Advantages of the Marine-Based LV Zenit Project

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Pauk, Oleh and Dmytro Sokol (2020) Advantages of the Marine-Based LV Zenit Project. *Advanced Space Law,* Volume 6, Volume 6, 83-86. https://doi.org/10.29202/asl/6/10

Received: 21 October 2020 / Accepted: 22 November 2020 / Published: 10 December 2020

Introduction

No need to coordinate the fall zones of the LV stages:

a) insignificant investments in the construction of new Terrestrial infrastructure;
b) proven technological solutions used in the design of the Zenit LV;
c) the possibility of using cluster launch of spacecraft;
d) launching to a sun-synchronous orbit 700 km high with a payload of 700 kg;
e) the ability to implement any values of the inclination of the satellite's orbit.

Project Description

The launch of Zenit LV is planned to be carried out from an offshore platform manufactured as a non-self-propelled floating dock with a displacement of 10,000 tons.

Starting point — neutral waters.

The choice of this launch site will allow achieving maximum performance indicators of the

payload output to the sun-synchronous orbit.

Pre-launch operations are performed at the base port, and launch operations are performed at the launch platform.

The payload mass for transport to a sun-synchronous orbit is 700 kg.

Solar-synchronous orbit — 550-700km.

Technical characteristics of the Zenith LV

•Number of stages — 2
•Sun-synchronous orbit payload weight (up to 700km) — 700kg
•Diameter — 2.4 m
•Height — 26 m
•Quantity of the sun-synchronous orbit engines:
4-chamber main — steering engine of the 1 stage — 1 pc
The main single-chamber engine of the 1 stage — 2 pieces
•Number of engines of the 2 stage:
4-chamber main — steering engine 1 stage — 1 pc
•Type of launch — Offshore platform.

The cost of creating the Marine-Based LV Zenit Project

The necessary investments for the creation, design, development, manufacturing of the first flight product — flight product — $ 65 millions.

Period of creation: 3 — 5 years.

The cost of the serial manufacturing of the launch vehicles will be cost about $ 14 millions, dollars, under the term to provide the order at least four vehicles simultaneously.

Additional non-recurring project costs:

a) Design and manufacture of load-lifting mechanisms with microspeed for overloading the LV.
b) Creation of a ground-based infrastructure for storing launch vehicles, fuel components, etc.
c) Design and manufacture of the "Offshore platform."
d) Design and manufacture of the necessary starting and pre-launch equipment.

The total value of additional costs is $ 70 millions.

TOTAL costs under the project: $ 135 millions "Full construction"!

Prospects of the Marine-Based LV Zenit Project

The Zenit launch vehicle will occupy the market segment for the launching of small and medium-sized satellites into low orbits. The choice of this market segment is due to the following factors:

a) The increasing interest of large companies in the production of small satellites (Boeing, EADS) and entering the market of small satellites of developing countries;
b) A significant reduction in the cost of the design and launch of new satellites to orbit;
c) Reduced weight and size of satellites. The average weight of small satellites

decreases by 8% annually while their functionality increases;

d) Platform standardization and serial production of satellites (SSTL platforms, Cubesat, PocketQub standards);
e) The use of industrial electronic components in the construction of satellites, rather than special "space" ones;
f) The output of satellites into a lower orbit provides a higher speed of signal transmission from the Earth to a satellite and vice versa, as well as lower signal delay;
g) Low Earth orbit is an exhaustible resource. The range of 600-1000 km is the most popular and, from this circumstance, is the most usable and busy orbit. The future risks of the operation of a satellite and their removal from the orbit after the end of their service life is accumulating from year to year;

The possibility of obtaining global coverage of the Earth by means of a large number of small satellites;

a) The growth of the number of small satellites are being designed at universities (an increase of 16% annually);
b) US companies' interest in investing in projects to launch hundreds and thousands of small satellites;
c) The growth in revenues from the sale of satellite subscriber equipment in the world in all market segments — satellite TV, satellite radio, stable fixed Internet and MSS services;
d) The activity of satellite operators in the MSS services market is updating their satellite constellations, which have been operating in orbit for many years and are technologically outdated in comparison with the rapidly improving capabilities of cellular and wireline data networks. (The satellite operators Iridium and Inmarsat are updating their communication satellites with more modern second-generation devices, investing to this market for a total of $ 4.5 billion for the period until 2023. The total volume investments up to 2023 of these companies may exceed $ 22 billion.

Conclusions

The rapid development of the telecommunication technologies and component base, reducing the weight, size, and cost of satellites, reducing the cost of putting them into orbit, the possibility of organizing global coverage of the planet in a short time, allowed satellite operators, satellite infrastructure developers and commercial and investment companies to take a fresh look at the prospects satellite communications and Internet markets making a new ambitious multi-billion dollar projects.

The modern global satellite market is estimated at 201 billion US dollars. With the possibility of growing up to 250 billion US dollars. At the same time, satellite services account for more than 60% of the market revenue. Mobile satellite communications and Internet (MSS) services account for 1.4% of the market's revenue, or 2.8 billion US dollars, and will grow by an average of at least 5% per year over the next five years. The number of MSS satellite services users will increase from today's 2.9 million to almost 6 million users.

Total investments in the construction of new satellite constellations of thousands of

satellites are announced at more than 21 billion US dollars. Large companies including Google, Virgin Group, Qualcomm, SpaceX have indicated their participation on their own, or venture, in satellite projects with the same goals: to provide new customers, remote and unreached areas of the Earth with affordable satellite Internet and communications. Some — in order to increase the number of users of their basic services, others — to receive a direct income from satellite services.

Existing satellite operators Iridium and Inmarsat are updating their constellations by the second-generation launching satellites, which should significantly increase data transfer speed and the quality of end-user services.

All operators are trying to expand the portfolio of their subscriber equipment for the mass market with portable satellite Wi-Fi hotspots, which will allow you to receive satellite communications using an ordinary modern smartphone. This trend is a new direction of development, which will be strengthened and developed by newly created companies more and more, bringing satellite communications closer to the mass consumer.

Considering the dynamics of the development of the space services market and the financial and technical characteristics of the Zenit LV "Marine Based" project, it can be concluded that the project is in demand on the global market.