ZERO WASTE BLADE RESEARCH PROJECT

ZEBRA PROJECT

The aim of ZEBRA project is to demonstrate on a full scale the technical, economic and environmental relevance of thermoplastic wind turbine blades, with eco-design to recycling.

TECHNICAL AND ECONOMIC IMPACTS

• The use of Elium resin and recycling process optimization constitute an opportunity to reduce impact environmental impact
• Manufacturing optimization constitute an opportunity to reduce cost
• Redesign, better collect and reuse of material in market will allow the deployment of sustainable blades

PARTNERS

IRT Jules Verne, Arkema, ENGIE, LM Windpower, Owens Corning, Suez, CANOE

BUDGET

18 500 K€

EQUIPMENTS

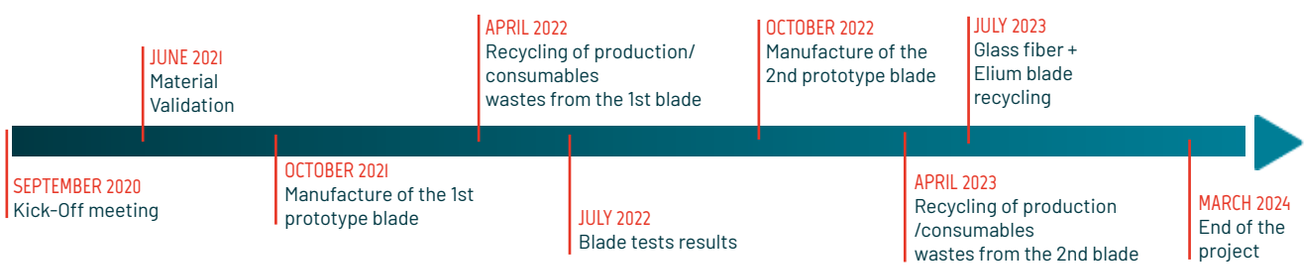
Madras Line
Recycling pilot line
Sub component
Static and fatigue test bench
Blade test facilities

KEYWORDS

Sustainable, eco conception, In process waste management, end of life management, automation, recycling

RESEARCH THEMES AND EXPERTISES

Manufacturing flexibility
Forming & preforming processes
Recycling process innovation
Process innovation



INDUSTRIAL CONTEXT

The composite structure and materials of the turbine blades represent specific challenge. This composite design is necessary to boost the performance of wind blades by allowing lighter and longer blades. 2.5 million tons of composite material are in use int the wind sector globally. The main technology for recycling composite waste is through cement co-processing.

In order to sustainably improve the recyclability of the blades, the solution is to find an alternative to thermosetting composites, which cannot be recycled. The envisaged solution: Use thermoplastic composites. Also resistant and light, they have the advantage of being able to be remelted after use to make new materials.

Today, a network of innovative companies recognized at the world level, supported by research laboratories, has all the skills required for the deployment of sustainable thermoplastic wind turbine blades.

INNOVATIVE FEATURES

• Use of Elium in a large scale blade in particulary Elium infusion on very thick part
• Manufacturing of composite parts improvement to reduce waste such as glass fiber fabrics
• Automation proof of concept for the fiber placement for blade draping to improve the cost
• Recycling methods improvement to recover and reuse secondary raw material

INDUSTRIAL APPLICATIONS

The general objective of this project is to develop sustainable material and production processes for the manufacturing of wind energy blades.The use of this resin versus its thermosetting counterparts introduces cost savings due to non-heated tooling, shorter manufacturing cycle times, and recovery of raw materials from the retired part. Because composites parts have high embedded energy, recovery of their constituent materials can provide substantial economic benefit. This project will determine the feasibility at lab scale and pilot scale of recycling composite wind turbine blade components that are fabricated with glass fiber reinforced Elium® thermoplastic resin.

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