

# Demonstration and methodology of structural monitoring of hidden composite areas by embedded optical fiber sensors and connectors.

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**Key words:** structural monitoring application, embedded optical fibers, ingress-egress, fiber Bragg grating sensors

## Abstract

This paper describes an application of optical fiber sensors to monitor structural behavior of hidden composite areas by the integration of the fibers inside the laminate. The test specimen comprises a structural skin panel with associated stringer completely representative of the root joint area of the lower cover wing of a real aircraft. The optical fiber sensors specification and drawings were designed in accordance with Stress and Manufacturing requirements. The fiber sensors, consisting of Bragg grating sensors arrays, were integrated into the composite laminate during automatic tape layup process inside the composite production plant. The ingress-egress of the fibers was achieved following a defined methodology and through the integration inside the material of miniaturized optical fiber connectors compatible with the composite manufacturing conditions: temperature, pressure, trimming process, etc. After manufacturing, the test specimen was conducted to structural test Facilities wherein it was installed in its specific test rig designed to reproduce the real load and boundary condition. Finally the structural test was carried out according to test specification, the embedded fibers were simultaneously monitored and the structural analysis was done.

