

# Smart composite materials and reinforced

EVEREST Project

IRT  
JULES  
VERNE

The Everest project focuses on the production of a large reinforced-composite structure equipped with a sensor network. The use of new materials should help to make the structure more robust. The sensors will serve to monitor the structural health throughout the service life.

## Technical and economic impacts

- ▶ 5% weight saving on wind turbine blades
- ▶ 10% lower blade maintenance costs
- ▶ 25% fewer on-site interventions

## Keywords

Sensors // Diagnostics  
Monitoring // Smart materials  
Composite material reinforcements



## INDUSTRIAL CONTEXT

A French offshore wind industry is emerging with support from the French government. Three gigawatts on 6 wind farms are scheduled by 2020. Due to the increasingly gigantic sizes of wind turbines, the difficult access conditions, and the estimated lifespan of 25-30 years, operating and maintenance costs are high, accounting for about 30% of the global cost. In this context, lowering structural weight, reinforcing the structures and optimising maintenance costs are fundamental issues

## INNOVATIVE FEATURES

- ▶ **The material aspect:** improving the mechanical properties of large structures made of composite materials by adding carbon nanotubes.
- ▶ **The inspection aspect:** optimising maintenance operations and making them more reliable by integrating sensors in the highly stressed areas on the blades.

## INDUSTRIAL APPLICATIONS

If the maintenance costs can be reduced and major failures anticipated, it will help optimise the cost of the KW/h produced by sea-based renewable energy. These results could also be applied to land-based wind turbines and the aerospace and automotive industries.



## Partners

- ▶ IRT JULES VERNE
- ▶ GE RENEWABLE POWER
- ▶ EUROPE TECHNOLOGIES
- ▶ IFSTTAR
- ▶ LARMAUR (UMR CNRS, UNIVERSITE RENNES)
- ▶ LIMATB (UBS)
- ▶ ARTS ET METIERS PARISTECH ANGERS
- ▶ IPR (UMR CNRS, UNIVERSITE RENNES)

## Equipment

- ▶ Banc d'essai multi-vérins

## Budget

- ▶ 1 282 k€

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