

FUEL TURBOPUMP DEVELOPMENT FOR THE LM10-MIRA LOX-LNG EXPANDER CYCLE ENGINE IN THE FRAME OF LYRA PROGRAM

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In the frame of LYRA Program founded by ASI and with ASI-Roscosmos Agreement, a 10 ton class engine (LM10 MIRA) demonstrator has been studied by AVIO-KBKHA propulsion team. New technologies linked to use of methane have been developed for injector head and fuel turbopump.

The new fuel turbopump has been designed to be implemented in the demonstrator engine. The major characteristics of the turbopump are relevant to the pump, bearings, rotor dynamics and manufacturing technology. Pump is characterized by a low volumetric flow pump with an high pressure rise made up of only one centrifugal stage. The rotor architecture choice has been done in order to have a sub-critical behaviour to reduce complexity and damping requirements. Bearings have been designed with high stiffness to guarantee the rotor dynamics leading to high speed and high diameter combination. Furthermore new technology has been dedicated to manufacture in a short time with low cost the more complex parts of the turbopump such as main housings with pump volute and turbine manifold and impeller.

Such peculiarities lead to reach a high level in the design and manufacturing aspects