Access strategy in the accelerator complex and experimental areas

Rui Nunes GS-ASE
For the Access Team

thanks to P. Ninin, E. Sanchez-Corral, T. Ladzinski
Overview

• PS
  – PS Primary Areas Project (PS PSS)
    • PSPSS Main features
    • PSPSS Installation planning
  – PS Secondary Areas news

• SPS
  – SPS Primary Access Control Project
  – SPS Secondary Areas news

• LHC
  – LACS/LASS Main updates
  – LHC Access Improvement Programme
PS PSS – PS Personnel Safety System

- Main difference from LHC is the different layout of the machines involved
- LHC has 5 chains & 12 EIS-f/m
- PS has 17 chains & ~100 EIS-f/m

<table>
<thead>
<tr>
<th></th>
<th>LHC</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Points</td>
<td>36</td>
<td>28</td>
</tr>
<tr>
<td>Doors</td>
<td>265</td>
<td>~ 100</td>
</tr>
<tr>
<td>Patrol Boxes</td>
<td>330</td>
<td>~ 110</td>
</tr>
<tr>
<td>EIS-f/m/ext</td>
<td>13</td>
<td>~ 100</td>
</tr>
<tr>
<td>Interlock “Chains”</td>
<td>5</td>
<td>17</td>
</tr>
</tbody>
</table>

Figure 4-1: Schematic overview of the PS Complex zones and their relationship from

personnel access and passage point of view.

from Functional Specification for PACS (901505)
PS PSS Main Features

• Main differences wrt LHC Access System
  – Although Radiological risks covered, some other risks considered
    • External interlocks in special cases (ventilation, laser, etc...)
  – New Modes
    • Special permit mode - Magnet testing for specialists only
    • Test EIS-f mode - Testing of all EIS of a Zone by interlocking the upstream chain
  – Public Address
  – Mini-MAD “drawer” in Access Point for small material
  – Maintenance doors

• Main similarities
  – Biometrics (2 eyes)
  – MAD / PAD (improved unicity check)
  – Keys (trapped keys & improved key-taking sequence)
PS PSS Design Status

- Functional Specification & Sectorisation
  - Sectorisation documents under final approval
- Risk analysis
  - Safety functions defined
- Technical Specification done
- System design completed
  - Architecture design
  - Equipment selected & validated
- Test platform
  - Factory Acceptance tests completed
  - System validation on CERN platform 2012 Q2
  - PS0 test platform in building 271
- Integration studies ongoing
  - Area 3D scans done
  - Integration Studies
    - Difficulties due to lack of space for cables and access points
PS PSS Work in Progress

- Installation of Rack Control Room
  - Building 271
- First functional tests on test platform
- Civil engineering preparations for LS1
- New Buffer Zones
  - integrated with access points
  - DGS/RP & EN/MME collaboration
  - Optimize installation works
- Preparation of technical infrastructure for Installation
  - Support from EN/MEF
  - Optical fiber network
  - Cabling for Power, Controls and I/Os
    - With EN/EL & IT/CS
- Cabling galleries
  - Cable tranches or new galleries have to be made with EN/EL, GS/SE
  - Major effort to clean existing cable trays and install new cables
PS PSS Installation planning

• **Constraints** for planning during LS1
  – Requirements for Machine run
    • Linac3, CTF, ISOLDE ? - Operation dates still to be confirmed
    • Current system must be kept fully operational for these zones, including interlocks
  – Requirements to give Access
    • Current system must provide full access control functionality (but not interlock)
  – RP Constraints
    • ALARA working conditions, decay time for some areas
    • DIMR Procedure
  – Coactivity Management
    • Coordinated via EN-MEF (e.g. route Goward shielding)

• **Objective**
  – Installations **starting** in 2012 Q4
  – **Install all zones during LS1** starting with zones in the LHC injector chain
    • 2-4 months per zone - 2 zones installed in parallel
  – System Commissioning & Testing (BE DSO & OP) – 2 months – **Jan&Feb 2014**
    • LHC injectors operational by April 2014
    • Linac4 must be ready for HwC in 2013 Q1
PS PSS Installation Schedule

PS PSS 18c Strategy:
- PSS Inst. planning: RP & LS1 works constraints & PSS system (current, new) operation requirements
- PSS Commissioning planning: safety chains and PSS system (new) operation requirements

PS PSS Safety & Access system - Installation & commissioning planning during LS1
Last update: LS1 preparation meeting 25/11/2011

08/02/2012  R. Nunes GS/ASE - Chamonix 2012
PS Secondary Areas

• Works during LS1 (AD & East Hall)
  – Add dosimeter badge readers & access control to restrict patrol mode to “trained” users
  – Similar to new North Area system
  – New Layout to include ELENA in AD

• Depending on the East Area Renovation project (cf. East Area Day Workshop)
  – Change Secondary Access System Layout
  – Spin-off command of EIS-f to “CESAR-type” control
  – Install building access control to the Hall 157
    • Like 193 (AD) and EHN1 (North Area)
SPS Primary Access

• 2011-2012
  – Upgrade of SCADA supervision
    • Non-supported FactoryLink → WinCC
  – “Usual” modifications
    • HiRadMat & other resectorisations
• During LS1
  – No special actions are foreseen
  – IMPACT tool can be used if needed

• New System Deployment during LS2 (when?)
  – Complete rebuilding is necessary
    • Obsolete safety & control architecture
    • Rapidly diminishing support for PLCs (S5)
  – Risk analysis phase started
    • Similarities with PS&LHC shall be explored
  – Development to start back-to-back with PS PSS project
SPS Secondary Access

• 2011-2012
  – Access control completely rebuilt in 2011
    • Aligned with PS AD and East Hall Secondary systems
    • Good performance
  – Access control to the NORTH Hall (EHN1) in 2012 Q2
    • Enforce use of dosimeter
    • Reduce vehicle parking on “Salève side”
• During LS1
  – Project for High Intensity Proton Beam
    • LOKN refurbishing
    • Safety Study ongoing
  – Additional access points for EHN1 galleries
    • tbconfirmed
LHC Access Main Updates 2011

• Updates done in 2011-2012
  – Integration of access with Impact
  – Automatic Key Distribution – New sub-mode
    – ECR LHC-Y-EC-0006
    – Deployed, useful during Xmas Break
  – 11 new key distributors
    • For some UJ areas
  – 2 new PADs in PM54 (CMS) installed
  – Biometry upgrade (2 eyes)
    • 9 oo 36 access points installed
LHC Access Improvement Programme

“Improve availability but don’t compromise on safety”

consultation with main stakeholders in BE-OP & EN-MEF
LHC Access Improvement Programme

1. Interlock more than just Beam ↔ Access
   - He₂ / Air-tightness / Cryo / Powering

2. Performance Improvements
   - Access point improvements
   - Sectorization improvements
   - Maintenance improvement
   - CCC improvements

3. R2E-motivated relocations
Interlock more than just just
Beam ↔ Access

• Access doors interlock the beam

• Other types of doors do not interlock the beam... should they?
  – e.g. Ventilation & Overpressure doors
  – i.e.: Should a LASS-type system contribute to the risk reduction of personnel exposure to Cryo risk, ODH risk or activated air?
  – Acceptable impact on machine availability?
    • Should the beam/powering be stopped immediately?
    • Should the patrols be lost if external envelope is not breached?

• Should a LASS-type system also interlock the power converters?
  – e.g. using any type of available doors
  – i.e.: Should a LASS-type system interlock the PIC to reduce the risk of exposure to a He2 discharge during powering tests?
    • A safety HW interlock to be deployed in LS1, replacing current SW interlocks
    • Technical solution is available and agreed with PIC
  – Acceptable impact on the machine availability?
    • Increased number of elements that firmly interlock the powering.
    • Impact of safety constraints on availability for powering tests?
    • Impact on maintenance of the power converters? (bypass for tests?)
Interlock more than just
Beam ↔ Access

Access Doors ↔ INTERLOCK ↔ Beam Elements
Non-Access Doors ↔ INTERLOCK ↔ Beam Elements
All types of Doors ↔ INTERLOCK ↔ Powering Elements

INTERLOCK = HW Safety-type interlock
LHC Access Improvement Programme

- Access point improvements
  - PAD: Avoid spurious patrol losses
  - MAD: Improve performance by alternative solutions
    - Human supervision in case of difficulty
  - Improve exit procedure
    - No green button
  - Improve information to users on refusal reasons
  - No biometry underground?
    - If same access right
- Sectorization improvements
  - Improve sectorization (ALARA) of LHC3 and LHC7
  - New Zone/sectors for TZ32 pre-alignment tests for CLIC
  - Provide RP veto for TI2, TI8 and Dumps
- Maintenance improvement
  - Bypass of the ToP access points
    - Allow maintenance during beam
  - ECR in draft
- CCC improvements
  - Upgrade LASS servers
  - Closely integrate ADaMS and IMPACT
  - Improve monitoring of “really closed” doors in CCC
Curtain @ ToPit for Access Maintenance

Drawings and layouts S. Di Luca
R2E-related Relocations

• Complete Access Point
  – UJ14 → UL14
  – UJ16 → UL16

• Controls racks relocation
  – UJ56 → USC55
  – UJ76 → TZ76
Thank you for your attention