MPE Activities within CSCM

MPE LS1 Review

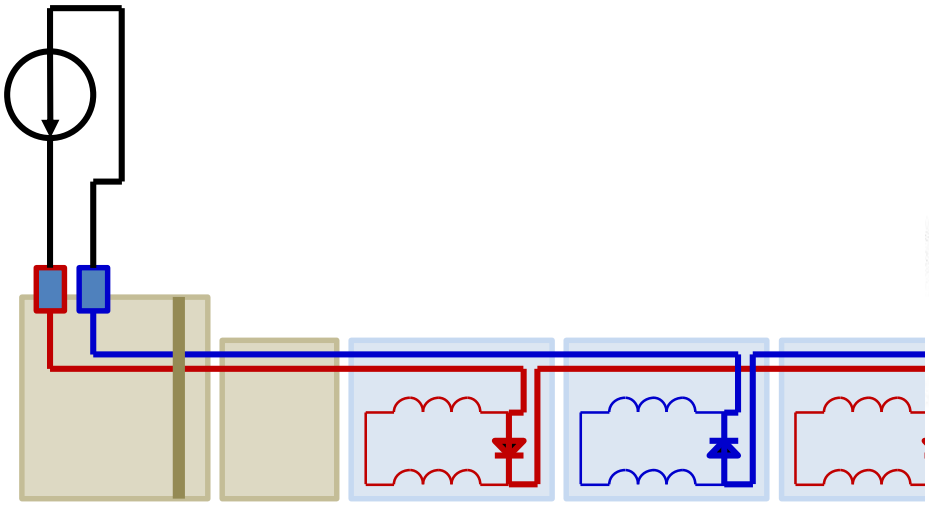
2 June 2015

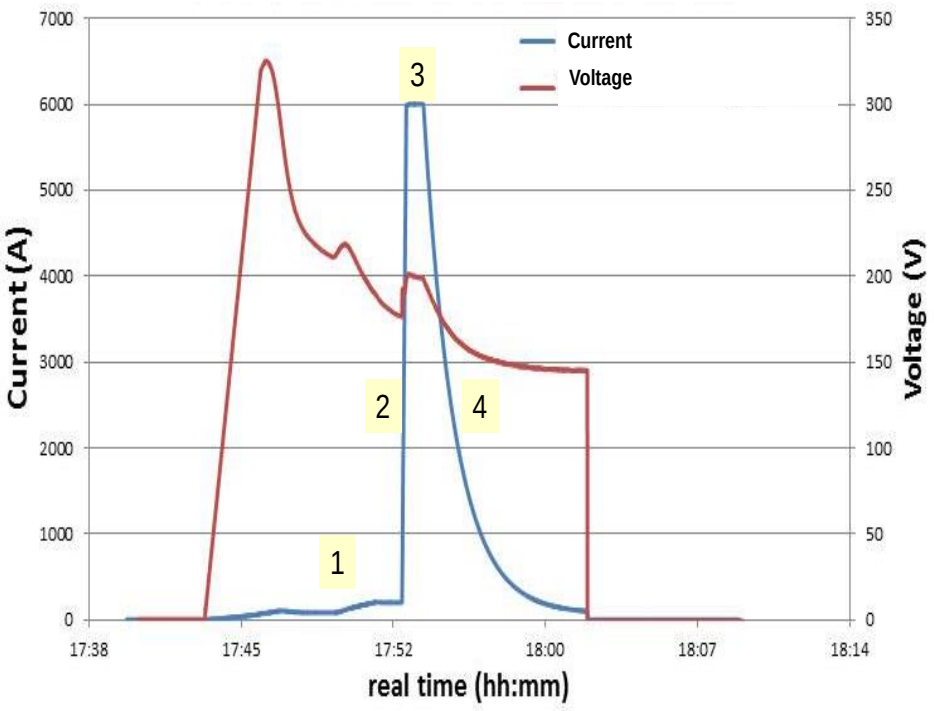
Define the scope of the work for your activity

- The objective of the CSCM tests was the qualification of the “13 kA bus bar systems” before the powering tests at 1.9 K including joints, lyras, diode leads and diodes
- Due to the limited resources (TE/MPE), TE-MB and LSC has approved the 6th December 2013 the CSCM tests:
  - In 3 sectors (S67, S78 and S81), but finally 2 sectors were planned (S67 and S81)
  - Only for RB circuits

Define the scope of the work for your activity

- CSCM tests
  - Stabilized the magnets at 20 K / 5 bar
  - Keep the DBFAs at nominal condition (4.5 K / 1 bar)
  - Power the circuit by the RB converter (reconfiguration)
    - Current cycles at 2 kA, 5 kA, 7 kA, 8.6 kA, 10 kA and 11 kA





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  - Power the circuit by the RB converter (reconfiguration)
    - Current cycles at 2 kA, 5 kA, 7 kA, 8.6 kA, 10 kA and 11 kA
  - Protection and Measurement by QPS electronics
    - Normal electronic for the DFBA,
    - iQPS for magnets and diodes
    - mQPS for busbars, lyras and diode leads

Define the scope of the work for your activity

- CSCM tests
  - Stabilized the magnets at 20 K / 5 bar
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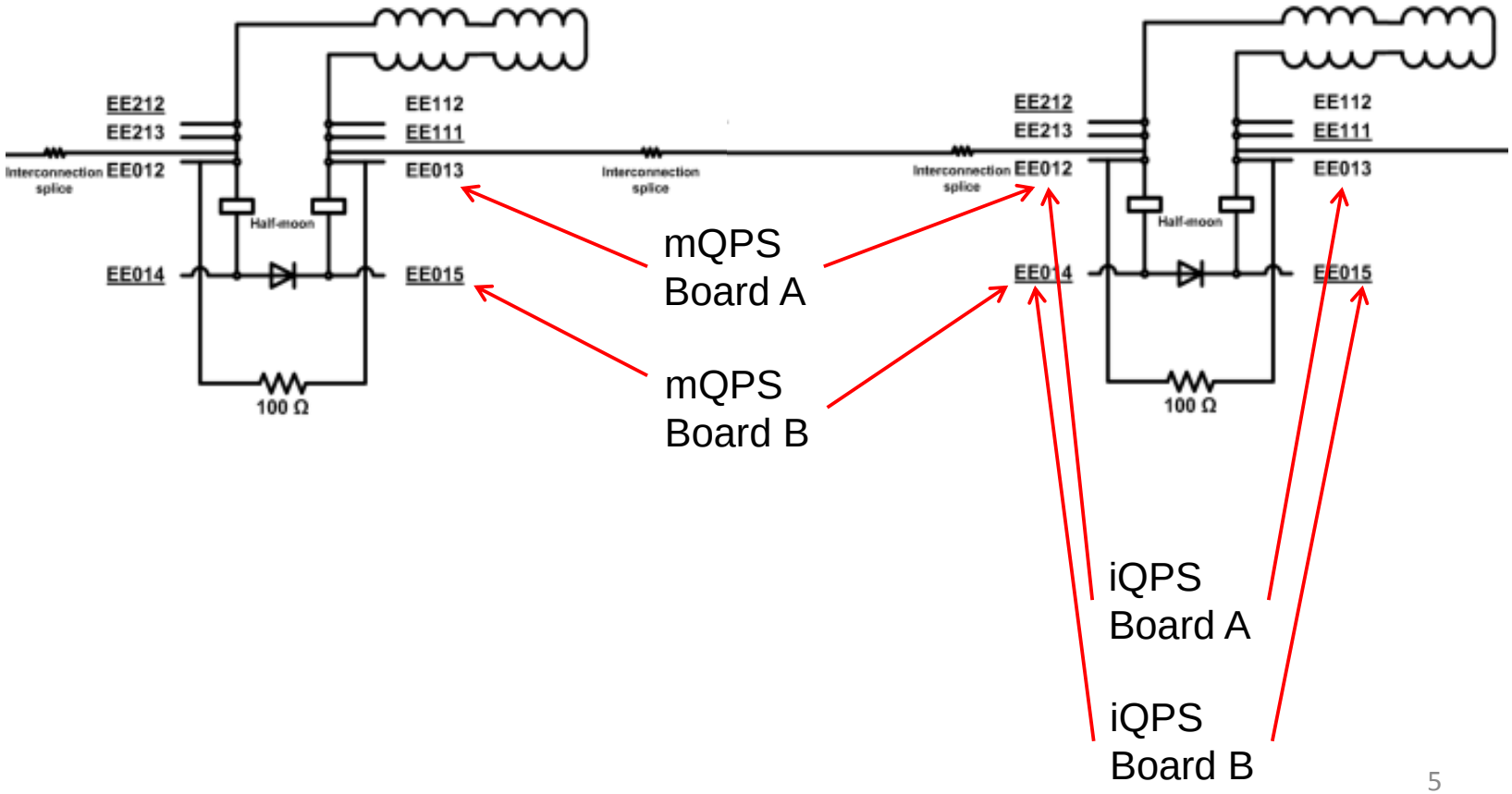
  - Power the circuit by the RR converter (reconfiguration)



Structure of the scope of work

- Installation of QPS systems
- Modification of RB power converter
- Cool down 300 K to 20 K

CSCM test campaign

1 week

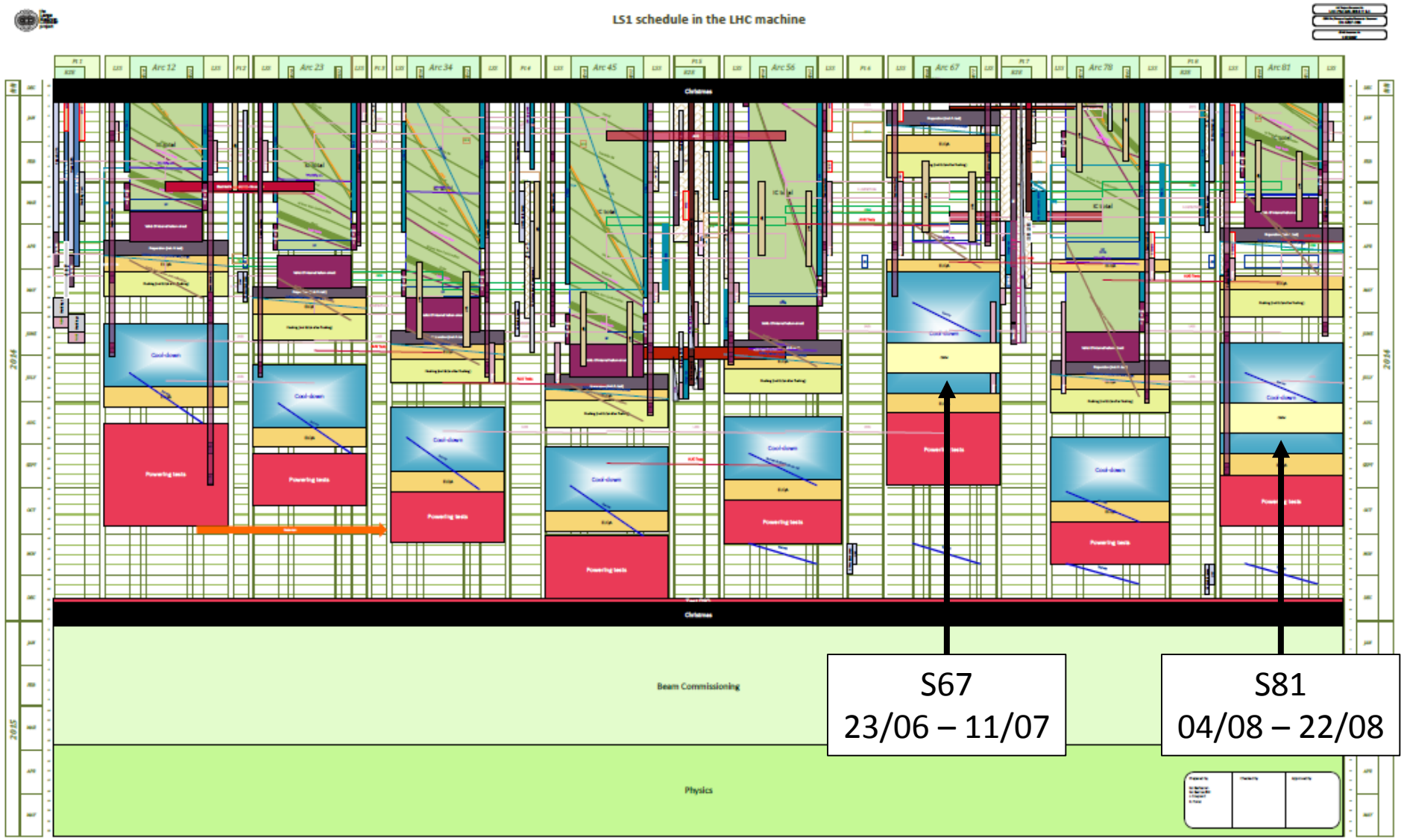
2 weeks

- Stabilization at 20 K
- IST of QPS system
- ElQA at 20 K
- Interlock Tests
  - PIC test w/o current
  - PC setting and QPS setting
- Powering cycles
  - Qualification of 13 kA bus bar system
- ElQA after CSCM
  - Check after CSCM power cycles

- Cool down to 1.9 K

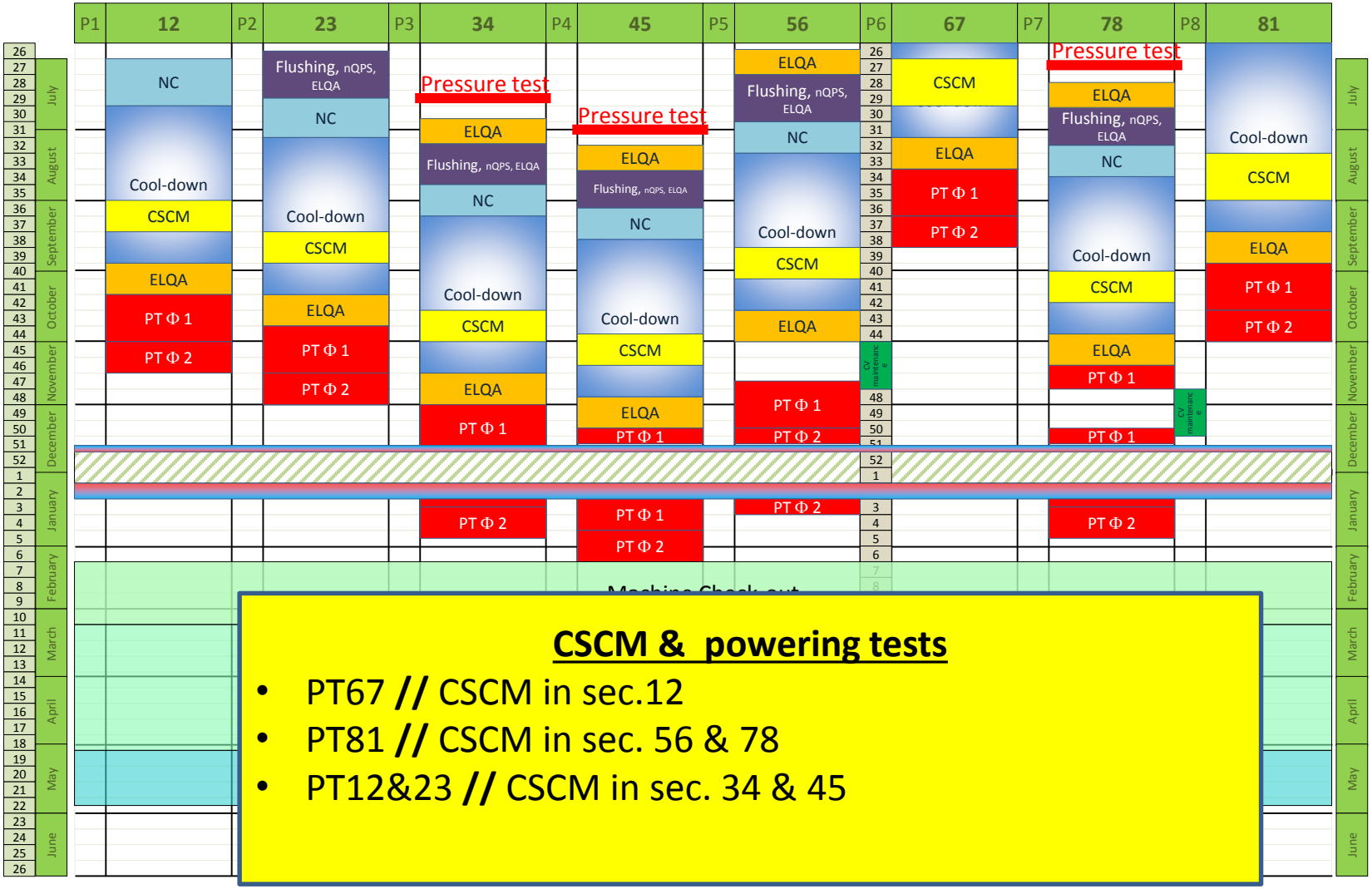
Was it properly planned, how much in advance?

- Two sectors were planned before LS1



Was it properly planned, how much in advance?

- The 6 other sectors were planned during LS1 (see LMC 182 and 183 June and July 2014)

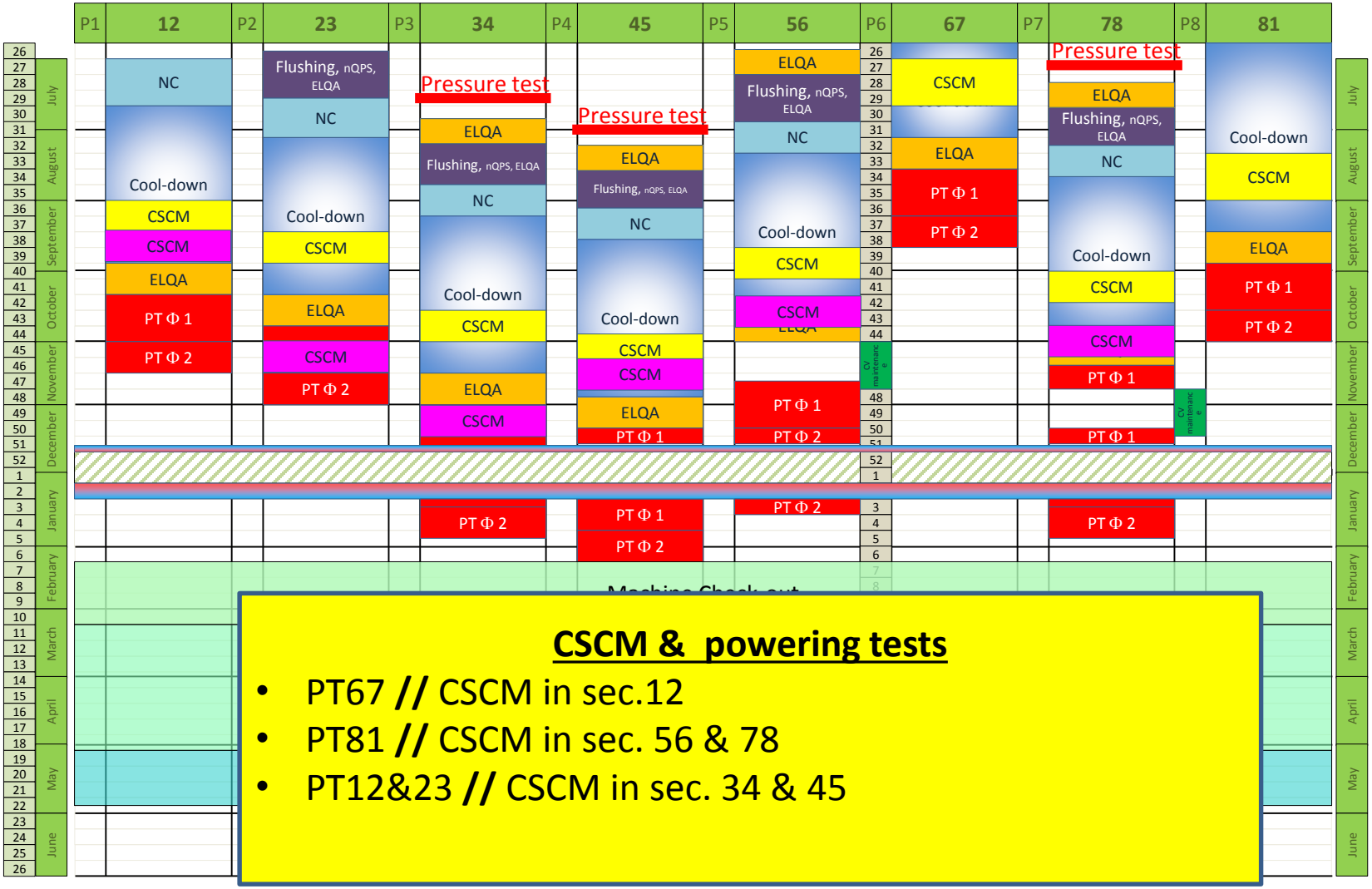


CSCM & powering tests

- PT67 // CSCM in sec.12
- PT81 // CSCM in sec. 56 & 78
- PT12&23 // CSCM in sec. 34 & 45

Initial schedule has been respected

- CSCM tests have been realized “as planned”



CSCM & powering tests

- PT67 // CSCM in sec.12
- PT81 // CSCM in sec. 56 & 78
- PT12&23 // CSCM in sec. 34 & 45

Impact on the resources

- The lack of resources has been identified before LS1 (mainly for MPE)
  - Only 2 sectors were planned before LS1
  - When the CSCM tests have been approved for the 6 other sectors the concerned group leaders have given their constraints
    - Impact on the resources
      - CSCM tests needed mainly specialists
      - CSCM and Powering Tests (PT) were realized in parallel
    - Impact on the planning
      - Powering tests were delayed
      - Same specialists for CSCM and PT

Impact on the resources

- CSCM tests have generated extra activities without extra resources
  - EP section (3 man*month)
    - Development and test of safety critical firmware for hybrid detection boards type mDQQBS
    - Adaption of functional test system for testing new functionalities
    - Programming and test of 1248 circuit boards type mDQQBS
    - Procurement and test of additional circuit boards to cover all 8 RB circuits (500 boards – RQ circuits are not cover)
    - Update of QPS controls to access new functionalities required for CSCM
    - Commissioning and operation of CSCM

Impact on the resources

- CSCM tests have generated extra activities without extra resources
  - Core team (>12 man*month)
    - Arjan, Felix, Jens and Zinur for preparation, operation (6 months) and analysis
  - Other teams (>6 man*month)
    - EM section for the procurement and test of 500 additional mDQQBS circuit boards
    - ElQA experts for HV tests before and after CSCM tests
    - Ivan for software and PIC
    - Vincent and field team for interventions

Give three examples of aspects which worked well

- The CSCM tests were a success despite the constraints
  - The 8 sectors have been tested
  - The planning has been respected
  - Short time to organize the tests in the last 6 sectors
  - Survey in // with the tests
  - “Unexpected” cryo cooling performance
- Implication of the persons
  - Good team spirit
  - Time flexibility of the persons (8:00:AM to 8:00:PM)
  - Important support of BE/OP and MP3
  - Reactivity of the people

Give three examples of aspects which worked well

- MPE test coordinator: “He has greased the wheels”
  - Not directly involved in the tests
  - He anticipates the problems
  - Interface with the other groups specially with EN/MEF (planning)

Give three examples of aspects which went wrong

- Preparation
  - Not clear strategy of MPE between CSCM/PT and mQPS/nQPS : few days before the first sector MPE has proposed to do the tests w/o QPS
  - QPS IST were not in the EN/MEF planning
- Planning
  - Underestimation of the time needed for the activities
- Communication
  - Difficulty to get updated information and delay

What needs to be improved/changed?

- Global organization
  - CSCM tests require full operational sector:
    - All LS activities must be finished
    - Cryo, QPS and Power converter
    - CCC, ACCTESTING, Timber, PM and control system
    - EN/EL, EN/CV and ACCESS
- Preparation
  - Dry Runs has been planned but never done
- Tracking of the activities
  - Put in place a tracking tool to know where we are and to identify in advance what are the weak points
- Drink at the end

What will be done in the same way next time?

- Nothing!
  - CSCM tests and Type test were different
    - Procedure
    - Software, firmware and hardware
  - CSCM tests have been done by specialists
    - Procedure tests must be defined by MP3 as for the other powering tests
    - Preparation and test campaigns must be done by HCC as for the other powering tests
  - RQ circuits have not be tested
    - nQPS boards
    - No procedure

END