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PREPARATION AND FIRST OPERATIONS EXPERIENCE OF THE LIFE SUPPORT RACK AT COL-CC

Abstract

Over the last years, the main focus of the Columbus Control Center (Col-CC) and the Columbus module was to support ESA science activities in different fields on the International Space Station ISS. In 2019, the first steps venturing into a crew habitat were taken with the installation of the Life Support Rack (LSR) in the US Lab. With the Life Support Rack (LSR) or Advanced Closed Loop System (ACLS), designed by Airbus, the field of environmental control responsibility at Col-CC was reaching a new level. Until now, only the air circulation in the Columbus module was handled by Col-CC but not the atmospheric control, which was covered by NASA. LSR can, amongst other things, regenerate oxygen and water in a closed loop, which means nearly no outside resources are needed. Responsibilities to operate the rack are shared between Airbus Friedrichshafen, Col-CC and NASA. The Col-CC responsible position is Columbus Operations Mission Execution Timeline Engineer (COMET). The operation includes resource coordination with counterparts and commanding which, so far, are not part of the COMET responsibilities. Therefore, training for the operators has been designed, which includes not only theoretical training but also practical simulations. Alongside this a new set up on console was designed and implemented.

During the Horizon Mission in October 2019, ESA astronaut Alexander Gerst installed LSR. During the first weeks of operation unexpected behavior was encountered, which could be solved by updating processes, and implementing improvements on hardware and software side that ensured system modes were functional. In 2021, however a required software update caused a pause in operations leading to a new software version that is installed in early 2022 allowing the operation to re-start, with the goal to have a fully functional rack.

This paper will focus on the preparation done before the first activities with LSR as well as the first experiences with the operation of the rack at Col-CC. The training for the COMET team will also be discussed, the problems and solutions during the early days will be analyzed and finally an insight into the future will be given.