



ECOLOGICAL AND MULTIFUNCTIONAL COMPOSITES FOR APPLICATION IN AIRCRAFT INTERIOR AND SECONDARY STRUCTURES

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Content



1. Context and challenge
2. Consortium
3. Objectives
4. Results

1. CONTEXT AND CHALLENGE

Context

Composites in aircraft materials

Carbon-Fibre-Reinforced Polymer (CFRP)

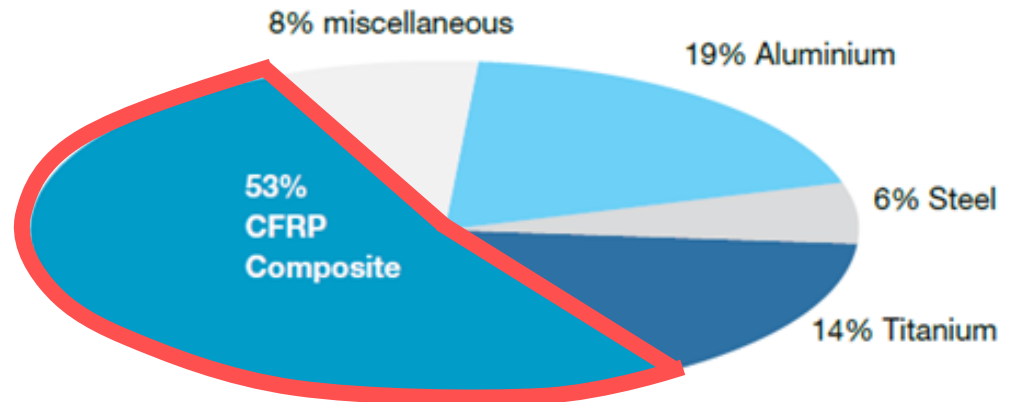
- no corrosion & fatigue tasks

- Wings
- Centre wing box and keel beam
- Tail cone
- Skin panels
- Frames, stringers and doublers
- Doors (passenger & cargo)

Titanium - no corrosion tasks

- High load frames
- Door surroundings
- Landing gear
- Pylons

Light airframe using
53% composites



Airbus A350 material composition.

Context



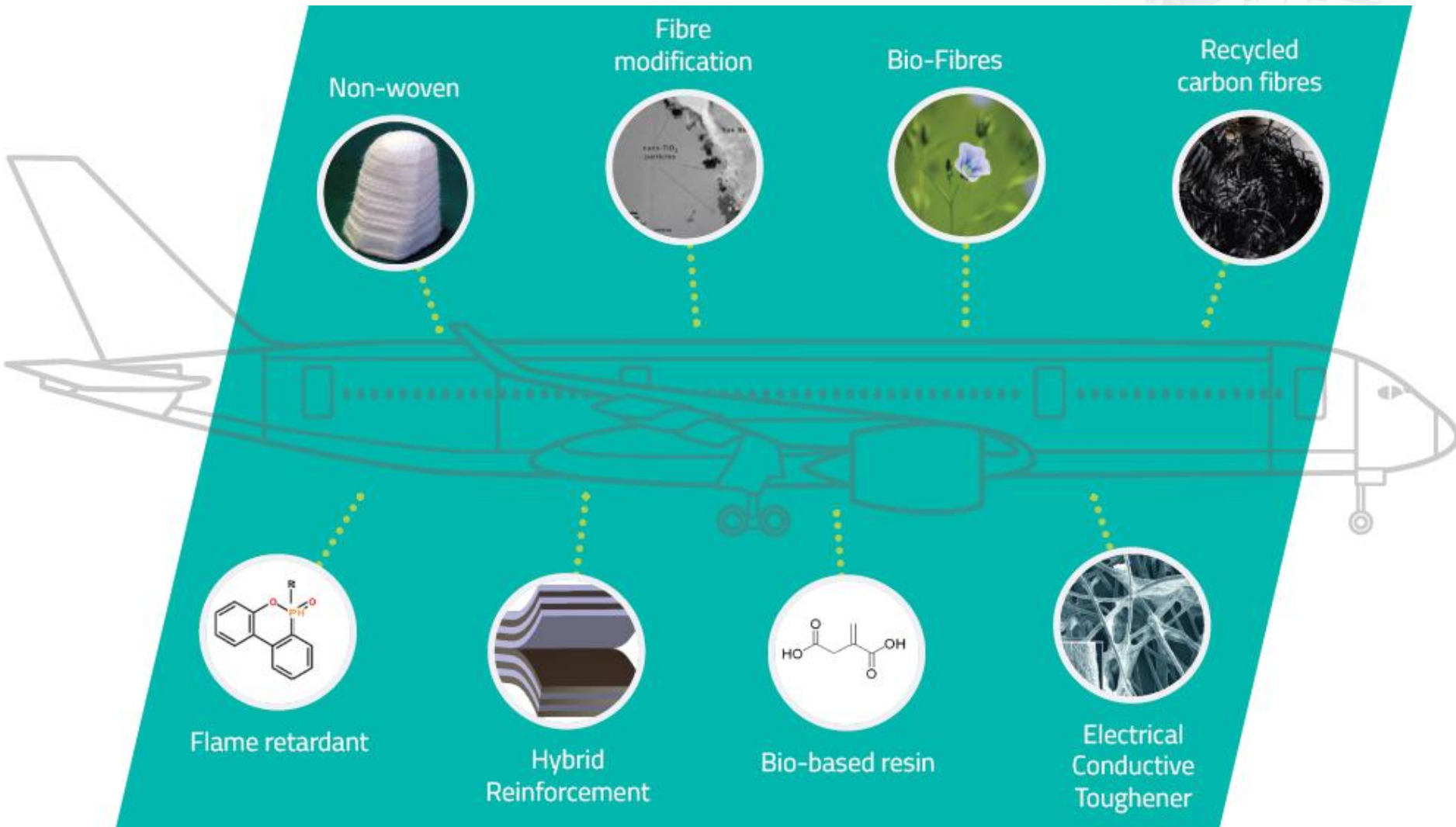
Cost of composites

- ✈ High energy consumption during production of fibers.
- ✈ Fossil-sourced materials → high carbon footprint.
 - Non renewability of materials.
 - Composites are not recyclable and the fibers difficult to recycle and energy consuming.
 - Polymers are man-made and fuel sourced.
- ✈ Short lifespan of airplanes.



Aircraft boneyard in the Mojave Desert (California).

Challenge



2. CONSORTIUM

Consortium



AIRBUS GROUP INNOVATIONS



CENTRE INTERNACIONAL
DE METODES NUMERICS EN
ENGINYERIA



DEUTSCHES ZENTRUM FUER
LUFT - UND RAUMFAHRT EV



INSTITUTO DE CIENCIA E
INOVACAO EM ENGENHARIA
MECANICA E ENGENHARIA
INDUSTRIAL



ACONDICIONAMIENTO
TARRASENSE ASSOCIACION



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The University of Manchester

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AVIC COMPOSITE
CORPORATION, LTD



CHINA AVIATION INDUSTRY
GENERAL AIRCRAFT CO.,LTD



AVIC BEIJING INSTITUTE OF
AERONAUTICAL MATERIALS



AVIC HARBIN AIRCRAFT
INDUSTRY (GROUP) CO. LTD



HARBIN INSTITUTE OF
TECHNOLOGY



AVIC HEFEI HANGTAI
ELECTROPHYSICS CO.,LTD



NINGBO INSTITUTE
OF INDUSTRIAL
TECHNOLOGY,CHINESE
ACADEMY OF SCIENCES.



SHANGHAI AIRCRAFT
MANUFACTURING CO.,LTD



SHANDONG UNIVERSITY



TONGJI UNIVERSITY



AVIC XI'AN AIRCRAFT INDUSTRY
(GROUP) COMPANY LTD



March 2018

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3. OBJECTIVES

Objectives



Bio-resins

Bio-fibres

Composites

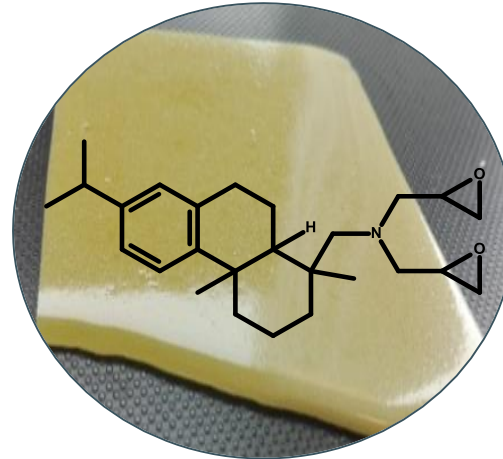
Characterization

Modeling

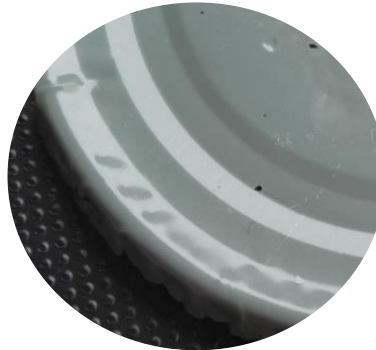
Applications



Rosin



Rosin based epoxy resin



Nanofilled epoxy resin



Objectives



Bio-resins

Bio-fibres

Composites

Characterization

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Applications

Ramie

Flax



Figure 3. Non woven matt production process by DLR.



Objectives



Bio-resins

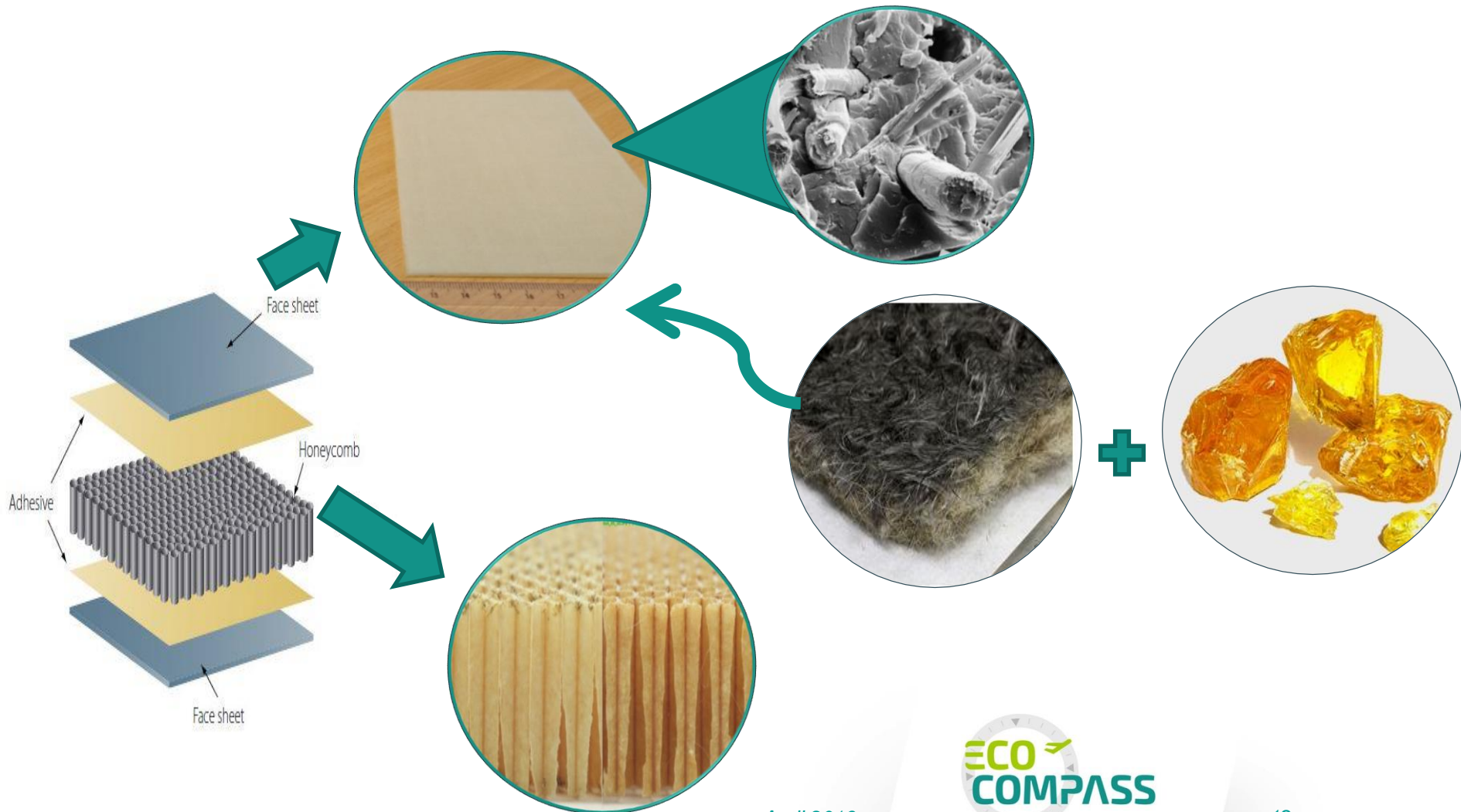
Bio-fibres

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Objectives

Bio-resins

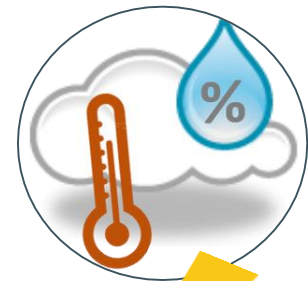
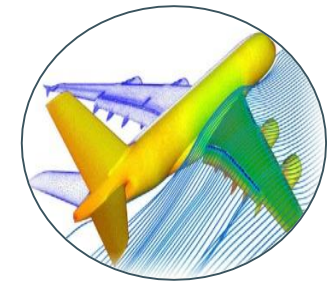
Bio-fibres

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Objectives

Bio-resins

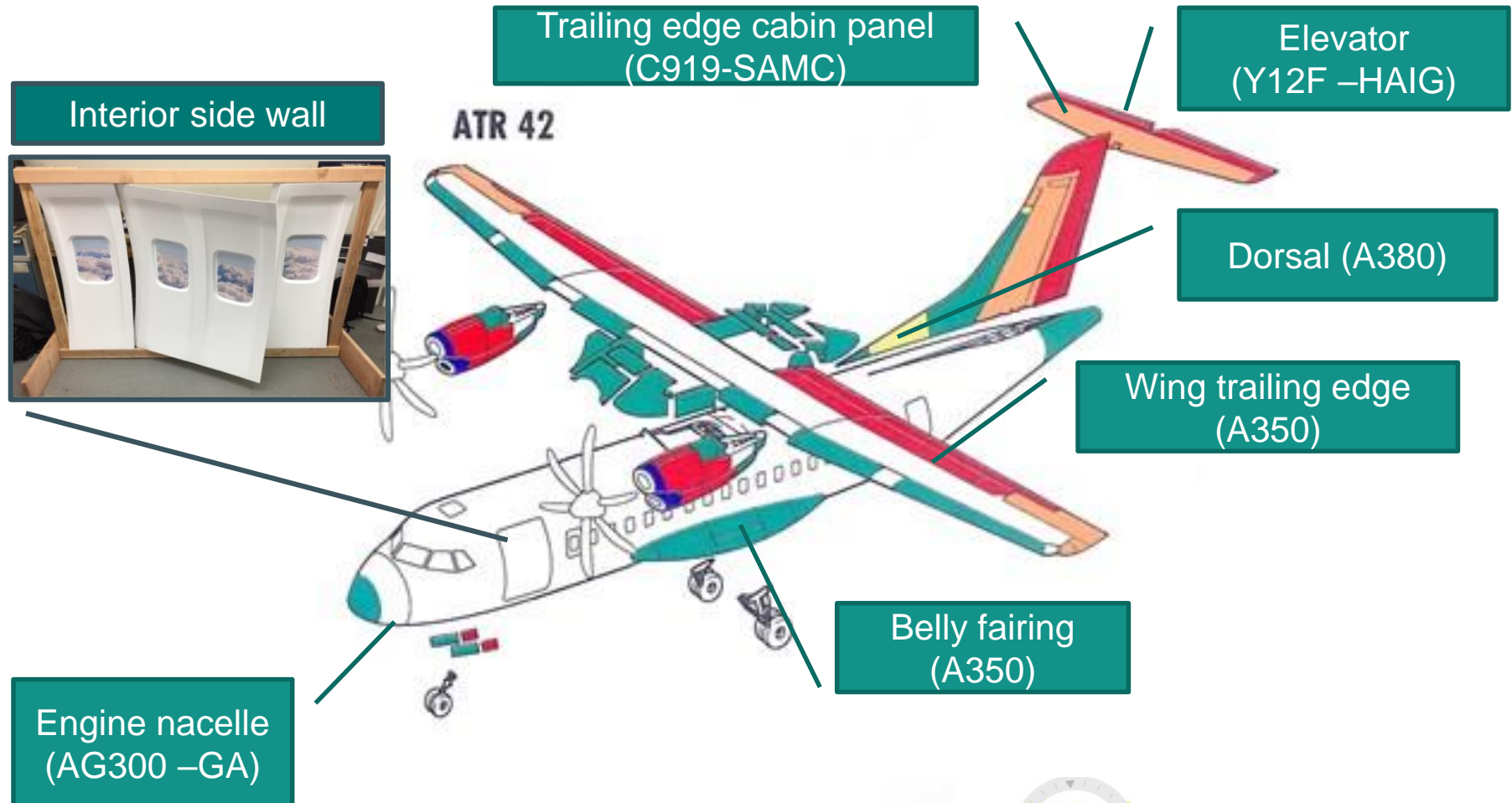
Bio-fibres

Composites

Characterization

Modeling

Applications



4. RESULTS

Results

Year 1

Year 2

Year 3

5. Introduction of fibers as reinforcement



Recycled carbon fibers

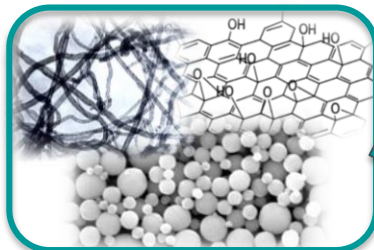


Natural fibers

4. Nanofilled resin



3. Nanofillers introduction



2. Neat Rosin based epoxy resin development



6. Composites fabrication



7. Final application in secondary structures and interior.

ECO COMPASS

1. Rosin based derivatives



ECO COMPASS

April 2016

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THANK YOU FOR
YOUR ATTENTION