From June 29 to July 1, 2022, Rzeszow University of Technology was the host of the **ENERGY HARVESTING TRAINING SCHOOL**, which was the result of cooperation of scientists from Europe as part of Cost Action CA18203 - **Optimizing Design for Inspection (ODIN***) (Fig.1.)*

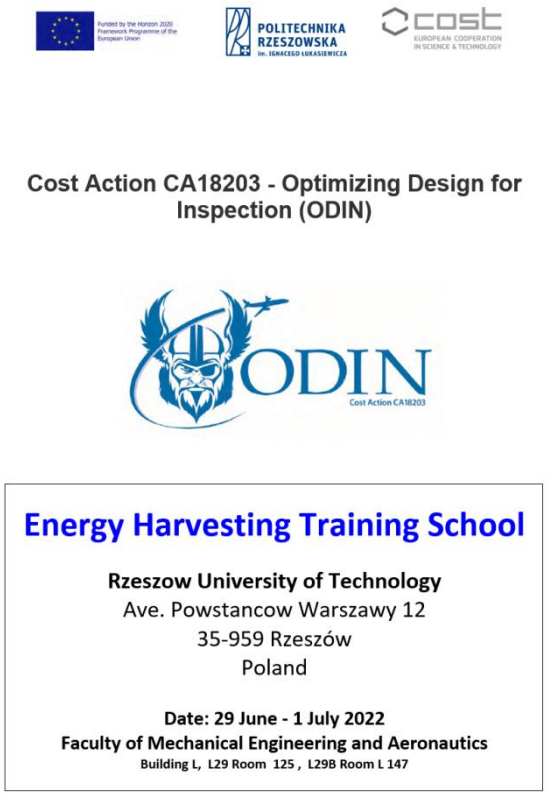

Figure 1 - POSTER EHTS ODIN Poland

This action aims to maximize the full benefits of continuous monitoring of critical aviation structures through the integration and use of non-destructive ultrasonic wave (NDE) methods, energy harvesting and wireless sensor technology in the design concept phase. Activities relate to optimization (sensors and structures), computational modeling, advanced signal processing and advanced design approaches to create novel frameworks, design tools and guidelines for the first generation of sensed aircraft capable of delivering accurate structural predictions. Ultrasound-based NDE techniques, energy harvesting and wireless sensor networks are increasingly shown to be effective in monitoring the failure of aircraft components under laboratory conditions. These components include critical components such as airframe structures, engines, landing gear and control surfaces. However, there is an urgent need to integrate these approaches and techniques at the aircraft design conception phase.

The event is the result of **cooperation between two ODIN working groups: WG3** (Leader, Prof. Zdenek Hadas), **and WG4** (Leader, Prof. Romana Ewa Śliwa).

Working group WG3 deals with energy management and its acquisition. Power demand is a key component of this network. Currently, there is a power gap between low-powered systems and available energy thanks to current download methods. In addition, there are large discrepancies between the published data and those that can be achieved based on testing and analysis methods. The group's work aims to develop a detailed understanding of current vibration levels and temperature differences, and the location or position they can be found on the plane, as well as standard test procedures to enable the results of different European research groups to be compared. There are activities associated with this group with other working groups. The Energy Harvesting Training School in cooperation with the WG4 group is an example of this. The scope of activities of the WG4 group concerns wireless communication, which is of great importance for unlocking the potential of

SHM (Structural Health Monitoring) systems in the aviation industry, bridge structures and in wind turbines. However, the biggest challenge is in aviation, where there is a limitation of acceptable wireless protocols and complex geometry and whose signals must propagate everywhere. The working group is focusing on the analysis of aviation protocols and strategies that may result in a reduction in power demand at the sensor node. In addition, the subject of the analysis of the WG4 working group is to review the security and protection status of existing protocols.

The event was attended by 39 representatives of research groups from **17 European countries**: **Italy, Cyprus, Ireland, the Czech Republic, Turkey, Estonia, Serbia, Iceland, Bosnia and Herzegovina, Great Britain, Finland, Sweden, Slovakia, Macedonia, Slovenia, Croatia and Poland.** (*Fig. 2)*

Figure 2 - Participants of Energy Harvesting Training School from 17 countres of Europe

Study visit of EHTS participants to the Aviation Training Center in Jasionka under the leadership of director Arkadiusz Rzucidło, PhD, Eng., aroused great interest (*Figs* 3,4,5,6,).

Figure 3 - Memebrs of EHTS during study visit at Aviation Training Centre of Rzeszow University of Technology)

Figure 4 - Visit in Aviation Training Centre in Jasionka (RUT) , Poland

Figure 5 - Visit in Aviation Training Centre in Jasionka (RUT) , Poland

Figure 6 - Visit in Aviation Training Centre in Jasionka(RUT) Poland

The EHTS program was carried out in the lecture hall of the Faculty of Mechanical Engineering and Aeronautics (*Figs 7,8,9*) and in the Computer Laboratory at the Department of Plastic Forming. (*Fig 10*).

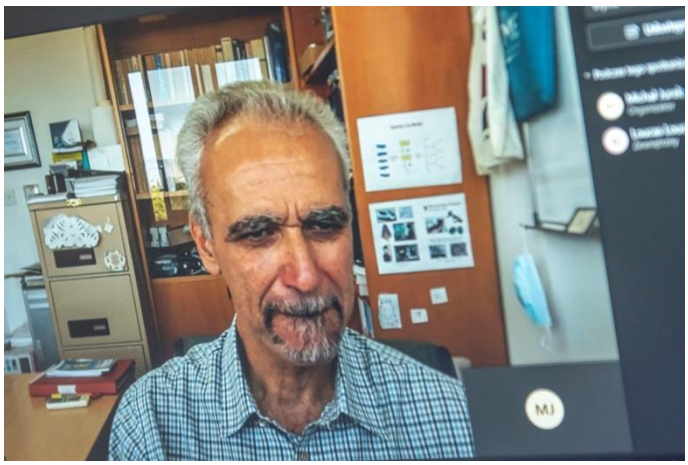

Figure 7 - On-line lecuure of professor Thomas Becker

Figure 8 - Lecture of prof. Theodora KYRATSI from Cyprus

Figure 9 - Prof. Carol Featherston from Great Britain during the lecture

On the part of Rzeszow University of Technology, the event was attended by employees from the Faculty of Electrical and Computer Engineering, the Faculty of Civil and Environmental Engineering and Architecture and the Faculty of Mechanical Engineering and Aeronautics.

Figure 10 - Energy Harvesting Training School- workshop in Computer lab

The possibility of taking advantage of such wide contacts, specialist lectures, participation in the implementation of the program of computer workshops and the exchange of experiences of researchers from many different European teams will certainly result in the desired cooperation and its good results in the future.