SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Systems and Infrastructures to Implement Future Building Blocks in Space Exploration and Development (2)

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CREATING A UNIVERSAL SPACE INTERFACE STANDARD

Abstract

The Universal Space Interface Standard (USIS) is a concept that combines the requirements of docking, berthing and a medium class launcher payload attachment into a single common interface standard. The concept was originally developed as an appropriate payload interface for reusable launch system, but has much wider application in both the human and robotic spaceflight. Such an interface is key to establishing any kind of space infrastructure which can lead to an expansion in the range of space activities.

The concept has been explored in five technical studies variously undertaken by University of Bristol, Reaction Engines, QinetiQ Space and Hempsell Astronautics. These established that the basic concept of a universal interface is viable and also explored the range of technical and functional options that could be incorporated in it.

From this work a provisional Requirement Specification has been produced. This defines a range of levels of complexity and functionality from a permanent or semi-permanent connection, through a berthing connection to docking connections. Both pressurised and unpressurised requirements are included, the former concerned with the pressure loads induced by the connection of one crewed space system to another and the latter concerned with the loads induced by a 10 tonne payload on existing medium class launch system. It was found that the forces created by these two requirements produced very similar loads on the structural connections. A passageway of 1.4 m by 0.8 m is specified which would allow astronauts in an EVA suits to pass through even when there is a gravitational force. This opens up the use of the USIS in Lunar or Martian environments.

To be a truly universal interface; the USIS would need to be universally accepted, and given the history of docking standards this is clearly a difficult issue. Using a model based on the standard generation process employed in the consumer electronics industry, where many competing companies require a neutral body to control it, the concept of a USIS Association was derived. This is a corporate body which controls the standard generation (but not the development of the actual systems that implement it) that is owned by all stakeholders in the USIS; including Space agencies and commercial system operators and the manufacturers of space systems. This leads to an open standard available to all mankind on an equal basis enabling any space system to connect with any other from any national background.