

Abstract

The accelerator facilities at CERN span large areas and the personnel protection systems consist of many interlocked doors delimiting the accelerator zones. Entrance into the interlocked zones from the outside is allowed only via a small number of access points. These are no longer made of doors, which have left their place to turnstiles and then to mantraps or Personnel Access Devices (PAD). Originally meant for high security zones, the commercially available PADs have a number of CERN specific additions. This paper presents in detail the purpose and characteristics of each piece of equipment constituting the access devices and its integration within the personnel protection system. Key concepts related to personnel safety (e.g. interlocked safety tokens, patrols) and to access control (e.g. access authorisation, biometric identity verification, equipment checks) are introduced and solutions discussed. Three generations of access devices are presented, starting from the LHC model put in service in 2008, continuing with the PS devices operational since 2014 and finally introducing the latest model under development for the refurbishment of the SPS Personnel Protection System.

Standalone Device

The electronics rack with additional equipment is physically integrated with the PAD forming one object. The PAD extension is composed of two sliding drawers:

- a cabinet housing Access Point PLC, its I/O modules and access control subsystem components;
- a mini Material Access Device.

Inside the PAD there are two token distributor modules from Deister Electronics, IrisID biometric reader, a film-badge reader and an operational dosimeter detector.

Once the PAD is completely mounted, it can be fully tested at the factory site. After shipment to CERN and on-site installation there are only a few signal cables and connections to test.

Single Controller

The PAD is equipped with an Access Point Controller – Siemens 1500F model running two distinct processes: standard and safety.

- **Standard** process interfaces with the user inputs, the access control system and the PAD control electronics. The PAD control electronics runs the proprietary algorithms to ensure only one person at a time uses the device. The standard process can refuse entry if access rights verification, biometry, equipment or single passage checks fail.

- **Safety** process monitors the doors for intrusion, verifies the state of the safety tokens and permits/inhibits the use of the PAD in function of the safety system status. The safety process can interrupt an ongoing cycle and cut the power supply to the door motors, but not while a door is moving.

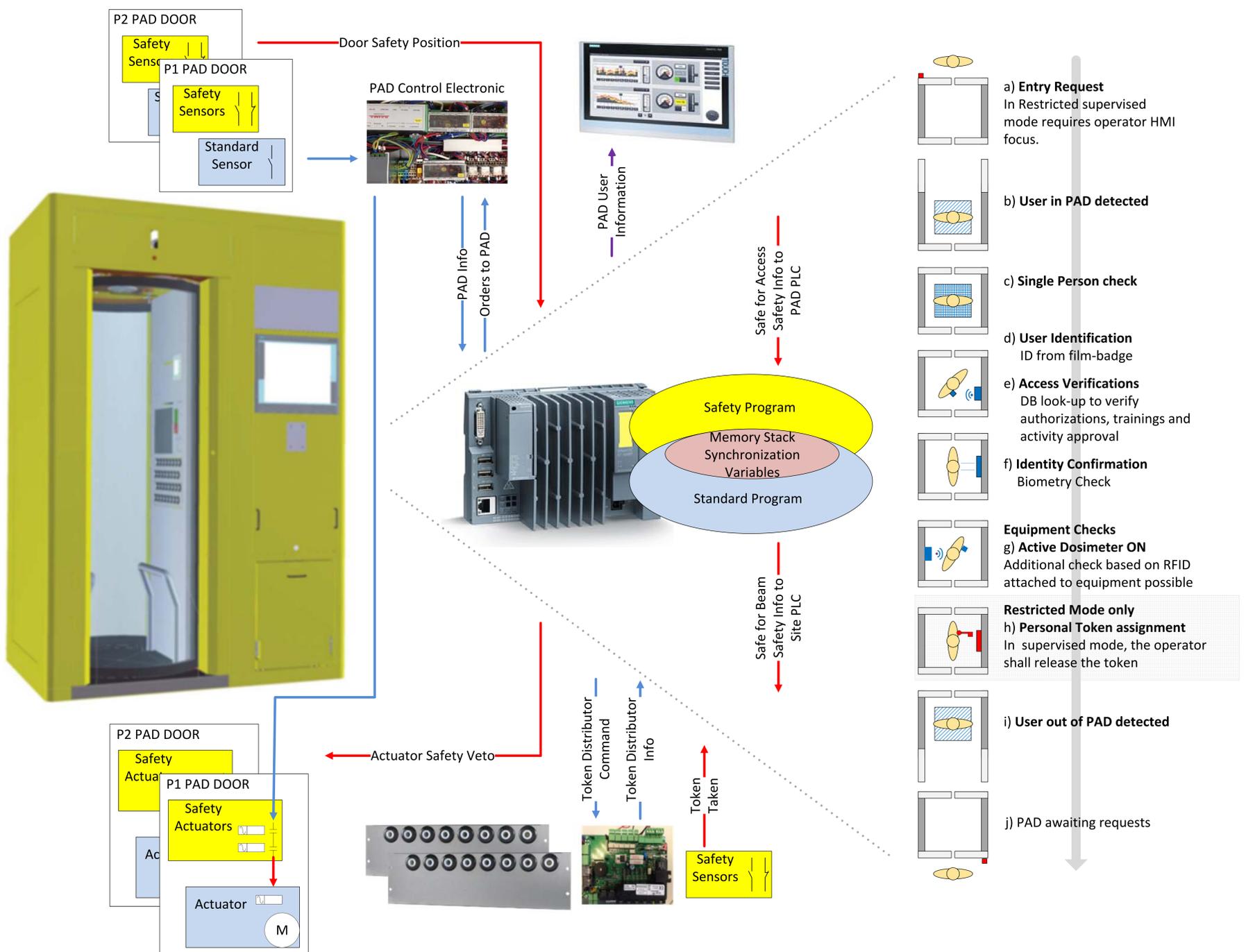
Symmetrical Cycle

The safety token distributors are located inside the PAD and the entry and exit cycles are very similar, both initiated by pressing a button and requiring the user to take similar actions inside the device.

In case of the exit cycle fewer checks are performed, as the principle is to facilitate a rapid exit, without performing unnecessary verifications.

The installation of the token distributors inside the device ensures that:

- the inner PAD door will only open, **ENTRY**
- once a safety token is taken;
- the outer PAD door will only open, **EXIT**
- once a safety token is returned.



Conclusions

Building on the experience from the LHC and PS access systems, a third generation Personnel Access Device for the SPS has been fully developed. Its design is more ergonomic for both the end-user and the maintenance team. The mechanical design, combining all elements into one unit, should allow rapid installation of 16 access points in a very dense Long Shutdown 2 period.