



The Plesetsk Cosmodrome

Plesetsk Cosmodrome is a spaceport located in Mirny, Arkhangelsk Oblast, about 800 km north of Moscow. It has served as a launch site since 1957. Its high latitude makes it ideal for Angara 1.2 LEO and SSTO missions. The future launch site for Angara is the Vostochny Cosmodrome, located on the east coast of Russia.

Quality

- Unified Quality Management System throughout Khrunichev and its integrated key suppliers
- Periodic reviews and recertification
- Quarterly Customer Quality Reports
- Insurance community annual briefings
- Commitment to continuous quality and reliability improvement

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Our Mission Statement

ILS creates value for our customers by providing dependable access to space through proven and innovative launch solutions.

EXPERIENCE ILS
ACHIEVE
YOUR MISSION

Angara 1.2

International Launch Services
FLEXIBILITY | PERFORMANCE | EXPERIENCE | DEDICATION



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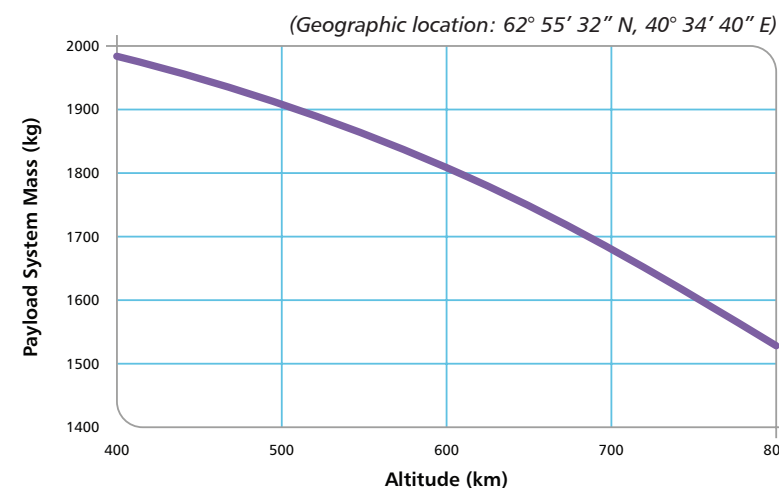
ANGARA 1.2 COMMERCIAL LAUNCH SERVICES

International Launch Services (ILS) possesses the exclusive rights to market the Angara 1.2 vehicle to commercial customers. Based on state of the art technology, the Angara 1.2 vehicle has a high performing payload mass to lift-off mass ratio, when fully fueled.

The Angara 1.2 launch vehicle can launch a variety of satellites, weighing up to 3 metric tons, to Low Earth Orbit (LEO) and was successfully flight demonstrated on July 9, 2014 from the Plesetsk launch site. The Proton launch vehicle family, launching from Baikonur, will continue to meet heavy lift requirements, with Angara 1.2 providing the low- and medium-lift requirements.

Plesetsk Cosmodrome Launch Site

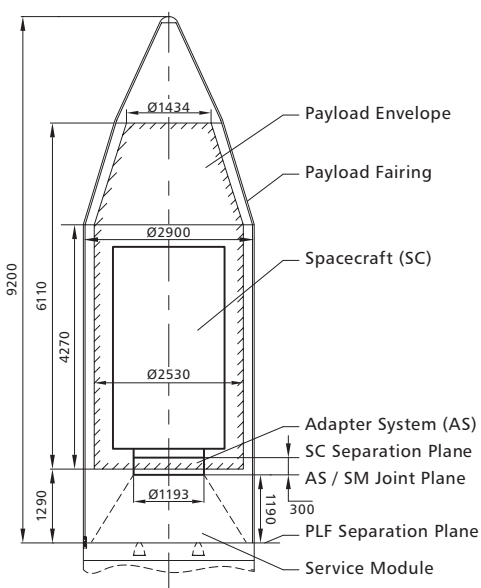
Operational Angara 1.2 SSO Projected Performance from Plesetsk



PAYLOAD FAIRING:

- Diameter: 2.9 m, 2.53 m³ usable volume
- Clamshell design
- Structure is three-layered honeycomb compound

Diagram of PLF and usable volume below



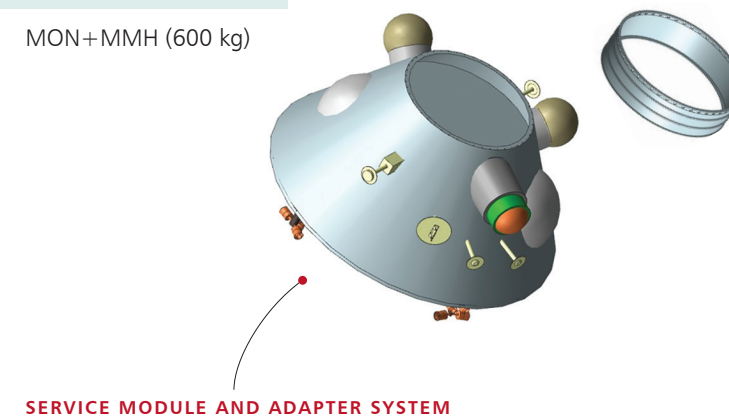
SERVICE MODULE:

The Service Module engine is designed to:

- Generate velocity impulses to inject the payload into the target orbit
- Support the required attitude during coast phase while on transfer orbit and for payload separation
- Generate velocity impulse for de-orbiting maneuver from the payload target orbit

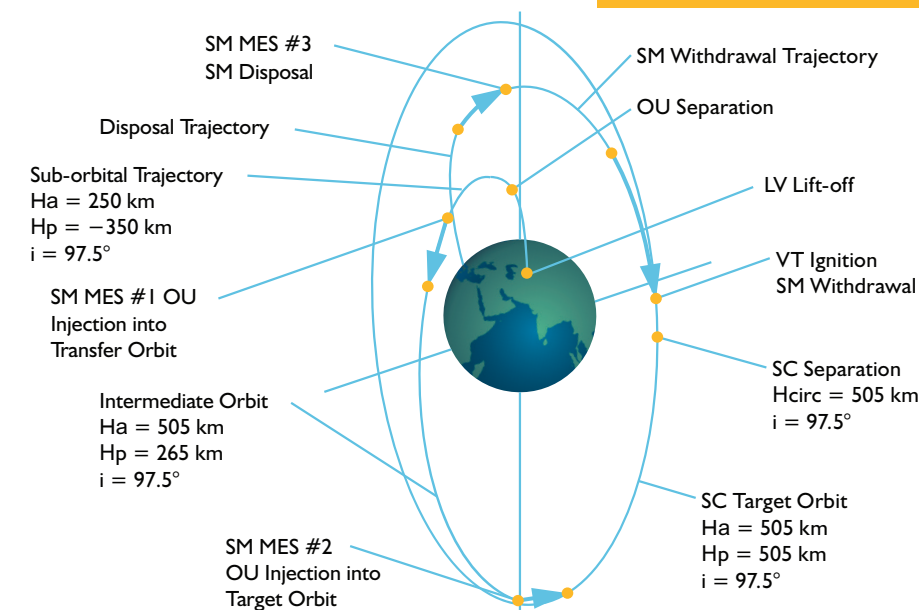
PROPELLANTS:

MON+MMH (600 kg)



SERVICE MODULE AND ADAPTER SYSTEM

Typical Mission



RD-0124A
ENGINE



RD-0191
FIRST STAGE ENGINE

- Sun-Synchronous Orbit (SSO) and Low Earth Orbit (LEO) missions
- Projected high performance launch capability
- Effective cost per kilo for launch
- Capability to launch to various orbits
- Ideal for highly inclined and polar orbit missions
- Two-Stage vehicle with restartable Service Module
- First Angara 1.2 commercial mission announced in August 2016 for Korea Aerospace Research Institute (KARI)

Angara Launch Vehicle Family

- Flight-proven launch vehicle:
 - Angara first stage major components were flight demonstrated on the Korean Space Launch Vehicle (KSLV) for first three missions (2009, 2010, 2013)
 - First Angara 1.2 maiden launch was successful in 2014
 - First Angara 5 maiden launch was successful in 2014
- Manufactured and tested by Khrunichev in Omsk and Moscow, Russia