Ukrainian startup has developed an aerospace reusable complex for launching microsatellites with aerodynamic lift into the atmosphere

Summary

Profile type	Company's country	POD reference
Business Offer	**Ukraine**	**BOUA20231211001**
Profile status	**Type of partnership**	**Targeted countries**
PUBLISHED	**Investment agreement**	**• World**
Contact Person	**Term of validity**	**Last update**
Johannes BÖHMER	**11 Dec 2023** **10 Dec 2024**	**11 Dec 2023**

General Information

Short summary

The Ukrainian company proposes to reduce the cost and simplify the launch of microsatellites into low orbit by abandoning the vertical launch of the launch vehicle, which requires a thrust-to-weight ratio of the propulsion system of more than 1, in favor of the horizontal launch of the launch vehicle. A rocket glider with high lift and a required thrust-to-weight ratio of 0.25.

Full description

A group of like-minded people from Ukraine, which will be formalized as a private law firm with equity participation of an investor after the announcement of funding for a project headquartered in Kyiv.
Conventional rockets are known to consume significant amounts of propellant to reach the stratosphere. For example, the Falcon 9 uses about 80% of the first stage fuel to climb up to 35 km, while it accelerates to Mach 3. A high vertical launch speed is necessary to reduce the gravitational losses caused by the need to resist gravity. This results in large aerodynamic losses caused by air friction.
The company proposes to reduce the influence of both of these factors by performing an ascent in the atmosphere to a height of 35 km with the launch, leaning on the wing, like a transonic jet glider.
Further, as the mass of fuel decreases and the thrust-to-weight ratio increases to 0.75, the rocket plane switches to ballistic climb and space velocity.

Upon reaching a height of 80 km and a speed of 6.6 km / s, the second stage weighing 110 kg with a payload of 50 kg is separated for independent acceleration, and the rocket plane is aerodynamically decelerated in the upper atmosphere to subsonic speeds. , decreases and lands at the destination, like a glider.
It is proposed to use non-cryogenic fuel. Oxidizing agent - hydrogen peroxide 85%. Reductant - Acetam 50/50 (a mixture of fuel from ammonia and acetylene) and a simple volumetric fuel supply system. This will make it possible to obtain the required specific impulse of LRE 280...300 s.
The presence of its own "good" wing will make it possible to lift in the atmosphere behind a regular aircraft tug along the rail to a height of up to 10 km without turning on its own propulsion system. This will add fuel economy.
A rough estimate of the cost of launching a rocket plane is $10,000 with the maximum possible frequency of launches in any direction, without reference to complex ground infrastructure.

• The design of the airframe rocket plane is made of carbon fiber parts by vacuum infusion.
• To ensure continuous operation of the LRE, the combustion chamber, throat and engine nozzle are covered with ceramic materials.
• Hydrogen peroxide will be used at a concentration of 85% to ensure safe operation, increase the frost resistance of the oxidizer and reduce its cost.
• Pilatus12 or Grob 520 aerotower will be used to provide the initial launch and ascent to a height of 10 km.
- To launch a rocket plane, unpaved airfields designed to launch gliders with minimal additional specific equipment can be used.
Launch direction - any. Temperature limits for the operation of the complex - -20 ... 35 C

Advantages and innovations

The rejection of the vertical launch of the payload carrier in favor of the horizontal launch with aerodynamic rise in the atmosphere to a height of up to 33 ... 35 km at transonic speeds will allow:
1. Reduce gravitational losses due to the fact that the gravitational force of the Earth's attraction is compensated by the aerodynamic lifting force of the wing.
2. Aerodynamic lift in the atmosphere reduces aerodynamic losses by 10...20 times in proportion to the aerodynamic quality of the rocket plane.
3 This lift is provided by a propulsion system with an initial thrust of 25% of the current weight of the rocket plane, which reduces its weight and cost.
4. The use of non-cryogenic innovative mixed fuel - acetam50/50, will reduce the loss of specific impulse in comparison with cryogenic engines with turbopump fuel units. This reduces the cost and facilitates the design, and also increases its reliability.
5. The ability to fly at an altitude of 33 ... 35 km at transonic speed allows the dual-use product to provide reconnaissance functions at a depth of up to 1000 km of enemy defense, which makes it difficult to detect and destroy such a viehicle by air defense systems.

Technical specification or expertise sought

Stage of development

Under development

Sustainable Development goals

• Goal 9: Industry, Innovation and Infrastructure

IPR Status

IPR applied but not yet granted

IPR Notes

The algorithm for launching microsatellites into low orbit is protected by copyright. Application number at the Ukrainian Institute of Intellectual Property "Ukrpatent" - a 2020 07587 from 01/05/2021

Partner Sought

Expected role of the partner

Business investor with equity participation in the project.
Promotion of goods and services in the global market.
Legal support.

Type of partnership

Investment agreement

Type and size of the partner

- **SME 11-49**

Dissemination

Technology keywords

- **02011001 - Aeronautical technology / Avionics**
- **02011002 - Aircraft**
- **02011005 - Space Exploration and Technology**

Market keywords

- **09001001 - Airlines**

Targeted countries

- **World**

Sector groups involved

- **Aerospace and Defence**