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Przewymiarowanie systemu sterowania
w aspekcie implementacji
funkcjonalnych środków bezpieczeństwa

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Abstract

The practical application of functional safety solutions in very different areas indicate several issues that need to be addressed to scientific research. One important issue is the oversizing of the control system in the aspect of use safety-related elements. The problems in this area determine the direction of the search for solutions, both in the areas of formulating and supplementing the methods of assessing the technical safety of machines, as well as modeling, designing, programming, validating functional safety systems. The consideration of new solutions, methods and the acquisition of new knowledge in this area is an important element of the activities and contributes to the overall progress in the field of development regarding the assessment of the technical safety of machinery and knowledge development. The dissertation attempts to answer some of the issues noticed at the stage of formulating the research problem related to the oversizing of the control system in terms of the implementation safety-related elements. Three basic areas have been identified that can be answer the questions raised: methodology and actual selected implementations, mechatronic transport system and virtual models of safety functions. As a result of the undertaken research, the technical safety assessment method has been developed, a new procedure for modeling the probabilistic safety function has been proposed, considering the introduction of a new functional safety indicator APL_i . A general formalism approach to these areas has been adopted, based on a structure in which its appropriate levels can be distinguished. The theoretical model was then detailed and used to carry out the safety assessment process of the actual technology line. The final conclusions, formulated because of achieving of the objectives of the dissertation, may be useful in the work related to the modeling, design, implementation of a safety-related control system. This process can significantly reduce the time needed to make the final design decision and reduce the costs needed to implement appropriate solutions. The results of research and experience gained from the implementation of the presented concept can be transferred directly to the industrial environment.