

CERN Safety Alarm Monitoring



CERN, the European Centre for Nuclear Research, is the world's largest research centre for particle physics.

The entire safety alarm monitoring system is being renewed for the project works for building the new particle accelerator, the Large Hadron Collider (LHC).

Goals

System goals:

- Ensure the safety of people and equipment for the future LHC (costing around 12 billion Swiss Francs).
- Alert the fire service in case of emergency.
- Ensure availability of information to external users (by Web server & OPC).
- Know the availability and breakdown rate of equipment at all times.

Main Features

The CERN Safety Alarm Monitoring (CSAM) system provides users with safety alarm information (on fire fighting, low oxygen levels, etc.) for the whole site so as to alert the fire brigade if necessary.

The system also provides diagnostic functions for its own equipment, to anticipate eventual system breakdowns (i.e. for monitoring the CSAM's own availability).

Based on PLCs with improved availability, the CSAM system has to monitor 33 safety areas, 24/7 during the LHC's 10 years of operation.

The system gathers and synthesises all field data for two operational control rooms (1 fire brigade room and 1 facility control room).

Operation Safety (a SIL2 certified system)

- Implementation of recommendations in the IEC 61508 standard for operational safety.
- Fault Tree Analysis (FTA), AMDEC and HAZOP (HAZard and Operability studies).
- Establishing a SIL safety level (Security Integrity Level).
- Frame of reference used from conception to dismantling of the facility.

Solution

- 33 redundant PLCs managing 20,000 I/O.
- 3,000 analog readings.
- PcVue: 2 redundant servers, 4 clients.
- WebVue server.
- Oracle server for long-term database storage.

