

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Future Space Transportation Systems Verification and In-Flight Experimentation (6)

Author: Mr. Adam Okninski  
Institute of Aviation, Poland, a.m.okninski@gmail.com

Mr. Blazej Marciniak  
Warsaw University of Technology (WUT), Poland, blazej.marciniak@ilot.edu.pl

Mr. Bartosz Bartkowiak  
Warsaw University of Technology (WUT), Poland, bartkowiak.bw@gmail.com

Mr. Damian Kaniewski  
Warsaw University of Technology (WUT), Poland, damian.kanies@gmail.com

Mr. Jan Matyszewski  
Warsaw University of Technology (WUT), Poland, janmat@ilot.edu.pl

Dr. Jan Kindracki  
Warsaw University of Technology (WUT), Poland, jkind@itc.pw.edu.pl

Mr. Piotr Wolanski  
Polish Academy of Sciences, Poland, wolanski@itc.pw.edu.pl

## THE DEVELOPMENT OF THE SMALL SOUNDING ROCKET PROGRAM

**Abstract**

The paper presents an overview of the Amelia small rocket program developed to build low cost, reusable CanSat launchers and enable the construction of sounding rockets in the near future. The paper covers early flown designs as well as the nearly finished two-stage CanSat Amelia 2 launcher. Moreover, a single stage larger rocket is presented. All of the vehicles are propelled by a reusable composite solid rocket motors enabling sending small scientific experiments to altitudes up to 10 km. One of the main goals was to develop rockets that could be fully recovered and reusable reducing operational costs. The possible professional sounding rocket being an outcome of the presented research is also discussed. Moreover, the work on the first rotating detonating engine flying demonstrator is covered. The paper consists of descriptions of the discussed rocket main subsystems. Key technical facts and the vehicle visualizations are presented. The design methodology and calculation methods are also given. The paper contains also a description of the technical equipment and background developed during the program, including propellant and motor production facilities and the launch pad. The results of the program are presented. The ultimate aim is to build larger sounding rockets in Poland based on innovative propulsion technologies. This work is based on results of the joint project of the Space Technology Department of the Institute of Aviation and the Division of Aircraft Engines of the Institute of Heat Engineering of Warsaw University of Technology (WUT) with a key role of the members of the Students' Rocketry Group of the WUT Students' Space Association.