

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)  
ISS Utilisation (3)

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## PAYLOAD INTEGRATION METHODS ON NEW RUSSIAN MODULES OF THE ISS

**Abstract**

Assembly of the United States on-Orbit Segment (USOS) of the International Space Station (ISS), including all International Partners' components, is now virtually complete with all core elements successfully integrated and functionally verified on-orbit. At the same time construction of the ISS Russian Segment (ISS RS) is still under way. The newest Mini Research Modules (MRM) *Poisk* (MRM2) and *Rassvet* (MRM1) have become integral parts of the ISS in 2009-2010 and process of the ISS RS assembly will be continued providing more and more research capabilities for scientists and engineers. Multipurpose Laboratory Module (MLM), which is targeted for the station in 2012, will be the largest Russian laboratory on ISS. The next step in this process will be Scientific-Power Modules (SPM) 1 and 2. All of them provide new capabilities for accommodation of existing and next-generation research facilities. On the Service Module (SM) and Docking Compartment 1 (DC1) the distributed payloads' service principle is utilized till now. It means that separate payloads are provided with onboard resources directly omitting special racks by means of universal electrical, thermal, vacuum and others modules' interfaces. From the standpoint of science capabilities to be provided, as well as payload integration principles to be applied, MRM2 and MRM1 can be considered as intermediate ones between the older SM and future MLM. Some advanced principles of research facilities development and integration as compared with the SM have been applied on MRMs, which will increase the utilization efficiency of the Russian segment. A key feature of the ISS RS construction process is a consecutive expansion of the exchangeable payloads method application on the modules, directed towards efficient utilization of their research facilities. The method is based on a concept of the universal workstations. Advanced universal workstations and payloads racks will be used on MLM, SPM1, and SPM2. This paper analyses payloads integration methods applied on different generations of the ISS RS modules, and explores their role as integrated elements of the ISS, unveils their scientific potential and prospective of utilization.