FIRE-RESIST - Developing Novel Fire-Resistant High Performance Composites

Project overview
E-LASS kick-off meeting 8.-9.10.2013 @ SP
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FIRE-RESIST

- EU FP7 research project for 2011–2014
  - total budget of 7.7 M€
  - coordinated by University of Newcastle
  - 18 beneficiaries, including transport sector companies (rail, aeronautic and maritime), material manufacturers and research organizations

- The **overall goal of FIRE-RESIST** is to
  
  develop novel, cost effective, high-performance, lightweight polymer matrix composite materials **with a step-change improvement in fire behaviour**

- Five specific S&T objectives
Project beneficiaries
Objective 1: multi-micro-layered structural composites that provide a step-change improvement in fire behaviour

- Micro-layered structural materials that are designed to delaminate extensively when exposed to heat, thus generating a fire barrier of exceptionally low thermal conductivity
Objective 2: hybrid thermoset composites that provide a step-change improvement in fire behaviour

- Hybrid thermoset composites that are polymeric at normal temperature, but which decompose under fire to provide highly protective ceramic char phases
Objective 3: high char polymer matrix composites derived from natural sources that provide a step-change improvement in fire behaviour

- Development of mainly glass fibre reinforced composites with enhanced char-producing capabilities
- Use matrices from natural and sustainable sources, most notably those involving furan and lignin-based precursors
- Target is to achieve high yields of char (40–60%) in fire conditions
Objective 4: particle-doped polymer fibres for fire-retarded commingled composites

- Commingling of particle-doped polymer fibres and conventional fibre reinforcements for the highly efficient dispersion of fire retarding particles within a composite
Objective 5: advanced multi-scale simulation of polymer matrix composites in fire

- Simulation methods for the response of polymer matrix composite materials and structures to fire
- CFD-FEA coupling methodology
- Material models for the fire and structural simulations
- Experimental validation of the full simulation chain
Evaluation of alternative solutions by simulation

Alternative solution

Fire simulation
1) Calibrate the model using e.g. fire resistance tests.
2) Apply in real configuration assuming a design fire.

Evaluation of alternative solution

Design acceptance
A) Risk level
B) Comparison with SOLAS solution

Evaluation of SOLAS solution

MSC/Circ.1002. Guidelines on alternative design and arrangements for fire safety
VTT creates business from technology