Wireless/Integrated Strain Monitoring and Simulation System

From 2011-02-01 to 2013-01-31, closed project

Objective

"This proposal addresses the development and real time test validation of an integrated hardware and software environment that will be able to measure real-time in-situ strain and deformation fields using a state-of-the-art wireless sensor system to enhance structural durability and damage tolerance (D&DT), reliability via real-time structural health monitoring (SHM) for sensorized aerospace structures. The tool will be a vital added extension of existing suite of structural health monitoring (SHM) and diagnostic prognostic system (DPS). The goal of the extended SHM-DPS is to apply a multi-scale nonlinear physics-based finite element analyses (FEA) to the 'as-is' structural configuration to determine multi-site damage evolution, residual strength, remaining service life, and future inspection intervals and procedures. The proposed approach will enable active monitoring of aerospace structural component performance and realization of DPS-based conditioned based maintenance. Software enhancements will incorporate information from a distributed sensor network system. As case study DPS application a realistic composite stiffened panel representative of fuselage/wing components will be selected. Two stiffened panels will be manufactured and instrumented; a) embedded internally between composite layers, and b) surface mounted with an optimized distribution of wireless sensors. The panels will be tested in compression following low-velocity impact. The sensor system output will be integrated with a finite element analysis (FEA) tool to determine the multi-site damage locations, and associated failure mechanisms, residual strength, remaining service life, and future inspection interval. The FEA will utilize the web based GENOA commercial software capable of evaluating both metallic and advanced composite structural panels under service loading conditions. The proposal will utilize a building block validation strategy, and real-time structural health monitoring system."

Related information

Result In Brief
Wirelessly monitoring structural defects

Report Summaries
Final Report Summary - WISMOS (Wireless/integrated strain monitoring and simulation system)
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**EU contribution:** EUR 52 650

**Activity type:** Private for-profit entities (excluding Higher or Secondary Education Establishments)

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Subjects

Industrial Manufacture

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