

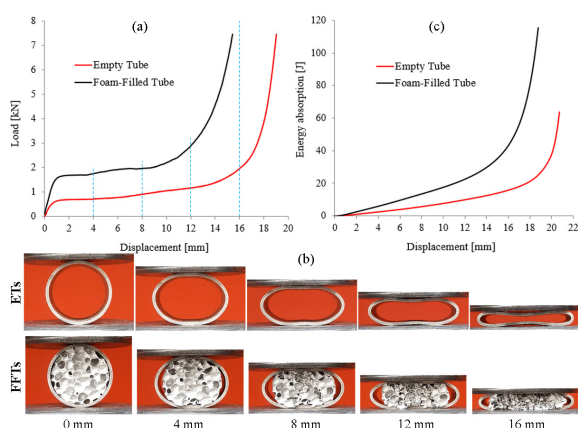
MECHANICAL CHARACTERIZATION OF ADVANCED COMPOSITE STRUCTURES WITH ALUMINUM FOAM CORE

Goal of the project

The main objective of this project was the development and mechanical characterization of advanced composite structures with aluminum foam core (TUSAA), both for the purpose of professional development of the young researchers involved in this project, as well in order to increase the scientific visibility of the Politehnica University Timișoara.

Short description of the project

This project focuses on the compressive performances of thin-walled steel tubes filled with closed-cell aluminum-alloy foam. For this purpose, the compressive behavior of empty and ex-situ foam-filled tubes were experimentally and numerically evaluated under different loading conditions (quasi-static / impact loading, uniaxial / lateral loading - see the figure below, room / high temperatures).



Load-displacement/energy-displacement curves (a,c) and deformation sequences (b) of empty and foam filled tube.

Implementation period

21.11.2017 – 31.12.2018

Budget

46.500 RON (10000 EUR)

Main activities

1. Design and manufacture of TUSAA composites;
2. Mechanical characterization of TUSAA composites;
3. Micro-structural analysis to highlight TUSAA degradation;
4. Numerical analysis of TUSAA composites.

Results

1. Publication of 9 scientific papers in the ISI circuit, of which 8 as the first author, as follows:

- 5 papers in ISI journals with impact factor:
 - Composite Structures (Q1, IF=4,101);
 - Journal of Alloys and Compounds (Q1, IF=3,779);
 - Engineering Fracture Mechanics (Q1, IF=2,580);
 - Polymers (Q1, IF=2,935);
 - Materials (Q2, IF=2,467).
 - 4 papers in ISI Proceedings (IOP Conference Series: Materials Science and Engineering volume).
2. Participation at 2 international conferences of the project manager and two members of the research team:
- The 7th Int. Conf. on Adv. Materials and Structures, Timisoara (Romania), <http://ams.upt.ro/>;
 - The 21st Int. Conference on Composite Structures, Bologna (Italy), <https://events.unibo.it/iccs21>.

Applicability and transferability of the results:

Metallic Foams (MFs) have grown considerably over the past 20 years, both from a technological point of view and through the achievement of high mechanical properties. Thus, the use of MFs has experienced a major spread from the automotive industry (filling stiffening elements with MFs in order to increase energy absorption capacity), to civil engineering (panels and heaters made of MFs).

Research team

Emanoil LINUL, Project Director
 Dan-Andrei SERBAN, Member
 Sergiu GALATANU, Member

Contact information

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