

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
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STEPPING-STONES TOWARDS ORBITAL LAUNCH IN SE ASIA THROUGH HIGH POWER
ROCKET JOINT-VENTURES

Abstract

Malaysia and Singapore are two economically advanced Southeast Asian neighbors on the cusp of a space boom. Regional space startups and spaceport feasibility studies are gathering momentum, while at the university level, Malaysia's USM, UPM, IIUM, UiTM and Singapore's NUS are collectively engaged in rocket, high-altitude balloon and cubesat programs. Simultaneously, at the organizations level, Kedah Rocketry Group, ApaDiLangit, Malaysia Space Initiatives and other NGO's spearhead community engagements with a following in excess of 10,000. Sentiments on the ground suggest Malaysia, Singapore and the SE Asian region are at a unique juncture where sufficient support exists to push the community from sporadic, small-scale space projects of the past into a new era of self-sustaining space activities. In this delivery, we present a start-up joint-venture by Malaysia's Boleh Rockets and Singapore's Equatorial Space Industries (ESI) to accelerate the region's space launch capability through design and flight of an actively guided, hybrid "Low Altitude Demonstrator (LAD)" rocket. At 0.15m in diameter, 2.4m in length, LAD's layout consists of a single-stage body with passively stabilizing delta-fins and actuated canards. Propulsion is provided by an indigenously developed hybrid motor burning a proprietary high regression-rate paraffin-based fuel with N₂O oxidizer. A boost-phase of 8seconds is achieved, with an average thrust of 630+ N, providing LAD with total impulse exceeding 5200 Ns (i.e., within the Level-3 M-class high power rocket category). At the point of writing, two flights of LAD are slated for mid-February 2020 from the Royal Thai Air Force base in Chandy, Thailand. First flight aims to establish LAD's stability and performance in passive flight mode, while Flight Two will execute an actively guided gravity-turn to simulate trajectory-keeping in orbital launch. At the conclusion of its maiden flights from Chandy Range, LAD will have succeeded in (i) becoming the largest privately-developed hybrid rocket in the region, (ii) representing the forefront of Malaysian/Singaporean rocket technology, (iii) demonstrating the feasibility of cross-border collaboration, and (iv) paving the first stepping stones towards regional space industry. Details of the LAD project will be presented at IAC 2020, along with vision of ESI's development roadmap towards orbital capability.