

IAF SPACE PROPULSION SYMPOSIUM (C4)  
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A NEW H<sub>2</sub>O<sub>2</sub> ORIENTED ROCKET AND SATELLITE PROPULSION LABORATORY CENTER

**Abstract**

This paper describes a new, green propulsion oriented, rocket and satellite propulsion laboratory center currently under construction at the Lukasiewicz Research Network - Institute of Aviation, located in Warsaw, Poland. The facility will house a high altitude hot fire test stand for engines up to 500 N thrust, rocket subsystems laboratory, satellite attitude and orbital control propulsion laboratory and a number of chemical laboratories dedicated to propellant research. It is expected to be commissioned until December 2023, and to reach full potential until the end of 2024. The hot fire test stand will feature a 5 m<sup>3</sup> vacuum chamber equipped with a vertically oriented thrust bed. Vacuum will be generated with use of a multistage pumps system, supported by a supersonic diffuser, hot gas intercooler and drycooler station. The system is designed to provide pressure level below 2 mbar(abs) for the largest engines to be tested (Liquid Apogee Engine class) working in steady-state mode. Propellants' installations are sized for 800 liters of H<sub>2</sub>O<sub>2</sub>, and 400 liters of fuel with supply pressure up to 40 bar(g). The stand will be operated via modular control data acquisition system equipped with digital and analog channels, high speed cameras, all connected via single time server. Furthermore, an overview of the center's laboratories equipped with cutting-edge apparatus for chemical research on new propellants shall be given. This includes information on future work planned, which is to accelerate development of propellants with reduced toxicity, preparation and testing of catalytic beds for decomposition of highly concentrated H<sub>2</sub>O<sub>2</sub>, as well as preparation of smokeless solid propellants and pyrotechnic components. Two rocket systems laboratories are also

included in the center, one of them featuring a clean room. They will provide advanced equipment for testing rocket mechanisms, drives, avionics instruments, electronics, etc. The new infrastructure is to be used by the institute's researchers, its collaborating entities as well as for the commercial research services and cooperation with technical universities. Commissioning of the center, constructed thanks to EU funding from the 2014-2020 Regional Operational Programme of the Mazowieckie Voivodeship, will be taking place at the time of the congress. Up-to-date progress and future outlook together with some design considerations and more detailed technical capabilities will be presented in the paper.