SmartFAN

Smart by Design and Intelligent by Architecture for turbine blade fan and structural components systems

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OBJECTIVES

SMARTFAN proposes the development of "smart" material and product architectures, with integrated functionalities, that will interact with their environment and react to stimuli by employing biomimetic, self-sensing, actuating and damage-repairing technologies.

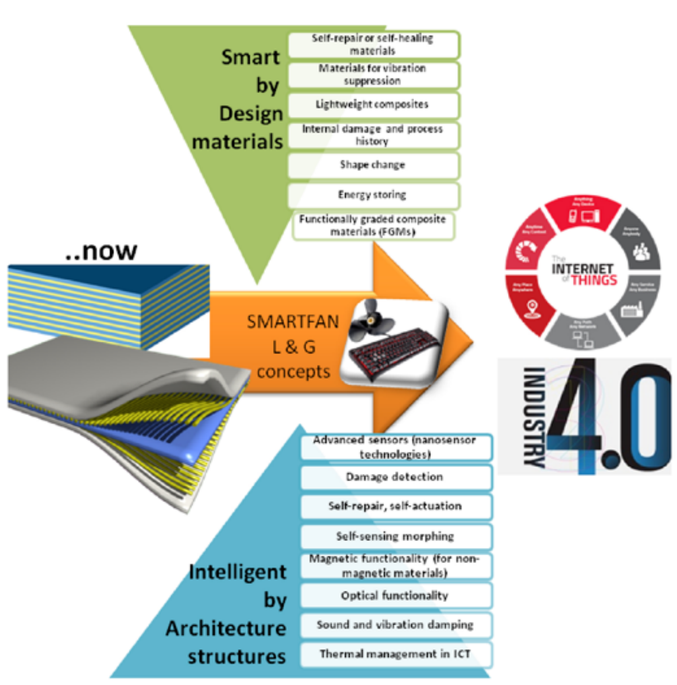
Their smartness is based on bio-inspired engineering and the use of:

- Low and high grade carbon fibres (CF)
- CF reinforced polymers (CFRPs)
- Nano-/micro- composites with special physicochemical properties, in order to develop smart (bulk) materials, applied on intelligent structures

Special functions of the smart materials involve:

- CFs for reinforcement of the structure and creation of conductivity gradients
- Carbon Nano Tubes (CNTs) and Carbon Nano Fibres (CNFs) for sensing, micro-hollow particles for self-healing
- Electro-magnetic nanoparticles that enable field detection and shielding
- Coloring agents or marking cracks and defects
- Intelligent communication through Internet of Things (IoT).

THE FRAMEWORK



MAIN CHALLENGES

1. Novel concepts for intelligent components and structures with integrated functionalities that are able to communicate and interact with their environment, store data about their condition and react accordingly to external stimuli
2. Development of materials that can alter their physical properties and shape
3. Intelligent structures and components that provide information of their in-service conditions
4. Self-repair, self-healing, lightweight composites that inform the user of any internal damage without the need of time consuming measurement techniques
5. Non-destructive examination
6. Materials or structures that can undergo shape change either passively or by activation. Functionally Graded composite Materials (FGMs), energy storing components
7. Predictive modelling of materials functionalities for those materials for which there are currently no accurate commercial or open-source codes available

EXPECTED GOALS

Development of "smart and green" chemical composites

Production of CFs using renewable resources

Development of system design strategies

Development of new strategies and processes for pilot scale production

DETAILS

- **PROJECT REFERENCE:** 760779
- **START/END:** Jan 2018 – Dec 2021
- **EU CONTRIBUTION:** EUR 7,989,601.25
- **PROGRAMME ACRONYM:** SMARTFAN
- **CALL IDENTIFIER:** H2020-NMBP-2017-two-stage
- **TOPIC:** NMBP-04-2017 Architectured/Advanced material concepts for intelligent bulk material structures

CLUSTERS

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