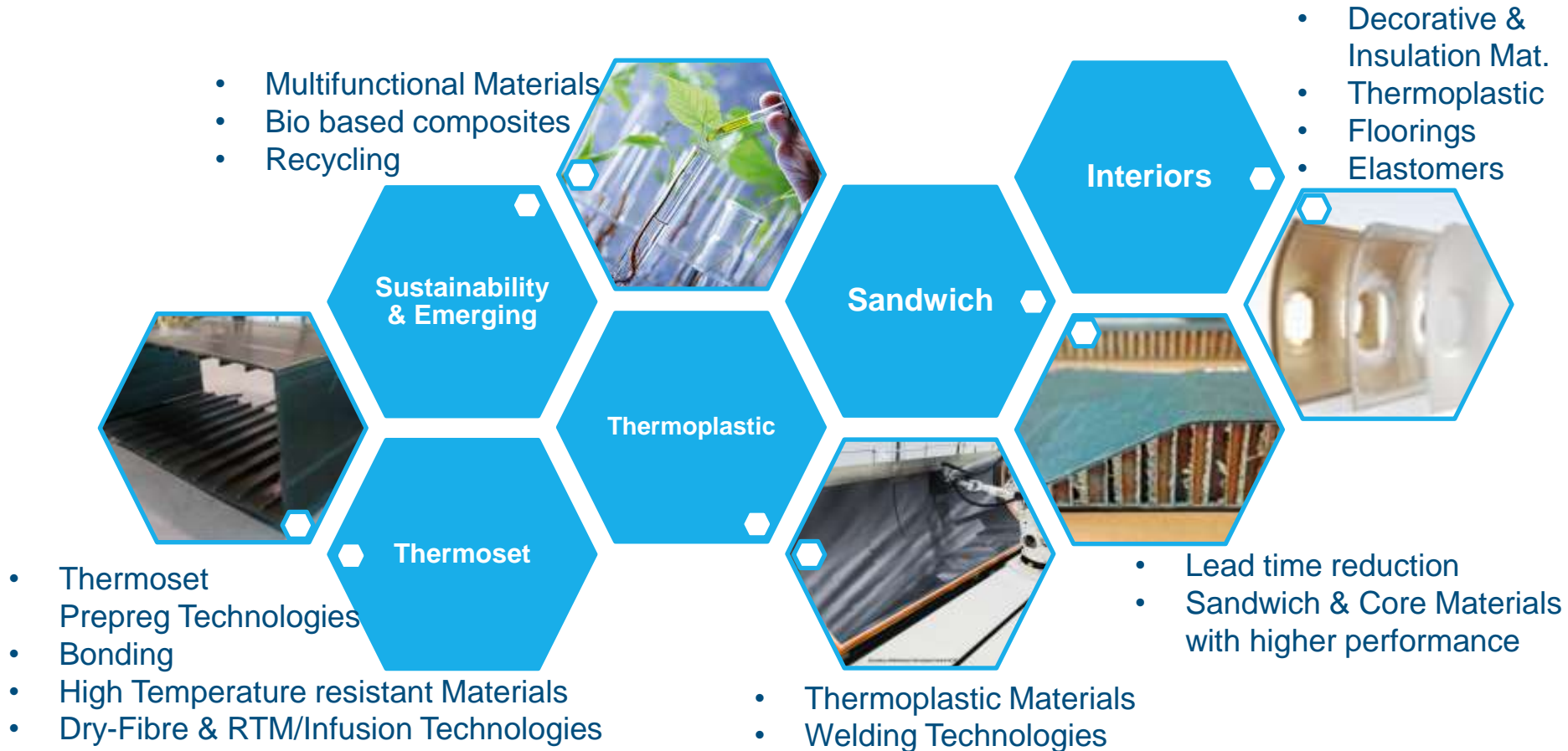
Keep trust in Air Travel

Zero Emission Aircraft

# Material Process Relation - Metal



# Material Process Relation - Composites



# Additive Manufacturing

- ✓ RC saving
- ✓ Function integration
- ✓ Lead time reduction
- ✓ Environmental footprint
- ✓ Tailored performance



>150 Satellite parts  
 >20.000 Helicopter parts  
 >1.500 Airbus Civil parts  
 >1.600 Spare parts



## Metal

Powder Bed Fusion

Direct Energy Deposition

## Polymer

Powder Bed Fusion

Fused Layer Manufacturing /SLS



>33.000 Airbus Civil parts



**Whole process chain has to be considered**  
**Effect of Defect and Fatigue & Damage Tolerance is key**

**Highly integrated Systems up to Airframe Structures**

# Sustainable Solutions and Technologies

## Regulation



- Following regulation and anticipate future substitutions
- Anticipation of substances to be banned

## Re-use & Recycling



- Re-use of waste during production
- Ensure recyclability of materials, including ancillaries

## Critical & Ethical Materials



- Consider secure and sustainable supply of materials

## Buy-to-Fly Ratio



- Reduce waste by improved processes
- Topology optimized design

## BIO-Sourced Materials



- Material made from substances derived from living organisms
- Biomass carbon fibres, mineral fibres, bio-sourced resins
- Capture CO2 from atmosphere and turn into materials for flight

## Life-Cycle Assessment (LCA)



- Use of life-cycle assessment to determine the contribution of materials to sustainability

## Eco-efficient Industrial Processes



- No hazardous substances
- Reduced emissions
- Efficient use of resources
- Waste reduction and recycling

## Materials as Enabler for new Sustainable Technologies



- E.g. Laminar / Hybrid laminar flow, more efficient flight
- Hydrogen related technologies

## General Sustainable Approaches



- Develop external network
- Supplier / Product selection based on sustainable assessment

# M&P Challenges for Future Aircraft

- Reduction of material development time, reduction in testing time, reduction in material certification time by digitalization
- Performance increase, mainly by integration and multifunctional materials (Performance versus Cost → Performance versus Environment)
- Recurring Cost reduction by simplified, cost-balanced materials with robust supply chain; harmonization between products & industries
- Process cycle reduction by automated, high rate production
- Circularity by blended materials with recycled or bio based content, waste-less, eco-efficient processes and end of life management
- Zero or significantly reduced Emissions lead to new material & process challenges (i.e. F&DT under cryogenic conditions and secondary alloys)



**Thank you very much for your attention!**

Any questions inside the Q&A?