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ABSTRACT

Entitled: Reliability test of selected unmanned aerial vehicle components.

The doctoral dissertation focuses on testing the reliability of selected unmanned aerial vehicle (UAV) components through the use of technical research methods - reliability measures. The research has been conducted based on the UAV Orbiter 2B type, which is used in the Armed Forces of the Republic of Poland.

During the research process, theoretical and empirical methods were used in a complementary manner. Firstly, an analysis of the literature has been carried out in terms of terminology, classification as well as exploitation and technical characteristics of the UAVs. As a result of the research, one type of UAV was determined and selected, which was used to implement reliability tests of selected UAV components.

Then, the UAV exploitation process has been determined by the estimation of the mathematical model. To the most important aspects in this area included the determination of the impact by internal and external factors affecting the functional and reliability structure of UAV.

In the next part, the author carried out an analysis of UAV Orbiter 2B type technical documentation, which the results were supplemented in empirical studies conducted at the 12th Unmanned Aerial Vehicles Base in Mirosławiec. First, all damages were identified during the 3-year observation period (June 2016 - July 2019), and then their causes were determined and reliability measures were calculated – failure-free. The choice of the measure of reliability was strictly related to the characteristic of the use of the reliability measure for the assessment of individual BSP structural elements, and not the whole object.

In the last stage, based on the conducted research and the conclusions resulting therefrom, changes in the usage, operation and construction were proposed, in order to minimize the damage occurring in UAV Orbiter 2B type.

The presented research, carried out in a comprehensive manner, are also an introduction to the organization of further research on reliability of the UAV, including the possibility of implementing the solutions contained in this dissertation.