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MODIFICATION OF THE ELECTRICAL INSTALLATIONS IN POINT 8

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Abstract

Proceeding with the LHC project implies various electrical reconfigurations and modifications.

This poster shows the numerous changes needed for the LHC installations in point 8. The complexity of the technical problems, even to the power distribution system and the cableways, is highlighted.

The needs of a considerable number of clients must be taken into account, as well as different technical issues.

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1 INTRODUCTION

The installation for the LHC project implies various reconfigurations, modifications, and electrical works, in point 8 as well as in all other points.

This document gives the reader a few examples of the types of projects in progress and having been completed over the past year.

Three types of projects have been selected as examples, in order to give a clear idea of the diversity of the ST/EL action on site:

- Activities directly related to the LHC machine:
SF8: Feeding of an electrical switchboard for ST/CV
SR8: Transformer for SL/BT
SD8, SDH8, SH8, SHM8 : 24V distribution and UPS system
- Activities carried out to prepare the LHC experiment:
SE8: 18 kV switchboards reconfiguration
PM85: Removal of cable trays and installation of supplementary cables
US85: Cable trays reconfiguration and refurbishment
UX85: General services to accommodate the LHC-B experiment.
- Activities unrelated to the LHC:
SR8: The CAST experiment

2 PROJECTS DIRECTLY RELATED TO THE LHC MACHINE

2.1 SF8: Feeding of an electrical switchboard for ST/CV

ST/EL was requested to feed and control an electrical switchboard containing circuit breakers meant to feed and protect pumps. This set of pumps is part of a process helping to cool down part of the LHC-B and CAST magnet.

We first met a space problem to install this new electrical switchboard which is bigger than the one previously installed. To solve it, we had to reinforce a mechanical structure in building SF8. Because the old switchboard was still in use for the CAST experiment, we had to prepare all the cabling work in order to reduce the time for the power cut. We also had to face a routing problem for the cables coming from the transformer.

2.2 SR8: Control and feeding of a transformer for AB/PO

The solenoid of the LHC-B magnet needs DC current to perform its function. For this purpose, AB/PO purchased a transformer. The task of ST/EL was to do all the cabling related to this transformer, which includes the HTA cabling, and the BT cabling. HTA cabling consists of connecting the primary circuit of the transformer to the source, which is in this case the 18 kV circuit breaker located in SE8 building. BT cabling concerns the cables between the secondary circuit of transformer and the converter. Later, ST/EL will be asked to install the DC cabling, going from the converter situated in SR8, surface building, down to the UX85 cavern, on the LHC-B solenoid. We will also have to reconfigure the SR8, taking into account the needs of new racks and cable trays in the false floor.

2.3 SD8, SDH8, SH8, SHM8: 24V distribution and UPS system for LHC/ACR

Cryogenic systems are very important for the good working order of the LHC experiment. To this end, all these systems need a 24V power supply, and a no break power network. For each point of the LHC, ST/EL, jointly with the concerned users, made a study to comply with the requirements. Once this study was presented and accepted by the future users, ST/EL became in charge of carrying out the project.

All the cabling, building of racks and ordering of equipment will be done by the ST/EL group. Once the work will be completed, commissioning and acceptance tests will be made jointly with the future user.

3 PROJECTS CARRIED OUT TO PREPARE THE LHC EXPERIMENT

3.1 SE8: 18 kV switchboards reconfiguration

SE buildings, in all the LHC points are hosting the 18 kV electrical switchboards. On each point, they represent the heart of the electrical power network. Their configuration corresponds to the needs for the LEP experiment. Because the LHC is based on a brand new technology, the present needs are totally different from the previous ones, and thus have been redefined. To ensure the electrical distribution as per the requested needs, each SE building and all its switchboards was the object of a study and a reconfiguration.

3.2 US85: Removal of cable trays

At the bottom of the PM85 shaft, the US85 area presents three floors. The second and third floor will have to be freed in order to receive the new cold box. All the cable trays positioned in the false floor will have to be moved, as well as all the cables running on them. At the bottom of the pit, all the cables, cable trays, and installed equipment will have to be repositioned, in order for them not to be in the way of the cold box when it will arrive and be positioned. For the existing cable trays, a refurbishment campaign has to be done, indeed large number part of them were badly injured during the dismantling work of the LEP.

3.3 PM85: Cable trays reconfiguration and installation of missing cables

The needs for the LHC experiment being different from the one for the LEP, ST/EL has to bring different power in each different location. To do this, cable trays are needed. We thus had to study the new cable tray distribution. Project is in progress to ensure the compliance of the existing cable trays distribution with the one which will be needed in the future. Extra power was requested down the shaft. Since this power is coming from the surface, we have to install the new feeding cables down along the PM85.

3.4 UX85: General services for the LHC-B experiment

The LHC-B experiment will be installed in the UX85 cavern. In order to receive it, all the general services have to be studied, to comply with the needs of the future users. Lighting, power distribution, emergency stops, fire detection, phones, emergency lighting, electrical switchboards, shall be defined. Once the proposal has been accepted by the responsible person, our mission consists in ensuring that the project is successfully completed.

4 PROJECT UNRELATED TO THE LHC EXPERIMENT

4.1 SR8: The CATS experiment

CERN Axion Solar Telescope is a new experiment located in point 8 of the LHC, SR building.

It consists of a magnet supported by a tray, which follows the sun during one hour after dawn and one hour before sunset. Following sun's movement allows the magnet to catch the emitted axions.

At the very beginning of the project, ST/EL was first requested to help the CAST physicists to define their needs. As the project grew, the ST/EL group became in charge of designing the whole distribution, taking into account ground problems of each of the three sub-detectors installed on the same magnet.

And finally, on the 5th of May, ST/EL commissioned and tested the electrical installation.