



Information

Columbus: Europe's central contribution to the International Space Station ISS

- ISS module enables research under zero gravity conditions
- Launch planned for December 2007

Bremen, September 2007 – Due to be launched in December 2007 aboard a Space Shuttle from the Kennedy Space Center in Florida, the Columbus space laboratory is Europe's central contribution to the International Space Station ISS. On board Columbus scientists will have the opportunity to conduct experiments that would not be possible in such a way in the Earth's gravity. Astrium has realized the Columbus laboratory as industrial prime contractor on behalf of the European Space Agency ESA. The space engineers at Astrium's site in Bremen, Germany, had worked on the 13-tonne space station module for just under ten years. Ten European countries have been involved in the development and construction of Columbus. The major partners in this project were Germany (51 percent), Italy (23 percent) and France (18 percent). Further participants are the USA and Canada.

The conception of the Columbus module is based on the experience that Astrium has gathered in the development and construction of the Spacelab space laboratory since the late 1970s. Up to 1998, Spacelab flew aboard a Space Shuttle 22 times in all.

The Columbus laboratory is 8 m long, has a cross-section of 4.50 m and at launch its weight is almost 13 tonnes, which includes the 2.5-tonne payload. In the laboratory there are ten so-called racks. These are internationally standardized payload cabinets, in which the experimental systems can be accommodated.

Columbus, which has cost 880 million euros, has been designed for a mission life of at least ten years. The module provides three crew members with sufficient space to carry out research under zero gravity conditions. In the laboratory, scientists have the opportunity to carry out investigations in all disciplines of basic research (biotechnology, medicine, materials sciences, fluids sciences, human sciences) and also experiments in applied technology

projects that would not be possible in the Earth's gravity. The reason for this is that materials and fluids behave differently under zero gravity conditions than they do on Earth. Out in space, for example, metal alloys merge, while under the influence of gravity they do not unite in an optimum manner. The same applies to fluids that blend in space, but not on Earth.

Scientific equipment for Columbus

Various payloads will already be integrated in the racks of the Columbus laboratory at the time of launch:

- the Biolab, which allows experiments to be conducted on cells, tissue cultures, micro-organisms, small plants and invertebrates.
- the European Physiology Module (EPM), which will assist in investigating the effects of weightlessness on the human organism. The focus will be on phenomena such as osteolysis, changes in the immune system and in the water balance in the human body.
- the Fluid Science Lab (FSL), in which the dynamic behaviour and other phenomena of fluids are examined.
- The European Drawer Rack (EDR), a universal cabinet in which any four small payloads can be connected up for data and video transmissions as well as mechanical and thermal control.

Astrium Friedrichshafen plays an important role in the payloads for Columbus. For decades now, the engineers from Lake Constance have been the globally acknowledged experts in developing and constructing equipment for conducting experiments under zero gravity conditions. The Protein Crystallisation and Diagnostic Facility (PCDF) and the Advanced Protein Crystallisation Facility (APCF), which both originate from Friedrichshafen, and the Cardiolab (CL) are also destined for the Columbus laboratory, but will not be integrated until docking with the International Space Station has taken place.

And the fresh air on board Columbus also "comes" from Lake Constance, the Environmental Control and Life Support System (ECLS) being developed and built in Friedrichshafen. The ECLS monitors the atmospheric pressure, ensures cabin air replacement, detects fire and regulates an air conditioning system that controls the cabin temperature and humidity.

Back in the summer of 2003, ESA and NASA had already verified that the Columbus laboratory was fit for flight. However, the problems with the Space Shuttle have delayed further expansion of the International Space Station so that also the launch of Columbus will be later than originally planned. The Astrium engineers in Bremen used the additional time until delivery of the laboratory for additional integration work and tests.

Astrium is also responsible for training the astronauts who will later conduct the experiments in the Columbus module. The training is taking place at the European Astronaut Centre (EAC) in Cologne. A simulation system provided by Astrium has been installed in Cologne since September 2002. A second trainer of identical design was delivered to NASA's astronaut training centre at the Johnson Space Center in Houston in early 2003.

Astrium – a central industrial partner in the build-up of the ISS

Astrium is involved in further projects connected with the build-up and operation of the International Space Station. The company is, for example, the prime contractor for the unmanned space transporter Automated Transfer Vehicle (ATV), which will bring supplies and fuel to the ISS. In addition, after each dock-on the ATV will repeatedly raise the station a little by means of boost manoeuvres in order to compensate for the gradual loss of momentum and thus prevent the station from dropping out of its prescribed orbit.

Astrium is also the supplier of further experimental systems for ISS that will not be used in the Columbus laboratory but in other station modules. The company is also a participant in the European Robotic Arm (ERA), which is an aid to the astronauts in the assembly of the station and during maintenance tasks.

Furthermore, Astrium and Thales Alenia Space have founded the joint enterprise EURISS for the operation and utilization of the European part of the ISS. EURISS is the "mediator" between ESA and the companies involved in the operation and utilization of the space station and is the sole contractual partner of ESA for all activities involving industrial operation and exploitation of the European part of the International Space Station.

Astrium, a wholly owned subsidiary of EADS, is dedicated to providing civil and defence space systems and services. In 2006, Astrium had a turnover of €3.2 billion and 11,000 employees in France, Germany, the United Kingdom, Spain and the Netherlands. Its three main areas of activity are: the business units Astrium Space Transportation for launchers and orbital infrastructure, and Astrium Satellites for spacecraft and ground segment, and its wholly

owned subsidiary Astrium Services for the development and delivery of satellite services.

EADS is a global leader in aerospace, defence and related services. In 2006, EADS generated revenues of €39.4 billion and employed a workforce of more than 116, 000.

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