

## HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)

Sustainable Operations of the ISS - Joint Session of the Human Space Endeavours and Space Operations  
Symposia (4.-B6.6)

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## EXTENDING THE CAPABILITIES OF THE ISS MSS ROBOTICS

**Abstract**

The Orbiter Boom Sensor System (OBSS) is operated in each Space Shuttle mission to satisfy NASA's Return-To-Flight requirement following the Columbia accident, to perform on-orbit inspection of the Shuttle's Thermal Protection System (TPS).

This 50 foot extension to the Space Shuttle robotics has proven so successful, that the OBSS will now be permanently docked on the International Space Station (ISS). The OBSS has incorporated enhancements to be permanently docked on ISS to provide extended Mobile Servicing System (MSS) reach for Extra Vehicular Activity (EVA) based inspection and repair. This MSS and OBSS combination will become the largest robotics element (over 100 feet / 30 meters in total length) in space for on-orbit inspection and repair of hard to reach areas of the ISS.

This paper presents a brief outline of the evolution of the OBSS, from a Space Shuttle based OBSS, to how this Shuttle based equipment (OBSS) was temporarily docked on the ISS for four months. Next, to how this versatile robotics completed an unplanned contingency Shuttle mission which revealed a broader role for its use on ISS, which finally lead to its planned permanent docking on the ISS. Finally, some practical growth concepts are presented which can exploit the extraordinary reach offered.

While the complexity of the ISS OBSS design was reduced through the use of existing Shuttle and robotic arm interfaces, as well as the use of existing flight hardware (where possible), a number of technical and operational challenges were faced in its development. This paper describes the mechanical, electrical and operational challenges that were addressed during the design of the ISS OBSS.

The OBSS on the Shuttle program has far surpassed its originally intended role of Shuttle TPS inspection and repair. As will be discussed in this paper, even mature systems such as NASA's Space Shuttle and the ISS still rely upon the operational flexibility provided by its robotic arms to achieve or enhance mission success.