

European Astronaut Centre, Cologne, Germany

(Crew Medical Support Office)



EAC - home base of the European Astronaut Corps. (Image: ESA)

The European Astronaut Centre (EAC) of the European Space Agency is situated in Cologne, Germany. It was established in 1990 as a result of Europe's commitment to human space programmes and is the home base of the 10 European astronauts who are members of the European Astronaut Corps.

During the Celsius mission the Crew Medical Support Office, part of EAC will be responsible for medical support and monitoring of ESA astronaut Christer Fuglesang. They have the same responsibilities for ESA astronaut Thomas Reiter currently serving on the ISS as a flight engineer for ISS Expedition 14 on the European Astrolab Mission. The medical support team is composed of flight surgeons, biomedical engineers and specialists in the field of psychology, exercise and rehabilitation.

For launch, landing, and specific events such as American EVAs, medical support is provided by

the team from the Mission Control Center at the Johnson Space Center in Houston. Russian EVAs would be supported from the Mission Control Centre (TsUP) in Moscow.

During all mission phases medical support comes from the Medical Console Room at EAC. This is staffed with a biomedical engineer and a flight surgeon working on consoles within shift schedules.

The main tasks of the team are to monitor the biomedical and environmental conditions for the crewmembers; to interact with all Medical Operations Groups from the international partners; and to provide guidance and advice for all medical procedures, in-flight fitness and countermeasures. Among their tasks is the execution of a daily or weekly medical conference with the ESA astronaut, depending on the phase of flight. The medical support team also provides medical support to the astronauts' families.

Kennedy Space Center

(Space Shuttle launch and post-flight operations)



Firing room during the launch of the Hubble Space Telescope on Space Shuttle STS-31 mission on 24 April 1990. (Image: NASA)

Control and monitoring of the Shuttle during the countdown and first seven seconds after launch takes place in one of the four firing rooms of the Launch Control Center at the Kennedy Space Center in Florida.

The Firing Room contains consoles associated with many different functions. The Launch Director heads the Firing Room having overall responsibility for management of launch activities and making the final determination to launch or stop.

The consoles are used to monitor the Shuttle systems during countdown and the first few seconds of launch including: navigation, guidance and flight control systems; main engine parameters to verify acceptance for main engine start; control system thrusters; Environmental Control and Life Support Systems; and electrical power systems.

Launch pad systems are also controlled from the Firing Room consoles. This includes functions such as loading the external tank with propellant around eight hours before liftoff and retraction of

the Orbital Access Arm through which the crew enter the Shuttle prior to launch.

During the last nine minutes, most of the final configurations and systems checks are carried out by the computers, but the firing room engineers are still carefully checking everything to make sure that the Shuttle is still ready for launch.

At T-31 seconds, an automatic command is sent to the Shuttle on-board launch sequencer that allows the Shuttle to start its engines and launch. Once the Shuttle boosters are ignited the Shuttle is launched. After seven seconds when the Shuttle has cleared the service tower on the launch pad, the control is handed over to the Mission Control Center in Houston.

In addition to Space Shuttle processing and launching, Kennedy is also the preferred end-of-mission landing site. On landing day a team of engineers monitor the orbiter in the firing room. Once the orbiter lands and rolls to a stop, Kennedy Space Center once again take over responsibility from the Mission Control Center in Houston.

Mission Control Center – Houston, Texas

(Overall Control of ISS activities and Space Shuttle Flight Control)



ISS Flight Control room at the Mission Control Center in Houston, Texas. (Image: NASA)

The NASA Mission Control Center, located at the Lyndon B. Johnson Space Center in Houston, Texas has been operational in the control of NASA Human Spaceflight launches since 1965. There are different Flight Control Rooms at the control centre covering ISS Operations and Shuttle flights.

The ISS Flight Control Room began operations on 20 November 1998. It acts as the command and coordination centre for all ISS activities, including ISS flight control. The Shuttle Flight Control Room takes control of Shuttle flight operations from the Kennedy Space Center seven seconds after a Shuttle launch, when the Shuttle has cleared the service tower until the shuttle rolls to a stop following landing.

The equipment and supporting structures in each control room are basically identical, though the ISS Flight Control Room is smaller with fewer consoles and requires fewer flight controllers. The ISS Flight Control Room normally operates with 12 or less flight controllers compared to about 20 in the Shuttle Flight Control Room. The consoles in each control room are associated with specific functions. A flight controller occupies each console with secondary support supplied by other engineers and flight controllers in different locations.

Work is undertaken in shift teams, monitoring systems and activities 24 hours a day with the use of sophisticated communications, computers, and data handling equipment. Each control room has large display screens at the front, two in the ISS Flight Control Room and three in the Shuttle Flight Control Room, and cameras for provision of live broadcasts.

The individual functions in the Flight Control Room start with the Flight Director. The Flight Director is the primary decision maker and responsible for the overall ISS or Shuttle mission operations. Next to him sits the capsule communicator or CAPCOM who is the primary communicator between the control room and the crew.

Other functions relate to guidance, navigation and control, and flight dynamics; monitoring ISS or Shuttle thermal control, power availability and life support systems; mission control and ISS or Shuttle infrastructure and communications systems; robotic arm operations; EVA and robotics operations; crew operations planning; crew health and Public Affairs. The Shuttle Control Room has additional functions such as for monitoring the performance of the main engine, solid rocket boosters, external tank and propulsion systems.

Payload Operations Center, Huntsville, Alabama

(Overall Control of ISS Research activities)



Payload Operations Center in Huntsville, Alabama. (Source: NASA)

The ISS Payload Operations Center (POC) is located at the Huntsville Operations Support Center, which is on NASA's Marshall Space Flight Center in Alabama. It is responsible for the overall control of scientific research activities on the ISS.

The Payload Operations Director at the POC is in charge of coordinating all payload activity, together with the Flight Director at Mission Control in Houston, international partners, crew and research facilities. From this interaction, timelines of scientific activity are drawn up.

The Payload Communications Manager at the POC coordinates voice communications between the International Space Station crew and the POC on payload matters, enabling researchers around

the world to talk directly with the crew about their experiments.

There are further functions at the Payload Operations Center associated with separate elements of payload procedure. These functions cover the safety of experiments (and changes to them); coordinating experiment resources such as power; scheduling; prioritisation; and controlling and processing of voice, video and data channels. The authority for the control of payloads and hence experiments is distributed around the world. Each International Partner is responsible for the operation of its payloads in its on-orbit laboratory, as it falls within the given payload timelines, under the guidance of the Payload Operations Center.