From Sensor Placement in the Context of CAD to Measured Data: Traceability through 3DEXPERIENCE

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Abstract

The Aerospace and Defence industry is facing huge challenges including the need to significantly reduce its environmental footprint. It is required to do this in an increasingly competitive market, which sees many new players joining the field. Companies must deliver superior performance whilst making no compromises on safety.

As part of the drive to be first to market with the right product, there is a big focus on improving and accelerating the testing and certification processes. The past few years has seen a large increase in the use of simulation during the design process but it is also the case that simulation can assist by allowing more targeted, more efficient physical testing. However, the usefulness of simulation is largely determined by how well the model represents and predicts the behaviour of the physical phenomena. It is therefore very important to be able to demonstrate how well simulation results correlate with physical test.

'Smarter Testing' is an Innovate UK funded four year project (#52036), which aims to optimise the testing and certification methods for aeronautical structures. The ambitions of the project are twofold:

- To improve the efficiency of the physical tests, better traceability of the test data, reduce the downtime of tests
- To make better use of simulation, making simulation data more easily accessible to help understand what is going on during a physical test and make it easier to correlate the physical and the simulation data.

The project commenced in January 2021. It is led by Airbus UK and involves a consortium of partners: University of Liverpool, Dassault Systèmes UK, National Physical Laboratory (NPL), Centre for Modelling and Simulation (CFMS) and GOM.

Dassault Systèmes' CATIA on the **3D**EXPERIENCE Platform is well established as being the place where CAD designers can design the products of the future but this same platform is now being used as the place to plan the physical and virtual tests that will help certify the product. The intention is that the **3D**EXPERIENCE Platform will provide the digital thread, underpinning the more effective use of both physical and virtual testing.

Our presentation provides an overview of some of the on-going work on this project, specifically focussing on how the digital thread is enabled and maintained; from initial requests for physical sensor placements through to comparing the measurements taken by the sensors with the predications from simulation. Included are details of:

- Capturing requests for strain gauge placement (and other sensors such as DIC full field) in the context of the design CAD of the items under test. This forms a Test Digital Mock-up Unit (TestDMU)
- Capturing as-fitted information including sensor serial numbers and calibration information within the same TestDMU
- Linking the TestDMU with corresponding simulation models within the **3D**EXPERIENCE Platform through a testing strategy
- Configuring data acquisition systems and physical test data storage from the same TestDMU structure
- Accessing large virtual and physical test data from within the context of the TestDMU