УДК 811.111:629.735:621.311.243

T. Matyas, A. Galin, N. Suruntovich

Solar Impulse-2

Belarusian National Technical University
Minsk, Belarus

Nowadays flights are quite affordable to a large part of the Earth population. Every day more than 50 thousand aircrafts transport about 9 million passengers because it's fast and comfortable. However, there are a number of disadvantages that have to do with adverse environmental impact, making it unfavourable to use conventional aircrafts so badly as we do today.

First, the most widely-used models of the aircrafts such as Boeing 737 and Airbus A320 burn a lot of fuel about 3000 liters per one-hour flight. Secondly, every burned liter of aviation fuel gives out 2.5 kilograms of carbon dioxide. A plane having flied 1000 kilometers produces 9 tons of CO_2. This amount is approximately 3 percent of CO_2 global production. Thus, aircrafts are very harmful for our environment.

Because of the reasons mentioned above, scientists are working tightly on developing alternative sources of energy such as solar panels and wind generators that are used to decrease people's adverse influence on the nature. Aircraft building engineering is not an exception. It relies heavily on the innovative technologies in its industry to solve the environmental problems caused by aviation fuel burning. That is why Google with the help of sponsors has hired talented engineers to work out the state-of the art, prospective and eco-friendly project, which is *Solar Impulse*.

According to the history, we have found out, that *Solar Impulse-1* was created by the Swiss constructors Andre and Bertrand and was came out in 2009. The first Solar Impulse

launch showed quite successful results. It spent about 75 min in the air. In four months, pilots made a 26-hour-flight in a testing electric energy-saving mode, the energy being accumulated by solar panels during the daytime.

The main initiator of the project to create a unique plane is a well-known traveler, aviator Bertrand Picard. He claimed about his intentions to start an ambitious project implementation in 2003. A «solar aircraft», to make a circumnavigation flight was planned to build. The project «SOLAR IMPULSE-2» was started [1].

Solar Impulse-2

Looking into the major peculiarities of Solar Impulse-2 design it is necessary to mention technical and human challenges [1].

We will start with the technical challenges. The aircraft is equipped with four motors, powered by a massive array of 17,248 solar panels. The aircraft can fly at an average speed of 140 km/hour attaining a maximum cruising altitude of 8,500 m. The weight of this huge aircraft is only 2.3 tonnes. The cockpit, where pilot should sit for 5 days, is only 3.8 cubic meters in size. The wingspan of the solar Impulse is 72 m, slightly more than one of the biggest aircraft in the world Boeing 747.

Speaking about human challenges it is necessary to refer to the fact that because of the limited carrying capacity of the aircraft, the weight of pilot equipment, water and food should be

calculated with a very high accuracy, for which Nestlé Health Science company is responsible. Pilots should have the skill to fall in a deep sleep phase immediately, because they have the possibility to sleep only 20 minutes a few times a day. The temperature in the cockpit will change from 40 to -40 during the day. Every flight will last from 12 to 120 hours.

The target of the *Solar Impulse 2* project is taking a round the world flight with 13 separate flights. The aircraft, which is controlled by the famous pilot Bertrand Piccard, has started in Abu Dhabi, has flown through Oman, India, Myanmar, China and Japan successfully. During the Pacific crossing the aircraft was damaged by high temperature in accumulators and was located in Hawaii, where the aircraft it has been repaired and already resumed its flight. Then it will fly across the USA, Abu Dhabi, making stops in South Europe and North Africa.

In our report, we considered cutting-the-edge project Solar Impulse-2, which is being developed by highly-qualified, promising engineers.

Summing up, the main advantage of this aircraft is the possibility to fly without using traditional sources of energy, but consuming solar energy only, which is free, eco-friendly and secure. This project intensively promotes alternative sources of energy, implementing innovations in civil aviation industry. We can significantly reduce the emissions of harmful substances into the atmosphere. Reducing carbon dioxide emissions leads to greenhouse effect reduction, which will help to slow down the Global Warming process. Although the Solar Impulse has not been brought into circulation yet, and still can carry only 1 pilot, we hope, that this project is quite promising and will get further development.

References:

1. Mode of access:
http://www.solarimpulse.com. – Date of access: 20.02.2016.