

SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND  
DEVELOPMENT (D3)

Novel Concepts and Technologies for Enable Future Building Blocks in Space Exploration and  
Development (3)

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CONCEPT FOR ON ORBIT SERVICEABLE SPACECRAFT BUILDING BLOCKS –  
MECHANICAL INTERFACE

**Abstract**

Within the iBOSS (Intelligent Building Blocks for On-Orbit Satellite Servicing) research program, founded by the German Aerospace Center, a full modular and serviceable satellite architecture is being developed, which allows assembly, maintenance as well as upgrade of satellites in space by means of robotic manipulation. This approach bears great potential for future satellite missions. It combines On-Orbit-Servicing with a spacecraft's generic modularization. The project's goal includes time and cost reduction in development and integration of new systems, lifetime enhancement of satellites and the reduction of space debris; it further aims to create the basic framework of future space missions, by enabling to build large orbital multipurpose platforms.

This will be achieved by dividing the satellite on subsystem level and creating independent building blocks. Interfacing these standardized cubic shaped blocks a mission specific satellite can be initially assembled in a cost effective way and launched into orbit. By allowing further the modules autonomous detachment in space, a robotic servicer is able to replace or add complete subsystems. Obsolete modules can be reused or deorbited in the process.

Challenged to develop an interface that satisfies the multiple requirements for such a modular satellite architecture a mechanical interface was developed, which combines rotation symmetry and androgyny in order to ensure maximal mission design flexibility. The retractable interface construction, which is embedded into the modules side panels, enables removing and inserting modules out or into a given satellite assembly. Furthermore the mechanical interface allows semi-passive separation, in order to ensure the disconnection of two modules in case of one partner's malfunction.