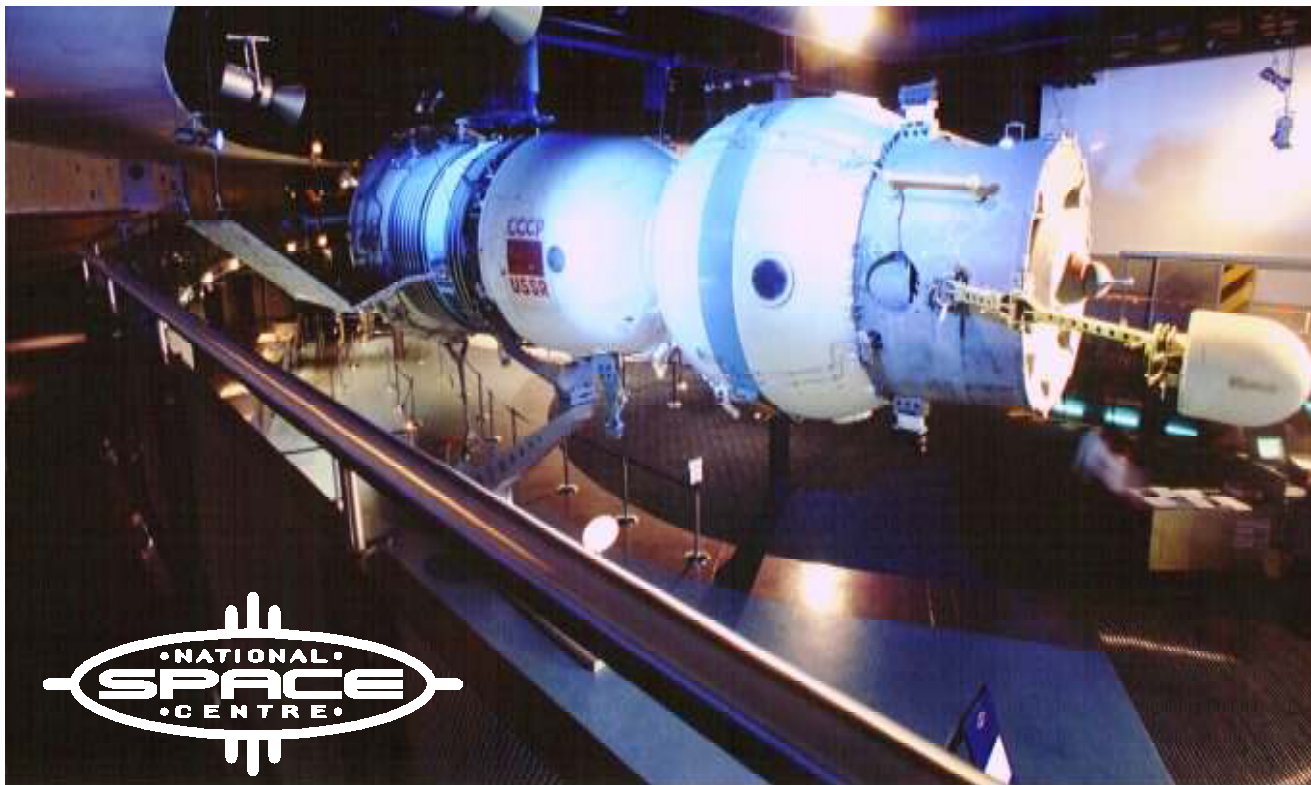


The National Space Centre



Information on the Soyuz Spacecraft

Plans for a manned spaceflight of the Soyuz began towards the end of the 1950's. The plan later evolved as a proposal to send men to orbit and eventually land on the Moon. The Soyuz was also developed to serve for military purposes, and by the late 1960's also operated as a ferry craft between space stations. As it continues to develop, it still remains the world's oldest operational manned spacecraft.



In early Soyuz missions the spacecraft was described as a three-part vehicle. The first part being the Orbital Module (OM), an area designed for habitation during orbital operations. It is also this compartment that houses the side hatch for crew entry on the launch pad. The compartment was also supplied with two windows, one that would allow for earthward observations, the other for celestial. In later models, installation of a forward-looking window allowed easier operation for the Flight Engineer to dock with the space station.

The second compartment is the Descent Module (DM), the only module of the Soyuz that is recoverable. It prepares the crew for launch, orbital manoeuvring, docking, undocking, re-entry and landing. It is made of a 'high-temperature-resistant ablative material' for protection during re-entry into the earth's atmosphere.

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The final compartment being the Propulsion Module (PM). This section has a mass of approximately 2,560kg, an overall length of 2.3 metres and a diameter of 2.2 metres, which flares to 2.72 metres. It is made up of the three sections; Intermediate (home of the fuel tanks and the approach and orientation engines (including their sub-engines)), Instrument (a sealed and pressurised unit that houses the thermal control system heat exchangers, associated equipment, radio and telemetry equipment, the power supply systems and guidance and rendezvous equipment) and the Assembly (housing the main propulsion system, additional approach and orientation engines and on-orbit storage batteries). Attached to the PM, is the upper part of the launch vehicle, originally known as the R-7.

The R-7 Launch Vehicle

It was originally designed in the early 1950's and first flew into orbit in May 1957. Earlier designs of the R-7 focused on single chamber engines. It was fuelled by a combination of liquid oxygen and kerosene. The central core, operated by a RD-106 engine produced 53 tonnes of thrust, a further four strap ones, operated by the RD-105 engines would create a further 55 tonnes of thrust during launch. The overall length of the Soyuz launch vehicle based on the R-7 would stretch to a distance of 49.3 metres. It was later developed to create more powerful engines such as the RD-108 for the central core that created 75 tonnes of thrust during launch and the RD-107 for the strap-ons, supplied a further 83 tonnes of thrust, thus creating a total of 122 seconds burn time. With development, the original single chamber engines were redesigned to a four chamber one.

Crew Positions Information

Depending on the type of mission a Soyuz mission can be manned by upto three cosmonauts. The initial stages of the launch are operated automatically, with little for the crew to do. Likewise landing and emergency procedures are usually automatic, with the Commander only interfering when problems arise. The three potential crew members are as follows:

- First crew member (centre seat) – The Soyuz Commander. Usually an Air Force cosmonaut, who is hired to deal with and operate the craft in emergencies.
- Second crew member (left seat) – The Flight Engineer. Supports the Commander by issuing and decoding data.
- Third crew member (right seat) – The Researcher