

IAF SPACE SYSTEMS SYMPOSIUM (D1)
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DESIGN AND QUALIFICATION OF A MULTIFUNCTIONAL INTERFACE FOR MODULAR
SATELLITE SYSTEMS**Abstract**

The presented multifunctional interface was designed within the project “intelligent Building Blocks for On-orbit Satellite Servicing” (iBOSS) which focuses on the development of a modular satellite bus system. A modular cube-based concept is used to enable servicing, reconfiguration and assembly operations in orbit performed by means of an autonomous robotic servicing satellite. Depending on the mission requirements each spacecraft is assembled from several cube shaped building blocks which house the bus subsystems and payload components. To create a fully operational satellite all modules are linked with a multifunctional interface which also serves as an end effector for the robotic system. The interface allows to establish a mechanically stiff connection and is also able to transfer electrical power, data and thermal energy. Besides the primary intended use of the interface within the iBOSS project also other robotic and modular applications could be fitted with this technology, for example hosted payload missions or modules for experiments and component validation onboard the ISS. Overall, it is intended to implement this mechanism as a standard connector for all modular space systems. Moreover, the use of this systems will allow for novel approaches in satellite design, for example for exploratory spacecrafts by utilizing the possibility of on-orbit assembly. The general design and functionality is described in previous papers. This paper will focus on the engineering analysis, testing and qualification of the mechanical and power part of the mechanism. This includes the full spectrum of qualification tests from sine and random vibration to shock and thermal vacuum testing following ECSS qualification requirements. Furthermore, some specialized tests, such as a determination of tribological characteristics or the analysis of cold-welding effects will be presented.