Integrating Virtual and Physical Test Data into the 3D CAD Environment within Structures Test

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Abstract
In order to enable faster, cheaper and more reliable testing at all scales, digital continuity to link physical testing and virtual testing is essential. The Data Driven Platform aims to provide an easy to access collaborative environment for testing teams and internal customers alike. The platform is built on 3DEXPERIENCE, using the concepts of single point of access to enable a digital thread to link test pyramids, design data, sensor locations, physical test data, virtual test data (structural FE) and reporting data. The Data Driven Platform allows the connection and management of all of these data types from a single location to provide end to end lifecycle management for structural testing.

Introduction
The Data Driven Platform has been created to manage all types of physical and virtual test data. This starts with the management of the hybrid test pyramid, which is employed to ensure that the testing requirements are answered with appropriate physical and virtual tests. It enables requirements, planning, strategy and project archiving data to be accessed from a single location, enabling more robust and traceable data management.

Physical test data must be captured from the test shop floor and brought into the digital environment. This data comes from many different sources, but it needs to be appropriately managed so that its origin is known, and it can be consumed with confidence. Virtual test data is captured from structural finite element simulations, which also need good traceability to increase the credibility of the data.

After the data has been collected, it may then be utilised in correlations and comparisons, to enable informed decision making both during and after the test. The correlations can be used to increase understanding of virtual testing, enabling a future where physical tests can be replaced by virtual tests.

Method
The Data Driven Platform aims to provide a user friendly tool to carry out all of these functions. So far, many of the features required to do this have been created as proof of concepts, using the 3DEXPERIENCE tool from Dassault Systèmes. The proof of concepts are being trialled on real tests in the Airbus Filton structures test department, in particular the Smarter Testing Dummy Demonstrator, which provides real user feedback and improvements for the tool.

These proof of concepts include:-

- Management of hybrid test pyramid in the Data Driven Platform.
- Management of data acquisition and strain gauge installations from Data Driven Platform.
- Virtual strain recovery from an FE simulation that has already been run, regardless of the pre-processing.
- Physical strain gauge data (live and post test), and virtual test data being displayed in the context of the 3D CAD.

Future Work

The development of the Data Driven Platform will continue to mature the proof of concepts, eventually aiming to create a full end to end solution that can be used on an industrial scale.

Acknowledgements

This work was carried out as part of the Smarter Testing project (Innovate UK, Contract: D20016286).