

3D printing technology began in 1984. Since then, there has been a huge development of materials and equipment used for printing. The doctoral dissertation „The analysis of possibilities of using 3D printing to produce and repair aviation equipment” shows how development of technology and materials used for spacial printing in terms of being used to make parts applied in aviation and to fix them. The first part of dissertation includes history, purpose and technologies used in spacial printing. The author’s utilitarian aim was „**Elaborating the methods using materials and 3D printing in the process of making and repairing aviation equipment**”.

To achieve utilitarian aim, detailed aims have been pointed:

- completing strength tests of samples used in 3D printing;
- preparing of creation algorithm and libraries of database containing materials and technologies connected with 3D printing;
- creating an application concerning the right choice of materials in terms of making and repairing aviation equipment;
- creating and analysis of printing a selected part of aviation equipment.

According to detailed assumptions, the next units are connected with making spacious printing by using selected technologies and selected materials. Samples from various materials were made with the use of 3D printers and the results were studied in detail.

Examined features were to show and point differences among individual samples influenced by: the kind of material, the source, printing orientation, the producer of the printer, and many other details which an operator should look into in the future trying to print an element of aviation equipment.

The next units are the presentation of created algorithm enabling the analysis of material, 3D printing technology in the terms of creating aviation equipment. This basis and the algorithm give a chance to use CAD models, material and technical range which can be used to create a chosen part due to modern methods of prototyping and creating. Next, the author presents the computer application which helps the operator choose technology and material to print a part of aviation equipment that has been damaged or worn out. The last part of dissertation is connected with practical use of printing technology using a selected element of aviation technology. The selected object has been scanned and analysed by using Xray scanner. The element has been „printed” using two metal powders with the use of SLM technology. It showed the advantages but also problems the user might have.

The author points that introducing spacial printing technology to the aviation industry, „printing farms” are worth considering. They consist of a few or a dozen printers allowing several elements being printed at the same time which makes the process quicker. 3D printers can be used to print constituent elements which are needed to produce them, making them self-generating machines. It would be crucial to introduce the possibility of spacial printing to the process of exploitation of airship. The greatest advantage of using 3D printers is the production of parts at any time and any place in the world. That is how the problem with delivery of spare parts from warehouses or producers can be avoided which is important when a combat component is abroad or near a battlefield.

The key words: **3D printing, aviation equipment, application, database, algorithm, production, material.**



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