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## **On Yuzhnoye Approach to Creation of a Family of Low Cost Launchers for Space Exploration**

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Existence of reliable, efficient and low cost launchers is an imperative for successful tackling of all the variety of Space Exploration problems both at LEO and beyond. The latter of the mentioned qualities of launchers has a special importance nowadays, when many of the world's leading space agencies have budgetary problems due to different reasons.

State Enterprise «Yuzhnoye Design Office», based on many years' experience in creation of launch vehicles of different types, on proven technical solutions as well as on recent innovative developments, has formed a pragmatic and at the same time highly efficient approach to creation of a family of launchers corresponding to the above requirements. At the heart of the work on this family of launchers called "Mayak" ("Lighthouse") are several principles, the major ones being:

- use of the modularity concept, when a versatile rocket module serves a basic "brick" for creation of the whole range of launchers, from light to (super)heavy;
- use of common hardware components: e.g., in all the Mayak launchers identical rocket engines are to be used working on the same, ecologically friendly components – oxygen/kerosene; the same concerns control system and telemetry system instruments as well as other launchers' units and aggregates;
- as a backbone, highly efficient developments and technologies proven by practice – in particular, during creation and exploitation of the Zenit and Cyclone families of launchers - are being used;
- implementation of Yuzhnoye original methodology on extremely efficient, in terms of time and financial resources, development and testing of new LOX-kerosene engines with thrust from 50 to 500 tons, and others.

As a result, one can achieve simplicity, low development costs and minimal technical risk, easy adaptability to this or another payload to be launched and task to be solved. Altogether, this guarantees a low cost of the proposed launch solutions while securing reliability and efficiency.

In the paper, the approach will be illustrated with examples of concrete launchers and their abilities to deliver payloads, in particular within the framework of planetary missions.