

SPACE PROPULSION SYMPOSIUM (C4)  
Propulsion System (1) (1)

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DEVELOPMENT OF A LM10-MIRA LOX – LNG EXPANDER CYCLE DEMONSTRATOR ENGINE

**Abstract**

This article contains results of joint works by Konstruktorskoe Buro Khimavtomatiki (KBKhA, Russia) and AVIO Company (Italy) on creation of the LM10-MIRA liquid-propellant rocket demonstrator engine for the third stage of the upgraded “Vega” launcher. Scientific and research activities conducted by KBKhA and AVIO in 2007 – 2014 in the frame of the LYRA Program, funded by the Italian Space Agency, with ELV as Prime contractor, and under dedicated ASI-Roscosmos inter-agencies agreement, were aimed at development and testing of a 7.5 tons thrust expander cycle demonstrator engine propelled by oxygen and liquid natural gas (further referred to as LNG). Contractual collaboration of KBKhA and AVIO started in 2007. The first phase of joint works was aimed for the concept design of the 10 tons-class thrust LM10-MIRA flight engine propelled by liquid oxygen and LNG. Successful completion of this phase of activities in 2008 allowed to start the next phase of works that involved design, manufacture and testing of the 7.5 tons thrust LM10-MIRA demonstrator engine (further referred to as the demonstrator). In June, 2014, LM10-MIRA Demonstrator engine firing test campaign has been successfully accomplished at Voronezh (Russia) premises. In order to conduct the contractual activities, a joint team of AVIO and KBKhA leading specialists was formed. The team successfully completed the scope of design, manufacturing and testing works in full compliance with both: European and Russian standards.