

degree of illumination depending on time of day and even the time of year, and the light turns on as soon as you appear at home. Multiroom system is responsible for the distribution of audio and video throughout the apartment. It can turn on and off appliances, send a signal to all devices, adjust sound, and create optimal conditions for watching videos or listening to music.

Climate control in the "smart home" controls the devices responsible for heating, cooling, cleaning and humidification. After selecting the desired mode, you can configure the system so that it can function properly.

The system of "smart house" makes house more convenient, comfortable and safer. With technical perfection, it simplifies life, while saving time and energy resources.

*Scientific supervisor: Balatska N.I.,
PhD, Senior Lecturer*

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Konovalenko V.O.
National Aviation University, Kyiv

THE PROOF OF CONCEPT OF USE OF THE RANQUE TUBE FOR COOLING AIRCRAFT EQUIPMENT

The problem of heating of the electronic on-board elements of aircraft systems appeared with the advent of electronic equipment. The efficiency of the electronic equipment is low, only a few percent of the total energy supplied to it from the power source is used for signal processing. The rest of the energy is released as waste heat. One of the main factors limiting the size reduction tendency of the electrical equipment casing (computers, radios, cellular equipment) is the temperature at the operational mode. A large number of electronic components require additional heat removal (cooling), which leads to an increase in the weight and dimensions of the product, which is unacceptable in aviation.

The complex design solutions aimed at reducing the temperature of the radio equipment require significant expenses. During the development of the design of the radio equipment, the cost of development of the cooling subsystems should be kept as low as possible.

With waste heat emission in range of $0.2 - 1 \text{ W/cm}^2$ the cooling fans are used. At the same time, it is mentioned that there is the possibility of use of the vortex tube (Ranque tube) to increase the intensity of the heat sink. The advantages of this device are its simplicity, small size and the possibility of significantly reducing the cooling air temperature. The main drawback is the low efficiency. At the same time there are no recommendations for the effective use of a vortex effect in the aviation in literature sources.

In this paper the approach to assessing the comparative power consumptions while cooling the flat surface located in a sealed compartment is being developed. An air flow of axial flow fan and the air flow from the cold zone of the vortex tube are being compared. In the first case, the air supplied to the cooling chamber has a temperature and the power consumed by the fan. In the second case, the air compressed by the compressor and a portion of it having a lower temperature is supplied for cooling. The bases of calculation are given according to the heat transfer coefficient in the boundary layer on a flat plate, which allows establishing a connection between the temperatures of the incoming flow and the wall with the air flow in the boundary layer.

The analysis allowed determining the conditions under which the use of the vortex tube is energetically more favorable than the traditional fan. One such condition is the temperature of the cooled surface have to be less then 40° C.

*Scientific supervisor: Yashchuk O.P.,
Lecturer*

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Kulish O.M., Kulish T.M.
National Aviation University, Kyiv

3D PRINTING IN MEDICINE

Innovation in medicine is of great importance . Ancient doctors used bone saws, suction cups, knives as a medical instruments. Nowadays, medicine has been transformed by new inventions. The precision of surgical robots lets doctors perform previously impossible procedures. Exoskeletons let paralyzed people, stand up and walk again, and smart algorithms help to analyze radiology images. 21 century, is a century of 3D printing boom.

For the first time 3D printing technologies appeared in early 1980's, at that time they were called Rapid Prototyping (RP) information technologies.

3D-printing may seem somewhat mystic, especially when you apply biomedical engineering technology to 3D-printing. In general, 3D-printing involves taking a blueprint, created with software or digital model that is later printed in gradual layers of materials. Hepatocytes, stellate cells and epithelial cells lining the blood vessels are the main material in bio printing.

Bio printing virtually identical to the technology 3D-printing, except that it uses living cells. Conglomerate cells perform bio ink role. The starting model for printing is a three-dimensional model, created in 3D Max.

3D-printing was used in healthcare in the early 2000s. Originally 3D technology was applied like custom prosthetics and dental implant. Since then, the medical tools and applications for 3D-printing have improved greatly. Some