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Fermilab's Horizontal Test Stand Upgrade Overview and Commissioning

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Cryo-assemblies with the low-beta Nb₃Sn quadrupoles for the high luminosity LHC (HL-LHC) upgrade will be tested at Fermilab's magnet test facility. Total of 10 cryo-assemblies will be delivered to CERN within the US HL-LHC Accelerator Upgrade Project (AUP). The horizontal test stand at Fermilab already has been used for testing the existing LHC inner-triplet quadrupoles, but the stand and related electrical and cryogenic sub-systems were not operational more than a decade.

In order to restore the test stand functions and meet the design and test requirements for the high luminosity LHC magnets, the existing horizontal test facility at Fermilab underwent a significant refurbishment of the cryogenic and mechanical components. Most of the upgrades were completed and then commissioned during so called zero-magnet test by late 2020. These tests with the shorted superconducting power leads verified the major cryo-mechanical installations, as well as the basic test stand operations, including controlled cooldown, current ramps, process controls and magnet protection.

Overview of the Fermilab's horizontal test facility upgrade and commissioning of these upgrades during the zero-magnet test are presented in this paper.

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