

IAF SPACE PROPULSION SYMPOSIUM (C4)  
Interactive Presentations - IAF SPACE PROPULSION SYMPOSIUM (IP)

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## LESSONS LEARNED DURING SRAD HYBRID ROCKET MOTOR DEVELOPMENT

**Abstract**

Student Researched and Developed (SRAD) hybrid rocket motor H-15 with total impulse of 15  $kNs$  was built. First version of the engine has average thrust of 3  $kN$ , the second, improved one is prepared with an aim to have average thrust of 5  $kN$ . Engine development was started from scratch and went through phases of: definition of design assumptions and constraints, numerical modelling to predict engine performance, CAD and CAM models preparation, manufacturing and static testing. Outcomes and conclusions of each phase will be presented, as well as development decisions which were the result of engine testing. H-15 employs nitrous oxide as an oxidizer and polypropylene and polyamide as fuels. This selection of materials was chosen due to their relative ease of preparation and wide availability.

The engine was built by SimLE student organisation, form Gdansk University of Technology (Gdansk, Poland). SimLE is one of the largest organisations at GUT which brings together students interested in many aspects of aerospace engineering. The reason for hybrid rocket propulsion development was partic-

ipation in international rocketry competitions, such as Spaceport America Cup and European Rocketry Challenge. The goal of these contests is delivering 4 *kg* of payload to an altitude of 3000 *m* by a sounding rocket. Conclusions from the engine development process will be discussed, as well as perspectives for further development of our engine.