Recommissioning Plans of Machines and Experimental Areas for beam after LS2

B. Mikulec on behalf of the
Injector Recommissioning Working Group (IRWG)

LS2 DAYS
29-30 SEPTEMBER 2015

http://indico.cern.ch/event/436424/

Introduction

- Injector restart analysis after LS1 during Chamonix 2014
- End of 2014 the IEFC issued a mandate to create an 'Injector Recommissioning Working Group' covering all accelerators (excluding LHC) and experimental areas:

1. provide an overview of the re-commissioning strategy, procedures and practices;
2. audit the different phases of the re-commissioning procedures and practices in the injector chain;
3. propose an agreed strategy and guideline describing all the steps and documentation (procedures, check list, etc.) required for an efficient, systematic and coherent re-commissioning of the aforementioned facilities taking into account the specific needs of each of the injectors;
4. enforce and follow-up the preparation of the documentation for the procedures of the individual system tests as well as the hardware commissioning together with the databases (e.g. MTF) for the test results;
5. organize dry-runs to validate the full re-commissioning process for each facility.

IRWG – Composition

- Chair/Deputy/Sc. Secretary: V. Kain/B. Mikulec/B. Lefort
- 10 meetings so far: https://indico.cern.ch/category/6174/
- Core team:
  - 2 representatives from each machine and experimental area plus EN-MEF representatives, M. Tavlet (DSO of BE) and M. Vanden Eynden (CO3 committee leader)

Post-LS1 Analysis

- Recommissioning after LS1 analysed for each machine/experimental area
  - What worked well?
  - Which phases and how were they organised?
  - Which procedures/documentation were available and applied?
  - Where were the main problems? Why?

  → *MANY common issues identified!*
- Currently defining concerted approach
  - Learn from each-other; include some good LHC practices
  - Define how to test, what to test, when to test and who should test
  - Formalise testing and follow-up → Procedures and Checklists

Post-LS1 Analysis: Some Common Issues (1)

- Partial testing; missing or incomplete procedures/checklists
  - Magnet polarity checks not routinely done in all machines
  - Optics not updated (e.g. after new installations or modified alignment)
  - Missing references, e.g. for BI systems
  - …
- Readiness date of main services, access, EIS, controls tools/system often too late to allow for sufficient testing
- Testing started too late
- Single-expert systems critical

Post-LS1 Analysis: Some Common Issues (2)

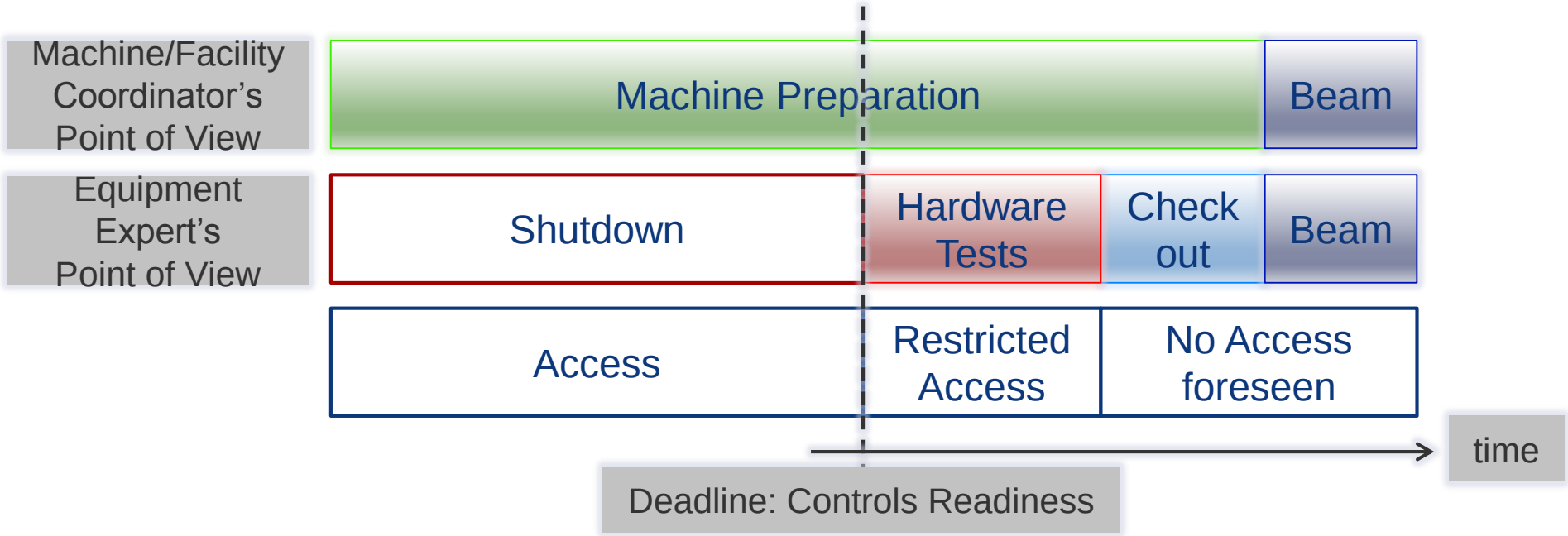
- Interfaces not sufficiently tested
  - Between systems, e.g. access <-> equipment
  - Between machines, e.g. PS <-> SPS
- Priority issues LHC <-> Injectors and proton <-> ion machines
- Insufficient communication of modifications of equipment and controls to OP and often no consultation
- …

'The essential element is continuous communication between all the partners all the time…'

Main Proposed Changes for Long Shutdowns

- Preparation and Use of Checklists
  - Members of IRWG prepare draft checklists for their machine/experimental area by the end of the year
    - To be completed and verified before/during 2016 restart
    - Base EYETS restart on these checklists
    - Will be stored on EDMS after each LS for reference
- 1 (2) person per machine/facility responsible for machine preparation throughout the LS
  - Follow activities, track progress, note modifications (HW+controls)
  - Organise coordination meetings with experts before test period; discuss modifications, readiness, pre-requisites for tests etc.
  - Organise tests in collaboration with EN Machine/Facility Coordinator
- Start testing earlier with equipment experts: ‘Full’ vertical slice with ‘all’ interfaces

Introduce Machine Preparation Phase



- Machine preparation tests coordinated by OP (or ABP/MEF for linacs/EA)
  - New role of 'Recommissioning Coordinator': EDMS 1540465
  - Coordination of punctual Dry Runs with equipment experts and MEF; incorporate into MEF planning
- HW test period: Daily morning meetings with equipment experts, MEF and OP for progress report and day-planning; OP gives access
- Aim: Test this new arrangement during EYETS 2016/17

Machine Preparation Phase - Safety

- Need to assure safety during Hardware Tests
  - New EDMS procedure for Linac2, PSB, PSB and TT2
  - Access mode 'Special Permit'
  - IMPACTs for HW test period
  - Habilitation Electrique to be clarified


EDMS NO. 1371388 REV. 1.0 VALIDITY RELEASED

REFERENCE CPS-Y-PRD-0001

Date: 2015-09-17

SAFETY PROCEDURE

Access to LINAC2, PSB, PS and TT2 during Hardware Commissioning and Tests

ABSTRACT:

During the hardware commissioning and test period in the LHC injectors (LINAC2, PSB, PS and TT2), the power supplies are no longer electrically "locked-out". The majority of the magnets will be powered, tested and validated before declaring them operational.

This procedure describes how access will be granted for personnel not part of the tests.

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2.1 ACCESS FOR FORESEEN ACTIVITIES

As a general rule, during hardware testing (HWT), access to an injector is forbidden. Two categories of foreseen activities for which a justified exception is possible, are defined:

- Access by hardware experts of equipment under test. For example, BE-RF accessing a cavity for tuning.
- Other planned access. For example, EN-CV accessing a ventilation substation for controls and measurements.

The access is authorised following this procedure:

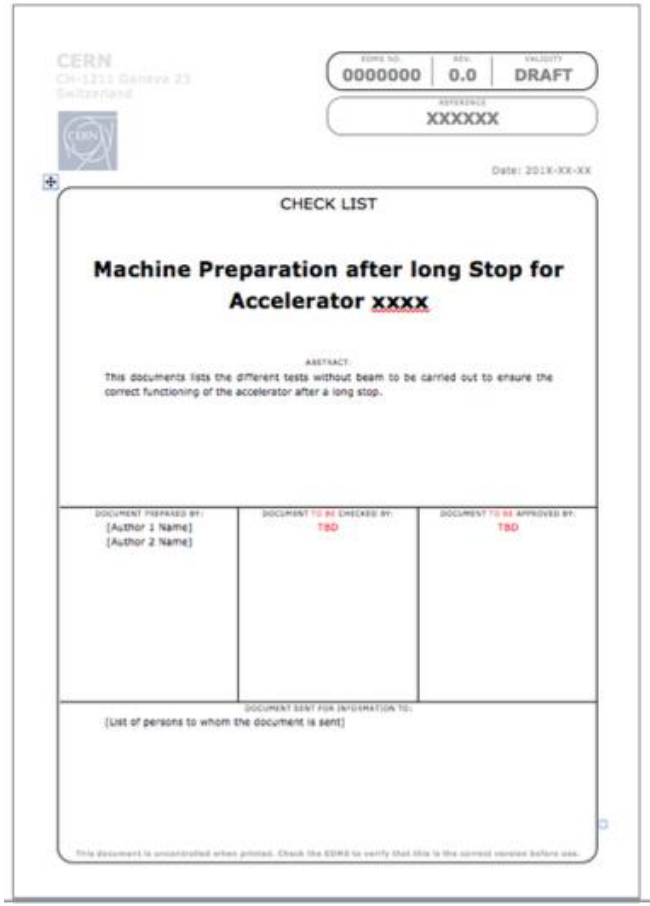
1. The machine coordinator chairs a daily HWT coordination meeting at 8h15.
2. The technical responsible person of the intervention announces and presents his intervention in the 8h15 meeting, describing what is to be done, and the area of the works.
3. The technical responsible person creates an impact request. The impact request MUST include the "mode opératoire": what has to be done and how (fiche de tache), and the access path to the work site.
4. Depending on the risk present in the machine (electrical or radiation), the "mode opératoire" and the schedule, the machine coordinator will either:
   - Accept the request in planned and dedicated time slots, or
   - Accept the request in planned and dedicated time slots, with the additional presence of an expert of the generated risk, or
   - Reject the request

Approach for Modifications

- Changes to HW baseline can be followed through ECRs
- NEW: Within CO3 committee implement as well strict control change rules and procedures for important equipment controls upgrades, making use of an 'ECR-like' mechanism
  - Draft 'Controls Change Request' being prepared within CO3
  - 'Controls Change Request' will be elaborated in collaboration with equipment expert, CO and OP/ABP representatives
    - Will contain OP/ABP requirements and list of interfaces to different controls services (HW, SW, databases) and OP applications
- If possible, introduce test modes in equipment for realistic testing without beam
- Foresee where possible a staged deployment interleaved with Dry Runs to catch potential issues early

Checklists per Machine/Facility

- EDMS document under preparation for each Machine/Facility individually due to the peculiarities of each



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Date: 201X-XX-XX

CHECK LIST

Machine Preparation after long Stop for Accelerator xxxx

ABSTRACT

This documents lists the different tests without beam to be carried out to ensure the correct functioning of the accelerator after a long stop.

DOCUMENT PREPARED BY: [Author 1 Name] [Author 2 Name]

DOCUMENT TO BE CHECKED BY: TBD

DOCUMENT TO BE APPROVED BY: TBD

DOCUMENT SENT FOR INFORMATION TO: [List of persons to whom the document is sent]

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Work in progress

Summary

- LS1 analysis performed within IRWG for Linac2/3, LEIR, PSB, ISOLDE, PS, East/North Area, AD and SPS
  - Restart with beam after LS1 mostly according to milestone, but performance ramp-up only slowly due to many issues → should be improved for future Long Shutdowns
- A report with the findings and proposals will be submitted end of this year and presented at the IEFC

Summary and Outlook

- Main proposed improvements:
  - Introduce a 'Machine Preparation' phase organised by a 'Recommissioning Coordinator' (new role under approval)
  - New safety procedures for equipment tests in 'Special Permit' access mode → earlier testing and identification of issues
  - Punctual dry runs should already be included in shutdown schedule and represent milestones for OP and equipment experts
  - Communication of deadlines for each system has to be improved (inter-dependencies)
  - 'Controls Change Requests' for major equipment controls upgrades
  - OP/ABP/MEF comprehensive recommissioning checklists
- This new approach should be tested during EYETS 2016/17.

Conclusion

COMMUNICATION, COORDINATION AND COLLABORATION BETWEEN ALL PARTIES IS THE KEY FOR SUCCESS!


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