MICROSTRUCTURE - MECHANICAL PROPERTIES RELATIONSHIP FOR METALLIC FOAMS BILATERAL AGREEMENT ROMANIA - SLOVAKIA

Goal of the project

Intensification of the already existing, up to date on volunteer basis, international scientific and technological cooperation between Universitatea Politehnica Timisoara (UPT) ROMANIA and Institute of Materials and Machine Mechanics (IMMM) from Slovak Academy of Sciences (SAS) Bratislava, SLOVACIA. This will be achieved by elaboration of common journal papers, and reciprocal sustain of scientific events organised on the partner country, preparation of joint international projects on European basis.

Short description of the project

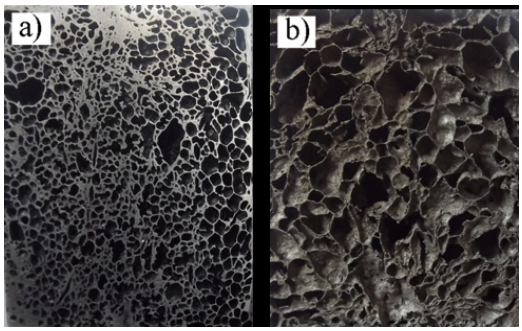
The technology for foaming of aluminum alloys has been considerably improved in last decade worldwide.
Aluminum foam can undergo static loading, and accidentally dynamic or impact loading during the crash accident. Unfortunately, there is still missing detailed connection between static and dynamic mechanical behaviour of foams.
The project investigates the mechanical properties of metallic foams under dynamic and static loading with respect to foam microstructure.
The project belongs to the priority domain "7 New Materials, Micro and Nanotechnologies – 7.1 Advanced Materials". Cellular metals are a class of advanced materials and investigation on graded cellular metals (cellular structures with different densities in different part of the piece) will also be investigated in present project.

Project implemented by

- Politehnica University of Timisoara
- Institute of Materials and Machine Mechanics (IMMM) from Slovak Academy of Sciences (SAS) Bratislava, SLOVAKIA

Implementation period

01.03.2013 – 10.12. 2014



a. AlMg1Si0.6 b. AlSi12Mg0.6
Cellular structures of two aluminium foams

Main activities

- Production of aluminium foams by the Slovak partners.
- Mechanical testing of aluminium foams. The relation between manufacturing parameters, density and mechanical properties was identified.
- Mechanical testing of aluminum foams under dynamic loading. Impact compression tests performed on aluminum foam specimens.
- Investigation of fatigue behavior of aluminium foam.

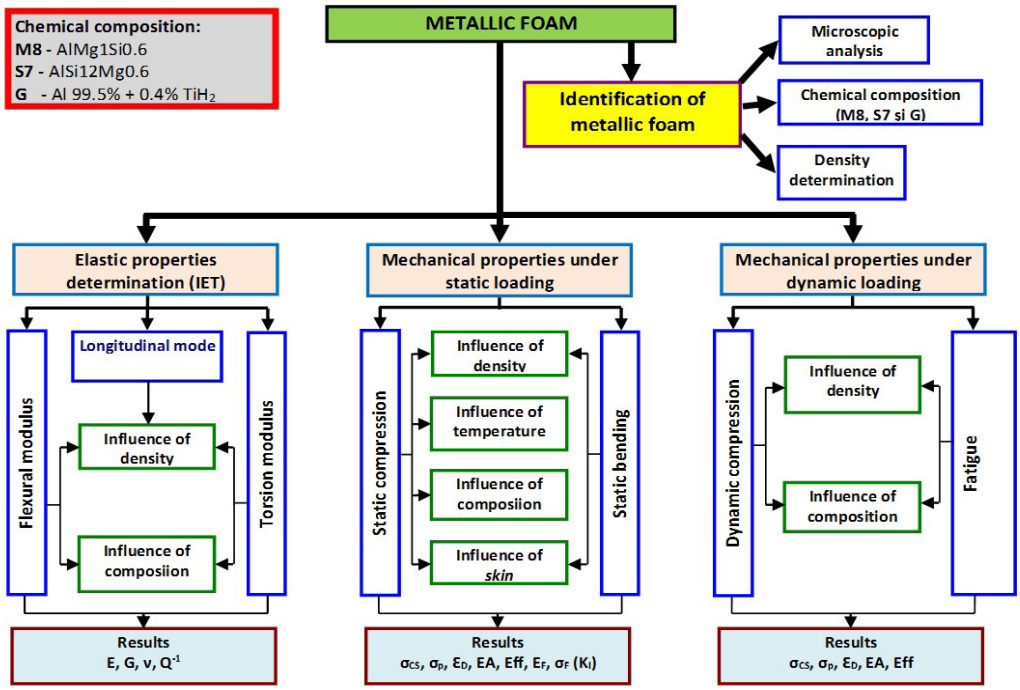
Main results for 2014 year:

Journal Papers:

1. E. Linul, T. Voiconi, L. Marșavina, J. Kováčik, A comparison between static and dynamic compression behavior of metal foams, (submitted)

Conference Papers:

1. T. Voiconi, E. Linul, L. Marșavina, J. Kováčik, M. Kneć , Experimental determination of mechanical properties of aluminium foams using Digital Image Correlation , Key Engineering Materials, vol. 601, pp. 254-257, 2014, DOI: (ISI Proceedings);
2. J. Kováčik, L. Marsavina, A. Adamčíková, F. Simančík, R. Florek, M. Nosko, P. Tobolka, P. Minár, N. Mináriková, J. Jerz, E. Linul, Uniaxial Compression Tests of Metallic Foams: A Recipe , Key Engineering Materials, vol. 601, pp. 237-241, 2014 (ISI Proceedings);
3. T. Voiconi, L. Marșavina, E. Linul, J. Kováčik, Determination of elastic and damping properties for clossed-cell aluminium foams using Impulse Excitation Technique, Proceedings of XIIIth Youth Symposium on Experimental Solid Mechanics, vol. 1, pp. 141-144, 2014, ISBN: 978-80-01-05556-4.



The Experimental plan for characterization of metallic foams

Applicability and transferability of the results

Results could be used by metallic foams manufacturers. Also, companies using foam components from automotive industry will benefit by our results in order to design better foam components as energy absorbers.

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"There are no secrets to success. It is the result of preparation, hard work, and learning from failure."
Colin Powell

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