

Primekss experience in CERN projects



CERN's expertise is broadly based upon three fields of technology: particle accelerators, particle detectors and computing.

To ensure a smooth, safe and successful operation of the LHC accelerator complex and the associated experiments, a wide range of various supporting technologies and infrastructure is required. It is regarding the latter where Primekss, in collaboration with its scientific partner institutions, can provide valuable inputs and solutions through advanced building technologies, material science and R&D.

Project overview:

Project #1. The assessment of concrete core and seating mortar samples from the UXC55 cavern base slab at the Compact Muon Solenoid (CMS) experiment.



Challenge

Time-dependent vertical deviations within the topmost layer of the UXC55 cavern floor system, ie. the steel plates, have been observed by the CERN personnel at specific locations.

These deviations have prompted an investigation into the potential source(-s) of the localized changes in the floor level.

As this floor system is supporting a very heavy, yet ultra-high precision experimental equipment, it is important to determine the cause of the vertical excursions and, if needed, stabilize the slab.

Primekss Concrete R&D experts were invited to take part in this project and to perform the system's material and structure analysis as well as the impact of the surrounding environment on it.

Project purpose

The main aim of this study was to perform an assessment of the floor system's concrete structures. This was done via the analysis of the samples of the concrete and the seating mortar at UXC55. The purpose of this analysis was to perform the following:

- Assess whether there are signs of on-going deterioration in the concrete samples and whether those could be the potential cause of the vertical deviations in the top surface of the slab in the UXC55 cavern;
- Provide the basic details of the composition of the concrete mix used;
- Propose the possible follow-up actions/inspections and next-step recommendations for the study.

Project timing and status

Start in 09-2018 (initial discussions); end in 12-2019 (final meeting, report and presentation); status - completed.



Project #2. Joint studies of specialist concrete with a focus on the radiation protection aspects.

Challenge

At CERN various concrete structures are exposed to a considerable dose of radiation.

Therefore, materials with optimized radiation resistance characteristics need to be developed and employed in order to ensure the longevity of the experimental structures and to minimize the risk of a leakage of any radioactive material.

Such material research is even more important in the context of the proposed construction of the 100km-long Future Circular Collider (FCC).

Primekss Concrete R&D experts were invited to participate in a joint research studies project of specialist concrete with a focus on the radiation protection aspects.

Project purpose

- Establish the necessary characteristics of the specialist concrete with respect to its radiation hardness and the activation of its chemical components;
- Establish the necessary characteristics of the specialist concrete with respect to its gas emanation, particularly regarding the Tritium gas;
- Establish whether concrete employing alternative reinforcements, e.g. glass fibre, is able to match the performance of the steel reinforced concrete; important in achieving lower activation of the material;
- Establish whether a crack-free specialist concrete is able to prevent liquid infiltration, particularly infiltration of water.

Project partners



Project timing and status

Refining of the project scope and clarification of its structure; status - on-going.

