

BCWG

Reports from the commissioning coordinators SPS

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OUTLINE

- Legibility and effectiveness of the SPS check list
- Usefulness of the check list and how to improve it
- Equipment tested by the experts
 - How to improve and increase these tests
- Feedback from check-out
- Evolution for future check-out

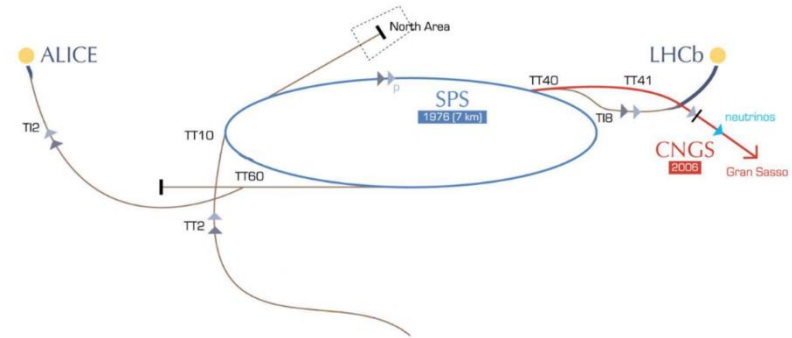
Legibility and effectiveness of the SPS check list

- Checklist structure

- Currently the main structure is like this

SPS

- 0 ▶ PREREQUISITES
- 1 ▶ HARDWARE TESTS
- 2 ▶ SPECIAL APPLICATIONS
- 3 ▶ MACHINE PROTECTION
- 4 ▶ SPECIAL OPERATION
- 5 ▶ BEAM COMMISSIONING
- 8 ▶ SOFTWARE INTERLOCKS



- We need to improve the main structure to facilitate the filtering of the tests during the different phases like

- Prerequisites
- Hardware tests
- Machine protection
- Beam permit
- Beam commissioning

- Inside each menu we put the architecture of the SPS (Injection line, Ring, Extraction, Transfer line).
- Inside each sub-context we put all the category of equipment group (Instrumentation, Power converter, Kicker, etc..).
- Inside the menu Beam commissioning we put an architecture by (beam type, operational mode, accelerator setup)

Legibility and effectiveness of the SPS check list

- Checklist structure
 - Our check lists need to still be more structured. For this some improvement are also needed on the software side (**priority levels, automatic alert ...**).
 - **We are working on an improved structure of**

Machine protection:

- Only the basic BICs tested are included.
- This year the software interlocks system for the ring was added.
- Not all tests are there yet
 - SMP, energy tracking,..
 - All SIS systems
 - Extraction master BIC together with LHC
 - For BIS and SIS tests: **link the update of the same test in different categories**, it would be better to follow the progress.
- **Concerning the Machine protection test in the SPS we think that all these tests should be validated before the first beam.**

Summary:

- The checklist in the SPS is already very complete (except machine protection) but we need to improve **the structure and add procedures for many of the tests still.**

Check lists: how to improve them

- Checklist disadvantages
 - Request a lot of time to prepare the lists, update or to develop a new structure.
 - But this needs only to be done “once”
 - SPS > 10'000 tests
 - During test execution: the documentation (snapshot, comment) and validation of the test shouldn't take more time than the test itself.
 - **We need to improve the efficiency when we do the snapshot or comment.**
 - Default configuration to be improved
 - Possibility to configure each test e.g. (N.A.), should not have to put this every year again
 - Should not have to prepare check lists to fit well into ASM
 - **The checklist structure should be used to facilitate testing and progress monitoring and not planning (ASM).**
- Checklist advantages
 - Very useful tool to not forget tests and track the progress of these.
 - This tool allows you to memorize tests and add new tests each year depending on the events encountered.
 - The power of this tool is that it is scalable.
 - The ability to schedule tests directly from the check list is also a strong point **if ASM becomes less dependent on the structure.**
 - Each year this list must live and evolve according to the events encountered during the different phases of the structure, **but we cannot allow to change this list completely.**

Equipment tested by the experts

- Dry run with carried out with Equipment experts this check-out:
 - Following an update of the PLC programs managing the magnet temperature deficiencies, a test with the experts was carried out on each circuit of the transfer lines.
 - With the BI expert like each year we tested the BPMs of each transfer line and carried out BCT calibration.
 - At each start, we give EPC two weeks to test the MPS. This can be classified as dry run
 - To note:
 - This year, a lack of communication was noted with the EPC software updates
 - When the experts change or add new parameters it would be good to know about it.
 - e.g. Irms interlock software.
 - The software and hardware experts went to Vancouver during their allocated test weeks.
 - EPC Aux would have liked to test all the PCs of the transfer line but for lack of time, they could not do it.
 - Many years ago all the Aux were tested during the end of shutdown and not in the hardware test period, but now with the new rules of the electrical safety it's difficult to do these test during the shutdown.
 - Perhaps we need more time in hardware test if we want test with the experts?

How to improve and increase efficiency of testing

- All the equipment is not tested by the equipment owners maybe due to a lack of time?
 - The experts work on all the machines and maybe they have not enough time and expertise is also lost.
- If we want to test everything, we need to increase the length of the hardware test period.
- Shutdown work during the hardware test generated a lot of lost time.
- We need to plan and coordinate even better to increase the tests efficiency and their number.
- Now with the new rules of the general safety it's difficult to do any tests during the shutdown and we accumulate all the test in hardware test period.

Feedback from check-out

- BLM cable disconnected at BA6 giving interlock. (found by OP test equipment not tested by the owner)
- BLM card in BA80 required modification to function. Due to a CPU change not being compatible with older card. (found by OP test equipment not tested by the owner)
- Magnet temperature interlock issue only once all mains pulsing together. Required to pulse in magnet patrol mode to diagnose.(found by OP test but this equipment can be tested only during the hardware test)
- Bypassing of ECX5 area doors for beam dump works not as transparent as expected.(shutdown work during hardware test)
- Problems on mains linked to IRMS limitation – expert absent therefore took time to diagnose and fix.(communication and planning problem of the experts)
- Crab cavities: RF state blocks access and vac valves closed during first beam commissioning.(shutdown work during hardware test and beam commissioning)
- ≈86 IMPACT requests for the intervention period OPERATION-SPS-2018. (shutdown work during hardware test)

Feedback from check-out

- A lot of problems from electrical lockouts to removed.
 - when moving machine from shutdown all the lockouts should be removed automatically.
- Mixing of test period and works complicates commissioning.
- A number of simple issues could have been avoided by equipment owners prior to closure.
- Dedicated time to be allocated for testing of certain equipment (e.g. TE-EPC for aux PS).
- Shared responsibility, different boundaries for different systems. Requires coordination, blocking of areas, balisage, etc. during tests (TI2, TI8).
- HW commissioning period cannot be further compressed.
- Obligated to omit some tests on the assumption that no works had taken place on systems.

Evolution for future check-outs

- It would be nice to have a global checklist for LSx.
 - But we should extract a dedicated list per type of shutdown EYETS, YETS.
 - We do more than 10 000 tests and I think we can't do this for all YETS it will be great to have a short checklist for the YETS with the essential tests.
- After the LSx it is essential to increase the number of collaborative tests between the experts and OP to understand all the updates of hardware and software.
- Is it possible to change the current of mode of running between two LS.
 - Perhaps one EYETS between two LS and no YETS, just a very short stop like a TS for Christmas.

Thanks for your attention