

ISS Crew & Ground Personnel Training

OVERVIEW

Voyager Space maintains qualified crew training personnel and performs crew and Ground Support Personnel (GSP) training/certification. Crew and GSP training is performed prior to each International Space Station (ISS) Increment.

Voyager Space personnel plan, develop and execute training for both the crew that will configure and operate our payloads once in space and Ground Support Personnel (GSP) that will operate our experiments from the ground (cadre and payload developers).

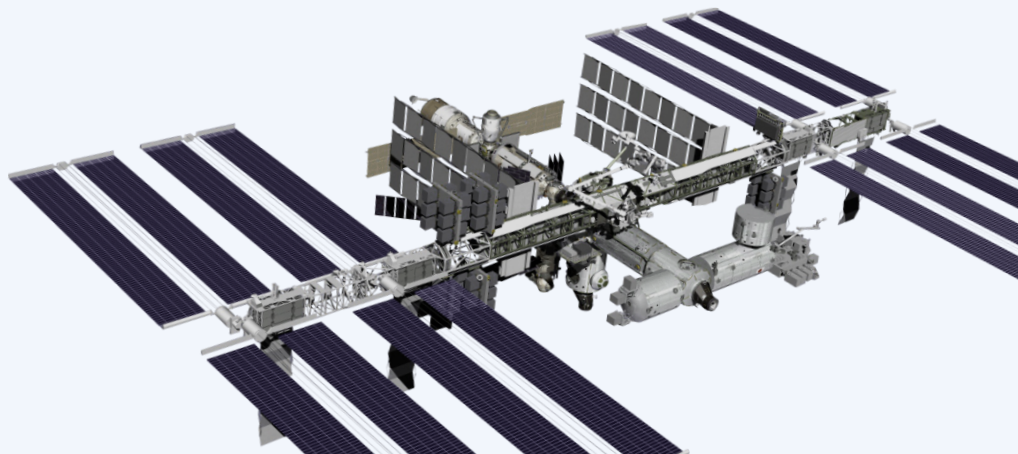
Our Team develops interactive courseware for complex experiments and research facilities such as the Voyager Space developed and operated Fluids and Combustion Facility (FCF) that operate on the ISS. We also develop courses for training payload operators including data, video, and payload support systems. Our payload training initiatives includes classroom instruction, electronic media, and web-based delivery.

- Voyager Space develops detailed crew mockups and trainers used by our dedicated crew trainers to train our on-orbit crew.
- Our ISS operations team is trained and certified for real-time operations and are also experienced with hands-on trainer, simulation and virtual training for each payload operated.
- Voyager Space designs and implements payload training initiatives, from classroom instruction to simulator/crew training unit design, development, maintenance and operation.
- Since 2001, Voyager Space has trained over 75 astronauts for over 60 ISS Increments.
- Voyager Space develops crew training classes for facilities and payloads that are skills based rather than procedure based whenever possible.

The Voyager Space Team is responsible for ISS payload operations that include development of operations products, on-orbit crew and ground personnel training/certification, and the real time payload operations on the ISS. Voyager Space has provided systems and crew operations training for more than 30 years in support of over 240 payloads flown on shuttle, MIR and ISS. Our expertise includes planning, integrating, maintaining, and administering training programs and operations for NASA.

Voyager Space maintains training materials including curriculum, lesson plans, and computer-based training. We typically train Crew members at JSC using Training Units designed and built by Voyager Space, located in Building 9 at JSC.

Voyager Space updates the training materials to be consistent with any hardware modifications, upgrades and crew procedure changes. Voyager Space develops and maintain the GSP Training and Certification Plan and maintain a certification status of the training completed for each person required to support on orbit operations. Prior to start of Increment, the training team will create an Increment operations overview for our payloads to be used for console operations training.



Space Systems & ISS Payload Integration

INTEGRATION CAPABILITIES

Payload Certification

- Requirements Definition
- Verifications
- Safety Certification

Mission Management

- Mission Requirements Definition
- Resource Planning
- Program Liaison
- Integrated Testing

Physical Integration

- Flight Manifesting
- Ground & Flight Logistics
- Vehicle Integration
- Late and/or Cold Stowage handling & Logistics

Post Flight Payload Processing

- Post Flight Hardware Recovery
- Sample Return Logistics

Implementation Partner Payload

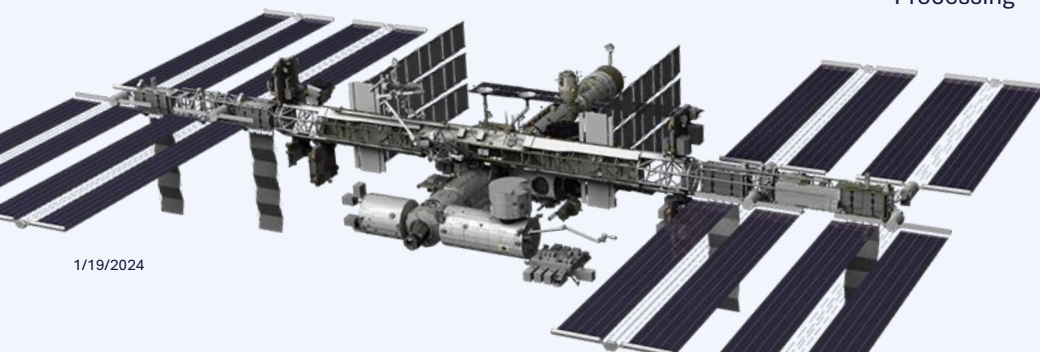
- Services
- Concierge type services for spaceflight

- Educational & Public Outreach
- Research & analysis

Our Payload Integration Team supports the integration of both pressurized and unpressurized spaceflight items, such as scientific payloads, ISS racks, logistics and assembly items, crew-related provisions, vehicle logistics hardware, research and development hardware, and spare/orbital replacement units. Our approach to ISS payload integration reduces the level of effort required through the use of in-house tools, templates and custom schedules which have been created to combine common products and data typically required for payloads.

Voyager Space is experienced in the flexible utilization of different launch and on-orbit carriers. We are able to customize a schedule fitting any level of complexity. Within the past 5-years, Voyager Space flew payload hardware on 31 of the 54 cargo and crew flights to ISS on 6 different types of Launch Vehicles (LV). The LV manifest is evolving and dynamic, consequently requiring a mature but flexible set of processes and tools. We also provided support to all of these vehicles for on-orbit operations.

- Payload Certification
- ISS COTS processes and requirements
- Verifications
- Fast track integration process
- Development of Integrated Safety, Operation, Stowage, and Training Documentation.
- Multi-Increment Planning
- Data Set Submittal
- Integration Working Groups and Panels
- Integration Documentation
- ISS Payload Advocacy
- Manifesting
- Physical Integration
- Post Flight Payload Processing



Space Systems & ISS Payload Integration

OPERATIONS OVERVIEW

- Operations Planning
- On orbit resource definition
- Concept of Operations Development
- Ground Training
- Command Procedures
- Crew Training
- Crew Procedures
- Real Time Flight Operations
- Telescience Support Center (TSC)
- Payload/System Remote Command & Monitoring
- Data Management & Distribution

Our Experience

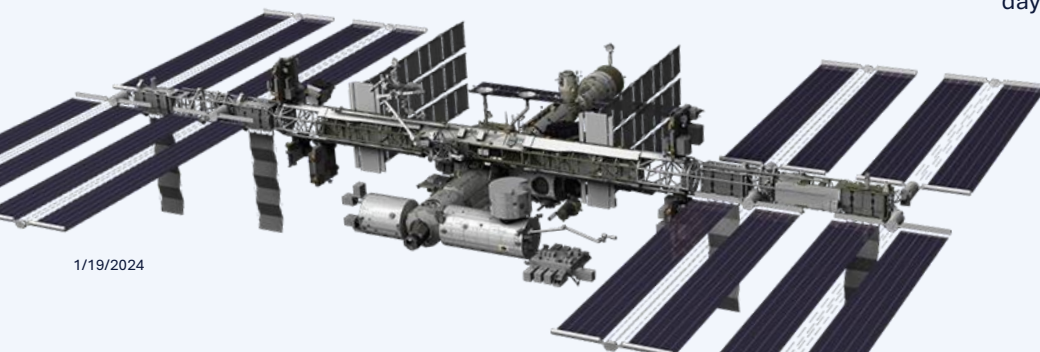
- Real Time & Remote Operations
- Build realistic operational timelines
- Hands-on Crew Training
- On Board Training (OBT) Training Products
- Console Operator Certification & Training
- Provide Commanding, Display and Data Processing

Voyager Space provides operations support in the areas of payload planning and planning products, ground training for operators, flight rule definition, Ops TMS and Real Time Operations.

Operations includes the many activities and products leading up to and including real time operations. The Voyager Space Team provides operations Planning Products: URC Inputs, OOS Review & Resource Planning, Operational Change Request (OCR) Generation & CoFR for Console Operations.

Voyager Space operates and maintains the NASA GRC Telescience Support Center (TSC). This facility can be used for the remote monitoring and command of systems and payloads aboard the ISS.

- Since 2001, Voyager Space has supported over 30,000 hours of continuous on orbit ISS operations
- On orbit operations support includes diverse microgravity experiments and ISS system monitoring 24 hours a day, 7 days a week when necessary.
- End-to-end mission operations support beginning with initial planning extending through crew and ground team training and culminating with on orbit operations
- Space operations are conducted locally at the GRC TSC. Voyager Space is capable of providing remote command and telemetry monitoring so that teams can operate their payloads or systems from their home institutions
- Operations support, consultation and issue resolution are available with experienced operations personnel 24 hours a day, 365 days per year.



ISS Payload Operations Center (ISSPOC) GRC Telescience Support Center (TSC)

DESIGN HIGHLIGHTS

Secure, dedicated audio, video, and data interfaces are provided and maintained for payload teams, including four channels of ISS video and the ability to communicate directly with the ISS crew.

The Voyager Space Team provide operations Planning Products: URC Inputs, OOS Review & Resource Planning, Operational Change Request (OCR) Generation & CoFR for Console Operations.

Our Experience

- Facilitates development of detailed payload operational scenarios
- Build realistic operational timelines
- Accurately estimate bandwidth, storage, video requirements
- Provide certified operations personnel
- Provide Commanding, Display, and Data Processing
- Provide training for the proper use of TSC resources
- Provide real-time support to perform payload operations

NASA Glenn Research Centers (GRC) ISS Payload Operations Center GIPOC – formerly known as the Telescience Support Center (TSC)) Provides around-the-clock operations support for space experiments on the ISS. The sustaining engineering and operations team is under a prime contract with Voyager Space.

The ISSPOC is a secure, multipurpose facility designed to provide dedicated support for simultaneous training, simulations and real-time operations of space experiments on the ISS. The facility includes the Payload Operations Center, the Communication and Network Support Room, the TSC Operations and Support Room and a visitors viewing area that provides access on a noninterference basis.

Principle investigators, project scientists and payload operators send commands and receive telemetry and science data from their payload hardware operating on board the ISS. By working off the Earth for the Earth, the International Space Station advances scientific knowledge in Earth, space, physical, and biological sciences.

- Since 2001, Voyager Space at the TSC has provided over 30,000 hours of continuous support for diverse microgravity research experiments and vehicle health onboard the ISS, 24 hours a day, 7 days a week when necessary.
- Hardware and software provide the ability to send commands to payload hardware and to receive feedback via telemetry.
- The quality of scientific and engineering data is enhanced while the long-term operational costs of experiments are reduced because principal investigators and engineering teams can operate their payloads from their home institutions with support of experienced operations personnel.