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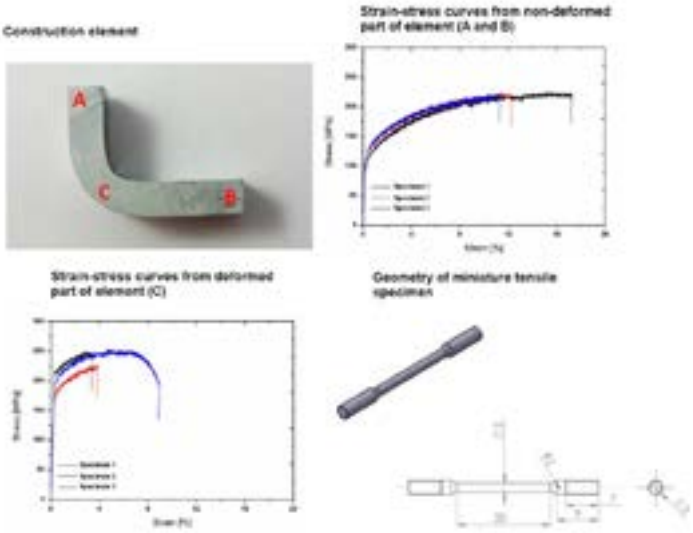
Microstructure and properties of aluminium elements selected for the medical cabin construction

Agata Sotniczuk, Piotr Bazarnik, Marta Orlowska, Rafal Molak, Anna Dobkowska, Donata Kuczynska, Piotr Kwasniak and **Halina Garbacz**
Warsaw University of Technology, Poland

Due to the ageing of human population, the number of people suffer senses diseases increasing inevitably. For this reason there is a constant necessity for new opportunities which allowed to examine as huge group of people as possible. The mobile medical devices, which can be quickly relocated to the distant places, will undoubtedly improve accessibility of the screening senses tests even in the underdeveloped areas. However, the mobility of designing cabin put a special requirements on its construction. The high mechanical strength related to density, which allow to the mass reduction, is essential for constructive materials used in designing cabin. Moreover, frequent transport provide possibility of exposure constructive elements on different environmental conditions so their high corrosion resistance is also important. The solution strengthened 5xxx aluminium alloys fulfil this requirements. Therefore, plates made from 5xxx alloy were selected for creating the mobile medical construction. Due to the specific shape of cabin, aluminium plates had to be bent in different angles. Moreover, the opportunity of cabin installation and reinstallation required introducing mounting holes for screw joints in constructive elements. Both of these processes can make an impact on the microstructure and consequently on the properties of the aluminium elements. In this study the influence of plastic deformation and the presence of mounting holes (cut by laser) on the microstructure, mechanical and corrosion properties of aluminium plates was investigated. For these purpose following investigations were performed: microstructure analysis (OIM, SEM+EDS, TEM), evaluation of the mechanical properties (microhardness measurements and static tensile tests also using miniature tensile specimens), analysis of the corrosion resistance (neutral salt spray tests in corrosion test chamber). Obtained results allowed to check if the existence of bends and mounting holes has a deleterious effect on the construction. There are no doubts that this study gave an insight if any modification of construction or additional material treatment have to be taken into consideration. *This research was financially supported by The National Centre for Research and Development in Poland under Grant STRATEGMED1/248664/7/NCBR/2014.*



Biography

Agata Sotniczuk is currently a PhD student at Faculty of Materials Science and Engineering, Warsaw University of Technology. In her work she focused on corrosion Agata Sotniczuk is currently a PhD student at Faculty of Materials Science and Engineering, Warsaw University of Technology. In her work she focused on corrosion behavior of nanocrystalline metals, especially titanium and aluminium alloys. One of her main interest is the influence of microstructural defects, like dislocations and grain boundaries on the passive layer formation is solutions simulating body fluids. This subject was also a topic of her Master Thesis which was awarded the first price from the Polish Corrosion Society. Her main investigation tools are electrochemical tests (impedance and potentiodynamic) together with electron microscopes (SEM, TEM) for microstructure characterization.

agata.sotniczuk@gmail.com