Virtual Upscaling through Modelling Factory

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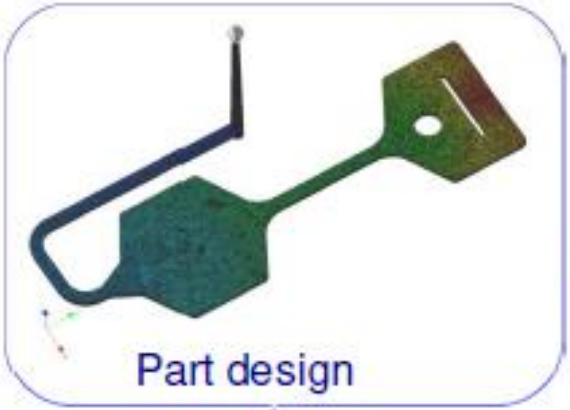
Task 3.1: Extracting requirements for Modelling Factory with sub case study 1

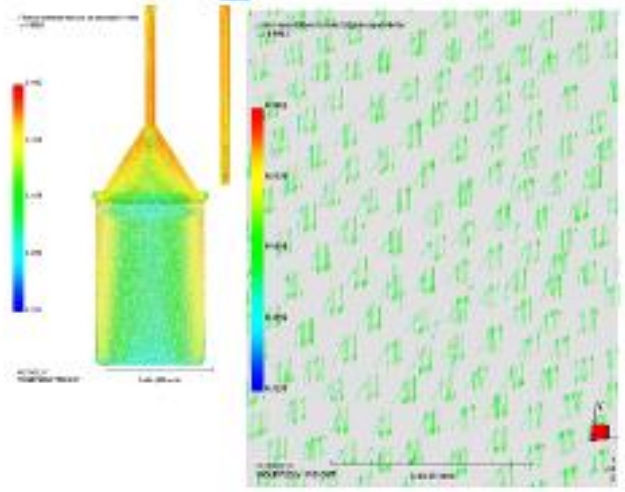
Description: Planning of the tasks:

- Analysis of the heterogeneity of the process (already done in other projects).
- Simulations with commercial material models (already done in other projects).
- Generate novel material models
- Simulate with novel material models, and select the best options
- Standardize the best models and define the virtual upscaling method in collaboration with WP4.
- Used Software: Autodesk Moldflow (fiber size, fiber orientation, and porosity), Digimat (material modelling from micro to macro scale, ANSYS (structural performace prediction at component level).



MOLDFLOW

Rheological simulation of the flow of the material in the mould. Determination of the orientation of the fibres



Iteration

µCTomography or Microscopy

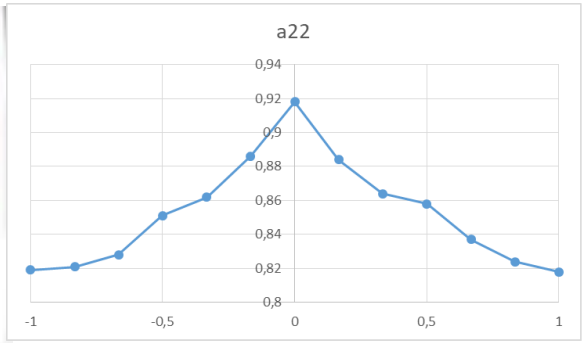
Determination of the real orientation of the fibres and their length

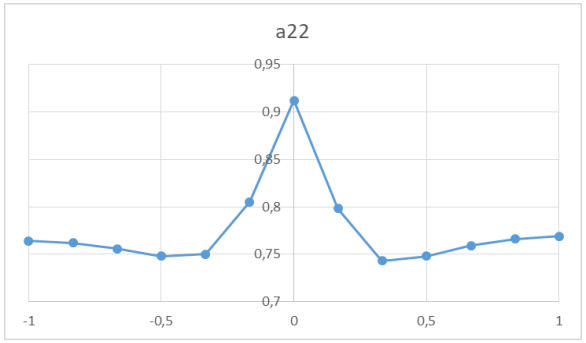
MOLDFLOW ANALYSIS

Side

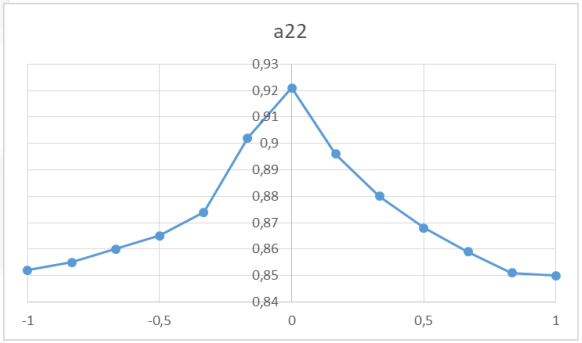
Core

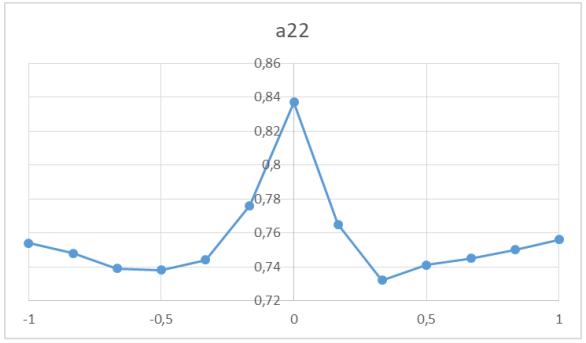
Entrance



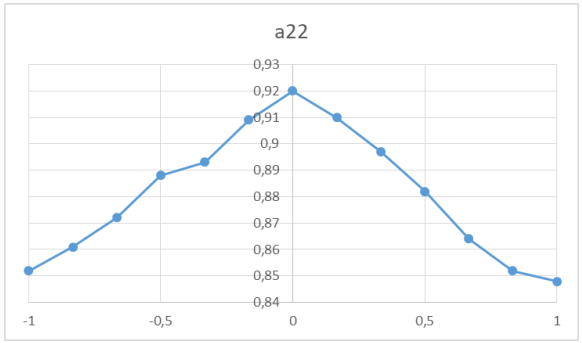


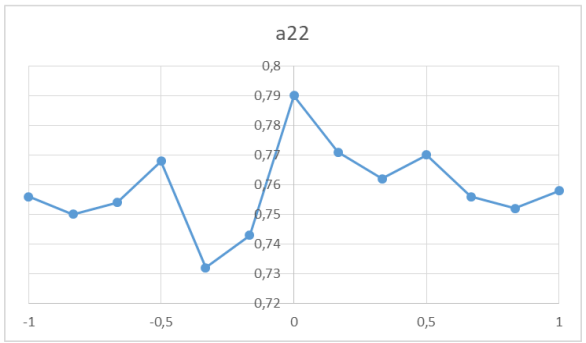
Centre



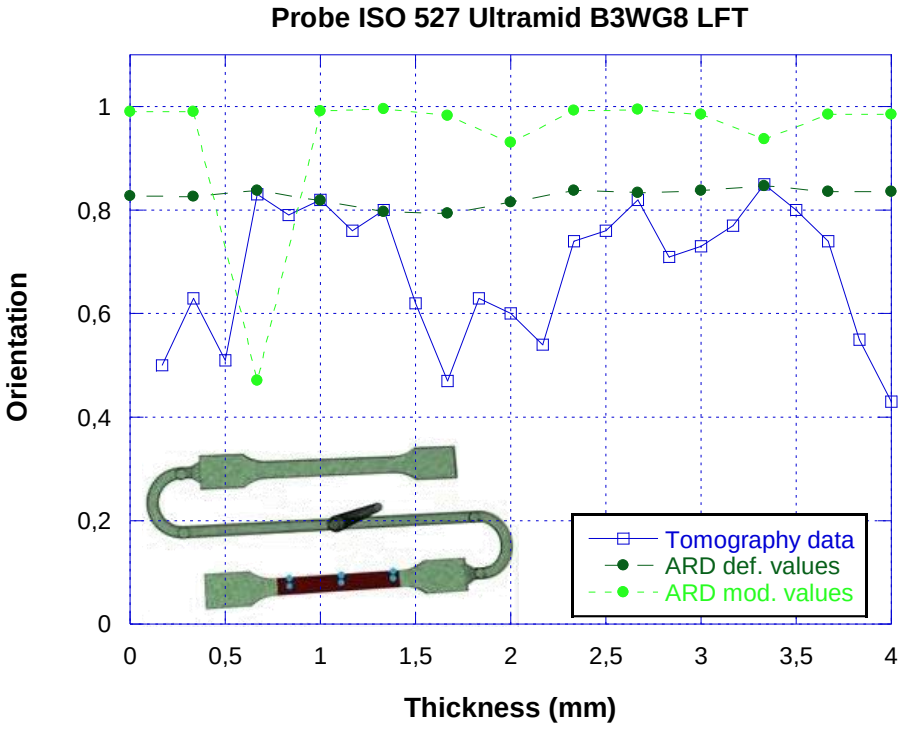


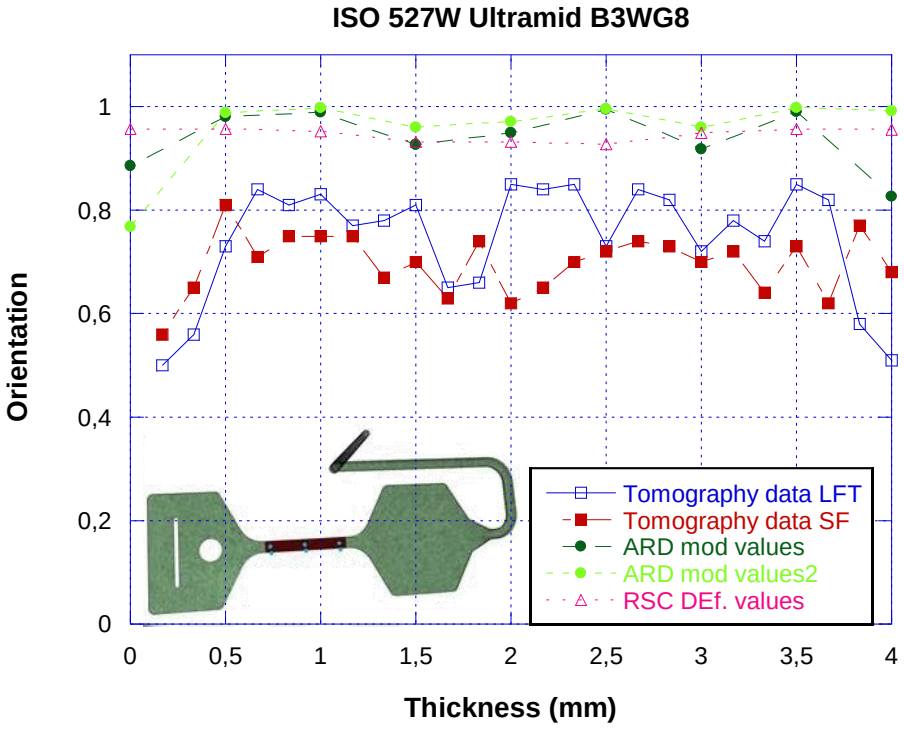
Exit

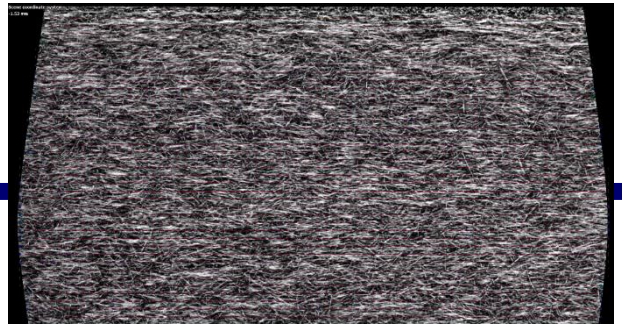


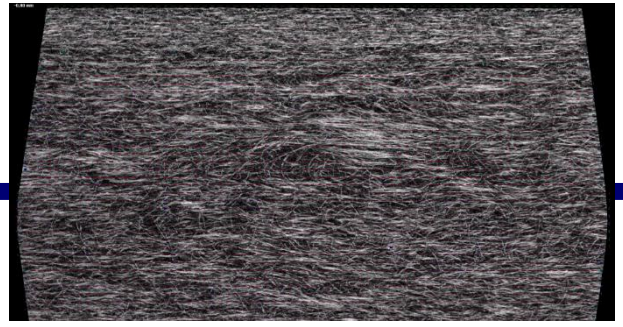


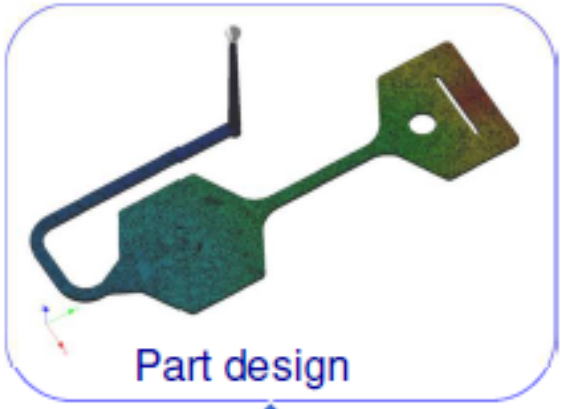
Comparison of tomography data with MOLDFLOW orientation patterns:







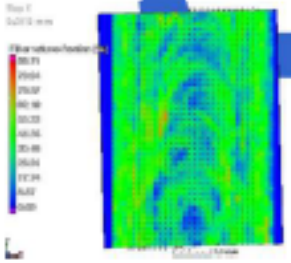




Part design

Redesign

ANSYS
Calculation of the structural behaviour of the parts



DIGIMAT
Translation of the material characteristics, orientation vectors and aspect ratios to structural analysis codes

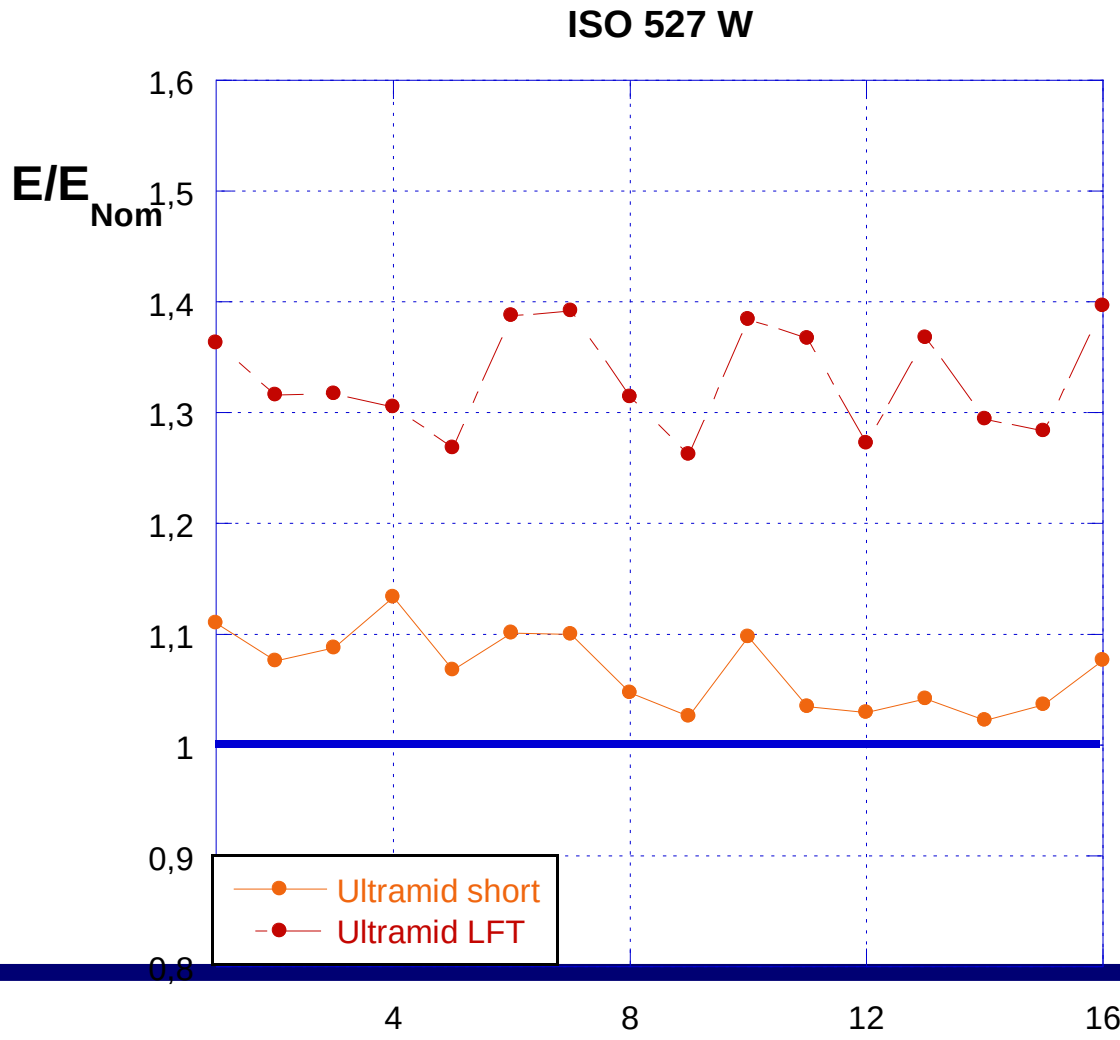
µCTomography or Microscopy
Determination of the real orientation of the fibres and their length.

Correction of parameters

MOLDFLOW
Rheological simulation of the flow of the material in the mould. Determination of the orientation of the fibres

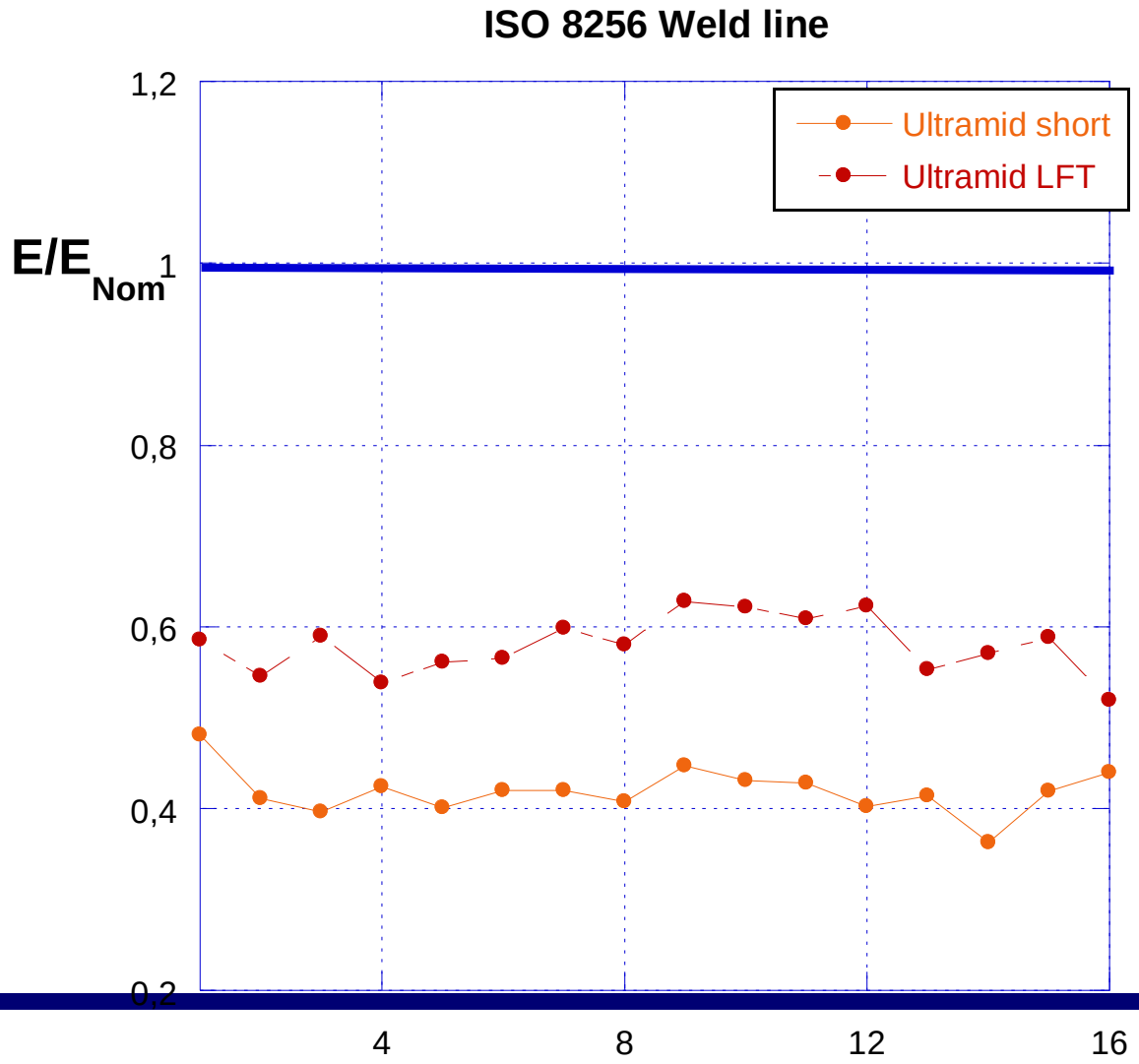
SPECIMEN TESTING:

Mechanical analysis: Modulus measurement

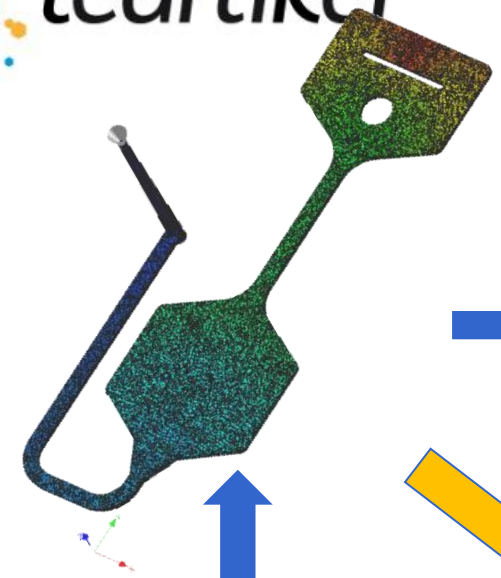


SPECIMEN TESTING:

Mechanical analysis: Modulus measurement



Welding probe, ISO 8256 C



Moldflow
Microscopy
μCTomography

Fibre orientation

Specimen testing

Properties

Iterations

Calculations

DIGIMAT: Material Models

Structural code:
(Abaqus, Ansys…)

In process

Discussion: