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CONCEPTUAL DESIGN OF MECHANICAL FLOOD BARRIER

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ABSTRACT

Flood barriers prevent invading water on protected side of the barrier or into buildings. There is an increasing requirement for flood barriers innovation due to more severe weather patterns predicted by global warming. Innovators should be aware that further barrier development is possible only when applying the systematic approach and design methodology in all stages of engineering design. Systematic approach in this case means that designers and engineers rigorously apply scientific knowledge, integrate different constraints and user priorities, carefully plan and systematically solve technical problems. This paper therefore deals with the complex approach to design that can bring new innovative concepts to design of mechanical flood barriers. Using methods such as e.g. QFD, TRIZ, FOS or mathematical modelling and FEM is presented in connection with the innovation portable flood barrier.

Keywords: flood barrier, design, concept, QFD, TRIZ, FOS, modelling, FEM.

INTRODUCTION

Two information transformations are required to determine design specification. During the first transformation the user's needs are translated to functional requirements. The second transformation takes place when converting the functional requirements to product characteristics. In today's world of technology, which leads to accelerated development e.g. in technologies or material science, to include to the mentioned transformations only information from users or information about other similar products is insufficient. That's because users do not have and cannot have sufficient knowledge of the possibilities of current technologies or have not access to information about trends in the relevant fields of technology. For that reason it is necessary to enrich traditional approach to determination of the design specification. First technological, ecological, economic and social trends should be included in a set of functional requirements (needs). Secondly relevant engineering characteristics with affinity to technological, social or economic trends should be involved into process of design specification determining as well. Third designers should additionally include information obtained by modelling that can objectively on the basis of physical and chemical laws extend set of suitable engineering characteristics describing future technical product.

After design specification determining logical process of problem solving or progressive techniques supporting designer's creativity should be used to obtain a concept of innovative solution. Among these techniques we can include function oriented search, 40 inventive principles and heuristics, laws or trends of evolution of technical systems, multilevel system thinking etc.

Utilization of the described complex approach to concept generation will be demonstrated on portable flood barrier.

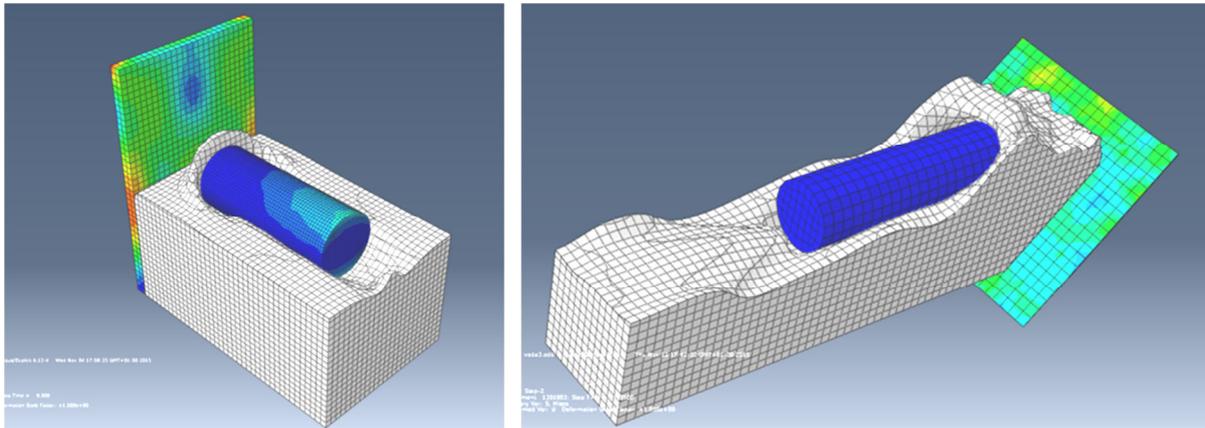


Fig. 1 - Modelling of flood barrier behavior

RESULTS AND CONCLUSIONS

Without a more complex approach to concept generation flood barriers cannot accomplish the necessary parameters as speed and simplicity of installation or dynamic impact resistance. It is useful to include extended information base obtained by modelling that can objectively extend set of suitable engineering characteristics describing parameters of future products. It was also confirmed that it is appropriate and necessary to use advanced tools of innovation science as inventive principles or trends of evolution of technical systems. By the complex approach to design specification and concept generation the new concepts of flood barriers were proposed.

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