Duqueine group

Defects identified using flash lamps

The Duqueine group used active infrared thermography to guarantee the quality of the composites used in a test cowl for an aircraft engine.

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NOTRE CLIENT

Corporate Name
Duqueine Group

Activity
Designs and manufactures composite parts and sub-assemblies for the aerospace sector and the sports, leisure and other industries

Turnover
55 million euros including 35 % exports

Workforce
720 staff

The Duqueine group specialises in composite parts and sub-assemblies, in particular for the aerospace industry. The company designed and manufactured an engine cowl for a maintenance test bench for A380 engines. Ordered by Air France for Roissy-Charles de Gaulle Airport in Paris, the cowl comprises two half-shells 3.2 meters in diameter and 3 meters long made of composite materials. The structure is made up of an aluminium honeycomb 30 mm thick sandwiched between two skins, each of which consists of four layers of carbon. The skins are manufactured by drape forming the successive layers and baking them at 180°C. The skin and honeycomb are assembled by curing the layer of adhesive, also at 180 °C.

Applying excitation to the part

When in use the cowl is subject to extreme pressure during the propulsion of the aircraft; accordingly its mechanical properties must be beyond reproach. This led the Duqueine group to search for two types of defect in particular: the delamination between the carbon layers of the skin and the separation between the skin and honeycomb.

Up to now non-destructive testing of the cowl was carried out by infrared thermography when leaving the oven. *"As we wanted to improve the testing, we canvassed Cetim about the different possible methods"*, says Mathieu Lapierre, program manager at Duqueine.

The Cetim experts suggested to optimise the active infrared thermography process. The solution that they chose consisted in applying excitation to the part with a heat source, in this case a flash lamp of 6,000 J, and analysing the development of the heat propagation in the material. The anomalies in the propagation highlight the defects.

Laboratory tests on a sample of the part demonstrated that this optimised method could detect finer defects than the original method. In addition, active thermography could also help the Duqueine group test other parts.

Cetim's asset

Flash and halogen lamps, ultra-sound, radiant exposure, induction… Cetim is expert in various sources of excitation, which are selected and adapted according to the type of material (composite, metal, etc.), the characteristics of the part and the defects that need to be identified.

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