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LEGACY RACK MODERNIZATION FOR NEW PAYLOAD EXPERIMENTS

Abstract

Columbus accommodates currently ten Class-1 Payload Rack facilities, nine being on active Rack locations. Class-1 facilities can be divided into science specific Racks, such as Fluid Science Laboratory or BIOLAB, and Multi-Purpose Racks like European Drawer Rack or European Drawer Rack Mark 2. The Columbus System and –infrastructure are undergoing constant modernization. Within the last recent years, International Standard Payload Racks show the design trend as Multi-Purpose facilities to provide standard Services to the Class-2 Units, such as Power, cooling, Datalink, Vacuum / Venting or Nitrogen. The class-2 units can follow any scientific orientation, like fluid science, material science or physiology science.

The BIOLAB Facility is part of the Columbus Infrastructure since Feb 2008 and has hosted a number of biologic Experiments until today. The Rack facility was designed in the late 1990s and provides a variety of legacy equipment and –Interfaces, including Software. BIOLAB represents a Class-1 Payload Rack facility, designed for biology scientific purposes and contains sub-systems to support the Experiment execution on System Level. Some of these sub-systems are showing legacy interfaces that can affect the concept layout of new Payloads and the procurement of new Payload-Experiment components. Further implications are imposed by datalink bottlenecks due to small bandwidths and heritage Software protocols. This leads to constraints within the design, component selection and required experiences by Designers and Manufacturing specialists. As a result, development lead times and especially verification activities are time consuming; the verification steps in the frame of functional acceptance are explicitly affected in case the Engineering Model facility is required for both: Verification of new Experiment Containers and Operational support during in orbit science execution. Eventually, the overall project life cycle in Phase A – D requires long duration and has potential downtimes due to unavailability of EM facility.

This abstract and the associated presentation aims to provide a new approach within Experiment accommodation, Interface layouts, Interface requirements and Payload Experiment development cycles. New Experiment Containers are supported by simplified Interfaces, larger Interface envelopes and basic Services from the Rack facility. The new Interfaces allow a broader overall utilization, but most important an Interface selection that can be transferred to the development environment, thus requiring less development and acceptance Tests at the Engineering Model. Hereby the facility actively supports shorter development cycles of the Experiment Containers and less constraints for acceptance Tests.