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C3Or4B-01: Operation of CERN's major tests facility with upgraded cryogenic infrastructure for superconducting magnets, power links, inner triplets String and radio-frequency cavities for HL-LHC

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The largest cryogenic multipurpose test facility at CERN (SM18), recently significantly upgraded, provides helium refrigeration capacity for testing at nominal conditions, superconducting magnets, power links, radiofrequency (RF) cavities and the IT String (Inner Triplet) for the High Luminosity - Large Hadron Collider (HL-LHC) upgrade project, towards increased luminosity at interaction points 1 (ATLAS) and 5 (CMS) in the LHC accelerator.

The SM18 cryogenics infrastructure and test benches have been progressively upgraded along the last 8 years to meet the technical requirements of the HL-LHC project. In parallel, cryogenic interfaces and process controls have been developed to adapt the operational requirements related to the use of new materials like Nb₃Sn for the HL-LHC magnets, to the tests of innovative MgB₂ powering links and to the new design of RF crab-cavities as well as crab-cryomodules.

In addition, the inner triplets string test bench, also located in the SM18 facilities, will be dedicated to the test of HL-LHC magnet's collective effects anticipating the operational behaviour of the structure powered by a superconducting link.

This paper outlines the development of advanced cryogenic process controls over the past two years, focusing on automation for safety and efficiency in the cryogenic test benches. Operational results will be presented including overall cryogenic capacity & tests parallelization. The paper concludes with perspectives for the expected future dense testing program.

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