ARCHIVED REPORT

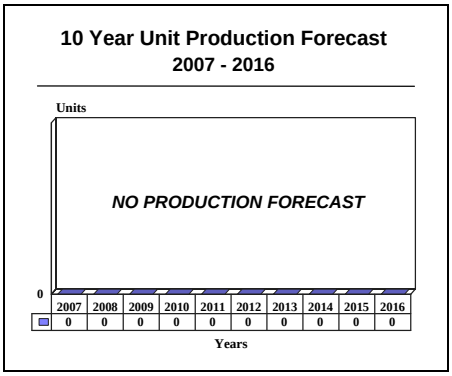
For data and forecasts on current programs please visit

www.forecastinternational.com or call +1 203.426.0800

Columbus Laboratory - Archived 02/2008

Outlook

- Columbus scheduled for launch on STS-122 (Discovery) in October 2007
- Columbus is expected to operate for 10 years once attached to the International Space Station



Orientation

Description. The Columbus Laboratory is a European science laboratory to be attached to the International Space Station.

Sponsor. European Space Agency (ESA).

Status. The Columbus Laboratory was delivered in May 2006 and is scheduled to launch on STS-122 (Discovery) in October 2007.

Total Produced. One

Application. The Columbus Laboratory is a crewed working environment to be operated as part of the International Space Station.

Price Range. Revised estimates put the cost of development and deployment of the Columbus facility at more than $2 billion.

Contractors

Prime

EADS Astrium	http://www.space.eads.net, 37, Ave Louis Breguet, BP 1, Velizy-Villacoublay, 78146 France, Tel: + 33 1 39 45 25 00, Fax: + 33 1 39 45 25 55, Prime

Subcontractor

Alcatel Bell NV	http://www.alcatel.be, Francis Wellesplein 1, Antwerpen, 2018 Belgium, Tel: + 32 3 240 40 11, Fax: + 32 3 240 99 99, Email: myriam.deridder@alcatel.be (Platform Assistance; Resource Module; Service Vehicle)
Bradford Engineering BV	http://www.bradford-space.com/php/, De Wijper 26, Heerle, 4726 TG Heerle, Netherlands, Tel: + 31 165 305 100, Fax: + 31 165 304 422, Email: info@bradford-space.com (Microgravity Science Glovebox Components)
EADS Space Transportation - Space Propulsion & Equipment	http://www.launchers.eads.net, Ludwig-Bölkow-Allee (Gate 2), Ottobrunn, Munich, 81663 Germany, Tel: + 49 89 607 0, Fax: + 49 89 607 26481 (Scientific Racks & Data Management)

Columbus Laboratory

Laben SpA	http://www.laben.it, SS Padana Superiore 290, Vimodrome, Milan, 20090 Italy, Tel: + 39 022 507 51, Fax: + 39 022 505 515, Email: info@laben.it (Pressurized, Crew & Resource Module Service)
OHB-System AG	http://www.ohb-system.de, Universitasallee 27-29, Bremen, 28359 Germany, Tel: + 49 0421 2020 8, Fax: + 49 0421 2020 700, Email: ohb@ohb-system.de (European Physiology Modules)
Verhaert Space	http://www.verhaert.com/, Hogenakkerhoekstraat 9, Kruibeke, B-9150 Belgium, Tel: + 32 3 250 1414, Fax: + 32 3 253 1464, Email: info@verhaert.com (Microgravity Science Glovebox Components)

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

Design Features. The Columbus Laboratory is the crewed research laboratory for microgravity experiments in the materials processing, fluid physics, bio-processing, and life sciences fields, and it will remain permanently attached to Node 2 of the International Space Station (ISS). The facility will be dependent on the Space Station for main power supply, heat rejection, environmental/life-support, and crew habitation facilities.

Columbus will feature two primary items: the Microgravity Facilities for Columbus (MFC) and the European Drawer Rack. The MFC provides five multiuser laboratories in the fields of biology, human physiology, materials, and fluid science. The Columbus Laboratory will contain four of these laboratories, and one will be located in a U.S. laboratory module.

The four MFC laboratories slated for inclusion within the Columbus Laboratory include the Biolab, the Fluid Science Laboratory (FSL), the European Physiology Modules (EPMs), and a Material Science Laboratory.

Under the ESA's original plans, the Columbus Laboratory would have been sized to fit an Ariane 5 expendable launch vehicle for launch to the Space Station. Funding requirements later reduced the facility's size and weight to make it fit into the Space Shuttle's payload bay.

	Metric	**U.S.**
Dimensions		
Length	6.8 m	22.3 ft
Diameter	4.5 m	17.7 ft
Weight		
Mass Without Payload	10,300 kg	22,707 lb
Launch Mass	12,800 kg	28,218 lb
Maximum Payload Mass	9,000 kg	19,841 lb
Maximum On Orbit Mass	19,300 kg	42,548 lb
Electrical Power		
Total Power	20 kW (provided by ISS)	
Payload Power	13.4 kW	

Program Review

Background. The Columbus Laboratory is a European-developed, self-contained, modular space station system designed to be a complementary project to the International Space Station program. It is intended to provide a facility for experiments and manufacturing processes that require less environmental pollution and movement than would be possible on the Space Station itself.

Development of the Columbus project began in 1982 when the European Space Agency (ESA) awarded Phase A study contracts to the German space authority DFVLR and preliminary studies to Dornier,

MBB/ERNO, AEG, and Aerospatiale. These studies examined prospects for the development and utilization of a manned space station. However, the original German/Italian Columbus study program was performed outside the jurisdiction of the ESA, although it paralleled some of the work sponsored by the ESA.

The Columbus designation was selected while there was still some prospect of going into orbit in 1992, the 500th anniversary of Columbus' discovery of the Americas, but this schedule has long since slipped.

The Columbus Laboratory development contract (Phase C/D) was awarded to Daimler-Benz Aerospace (now part of EADS Astrium) in 1996.

ESA Reviews Commercial Prospects for Columbus. As the launch date for the Columbus Laboratory draws closer, the ESA is studying all commercial possibilities for the module. The agency expects that one-third of the Laboratory's operating costs will be funded by commercial activities on board the module.

The agency is currently building a commercial station user facility in Turin, Italy. In addition, several workshops that will explain the uses and advantages of the Columbus Laboratory are planned to attract commercial business.

EADS Astrium is responsible for operating, updating, utilizing, and maintaining the Columbus Laboratory and its ground-based control centers. The ESA is likely to contract an outside agency to organize commercial endeavors for the module.

Columbus Control Center Contract. In March 2003, the ESA Director of Human Spaceflight, Jörg Feustel-Büechl, signed a contract worth $46 million with the German Space Agency (DLR). The contract is for the establishment of the Columbus Control Center, which will be located at DLR's German Space Operations Center (GSOC) at Oberpfaffenhofen, near Munich. The main priorities of the CCC will be the command and control of the Columbus Laboratory systems, the provision and operation of the European ground communications network for the facility, and the coordination of European payloads on board the ISS.

In October 2004, the ESA and DLR officially inaugurated the Columbus Control Center. The Columbus Control Center is now ready to take up operations of the European elements of the International Space Station (ISS).

Shuttle Grounding Facilitates Columbus Upgrade. The ESA and the Columbus contractors are using the launch delay forced by the grounding of the Shuttle fleet to make upgrades to the laboratory. Negotiations are under way to broaden the data stream from Columbus by installing a Ka-band antenna and its related components. Once in place, it is hoped that the upgrade to a state-of-the-art communications system will make the module more attractive to commercial users.

Work is scheduled to take place under a separate contract once EADS has completed its fixed-price contract on Columbus, which includes installation of the internal payloads.

EPMs Shipped. In June 2004, OHB System completed the flight model of the European Physiology Modules and shipped them for integration by EADS in Bremen, Germany.

Funding

The ESA allocated EUR2.651 billion for Columbus development and deployment from 1996 to 2004. Ten of the 14 ESA member states contributed to the Columbus program:

Country	Development Program	Columbus Microgravity Facilities
Germany	41%	40%
France	27.6%	22.8%
Italy	18.9%	15.8%
Belgium	3%	10%
Switzerland	2.5%	4%
Spain	2%	2%
Denmark	1.17%	1.93%
Netherlands	0.94%	1.5%
Norway	0.46%	–
Sweden	0.4%	–

Columbus Laboratory

Timetable

Month	Year	Major Development
Nov	1997	System Preliminary Design Review (PDR)
	1999	System Critical Design Review (CDR)
	2001	Qualification Review (QR)
	2002	Flight Acceptance Review (FAR)
Mid	2004	Delivery of Columbus to the ESA planned
Oct	2007	Scheduled launch of Columbus on a Space Shuttle (subject to delay)

Forecast Rationale

Of the five shuttle missions scheduled for 2007 the one most eagerly anticipated in Europe is the October 2007 flight of Discovery. Designated STS-122, this mission will launch the European Space Agency's Columbus Laboratory to its final destination, the International Space Station.

Completed in early 2006, the Columbus Laboratory was delivered to the Kennedy Space Center processing facility in May of that year after a transatlantic trip aboard one of the largest cargo aircraft in the world. It arrived at KSC's shuttle runway May 30 aboard a giant Beluga aircraft, a European super transporter designed to carry huge cargo.

The ESA is drumming up commercial support for the orbiting facility. Both it and the Russian Space Agency have released price lists for their respective services that substantially undercut NASA. Even so, anyone contemplating using Columbus will need deep pockets, for it is far from inexpensive.

How receptive the commercial market will be to the Columbus Laboratory, or to the entire ISS for that matter, is unclear. The ISS is not expected to be complete for three or four more years. The Columbus Laboratory is just one piece of the ISS puzzle, but it has taken a long time and billions of dollars to get this particular piece ready for its designed purpose. Forecast International expects the Columbus to launch in 2007 – 2008 at the latest – after which this report will be archived.

Ten-Year Outlook

Forecast International expects production of one Columbus Laboratory unit.

* * *

Columbus Laboratory

Source: ESA