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Materials selection for modern and mobile medical constructions

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Owing to the constant increasing of the number of people suffer hearing disorders, the demand for modern medical devices like mobile audiometric cabins is continues to grow. The opportunity to fold and relocate the cabin would allowed to examine greater number of population in distant places by the same equipment. Nevertheless the necessity of cabin mobility imposes special requirements on its construction The main requirement for constructive materials in case of mobile audiometric cabins is the high mechanical strength related to density which allowed for its mass reduction. Other properties like the high fatigue resistance, the great joining ability and high corrosion resistance in working conditions are also essential. Both titanium and aluminium alloys fulfil this requirements. Thus, the aluminium alloys, which are less expensive and possess better weldability, are the first choice for the mobile medical constructions. The precipitation strengthened 6xxx aluminium alloys have both satisfactory mechanical strength and weldability. The broad availability of semi-finished products made from 6xxx alloys is also a great advantage. Although mechanical properties of semi-products like yield or tensile strength are given in normalized worksheets, manufacturers data do not enclosed their anisotropy. The differences of mechanical properties on particular directions and on the elements thickness are connected with crystallographic and morphologic texture. In this study the homogeneity of the microstructure, texture and mechanical properties anisotropy of selected aluminium profiles with different shapes was investigated. For this purpose following tests were made: phase and texture analysis by XRD, microstructure analysis on different sections (OIM and SEM+EDS), static tensile tests and microhardness measurements. Obtained results are important due to its great influence on the construction mechanics. The elements of supporting structures work in the conditions of compression, shearing or bending. The anisotropy of its mechanical properties can lead to the contrary properties for different load conditions. There are no doubts that such results have to be taken into consideration during designing of the audiometric cabins construction.

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 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.

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