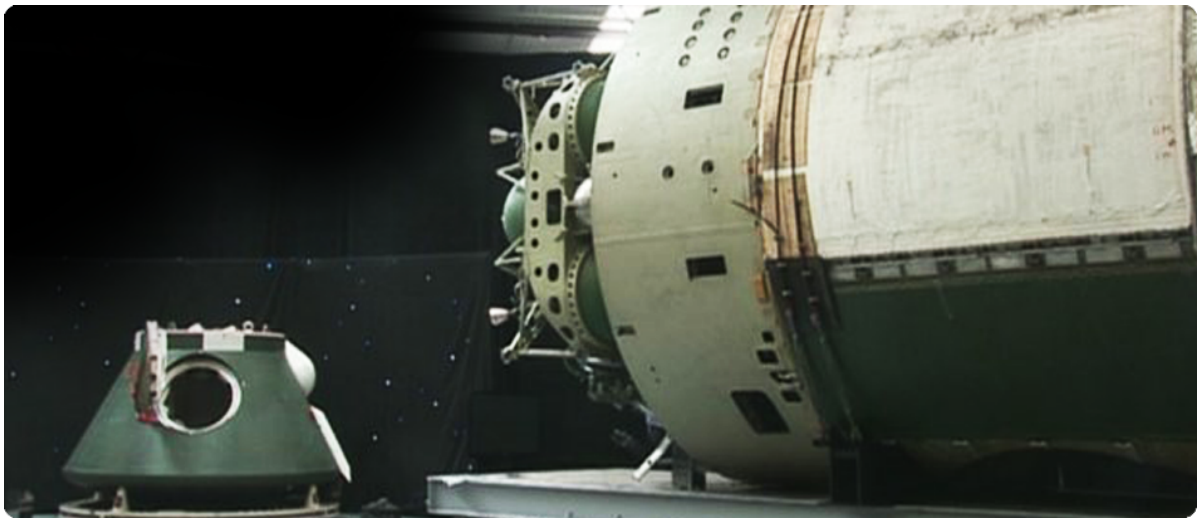
EXCALIBUR • ALMAZ
Space Business Solutions

Excalibur Almaz Spaceships



Excalibur Almaz's unique family of crew, research and logistics carriers enables us to maximize its market flexibility. Applying our knowledge of crew and cargo requirements and the challenges of working and living in a microgravity environment, Excalibur Almaz provides superior spacecraft designs. These designs enhance research capabilities, cargo carrying capacity and habitation capabilities, while meeting the specific needs of government and commercial customers.

Excalibur Almaz is a commercial space company that will provide the following products:

- Low Earth Orbit (LEO) crew space transportation services
- Low Earth Orbit (LEO) cargo space transportation services
- Cislunar, Libration Point and deep space missions
- Microgravity experiments on orbital missions lasting several days
- Third party end-to-end integration services for the transport of customer payloads to and from Low Earth Orbit

Spacecraft

Excalibur Almaz (EA) Spacecraft (space stations) will provide platforms for microgravity scientific experimentation as well as destinations for crewed space exploration missions to serve governments, businesses and academic institutions. The Spacecraft are part of EA's longer-term business plan and will return to NPOM for final preparation and launch from the Baikonaur Cosmodrome in Kazakhstan. Alternate missions involving the Spacecraft are under consideration such as lunar and asteroid exploration missions.

Reusable Return Vehicles

The Almaz Reusable Return Vehicles (RRV's) were also developed by Vladimir Chelomei in Soviet-era Russia and have a remarkable history and pedigree. Beginning in the mid-1970's the Almaz RRV's went through nine flight tests with two spacecrafts being flown to Low Earth Orbit

multiple times to demonstrate its reusability. Designed to carry a crew of up to three, or a combination of crew and cargo, the Almaz RRV was robustly constructed for both ground and water landings. The spacecraft also successfully completed open water testing by a crew of three commanded by USSR Cosmonaut Gennady Sarafanov. The crew remained inside the Almaz RRV for 72 hours during the post-landing test and was successfully recovered from the crew compartment in heavy seas.

The Almaz capsules were also used for ferrying equipment and cargo to and from the Almaz space stations. Durations on orbit ranged from 50 days to 175 days. The capsules were adjusted and fit for human flight and were occupied on orbit while docked to the station to validate life support and habitability features but were never launched with humans on board.

Service Module

The new service module will allow the spacecraft to perform flights of up to one week, without rendezvous with a space station. In these mission modes, the service module provides storage space for consumables and a separate flight compartment to allow mission participants adequate room to experience extended flights.

There are big challenges with high risk and high costs associated with developing and proving a human space transportation system. Excalibur Almaz already has many of the necessary elements for it Human Space Transportation System including a proven emergency escape system, a proven spacecraft capable of Earth reentries, an “in-space” service/propulsion module and compatibility with existing human-rated launch vehicles. The critical elements of EA’s Crew Transportation System are at Technology Readiness Level 9. These elements provide EA with tremendous development advantage worth hundreds of millions of dollars. Furthermore, the Excalibur Almaz Reusable Return Vehicles are reusable for up to 15 times providing a tremendous cost advantage.

Cargo Module

Excalibur Almaz’s cargo module will attach to the base of the re-usable capsule and will provide significant additional cargo volume capacity of up to 10 metric tons. These cargo modules can ferry both pressurized and unpressurized cargo as well as transport microgravity research experiments to and from space. Development of this module, including engineering of the intermediate stage linking the components to the RRV while in flight, are in the advance stages of development.