

INDOOR GREEN PROPULSION TEST FACILITY FOR ROCKET ENGINES UTILIZING HTP

Tobiasz Mayer¹, Kamil Sobczak¹, Michał Piwowarczyk¹

¹*Łukasiewicz Research Network – Institute of Aviation, Warsaw, Poland*

tobiasz.mayer@ilot.lukasiewicz.gov.pl, www.ilot.lukasiewicz.gov.pl

The main area of interest of Łukasiewicz Research Network – Institute of Aviation (Ł-IoA) is aimed on a research and development of rockets and space propulsion. The vast majority of the developed solutions are utilizing Highly Concentrated Hydrogen Peroxide (>98%) and several novel non-toxic fuel formulas.

Currently, almost all of the designs are verified during hot-fire test campaigns at the in-house test facility that started operations in 2011. Main atmospheric test facility is heavily modified decommissioned jet propulsion testing facility. Unique building with sound suppression system allows for indoor testing whole year, regardless weather conditions. Sound suppression system and thick concrete walls allows for safe and nearly silent operations in close proximity of the airport and offices, where over 1 000 people is employed.

In 2022 Center of Space Technologies done over 500 hot-fire tests in frame of 19 test campaigns using HTP. Hypergolic engines, hybrid motors, monopropellants and bipropellants were tested also with throttling capabilities. Advancement of the developed engines forced constant development of the whole test facility including control and measurement system (driven by custom developed software).

Besides engines that are using liquid propellants there are some projects dedicated to solid rocket motors. Also for these cases, available resources are used like high-speed cameras combined with advanced measurement and control devices are an invaluable source of information.

From 2011 at least 3 major upgrades of test bench infrastructure were introduced. Paper present those advancements based on lessons learned during years of operations along with status and future plans for new test facilities at Ł-IoA.