AdaptHEAT ™ Innovative Solution for Hot Bonding Repair on Advanced Fuselage Carbon Structures

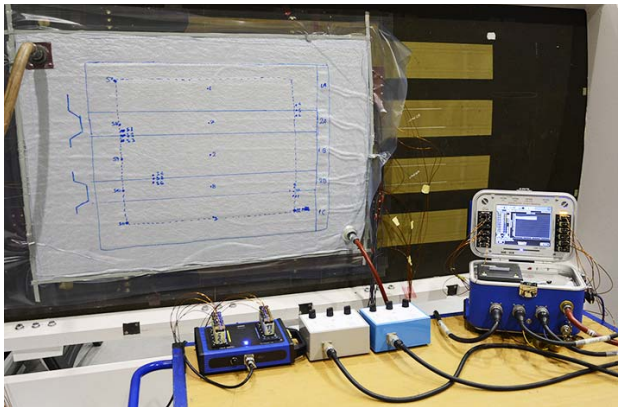
Applications to Airbus A350, Boeing 787, ...

INTRODUCTION & OBJECTIVES Appropriate curing of the patch resin and the adhesive layer is an essential step to secure the integrity and the sound mechanical performance of a bonded composite repair. The A350 fuselage panels are carbon laminate structures reinforced with either «Omega» shaped or «T» shaped carbon stringers. When heating a patch for repair, this complex structure makes it very difficult to achieve an even temperature distribution, while this performance is called imperiously for certification of the operation.
This technological issue has been challenged by our company and due to our expertise in the thermal properties of carbon structures, we are presenting to the operators a solution that is perfectly adapted to the problem in terms of performances and of conditions of implementation by the field technicians.

A laminate panel with Omega stringers ;

AdaptHEAT™ IS A KIT DEVELOPED BY GMI ... ..around an innovative heating circuit * to develop even temperature distribution on a surface up to 80 x 80 cm or more of a fuselage panel. The innovation consists in a specially designed heating circuit with a certain electrical zoning «adapted» in power to the geometry and thickness of the structure sub-areas to develop heat accordingly to their thermal reactions. It is made to be associated with the appropriate bonding console Anita EZ that implements its unique features for handling two zones heating control and its programmed strategy to handle the thermocouple sensor data.

For one type of stringer family, the operator selects the system according to the dimensions and the installation is made simple thanks to a template supplied appropriately.
The heating process can be controlled by the two heating channels of the Bonding Console Anita EZ, running its unique temperature control software features.



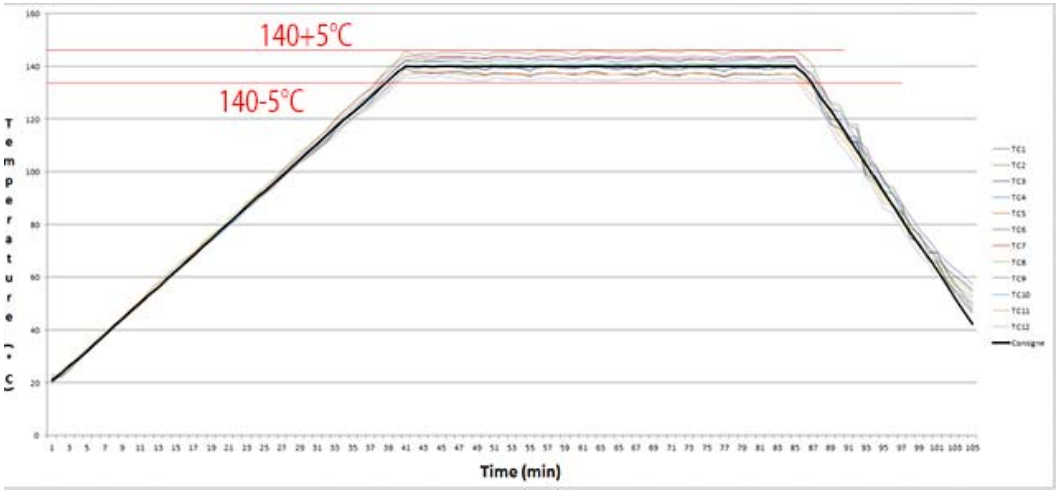
MATCHED PERFORMANCES EXPECTATIONS

The system has been tested on actual structures and gives excellent performances that match the expectations for a structural repair .The graphic below shows how on a surface of 80 x 80 cm, stiffened by Omega stringers, all temperatures are grouped in a window of 140°C +/- 5 °C thanks to the «adaptation» of the heating circuit and its temperature control process handled by the console ANITA EZ.

APPLICATIBILITY TO VARIOUS CONSTRUCTOR PARTS

The principles adopted for this design make the solution applicable to Airbus, Boeing and Bombardier structures. Due to stringer variations between constructors we have defined families of products accordingly.

* Conductor ™ - consult us for our innovation



AN EASY IMPLEMENTATION

- The presently marketed kits cover a maximum of situations and we can easily adapt to specific ones at request
- The Anita EZ is the tool to control the system and customers do not need to buy another equipment,
- For customers who have not our Anita EZ , a back up solution is proposed,

SUPPORT BY A SPECIALIST TEAM

GMI offers a unique service to customers who decide to be supported for the delivery and implementation of the solution. We have trained a team of specialists for intervention In Europe, Asia, America.
We propose also to large MRO Training Dept a special training session to transfer our know-how in designing the AdaptHEAT Circuits , the use of our Sensing Mat and the Implementation with the Anita EZ.

COMPLEMENTARY SOLUTIONS

Several developments are proposed to our customers as useful solutions

a) Extent of Temperature Sensor Channels : A scanner to measure up to 12 or 24 thermocouples ; this instrument connects to the Anita EZ and allows to conduct easily a Preparatory Dry Repair or a Complex one .

b) A Repair Reporting Software «Post@Repair» : after completion of repair, the operator needs to write a report describing fully the results of the operation and with information elements to help for the certification of the bonding process results.The operator has to handle different types of information : aircraft and identification, to ...several tenths of sensors measurements .including pictures .
To help the operator to gather easily and to produce a COMPLETE REPORT ready to be e-mailed, GMI Aero has conceived a SOFTWARE TOOL that is task oriented to produce automatically from a data base stored in a server the synthesis of all information.

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