

SPACE OPERATIONS SYMPOSIUM (B6)
Human Spaceflight Operations Concept (1)

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COLUMBUS STOWAGE OPTIMIZATION BY CAST (CARGO ACCOMMODATION SUPPORT
TOOL)

Abstract

A really challenging issue related to the International Space Station (ISS) utilization concerns the stowage on-board, giving rise to very strong impacts to habitability, safety and crew productivity. This holds with particular evidence, dealing with the European Columbus laboratory. The volume exploitation has to be maximized, in compliance with the given accommodation and operational rules. Very demanding loading problems must be solved quickly, efficiently, with high cost-effectiveness, taking into account the spaces made available time by time. This leads frequently to compare different operational scenarios, in order to select the most suitable one. Last minute upgrades, due to possible re-planning of the NASA Cargo Manifest, may moreover arise, implying the further capability to readapt quickly the current solutions to the updated situations. The problem results in being extremely challenging both for programmatic and technical reasons, so that looking into satisfactory solutions, quickly, by means of a manual approach alone, represents a very time consuming job, even for experienced designers. Thales Alenia Space Italia S.p.A., a leading company in European space technology, benefiting from a research and development activity carried out since the late eighties, has achieved a remarkable expertise in the field of cargo accommodation and stowage. In 2005 the company delivered CAST, a dedicated in-house software tool, to perform the analytical cargo accommodation of the European Automated Transfer Vehicle (ESA ATV). The tool, funded by ESA, conceived and developed by the company, has been successfully adopted for the first ATV mission (Jules Verne), accomplished in September 2008. An ad hoc CAST version, specifically extended and modified to support the Columbus stowage activity, has been achieved and is going to be used, within the program, from now on. This paper describes the Columbus stowage problem, showing recent results obtained by the tool. The advantages of the non-manual approach are pointed out.