

QUICOM

Quantitative Inspection of Complex Composite Aeronautic Parts Using Advanced X-ray Techniques

First results available

In the first year of QUICOM Milestone M1 "Definition of detailed specifications" was achieved, which marks the end of the first phase of the project. To achieve this milestone the industrial needs have been gathered, together with the samples as well as related reference NDT data.

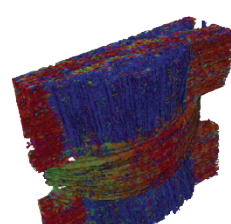
As for now, the core phase of the project was successfully initiated and also the development of methods and techniques for the QUICOM technology platform has been started:

For the evaluation and optimization of X-ray computed tomography techniques to analyse composites at the micro- and meso- scale, different porosity analysis techniques have been compared and evaluated.

The main influencing parameters have been identified. Further investigations have been done using CT and phase contrast. Optimized image acquisition protocols and reliable and robust image processing methods have been developed to separate the different components of composites, in order to evaluate the fiber and matrix content as well as local and main fiber directions. Regarding small high volume parts complex CFRP models with woven fibers incorporating features as porosity, lack of resin, missing fibers, delamination and fibers of different materials, were developed for simulation. The simulation scenarios were proposed and the corresponding radiographs simulated.



Scalar Data
containing
fiber bundles.



Reliable
Hessians.



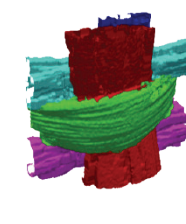
MetaTracts



Clustering
Meta Tracts



Voxelization

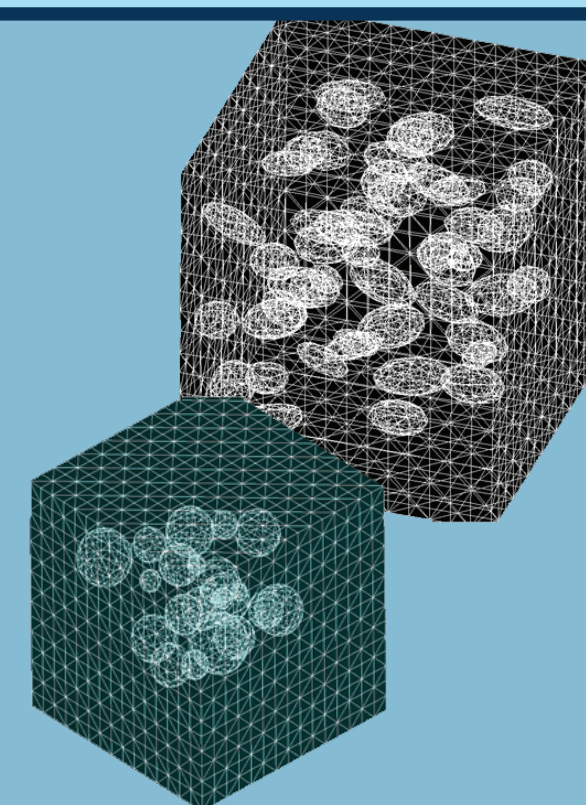


Surface
Extraction

Furthermore dual energy techniques and also the use of spectral detectors are currently investigated in the scope of small high volume parts. Furthermore fast process integrated tomosynthesis as well as axial and helical XCT scans were performed with encouraging results. Regarding composite metallic parts a large area single photon counting detector based on Medipix/Timepix device was adapted and tested for QUICOM purposes. Excellent images of the composite materials were obtained for both composites with metallic inlays as well as for sandwich structures with metal core. The procedure for identification and visualization of delaminations in composites with honeycomb structures was developed and successfully

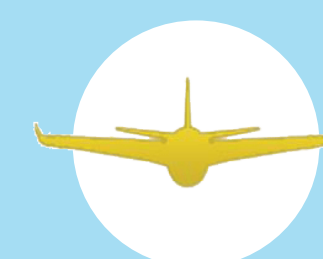
tested based on postprocessing of single radiograms. Also regarding large and complex parts, CFRP modeling has been started, including all demanded defect scenarios. In addition to that, first laminography simulation results have been generated. Furthermore, a new method to calculate the absolute porosity of composites without the need of using reference samples is currently being developed. Efforts have been started to develop a method of transformation of micro-CT images into voxel finite element models. Finally, for analysis and visualization of results two approaches called FiberScout and MetaTracts have been generated in order to investigate a 3D XCT dataset of fiber reinforced composites in a simple and fast way.

First results of the core phase have been presented in a special QUICOM session of the 3rd EASN workshop on Aerostructures in Milan, Italy at the beginning of October 2013. Furthermore, the 1st Industrial Interest Group Meeting took place together with the 3rd QUICOM general assembly meeting in October 2013.



Get Involved

There is still the chance to join the industrial interest group of the QUICOM project. In case you are interested feel free to contact us via the following email: c.heinzl@fh-wels.at



For more information on the QUICOM project please visit www.QUICOM.eu



QUICOM Project Website
www.QUICOM.eu



University of Applied Sciences



The QUICOM project has received funding from the European Union Seventh Framework Programme (FP7/2007- 2013) under Grant Agreement n° 314562.

