



Manufacturing of complex parts **based on unidirectional tapes**

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About the project

Research on efficient integrated systems for the manufacturing of complex parts based on unidirectional tapes for the automotive and aeronautical industry

- FoF-02-2014 Manufacturing processes for complex structures and geometries with efficient use of material
- Research and Innovation action
- Total cost / EU Contribution: 5 030 003,96€
- Consortium: 10 partners from 5 countries





Use of UD tapes Current situation




📦 UD-tapes with very high prices

📦 Lack of automation

📦 Lack of predictive models

📦 Faulty parts production rate is really high



Consolidation in-situ using PEEK: high performance & high price

Lack of material adapted to small and repetitive components

Lack of PA composites complying fireproof regulations for interior cabin applications

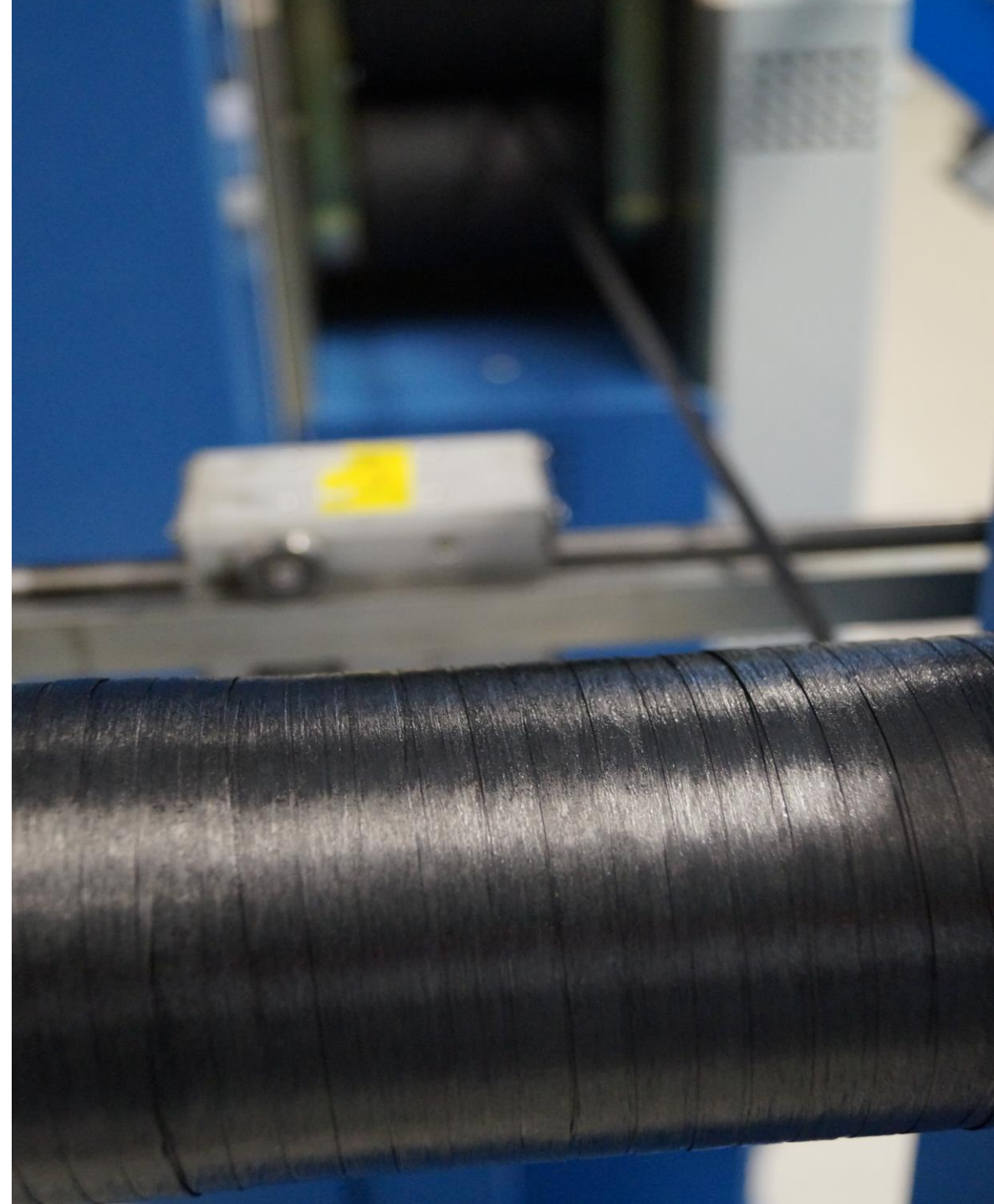


FORTAPE Innovations

Challenge 1

Development of an efficient process for carbon fibre and glass fibre UD tapes manufacturing with reduced material usage and increased mechanical performance

- ❖ Innovative impregnation systems:
 - Fluidized bed of thermoplastic powders
 - Melted supercritical fluid-aided thermoplastic polymer
- ❖ Replacement of the slitting and splicing stages
- ❖ Novel heating up techniques



Challenge 2

Development of an innovative overmoulding technology to manufacture complex composite parts locally reinforced with UD tapes



Injection-compression moulding

Automated tape laying

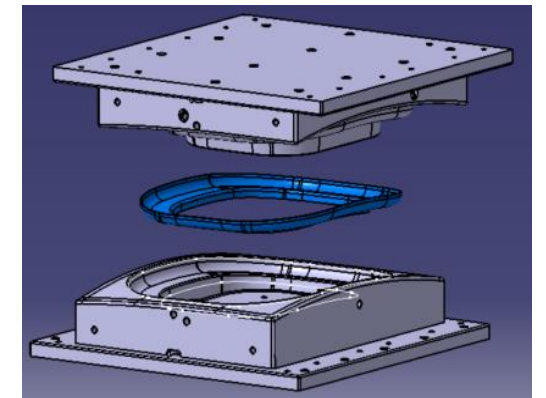
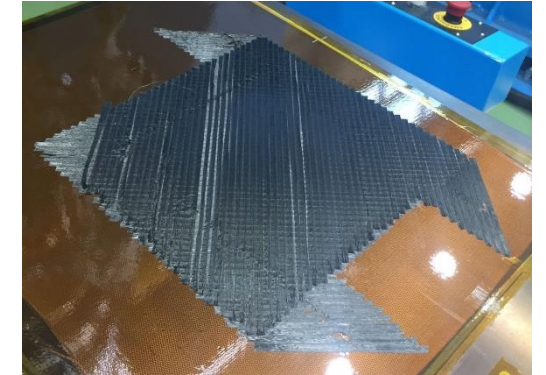
Online process control

**Automotive
cycle time**

Challenge 3

Development of a novel in-situ consolidation technology to manufacture complex composite parts for secondary structure and interior cabin

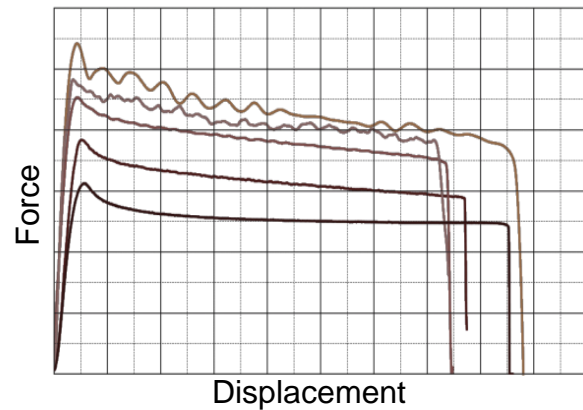
- PA complying fireproof regulations
- No need of autoclave



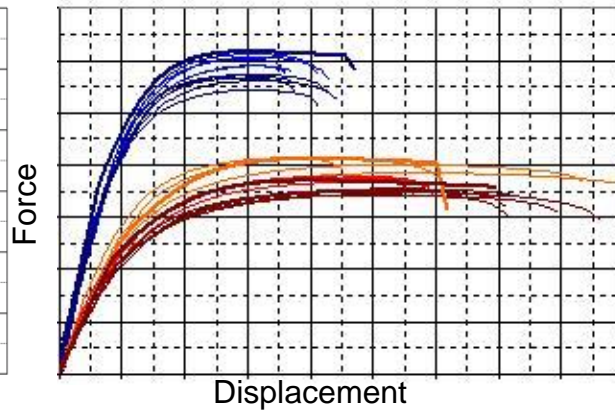
Challenge 4

Development of novel modelling concepts to assess the geometry design of complex parts and to select the best strategy for the part manufacturing

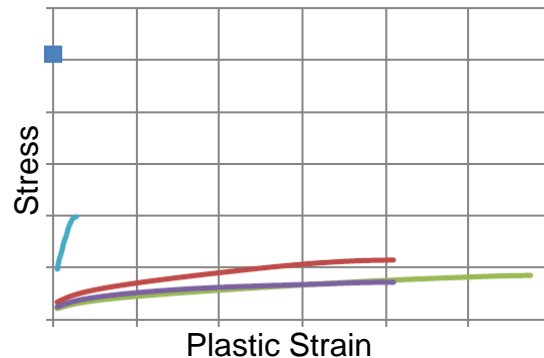
Behavior of PP is
visco-elastic, visco-plastic,
isotropic



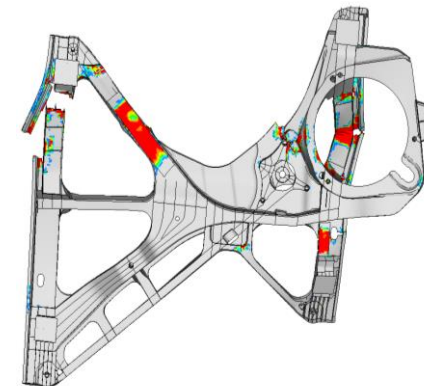
The behavior of PP SGF is
visco-elastic, visco-plastic,
orthotropic



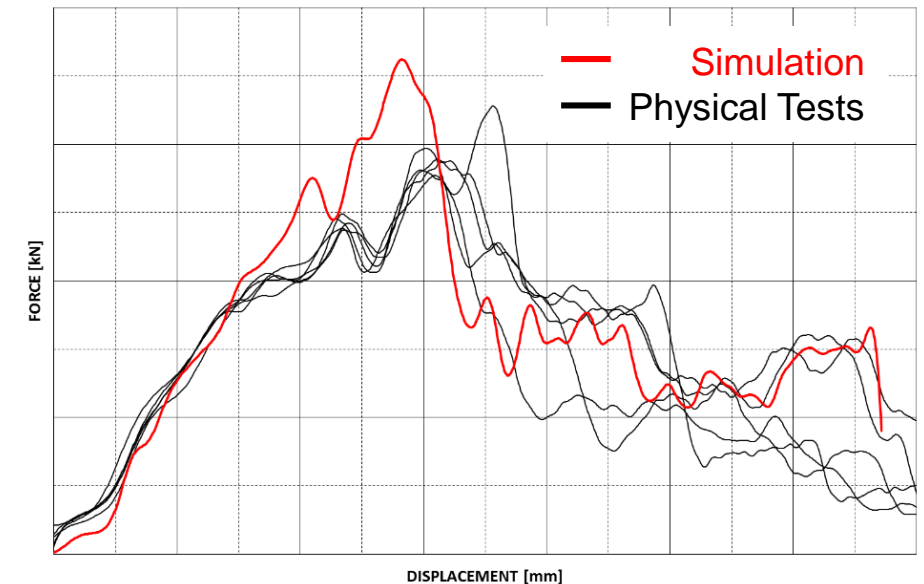
The behavior of UD tape can be pure
elastic without plasticity (0°) and visco
plastic with significant plasticity (90°)



Crash simulation
methodology



Physical Test





FORTAPE Impact

Impact:

 Reduction in raw material usage

40% on the
Automotive
Industry



75% on the
Aeronautic
Industry



 Energy consumption saving

35% on the
Automotive
Industry



45% on the
Aeronautic
Industry

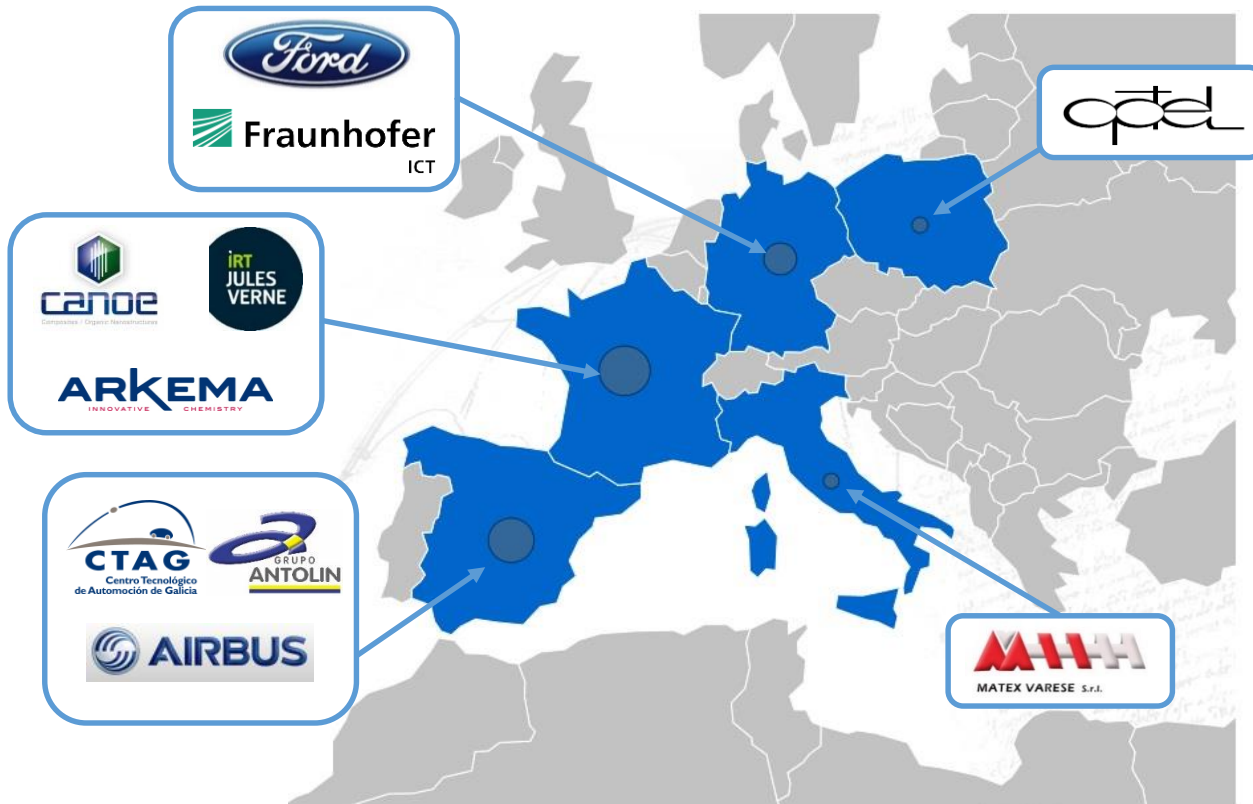


 Elimination of faulty manufactured parts

At least **85%** for **Automotive** applications and to keep performances (average value 7%) for **Aeronautics** Sector

Thank you for your attention

www.fortapeproject.eu



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