ADVISE Report Summary

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Periodic Report Summary - ADVISE (Advanced dynamic validations using integrated simulation and experimentation)

ADVISE in a nutshell
ADVISE is a pre-normative Seventh Framework Programme (FP7) project for quantitative validation of simulations of dynamic events using image-based methods of deformation measurement. Dynamic events are especially important in considering the safety aspects of means of transportation. Advances in optical techniques for deformation measurement are brought together with recent advances in modelling the impact of two- and three-dimensional composite structures. The project deliverables are:
- reference materials for dynamic calibration of image-based methods of deformation measurement;
- optimised methodologies for optical measurement and computational modelling;
- draft standards for experimental validation of dynamic simulations.

The ADVISE consortium includes research laboratories, universities, instrument suppliers, and companies from the aerospace and automotive industry (see www.dynamicvalidation.org online).

Project framework
The project falls within the FP7 Sustainable surface transport activity 'Improving safety and security; Area: integrated safety and security for surface transport systems (safety and security by design)'. A major issue is the safety of transport systems during critical events. The increasing number and capacity of transportation systems means an inevitable rise in the number of accidents and casualties unless there are substantial advances in design. Innovative approaches to design are being utilised, but need to be validated in order to demonstrate reliability and provide confidence. Although numerical simulation is an essential and valuable tool, experimental verification is a fundamental requirement for safe design.

ADVISE objectives
Advise is an extension of the successful 'Standardisation project for optical techniques of strain measurement' (SPOTS, FP5, Growth Programme, see http://www.opticalstrain.org online) from static strain to dynamic events. The objective of the ADVISE project will be to provide standardised procedures that allow confidence levels to be defined both for experimental methods via calibration and numerical models via validation. While best practice guides exist for numerical modelling and static measurements of stress and strain, there are no international standards covering the calibration of data from dynamic experiments and their use to validate numerical results in stress, vibration and impact response, i.e. to correlate finite element results with fullfield experimental observations.

The ADVISE objectives are pursued in three technical work packages with supporting work packages for 'coordination' and for 'dissemination'. 'Advanced tools for simulation and experimentation' focuses on image processing, numerical modelling and measurement instrumentation; 'Dynamic calibration' focuses on the development of reference materials for the calibration of optical instrumentation; and 'experimental validation' focused on specific test cases from industrial end-users.

The main outcomes of the project will be: reference materials for optical methods of dynamic deformation measurement;
optimised approaches for the application of optical methods to and advanced modelling techniques for dynamic events; and a recommended methodology for experimental validation by correlation of predictions with measurements.

Six countries plus the European Commission's Joint Research Centre (JRC) are involved in the partnership. The partners have been selected to provide complementarity both in their role in the innovation process and their expertise. The collaboration interacts with CEN, ISO, Nafems and VAMAS TWA26 to ensure that the pre-normative material can become quickly accepted globally thus providing worldwide traceability for validated designs. Constant dissemination through technical, professional and trade conferences and exhibitions is being performed to reach both the scientific audience as well as the European industrial base. Direct dissemination to the EU industrial base will be a priority.

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