

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)  
Joint Session on Going To and Beyond the Earth-Moon System: Human Missions to Mars, Libration  
Points and NEO's (4-D2.8)

Author: Dr. Mark Kinnersley  
EADS Astrium Space Transportation GmbH, Germany, Mark.Kinnersley@astrium-na.com

Mr. Klaus Pietsch  
EADS Space, Germany, klaus.pietsch@airbus.com

Mr. Philippe Berthe  
European Space Agency (ESA), The Netherlands, philippe.berthe@esa.int

Ms. Kathleen Schubert  
National Aeronautics and Space Administration (NASA), United States, Kathleen.E.Schubert@nasa.gov

Ms. Julie Grantier  
NASA Glenn Research Center, United States, julie.a.grantier@nasa.gov

Mr. Laurence Price  
Lockheed Martin (Space Systems Company), United States, laurence.a.price@lmco.com

EUROPE'S ENABLING CONTRIBUTION TO THE US HUMAN SPACE EXPLORATION  
PROGRAMME: THE SERVICE MODULE FOR THE ORION CREW MODULE

**Abstract**

NASA is designing the Multi-Purpose Crew Vehicle MPCV (Orion) as the future space exploration vehicle for crewed human missions beyond low Earth orbit. MPCV comprises the Crew Module, Service Module, Spacecraft Adapter, Launch Abort System, Crew Module Adapter, and Spacecraft Adapter Jettison - Fairings.

At the ESA conference at ministerial level 2012 it was decided to provide a barter element from ESA to NASA to offset the Common System Operations Cost (CSOC) obligations for Europe's continued participation within the ISS programme for the period 2018-2020. This resulted in ESA agreeing to develop and provide a flight model as well as flight spares for the Service Module for the EM-1 mission. Astrium, leveraging its ATV experience will through its Bremen site be the industrial prime for the MPCV-SM, working together with partner companies throughout Europe. Provision of an additional service module for the EM-2 mission is under discussion.

The MPCV is slated to fly for the first time in 2017. This mission will be the un-crewed EM-1 (Exploration Mission 1), where the complete MPCV (comprising ESA's supplied SM) will be lofted by SLS for a lunar flyby mission. In 2021 the crewed mission EM-2 will take place, bringing Astronauts to orbiting the moon. After EM-2, the MPCV spacecraft will become NASA's crew exploration vehicle towards the moon, near Earth Objects and Mars.

By agreeing to have ESA providing the Service Module of MPCV, NASA is recognizing the reliability of the partnership with Europe built through Columbus and ATV. Indeed, the Service Module is an essential, critical part of the MPCV providing propulsion, power, thermal control, attitude control, life support consumables to the Crew Module.

This paper will present the overall development and production logic of the MPCV-SM, and the status of the programme from technical and programmatic perspectives.