

LocomoSky hybrid thermal airships

Peter Lobner, 3 April 2021

1. Introduction

Starting in about 2005, a technical and management team was assembled, including members of the former Design Bureau Thermoplan and chief designer Aleksander Kharchikov, and the new firm LocomoSky was formed in Ulyanovsk, Russia, about 500 km (311 miles) east of Moscow. Their updated hybrid thermal airship design concept improved on the design of the Thermoplane airship (circa 1992) and was known as the LocomoSkyner. See my separate article for more information on the Thermoplane.

2. Planned development program

In 2010, LocomoSky CEO Roman Yurchenko described the following ten-year, four-stage, \$658 million development program that would lead to production of the LocomoSkyner airship in Ulyanovsk.

- **Phase 1:** Between 2010 and 2013, engineering and design studies would be performed and the first operational prototype with an under 60-ton payload would be built. The first funding increment was \$93 million.
- **Phase 2:** By 2015, a larger payload craft would be built and actual production would begin. This phase had an estimated cost of \$207 million.
- **Phase 3:** Between 2015 and 2017 the company had plans to design and build its first 600-ton cargo carrier. This phase had an estimated cost of \$286 million.
- **Phase 4:** By 2020, LocomoSky planned to invest another \$72 million to launch full-scale manufacturing of its entire product line, including cargo-and-passenger hybrids.

Ulyanovsk regional officials were prepared to provide their full support for the project, which became known as "Creation of aerostatic thermally ballasted aircraft (ATLA)." The high-profile project was presented to Russian President Dmitry Medvedev, who held a meeting with the State Council in Ulyanovsk.

In July 2012, at a meeting of the regional government, it was decided to cancel the ATLA program. You'll find details on events leading up to the cancellation in a translated Russian article, "Flying saucers' will not be built," at the following link: https://lynceans.org/wp-content/uploads/2021/02/Russian-flying-saucer-airships-will-not-be-built_July-2012.doc

3. Basic design features

Like the Thermoplane, the LokomoSkyner was a variable buoyancy, hybrid thermal airship that generated aerostatic lift from the combined buoyancy of a fixed amount of helium lift gas (about 2/3 of the aerostatic lift) and hot air at a variable temperature in separate chambers within the hull (up to about 1/3 of the aerostatic lift). This is called "thermo-ballasting." With helium alone the airship was semi-buoyant (heavier-than-air). There are some differences in the basic operating principles of the Locomoskyner and Thermoplane:

- The Thermoplane had a single helium cell. The Locomoskyner has 16 helium cells located in the top of the hull. Damage to one or two will not greatly affect the performance of the airship.
- Locomoskyner uses separate heaters ("heat guns") inside the air volume. In addition the air is heated via heat exchangers in the engine exhausts instead of heating the air directly with engine exhaust gases, as in the Thermoplane.

Load exchanges would be conducted as follows:

- To pick up a load, the neutrally buoyant airship hovers and connects to a load on the ground. Then the air in the thermal volume is rapidly heated to increase gross lift enough to establish positive buoyancy at the higher gross loaded weight. The loaded airship lifts off and proceed to the delivery site.
- To drop off a load, the airship hovers over the delivery site and slowly descends to place the load on the ground. Hot air in the thermal volume is vented and ambient cool air is introduced in the correct proportions to decrease gross lift during a hover and allow the weight of the load to be transferred to the ground. Then, the unloaded, neutrally buoyant airship can disconnect the load and proceed to its next destination.

4. Design evolution

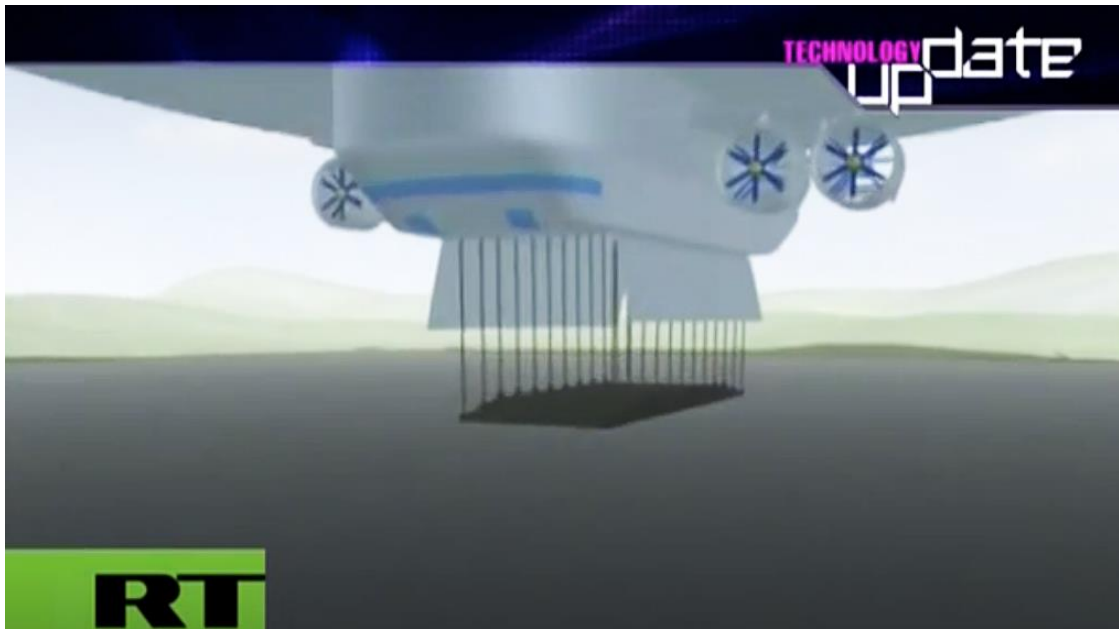
The LocomoSkyner airship appears to have gone through several major design iterations in less than a decade.

A possible early version appeared in a short 2010 Russian video that starts with an animation showing the following lenticular airship with a large gondola and a large external load platform with two battle tanks, which would be a 90 – 100 ton load. Propulsion is provided by two large diameter ducted fan propulsors amounted at the stern.



Source: 2010 PowerRossiya video, "Locomoskyner – Russian New UFO Flying Saucer Airship"

Another early design, shown in the following graphics, has a large internal cargo bay in the gondola and an extendable load floor for cargo pickup and delivery without landing. Note the propulsion units are adjacent to the gondola in this design.



Source: 2009 Technology Update video by Russia Today (RT), "UFO from Russia."

5. The sub-scale prototype (circa 2009)

This remotely-controlled, 1/7th scale lenticular airship was developed to test basic design features and control systems that, if successful, would be incorporated into a subsequent full-scale prototype airship.



Basic design parameters are:

- Diameter: about 6.5 meters (21 ft)
- Lifting capacity: about 20 kg
- Propulsion: 4 x electric motor driven propulsors



Source, three photos: 2009 Russia Today video, "UFO from Russia."



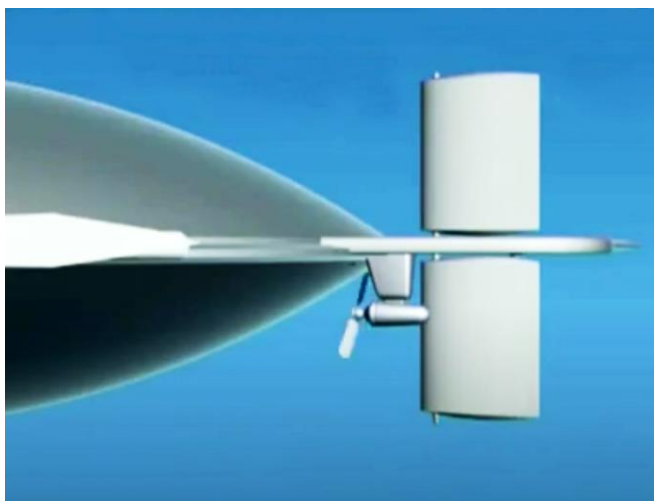
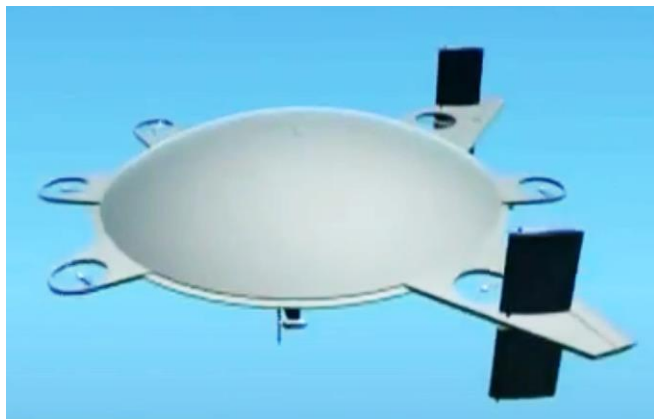
6. Concept for 2nd prototype (circa 2009)



One source identified a planned second prototype as the "LocomoSkyner-03." This may be the prototype design shown in a 2009 Technology Update video by Russia Today (RT), "UFO from Russia."

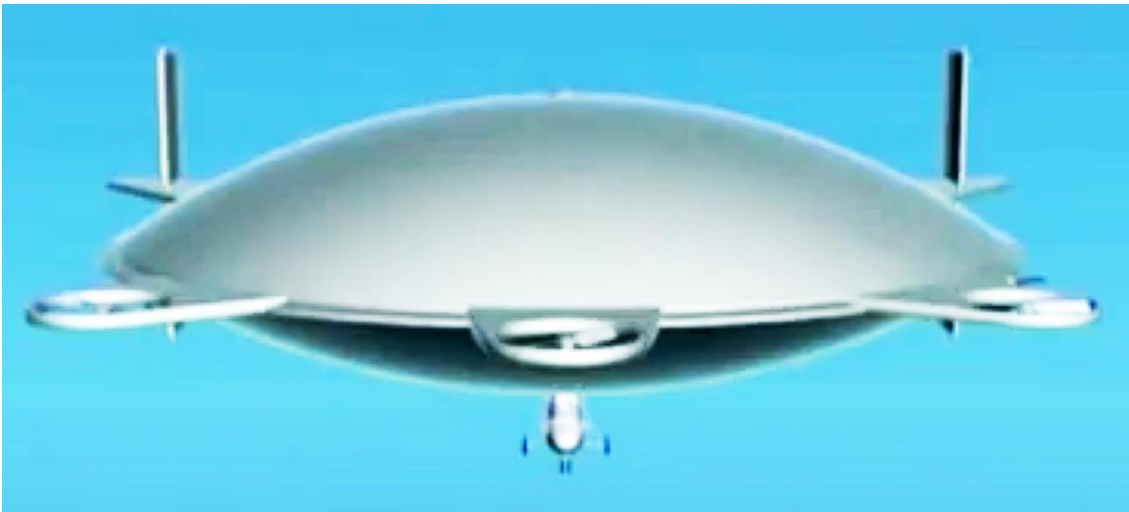
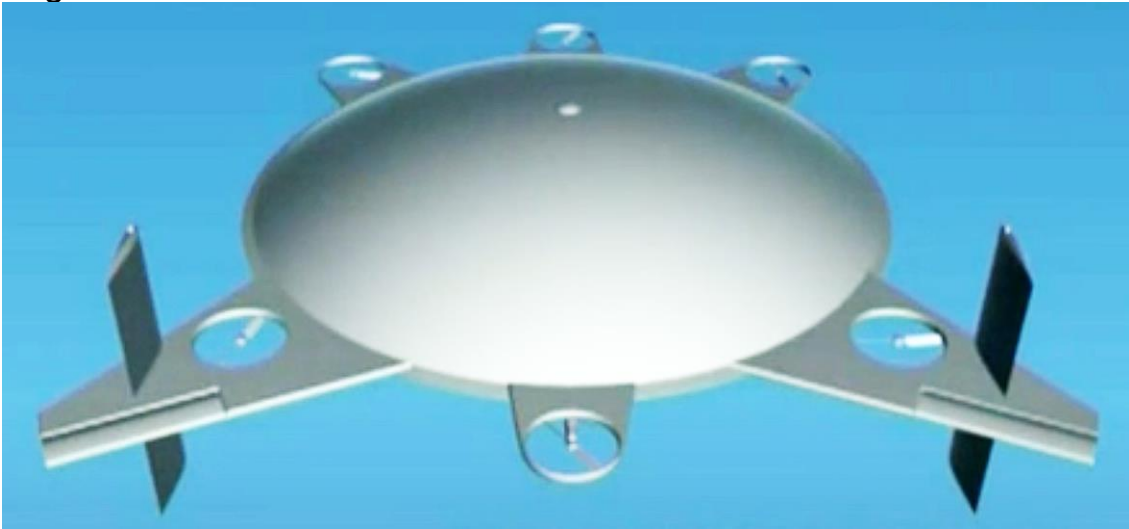
Basic characteristics of this design are as follows:

- Diameter: 50 m (164 ft)
- Disc thickness: 25 m (82 ft)
- Structural mass: 13 metric tons (14.3 tons)
- Maximum payload: 2 metric tons (2.2 tons)
- Propulsion: 8 x 150 – 200 hp (112 – 149 kW) engines
- Range: 500 km (311 miles)
- Cruise altitude: 2,000 m (6,562 ft)



Six engines are installed around the perimeter of the disc to provide vertical thrust. Three engines are installed under the rim of the disc for propulsion, two on the flanks and one at the stern (shown at left) that may share the drive with the stern vertical

engine.

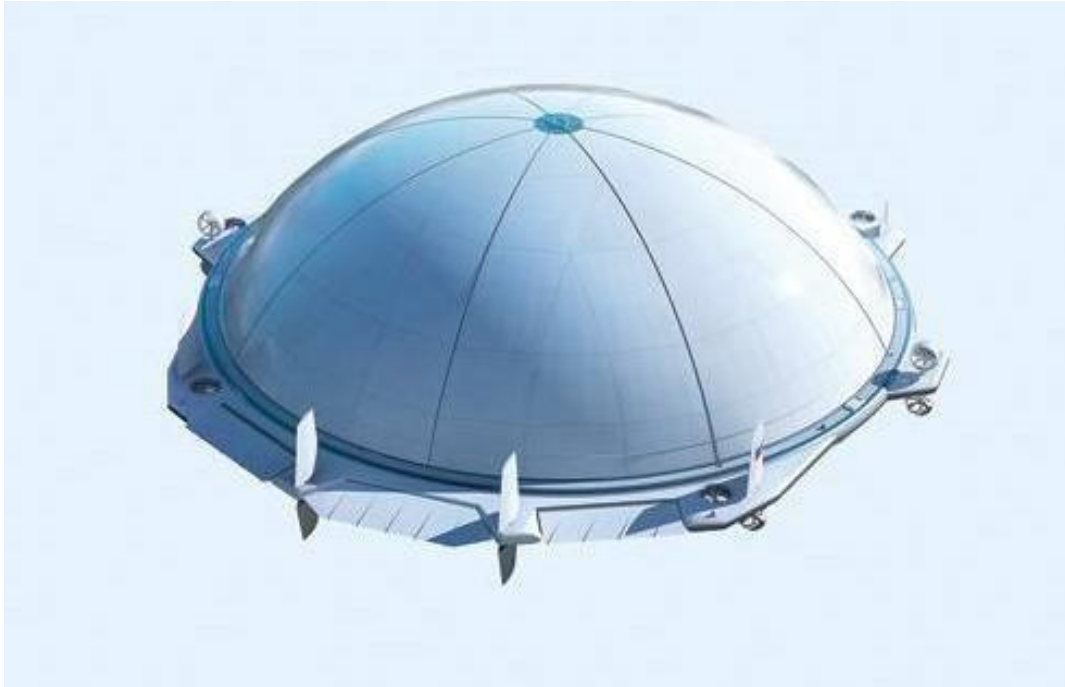


A helicopter fuselage would have served as the gondola on this prototype. The helicopter's gas turbine engines serve as the heat source for the hot air chamber (very similar to the arrangement on the

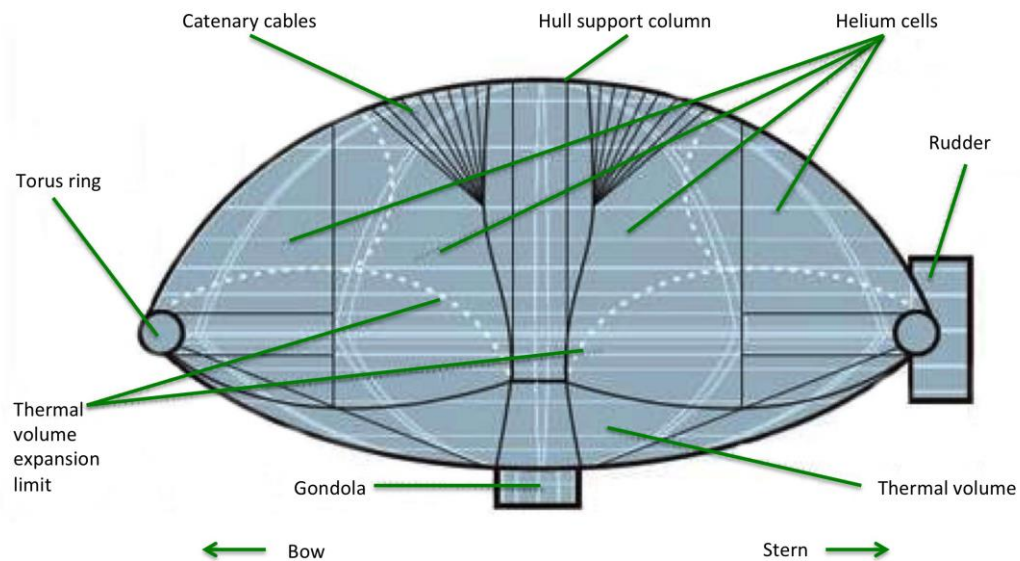
Russian Thermoplane ALA-40 prototype airship, circa 1992). In 2009, the planned date for the start of testing this LocomoSkyner prototype was in 2011. This prototype was not built.

7. Later concept for a production LocomoSkyner

The final design of the LocomoSkyner airship maintained the deep lenticular hull form seen in prior designs.



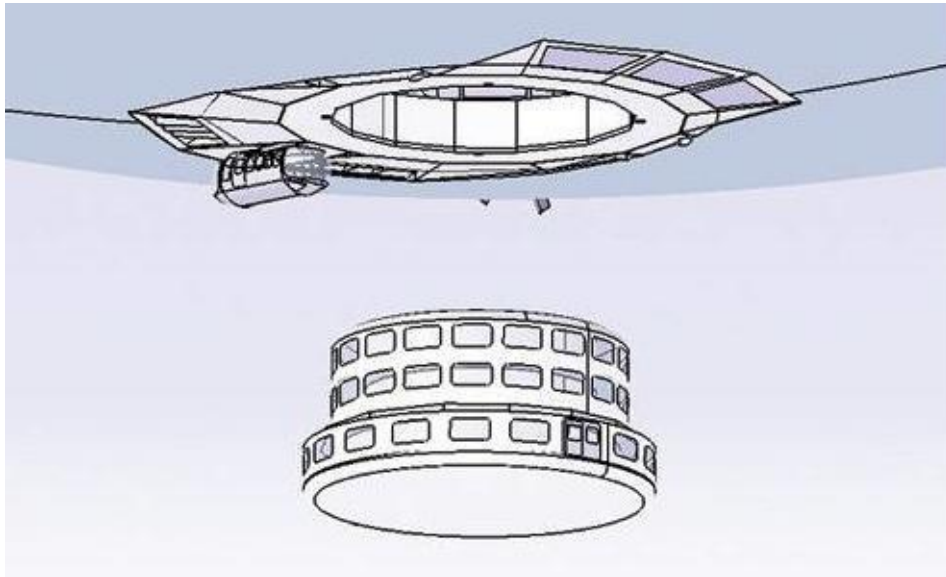
*External view looking down on the stern of the airship.
Source: LocomoSky*



*Cut-away diagram showing the airship internal structures.
Source: Adapted from LocomoSky*

Production LocomoSkyner airships were expected to have the following general characteristics.

- A family of similar hybrid thermal airships will range in size from 50 to 260 meters (164 to 853 ft) in diameter. Payload will be a function of size.
- The central gondola is a modular structure that can be pre-loaded with cargo and quickly exchanged at a destination.



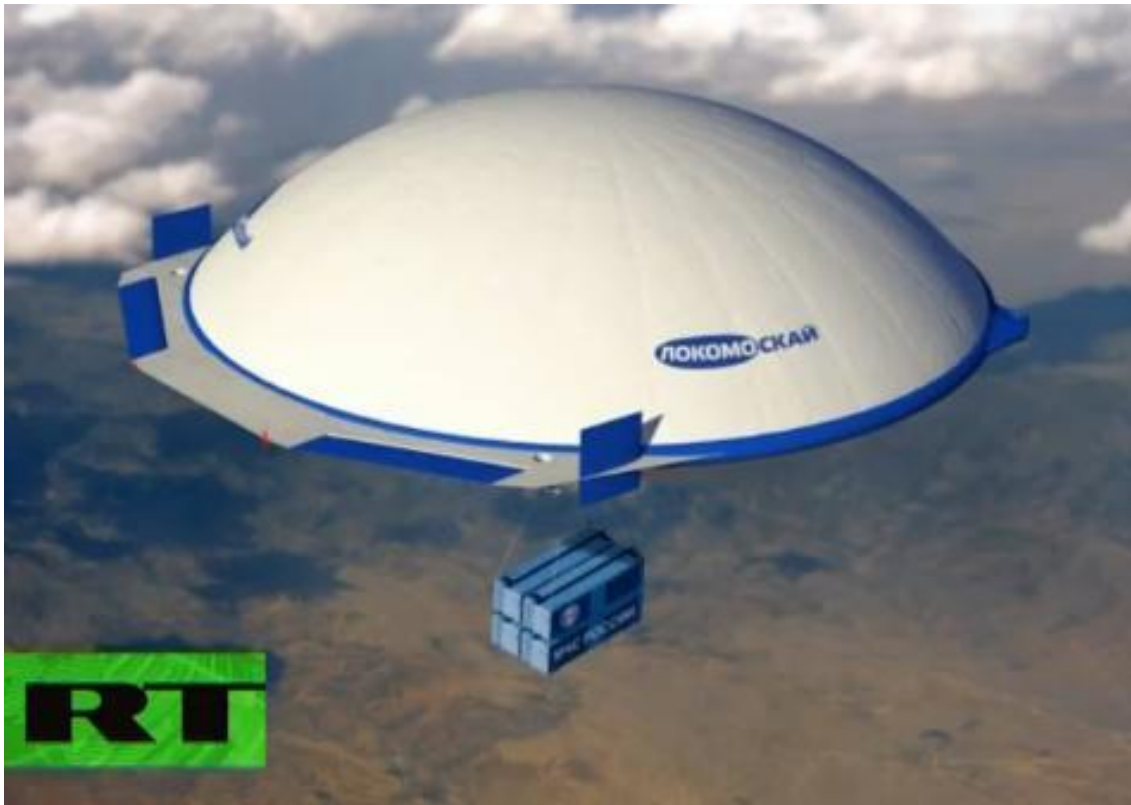
Modular gondola. Source: LokomoSky

- The lenticular airship hull provides ease of control and high maneuverability, even in a cross-wind up to 20 m/s (72 kph / 44.7 mph).
- The airship is capable of precise vertical takeoff and landing (VTOL) and hovering operations.
- The craft is propelled by electric motor driven propulsors.
- Maximum speed is 110 kph (68.3 mph).
- Maximum range is 3,000 km (1,864 miles).
- Small wings along the edges of the airship provide some aerodynamic lift.
- Hull is designed for operation in a temperature range from -50° C to + 50° C.

- Warm air can be fed inside almost any portion of the shell and maintain its temperature at any level. Because of this, operation even at Antarctic - 80° C temperature would be possible.
- Even if all 16 helium cells are damaged and helium lift is lost, it is still possible to operate the airship with just hot air and a reduced load.
- The final assembly of the airship is done in an open area, not in a hanger.
- When the airship is parked outside and secured to the ground by tethers, the top part of the rigid hull serves as the hanger.

No LocomoSkyner airship was produced.

The following graphics are from the 2010 short Russia Today video, "Locomoskyner: Mighty Russian UFO-style airship."



LocomoSkyner carrying a large external load.



LocomoSkyner delivering a reactor vessel.



LocomoSkyner carrying large external loads.

8. For more information:

- “LokomoSkyner- advanced strategic lift thermoplane airship,” Technically Jurisprudence, 28 May 2010: <http://technicallyjuris.blogspot.com/2010/05/lokomoskayner-advanced-strategic-lift.html>
- “UFOs exist!” Bashny.Net: <https://bashny.net/t/en/199676>
- “Flying saucers will not be built,” Российская Газета, 4 July 2012: https://lynceans.org/wp-content/uploads/2021/02/Russian-flying-saucer-airships-will-not-be-built_July-2012.doc

9. Videos

- “UFO from Russia” (8:01 min), RT Russia Today, Technology Update, 2009: <https://youtu.be/BbNv8PJ5SdI>
- “Locomoskyner: Mighty Russian UFO-style airship” (0:42 min), RT Russia Today video, 3 March 2010: <https://www.youtube.com/watch?v=AdKvdimbjLc>
- “Locomoskyner - Russian New UFO Flying Saucer Airship” (1:44 min), PowerRossiya, 29 November 2010: <https://www.youtube.com/watch?v=djV5bTxAfHI>