

Third Dimension Project – Airships of the New Great Silk Road

Peter Lobner, 11 February 2022

1. Introduction

After the death of Chief Designer Vyacheslav Stepanovich Shalaev in October 2013, the entire Krylo Design Bureau team left their base in Omsk and joined the Kaliningrad commercial firm ABVERTA, which launched and provided the patronage for the Tretye Izmereniye (Third Dimension) Project (<http://ngsw.ru>).

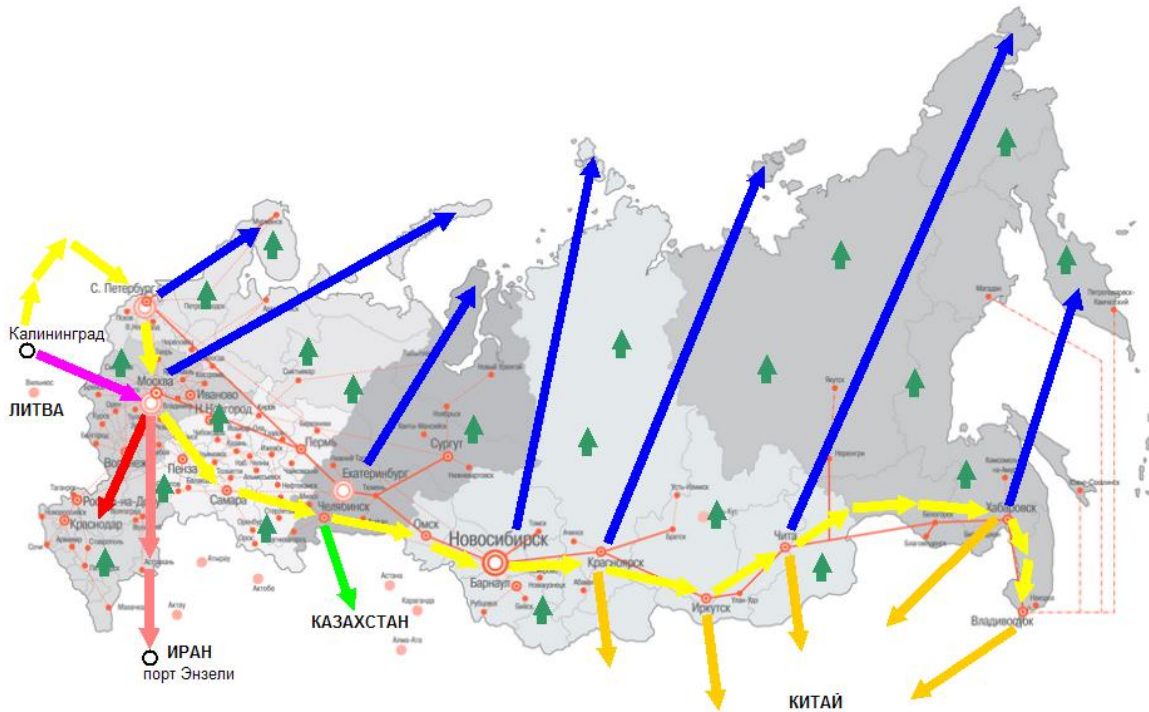
The Third Dimension Project was launched on 20 March 2014 to develop the concept for a “New Great Silk Road” cargo transportation network across Russia using optionally-manned, super-high-capacity airships as the primary transport vehicles. Each of these giant airships, also known as a “Robotic Aeronautical Complex” (Роботизированный воздухоплавательный комплекс, PBK in Russian, or RVK in English transliteration), would have a 3,500 metric ton (3,850 ton) cargo capacity.

2. The New Great Silk Road transportation network









The New Great Silk Road is envisioned as an aeronautical cargo distribution network that is organized around a main transportation route between the Russian cities of Kaliningrad (in the west) and Vladivostok (in the far east). Many hubs, or airship ports, will be established along the main route. These hubs are branch points for cargo, which can be offloaded from an RVK operating on the main route and transferred on another RVK or smaller airship serving a local or long-haul branch route to the end-user.

To operate the New Great Silk Road at its highest potential, the Third Dimension Project estimated that 3,263 RVKs would be required. Annual turnover of this great fleet was estimated in 2014 to be \$500-600 billion US dollars.

The airspace to be used by these many airships was at altitudes of 1.5 to 9 km (4,920 to 29,530 ft), which typically is not used by civilian fixed-wing aircraft flying in the region.



Color-coding legend:

-  Main RVK traffic
-  Northern (Arctic) RVK traffic
-  Southern RVK traffic
-  Internal regional RVK traffic
-  Transit European (Baltic) RVK traffic
-  Transit Persian RVK traffic
-  Transit Central Asian RVK traffic
-  Transit Chinese RVK traffic

*New Great Silk Road route structure.
Source: Translated from <http://ngsw.ru>*

The hubs are airship port facilities that can accommodate many transiting RVKs during cargo handling and include facilities for airship maintenance and repair. The hubs also serve as bases for two short-range support air vehicles: a manned, highly maneuverable aeronautical vehicle equipped for rescue and repair along a

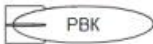
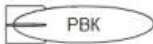
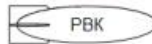



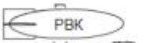





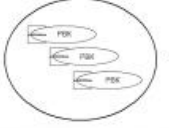
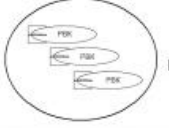
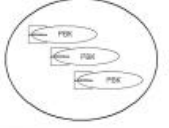
transportation route, and a small, unmanned aeronautical vehicle to provide local port monitoring and security support services.

3. Investment plan and business structure

The New Great Silk Road is a business venture on a grand scale that was conceived to deliver a range of transportation services that are not currently available anywhere in the world. The New Great Silk Road was designed to open up vast, resource-rich, but currently isolated, regions of Russia to economic development by making these transportation services available sooner and at lower cost and environmental impact than other alternatives, such as pipelines, roads, railroads, and fixed-wing aircraft.

The Third Dimension Project proposed developing the New Great Silk Road through three stages of investment, as summarized in the following graphic.

Schematic representation of an overall investment plan

Production	1st stage / base case	2nd stage	3rd stage
PBK fleet	5 units per year 	21 units per year 	189 units per year 
Main production plants	 2 units  2 units  1 unit	 n2 units  n2 units  n2 units	 n3 units  n3 units  n3 units
Infrastructure	 12 units	 n2 units	 n3 units
Investment	2 billion Euro	Stage 2 total TBD	Stage 3 total TBD

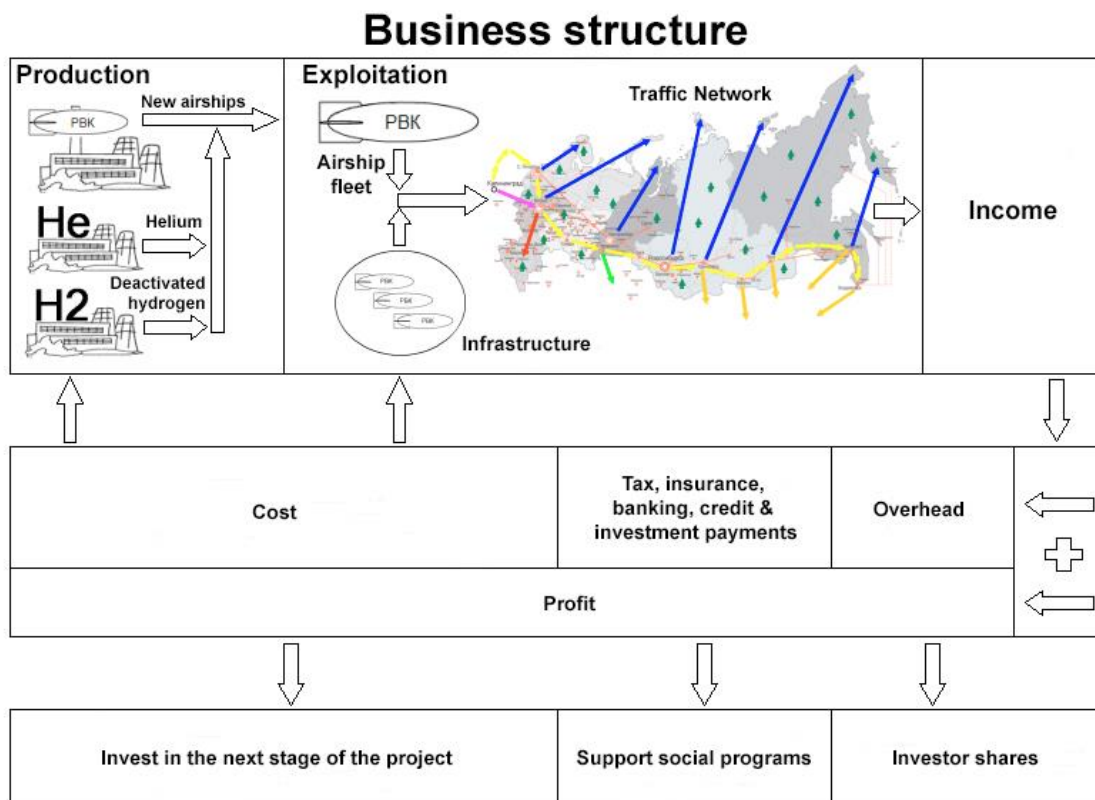
n = the estimated number of production facilities and infrastructure, providing the stage with a sufficient number of PBKs (RVCs).

Source: Translated from <http://ngsw.ru>

The first stage involves building the basic organizational structure, building the first set of plants for manufacturing the giant RVK airships and producing helium and deactivated hydrogen, and then building an initial small fleet of RVKs. In addition, the initial transportation network infrastructure, including the main airship ports and associated maintenance and repair facilities, would be put in place. The goal of the first stage is to test the RVKs in real commercial flights and demonstrate the viability of the New Great Silk Road transportation concept. Total investment for the first stage was estimated in 2014 to be about 2 billion Euros.

The second and third stages are successive expansions of the manufacturing and production plants, RVK fleet size, transportation network service area, and cargo capacity throughout the New Great Silk Road network.

The New Great Silk Road business venture is intended to make a profit. The basic cash flow for this venture is shown in the following graphic.



Source: Translated from <http://ngsw.ru>

4. Aeronautical vehicles of the New Great Silk Road

The Third Dimension Project identified three aeronautical vehicles that would be used along the New Great Silk Road:

- Krylo Design Bureau SHa-3500 optionally-manned, super-high-capacity cargo airship (RVK)
- JSC Tumenecotrans manned, semi-buoyant “rescue sloop”
- JSC Tumenecotrans unmanned, semi-buoyant “micro RVK” for local port monitoring and security support services

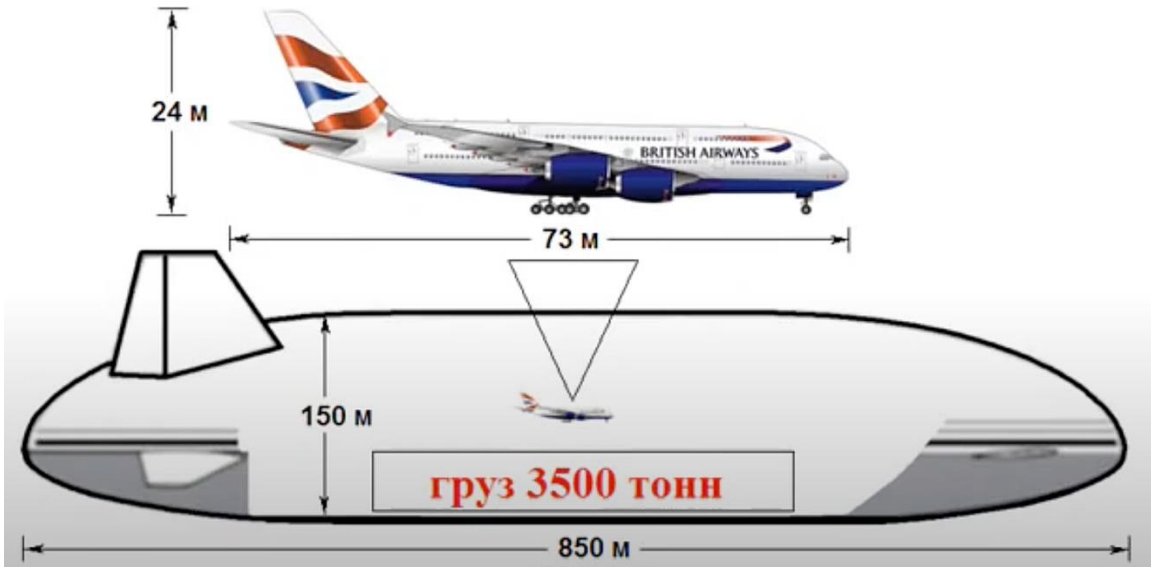
Basic characteristics of these airships are described in this section. More details are in the separate *Modern Airships* articles on the Krylo Design Bureau and JSC Tumenecotrans.

Krylo SHa-3500

The super-heavy lift RVKs are based on the giant Krylo SHa-3500 designed by VS Shalaev. This is a rigid airship with “active regulation of their aerodynamic characteristics.” These airships have a buoyancy control system that enables them to pick up and discharge a detachable cargo platform containing 3,500 metric ton payload.

General characteristics of the SHa-3500 RVK airship

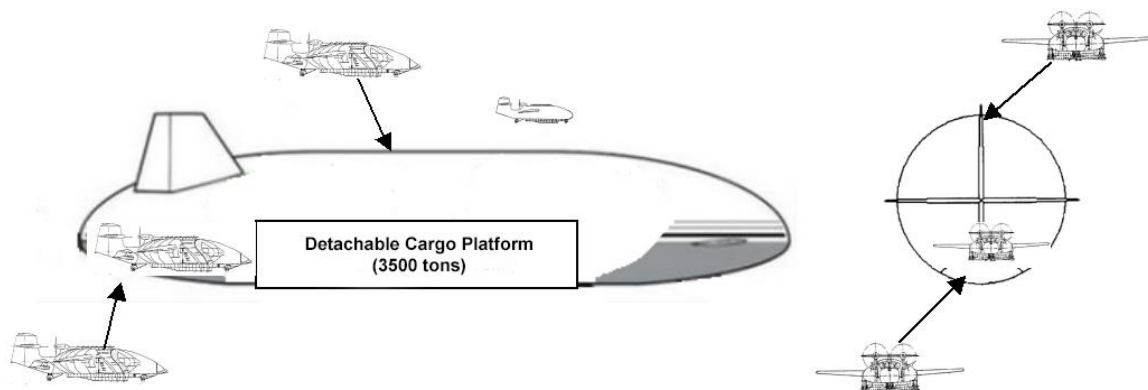
Parameter	SHa-3500 RVK
Envelope length	850 meters (2,789 ft, more than ½ mile)
Envelope height	150 meters (492 ft)
Envelope volume	about 9,000,000 m ³ (317,000,000 ft ³)
Lift gas	Helium or deactivated hydrogen
Payload	3,500 metric tons (3,850 tons)
Cargo loading / unloading	Detachables cargo loading platform able to carry the full payload weight
Propulsion	<ul style="list-style-type: none">• Primary: electric-powered fan-type propulsors.• Supplementary: turboprop or turbojet• Emergency: “fuel-free air-gravity technology”
Cruising speed	250 kph (155 mph)
Full load ceiling	8,000 m (26,247 ft)
Service life	30 years, minimum



Relative scale of a Krylo SHa-3500 very heavy lift airship and an Airbus A380 airliner.

Source: Screenshot from Third Dimension Project video

As configured for the Third Dimension project, the SHa-3500 airship has provisions for operating a vertical takeoff and landing (VTOL) aircraft from a landing pad on top of the envelope and housing a similar aircraft in a stern hangar. The VTOL aircraft depicted in the following diagram are a semi-buoyant manned aircraft and a semi-buoyant UAV designed by the Siberian firm JSC Tumencotrans.

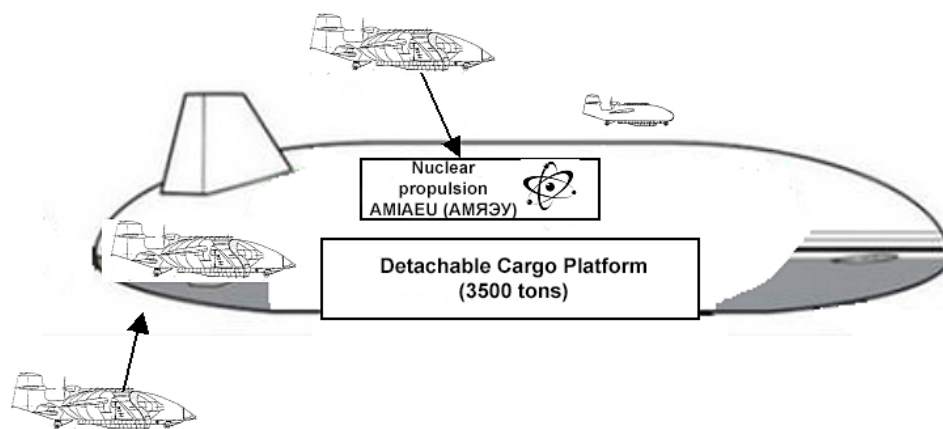


Giant SHa-3500 RVK airship with a detachable cargo platform and landing stations for a Bella-1 type rescue vehicle and a "micro-RVK".

Source: Third Dimension Project

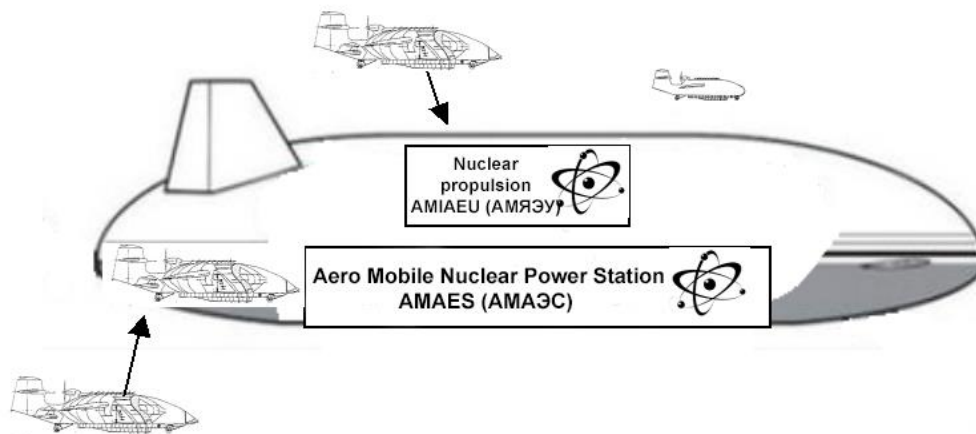
If the basic version of the SHa-3500 RVK was not ambitious enough, the Third Dimension Project proposed six versions of that airship:

1. **Basic version (RVK-BP):** Unmanned / autonomous, cargo-only, simplified version for use along the main route of the New Great Silk Road, where weather and terrain are not so challenging.
2. **Arctic modification (RVK-AP):** Piloted version, cargo-only, adapted for Arctic routes, which are more challenging than the main route.
3. **Cargo and passenger modification (RVK-PGP):** Piloted version, carrying mixed cargo and passengers.
4. **Marine modification (RVK-M):** Piloted and unmanned / autonomous versions, for trans-oceanic transportation (international routes beyond the New Great Silk Road).
5. **Nuclear propulsion modification 1 (RVK-AMIAEU):** Piloted version. The airship's conventional power sources are replaced by Aero Mobile Nuclear Power Plants (аэро мобильных ядерных энергетических установок, АМЯЭУ in Russian, AMIAEU in English transliteration). This modification retains the 3,500 metric ton payload capability and can be made to any of the above configurations.



RVK-AMIAEU. Source: Third Dimension Project

6. **Nuclear power plant modification 2 (RVK-AMAES):** Piloted version. This is a further modification of the nuclear propelled RVK-AMIAEU. A second nuclear power plant known as an Aero Mobile Nuclear Power Station (Аэро Мобильная Атомная Электро Станция, АМАЭС in Russian, AMAES in English transliteration) is carried in place of the detachable cargo platform. The AMAES power station will supply power to terrestrial users at a remote site.

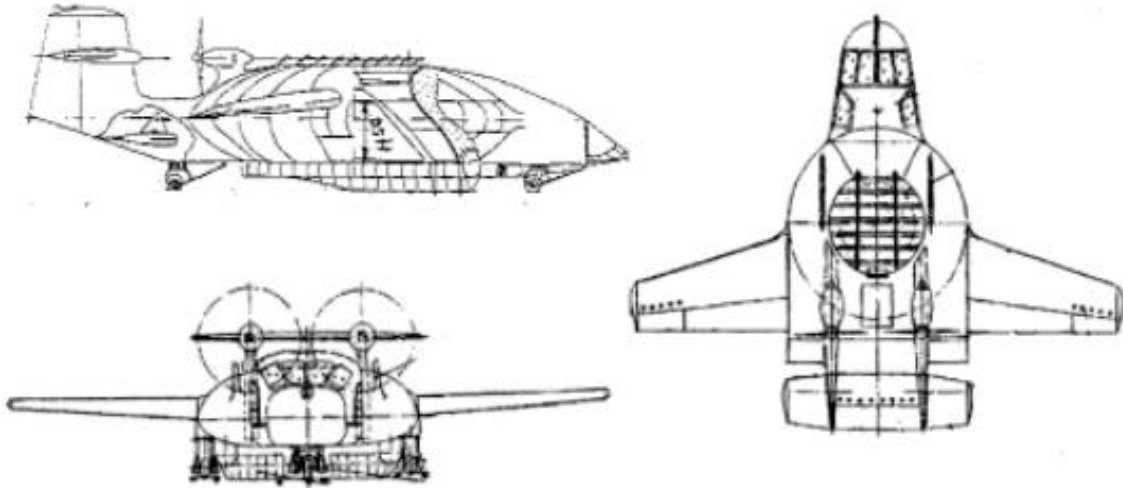


RVK-AMAES. Source: Third Dimension Project

Tumencotrans manned, semi-buoyant rescue sloop

In connection with this New Great Silk Road concept, a semi-buoyant aircraft based on the Tumencotrans Bella-1 prototype was proposed as a “manned, highly maneuverable aeronautical rescue sloop-boat” that was intended for emergency rescue operations along the transportation routes flown by the very heavy lift RVKs.

The rescue sloop has an air cushion landing system (ACLS) that enables landing on all types of relatively level surfaces (hard ground, mud, water, snow or ice).



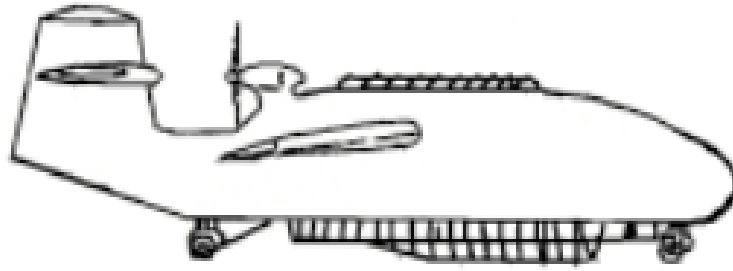
*Three-view drawing of the manned, semi-buoyant rescue sloop.
Source: Third Dimension Project*

General characteristics of the manned, semi-buoyant rescue sloop

Parameter	Manned, semi-buoyant rescue sloop
Payload capacity	up to 600 kg (1,323 lb)
Crew	1 person
Number of passengers	6
Lift gas	Helium or deactivated hydrogen
Propulsion and dynamic lift	<ul style="list-style-type: none"> • Main propulsion by turboprop or turbojet • Separate onboard power plants drive the lift fan and inflate the ACLS
Full load ceiling	8,000 m (26,247 ft)
Cruising speed	350 kph (217 mph)
Service life	min. 30 years

Tumencotrans unmanned, semi-buoyant “micro RVK”

An unmanned, semi-buoyant “micro RVK” was proposed to provide telemetric information to the dispatching services of the RVK ports established along the New Great Silk Road, particularly during takeoff and landing of the large RVK transport airships. In addition, the micro RVKs would provide general security services at the ports.



*Profile view of unmanned, semi-buoyant micro RVK.
Source: Third Dimension Project*

General characteristics of the unmanned, semi-buoyant Micro-RVK

Parameter	Unmanned, semi-buoyant micro-RVK
Payload capacity	up to 100 kg (220 lb)
Crew	0
Lift gas	Helium or deactivated hydrogen
Propulsion and dynamic lift	Onboard power plants drive fan-type, electrically-driven propulsion propellers, the lift fan and the ACLS
Full load ceiling	8,000 m (26,247 ft)
Cruising speed	250 kph (155 mph)

5. For additional information

- Mikhail Shmelkov, “Средство осуществления проекта,” (“Project tools” in Russian), Third Dimension Project, 2014: <http://ngsw.ru/index.php/sredstvo-osushchestvleniya#rvk>

Video

- Mikhail Shmelkov, “На кону свыше 500 миллиардов Долларов США! Проект Третье измерение! Новые российские технологии!,” (“Over 500 billion US dollars are at stake! Project Third Dimension! New Russian technologies!”), (18:02 minutes), Third Dimension Project, 30 August 2014: <https://www.youtube.com/watch?v=80t67XYZcVs&t=2s>

Other *Modern Airships* articles

- *Modern Airships - Part 1*: <https://lynceans.org/all-posts/modern-airships-part-1/>
 - Tumenecotrans_BARS & Bella-1
- *Modern Airships - Part 2*: <https://lynceans.org/all-posts/modern-airships-part-2/>
 - Shalaev & Krylo Design Bureau airships
- *Modern Airships - Part 3*: <https://lynceans.org/all-posts/modern-airships-part-3/>