**ISS History**

The ISS provides a platform to conduct experiments that require one or more of the unusual conditions present on the station. The primary fields of research include human research, space medicine, life sciences, physical sciences, astronomy and meteorology. The 2005 NASA Authorization Act designated the American segment of the International Space Station as a national laboratory with the goal of increasing the use of the ISS by other federal agencies and the private sector.

Over the next two years the station continued to expand. A Soyuz-U rocket delivered the *Pirs* docking compartment. The Space Shuttles *Discovery*, *Atlantis*, and *Endeavour* delivered the *Destiny* laboratory and *Quest* airlock, in addition to the station's main robot arm, the *Canadarm2*, and several more segments of the Integrated Truss Structure.

The expansion schedule was interrupted by the destruction of the Space Shuttle *Columbia* on STS-107 in 2003, with the resulting hiatus in the Space Shuttle program halting station assembly until the launch of *Discovery* on STS-114 in 2005.

The official resumption of assembly was marked by the arrival of *Atlantis*, flying STS-115, which delivered the station's second set of solar arrays. Several more truss segments and a third set of arrays were delivered on STS-116, STS-117, and STS-118. As a result of the major expansion of the station's power-generating capabilities, more pressurised modules could be accommodated, and the *Harmony* node and *Columbus* European laboratory were added. These were followed shortly after by the first two components of *Kibō*, the Japanese Experiment Module. In March 2009, STS-119 completed the Integrated Truss Structure with the installation of the fourth and final set of solar arrays. The final section of *Kibō* was delivered in July 2009 on STS-127, and the third node, *Tranquillity*, in February 2010 during STS-130 by the Space Shuttle *Endeavour*, alongside the Cupola.

As of February 2010[update], the station consisted of thirteen pressurised modules and the complete Integrated Truss Structure. Still to be launched is the Pressurised Multipurpose Module *Leonardo*, the European Robotic Arm, two Russian modules and a number of external components, including the Alpha Magnetic Spectrometer (AMS-02). Assembly is expected to be completed by 2011, by which point the station will have a mass in excess of 400 metric tons (440 short tons).

The International Space Station (ISS) is an internationally developed satellite currently being assembled in Low Earth Orbit. Primarily a research laboratory, the ISS offers an advantage over spacecraft such as NASA's Space Shuttle because it is a long-term platform in the space environment, where extended studies are conducted. The presence of a permanent crew affords the ability to monitor, replenish, repair, and replace experiments and components of the spacecraft itself. Scientists on Earth have swift access to the crew's data and can modify experiments or launch new ones, benefits generally unavailable on specialised unmanned spacecraft.

Crews, who fly expeditions of several months' duration, conduct scientific experiments each day (approximately 160 man-hours a week). As of the conclusion of Expedition 15, 138 major science investigations had been conducted on the ISS. Scientific findings, in fields from basic science to exploration research, are published every month.

The ISS provides a location in the relative safety of Low Earth Orbit to test spacecraft systems that will be required for long-duration missions to the Moon and Mars. This provides experience in the maintenance, repair, and replacement of systems on-orbit, which will be essential in operating spacecraft further from Earth. Mission risks are reduced, and the capabilities of interplanetary spacecraft are advanced.

Part of the crew's mission is educational outreach and international cooperation. The crew of the ISS provide opportunities for students on Earth by running student-developed experiments, making educational demonstrations, and allowing for student participation in classroom versions of ISS experiments, NASA investigator experiments, and ISS engineering activities. The ISS program itself, with the international cooperation that it represents, allows 14 nations to live and work together in space, providing lessons for future multi-national missions.

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The **International Space Station** (**ISS**) is an internationally developed research facility that is being assembled in low Earth orbit. On-orbit construction of the station began in 1998 and is scheduled for completion by 2011. The station is expected to remain in operation until at least 2015, and likely 2020. With a greater mass than that of any previous space station, the ISS can be seen from the Earth with the naked eye, and, as of 2010[update], is the largest artificial satellite orbiting the Earth. The ISS serves as a research laboratory that has a microgravity environment in which crews conduct experiments in biology, human biology, physics, astronomy and meteorology. The station has a unique environment for the testing of the spacecraft systems that will be required for missions to the Moon and Mars. The ISS is operated by Expedition crews, and has been continuously staffed since 2 November 2000, meaning the ISS program has maintained an uninterrupted human presence in space for the past &0000000000000009.0000009 years and &0000000000000132.000000132 days, which is approaching the current record, set aboard *Mir*, of 9 years and 257 days. As of 1 December 2009 (2009 -12-01)[update], the crew of Expedition 22 is aboard.

The ISS is a synthesis of several space station projects that includes the American *Freedom*, the Soviet/Russian *Mir*-2, the European *Columbus* and the Japanese *Kibō*.

Budget constraints led to the merger of these projects into a single multi-national program. The ISS project began in 1994 with the Shuttle-*Mir* program, and the first module of the station, *Zarya*, was launched in 1998 by Russia. Assembly continues, as pressurised modules, external trusses and other components are launched by American space shuttles, Russian Proton rockets and Russian Soyuz rockets. As of November 2009[update], the station consisted of 11 pressurised modules and an extensive integrated truss structure (ITS). Power is provided by 16 solar arrays mounted on the external truss, in addition to four smaller arrays on the Russian modules. The station is maintained at an orbit between 278 km (173 mi) and 460 km (286 mi) altitude, and travels at an average speed of 27,724 km/h (17,227 mph), completing 15.7 orbits per day.

Operated as a joint project between the five participant space agencies, the station's sections are controlled by mission control centres on the ground operated by the American National Aeronautics and Space Administration (NASA), the Russian Federal Space Agency (RKA), the Japan Aerospace Exploration Agency (JAXA), the Canadian Space Agency (CSA), and the European Space Agency (ESA). The ownership and use of the space station is established in intergovernmental treaties and agreements that allow the Russian Federation to retain full ownership of its own modules, with the remainder of the station allocated between the other international partners. The cost of the station has been estimated by ESA as €100 billion over 30 years, and, although estimates range from 35 billion dollars to 160 billion dollars, the ISS is believed to be the most expensive object ever constructed. The financing, research capabilities and technical design of the ISS program have been criticised because of the high cost. The station is serviced by Soyuz spacecraft, Progress spacecraft, space shuttles, the Automated Transfer Vehicle and the H-II Transfer Vehicle, and has been visited by astronauts and cosmonauts from 15 different nations.