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YUZHNOYE TECHNOLOGIES FOR THE GLOBAL EXPLORATION STRATEGY IMPLEMENTATION

Abstract

As a first step towards implementation of the Global Exploration Strategy, the International Space Exploration Coordination Group (ISECG) in September 2011 released a Global Exploration Roadmap (GER). Being a member of ISECG, State Space Agency of Ukraine had made its initial input, along with 10 other world leading space agencies, to mapping the needed technologies. With reference to the Categorization of Proposed Technology Developments compiled in GER, this paper gives an overview of the technologies developed or being developed by the leading Ukrainian space company Yuzhnoye Design Office.

The technologies in question include, inter alia, highly reliable and effective liquid propulsion systems, particularly with deep-throttling engines for lunar and Martian missions. Also will be presented high thrust engines mastered by Yuzhnoye and intended for the first stages of launch vehicles (LV): these engines are characterised by low development cost, relative simplicity, higher reliability and shorter development time in comparison with the existing analogues. The engines are considered to be building blocks for the brand new Mayak LV family based on the proven Zenit and Cyclone LVs technologies.

The heaviest Mayak launchers are well suited for deep space missions. Due to use of modularity and unification principles, in combination with some other features, e.g. ones inherent to Zenit LV such as full pre-launch process automatisation and exploitation of the "green" propellants, one can speak about optimization of the life-cycle operational costs, increased reliability and mission availability, improved mis-sion safety, reduced mission risk and reduced environmental impacts – just as it is envisaged in GER.

Other technologies to be presented deal with in-space propulsion, in particular one based on multiple use of energy carriers, materials and structures as well as innovative manufacturing. All the described technologies will be illustrated by possible applications related to space exploration.