

MATERIALS DESIGN AS AN IMPORTANT ELEMENT OF ADVANCED PRODUCTS' ENGINEERING DESIGN AND MANUFACTURING

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Abstract. The paper emphasises the very significant role of materials selection for design and manufacturing processes of new needed products, having the highest attainable quality and performance at the optimum and possibly the lowest cost level. The engineering design processes cannot be set apart either from the materials design, being more and more often computer-aided, or the technological design of the most suitable manufacturing processes. The review of the multi-millennia long history of human civilisation indicates that the significant increase of the level of living and production is connected more often with the launching of new material groups with the properties better and better adjusted to real requirements of customers getting more sophisticated nearly each day, and also the launching of the technological processes which are relevant to them. The given reasons enable to forecast that the future of the market and products with the required properties which appear on the market, are inseparably connected with the development of materials science and engineering. Two main priorities can be specified in that area, that is: the continuous improvement of existing materials and technological processes and the development of materials and technological processes ensuring environment protection or/and improving conditions and extending of human life. The paper includes also the description of the world developmental trends in that area in the first decades of the 21st century. The fundamental aim of materials science and engineering is materials selection ensuring required functions and application properties of products which are manufactured out of them. The tasks of that field of science in priority spheres of the world development are determined. Directions of activities of materials science and engineering ensuring the achievements of strategic aims of the developments of societies include materials design, computational materials science, advanced analytical methods, manufacturing and processing, nano-, smart and biomimetic materials are included. It is concluded that there is a humanistic mission which stands at the engineering circle, especially associated with materials and manufacturing engineering and its aim is to make products and consumer goods, deciding directly about the level and quality of human life, available to people and it is also mentioned that current financing of scientific researches especially in the mentioned fields of science gives a chance to achieve modern technological development and to ensure prosperity of societies in future.

Keywords: quality of life, prosperity of societies, development of human civilisation, advanced products, engineering design, materials design, manufacturing, materials science and engineering