

Title

DEEP EXPERIMENTAL COMPARATIVE STUDY BETWEEN ACOUSTIC EMISSION METHOD AND HYDROSTATIC PROOF TEST OF COMPOSITE VESSELS

Abstract text

Composite overwrapped pressure vessels (COPVs) are currently used to contain high-pressure fluids or gases in transportation, propulsion, science experiments, etc. These structures are exposed permanently to thermal and mechanical fatigue in addition to in-situ hazards and the natural ageing of composite materials. To maintain the quality and safety of COPVs, a testing method should be used periodically.

In order to achieve this goal, the common hydrostatic proof test may be performed. It permits to validate the integrity of such a COPV if there is no leak or burst, and consequently the vessel is accepted to continue operating till the next proof test. In the opposite case, the vessel is rejected. Through this test, some defective materials can be missed. Consequently, it is not certain that all remaining defects are insignificant enough to allow operation at the design pressure, and until the next proof test. The safety requirements of these vessels are constraining and involve the development of a sensitive and accuracy Non-Destructive Testing method to provide information on the structural health of composites in operating conditions. Acoustic Emission Testing (AET) can be used to perform these requirements and is tending to replace the hydrostatic proof.

The present work aims to give a deep comparison between the hydrostatic proof (HP) and the AET, and carry out, over experimental tests, the real benefits of the AET with respect to the HP. The tests were achieved on healthy COPVs which were subjected afterwards to drop tests, to be tested then by both methods. A substantial correlation between acoustic activities and tomography was observed. Further results will be detailed in the presentation and the correspondent proceeding.

Keywords

COPV, ACOUSTIC EMISSION, HYDROSTATIC PROOF, NON DESTRUCTIVE TESTING, SAFETY, OCCURACY, RELIABILITY

Authors 3

BITTENDIEBEL, SYLVIE (INSTITUT DE SOUDURE)

SLAH, YAACOUBI (INSTITUT DE SOUDURE)

RAMADAN, SALAH ()