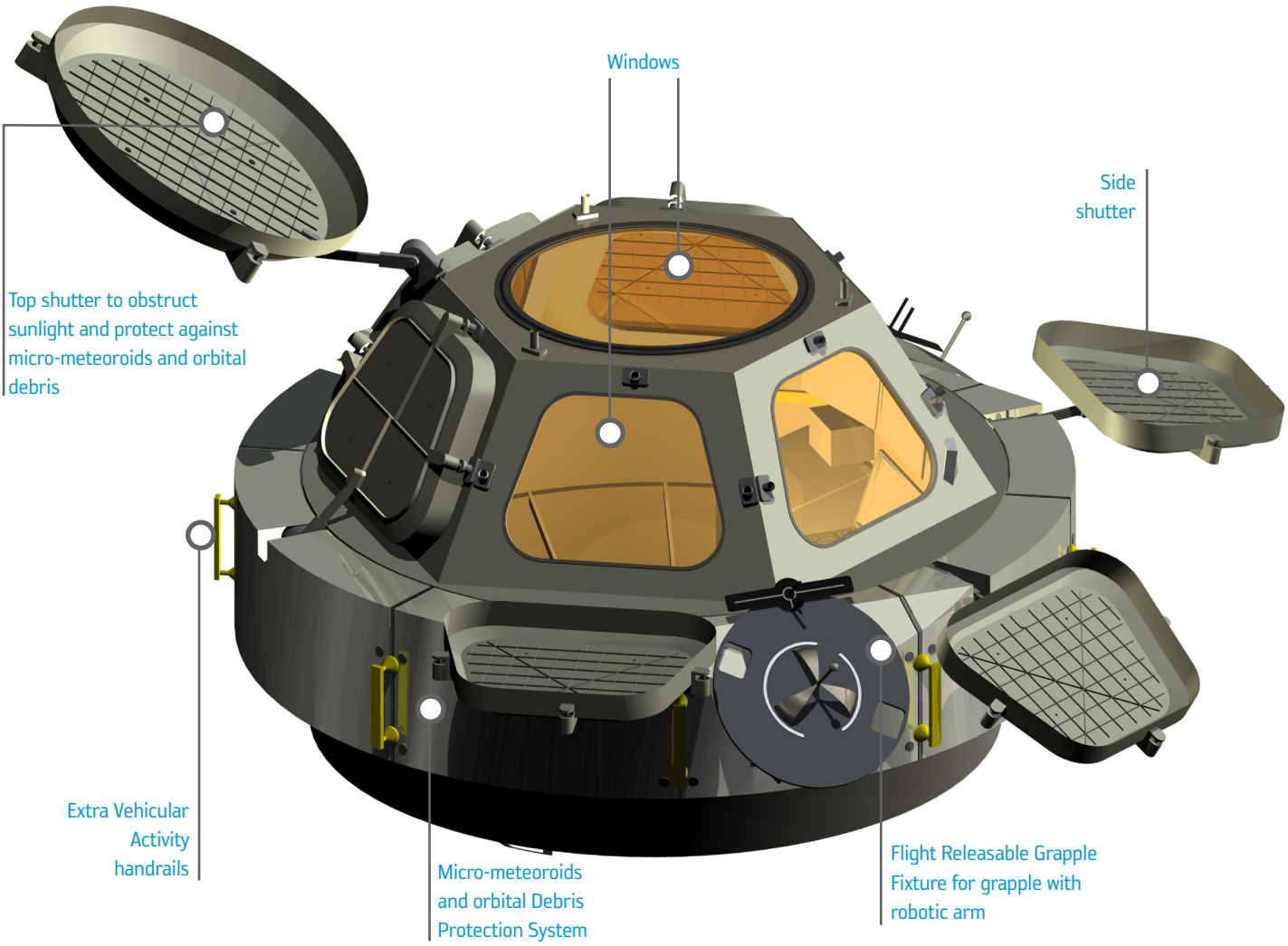
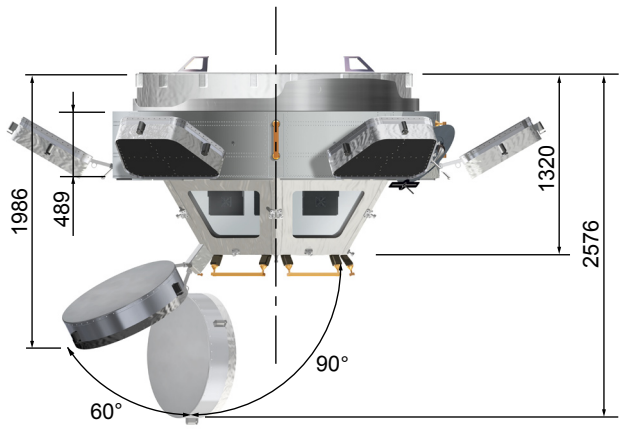
→ CUPOLA

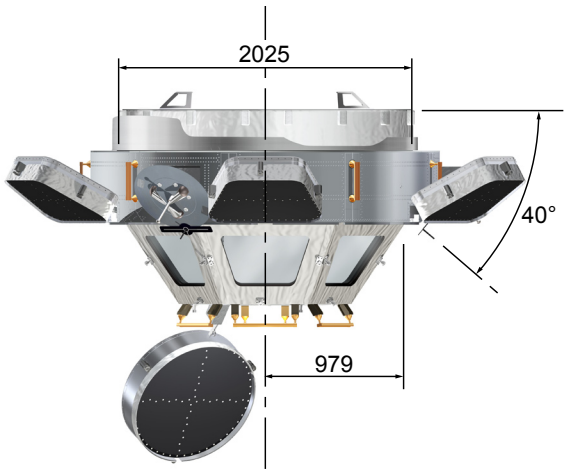
Observation module

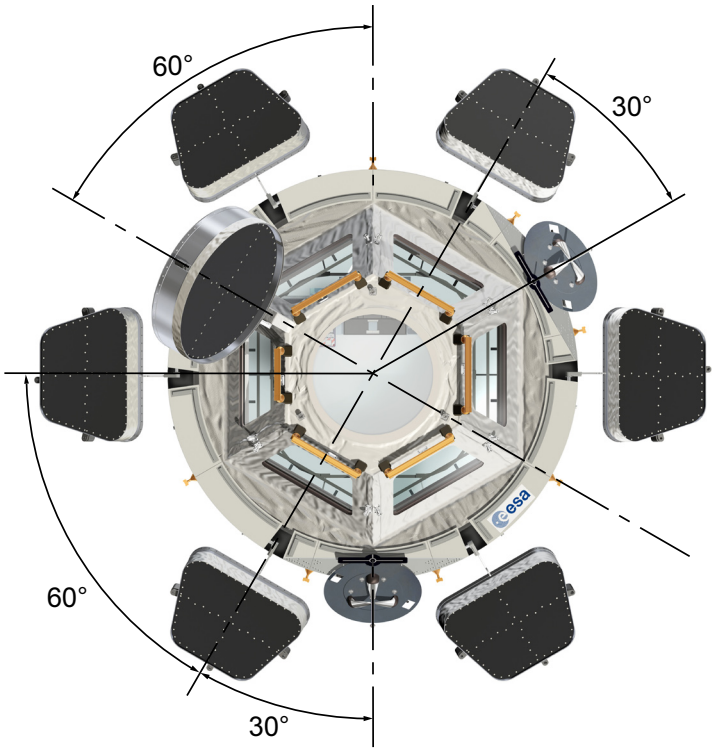
Cupola provides a pressurised observation and work area for the Space Station crew giving visibility to support the control of the space station remote manipulator system and general external viewing of the Earth, celestial objects and visiting vehicles.

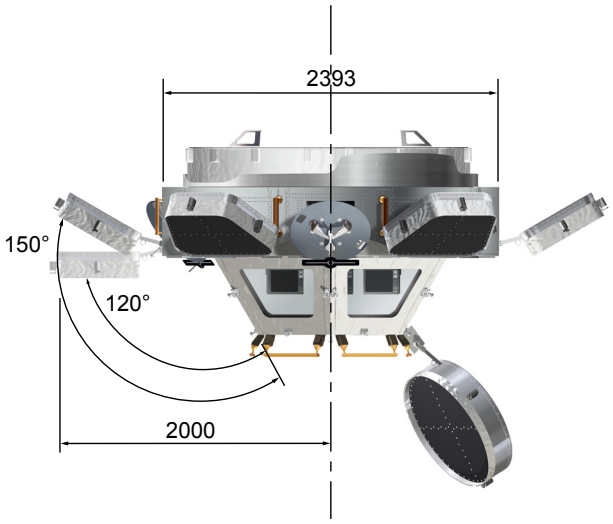


esa	PROJECT: International Space Station		
TITLE: Cupola		DOCUMENT N°: ESA-HSO-COU-004	REV. 2.0

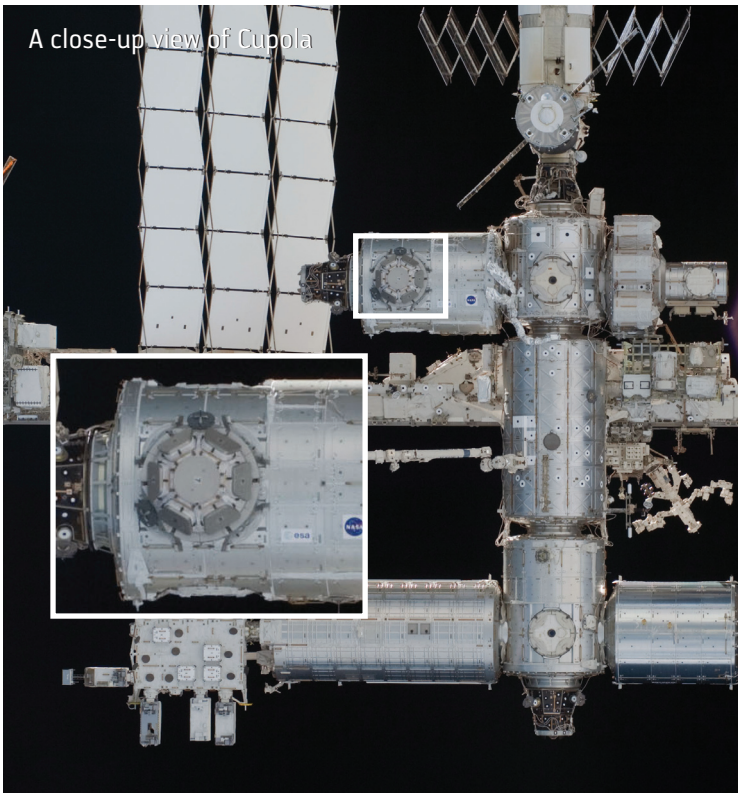









Cupola is moved into final position on Node-3


A close-up view of Cupola

Specifications

DIMENSIONS

Overall height: 1,500 mm

Maximum diameter: 2955 mm (including Micrometeoroid and orbital Debris Protection System (MDPS) with shutters closed and including Flight Releasable Grapple Fixture.

MASS BUDGET

Launch mass: 1610 kg

On-orbit mass: 1700 kg

COMMUNICATIONS AND DATA INFRASTRUCTURE

Via Audio Terminal Unit that is connected to Node-w 3 and the rest of the station.
1553B buses via Utility Outlet Panel
Dedicated discrete lines for Robotic Work Station.

ENVIRONMENTAL CONTROL

Environmental Control and Life Support air from Node Inter-Module-Ventilation with manual temperature adjustment.

ELECTRICAL POWER

Window heaters powered directly from the Node 120 V interface, Robotic Workstation, Portable Computer System and Portable Light System powered via the Utility Outlet Panel, 120 V interface.

CONSTRUCTION MATERIAL

Dome: Forged Al 2219-T851

Skirt: Al 2219-T851

Thermal control: Aluminium Kapton Multi-layer Insulation

Windows: Fused Silica and borosilicate glass

MDPS blankets and shutters: Al-6061-T6, AL 7075-T7352 and Kevlar/Nextel sheets

OWNERSHIP AND DEVELOPMENT AUTHORITY

The Cupola is provided by ESA to NASA in exchange for the transport of 5 external payloads.

PRIME CONTRACTOR

Thales Alenia Space leading a consortium of European sub-contractors.

esa

PROJECT: International Space Station

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REV. 2.0

ESA astronaut Paolo Nespoli in Cupola

A view looking out of Cupola

Utilisation Relevant Data

LAUNCH CONFIGURATION

Launch vehicle: Space Shuttle.
Launched inside the Orbiter cargo bay, mounted on the Node-3 active axial port via the Manual Berthing Mechanism.

Launch site: Kennedy Space Center

Launch date: 8 February 2010

ON ORBIT CONFIGURATION

Relocated to Node-3 nadir port after deployment of Node-3 from Shuttle cargo bay to Node-1 port port.

OUTFITTING ON-ORBIT

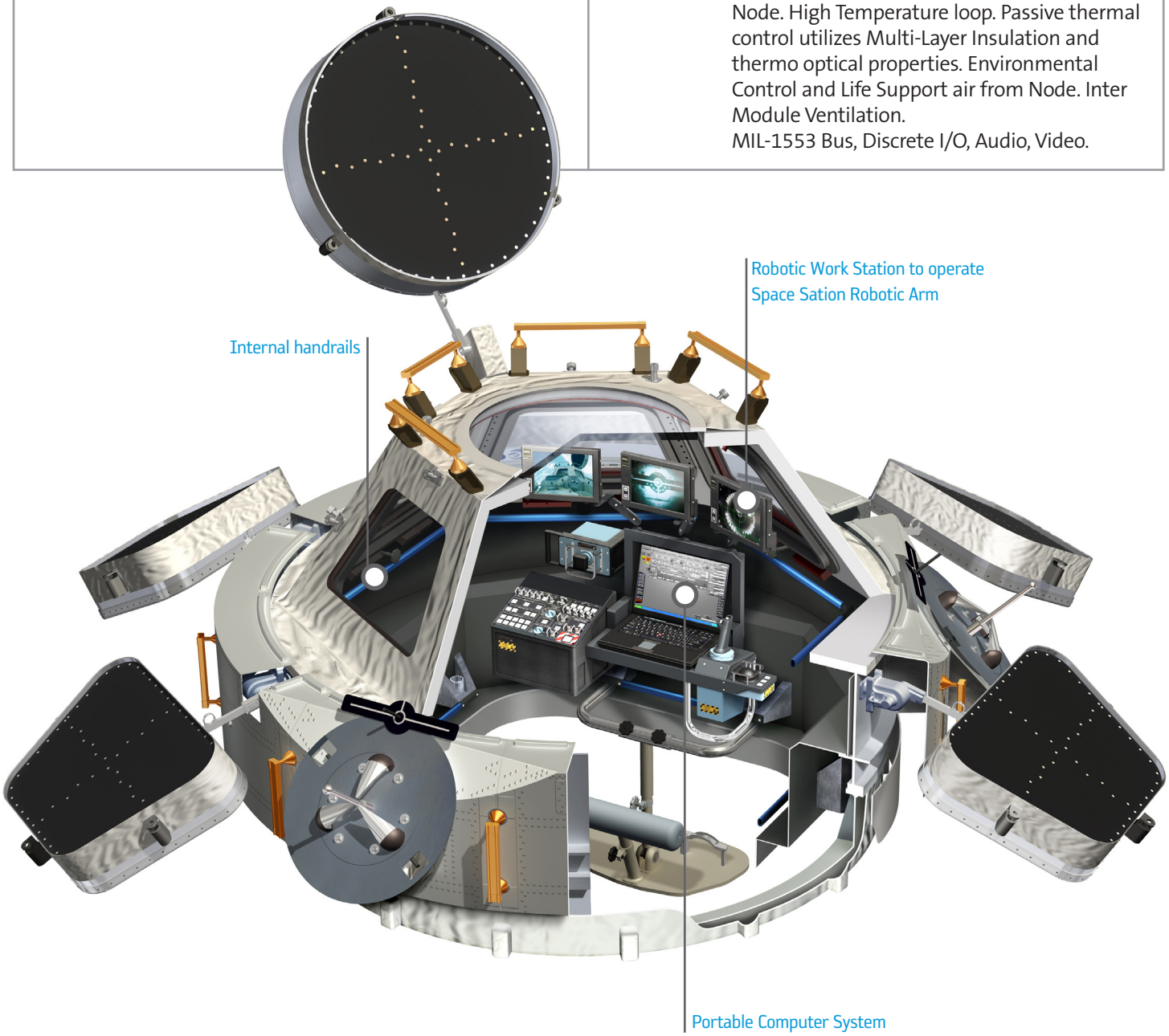
Permanently: 1 Audio Terminal Unit and 2 Utility Outlet Panels.

Periodically: Robotic Work Station, Portable Computer System, Portable Light System, Foot restraint device to support crew operations.

FLIGHT HARDWARE

Primary: Forged/Machined Aluminium dome welded to skirt. Window Assembly, (6 side and 1 top), glass panels and window heaters and thermistors.
Passive Common Berthing Mechanism bolted to the skirt.
Micro-meteoroid and orbital Debris Protection. System Aluminium bumper on the cylindrical portion.
2 Flight Releasable Grapple Fixture interface plates.

Secondary: Internal closure panels equipment & harness support brackets.
Crew System Kit; seat tracks, handrails, handholds, tethers.
Manually operated shutters for each window (also serves as MDPS).
2 Window Change Out Covers to support on orbit. Window assembly replacement.
Thermal Control System; water supplied from Node. High Temperature loop. Passive thermal control utilizes Multi-Layer Insulation and thermo optical properties. Environmental Control and Life Support air from Node. Inter Module Ventilation.
MIL-1553 Bus, Discrete I/O, Audio, Video.



Illustrations: ESA/D. Ducros