

CSC Shifter Training Course

—

Global Running

Fred Borcharding

Reach from CSCOperations Twiki page or directly:

<https://cms-emu-slicetest.web.cern.ch/cms-emu-slicetest/904/Procedures/ShifterTraining-GlobalRunning.pdf>

Overview

- These slides are meant to be the top level notes on what the CSC shifter needs to know to be a qualified CSC shift stander
- The procedures for the CSC shifts are documented in CMS Twiki pages
 - The procedure pages home is – the CSCOperations Twiki page -
<http://twiki.cern.ch/twiki/bin/viewauth/CMS/CSCOperations>
- The above document also has links to documentation and other procedures – use these links to become familiar with CSC
- The CSC shift stander is expected to be fully qualified for ‘Global Running’ That is for periods where CMS is in global running mode.
- At other times the shifter may stand shifts but is not expected to be fully qualified for all possible activities
 - Expert will lead exceptional activities during the shift and direct shifter
 - The shifter may be ‘requested’ to stand shift alone with minimal further instructions

Overview cont.

- Steps to becoming qualified
 - Take the shift training
 - Participate in a check shift
- Steps to remaining qualified
 - Stand shifts
 - Review procedures
 - Re-take training
- Shift training
 - Mondays at Pt5
 - With prior arrangement with trainer
 - Training slides – A typical shift (These slides)
 - DCS slides
 - EMU Page 1 slides
 - DQM slides
 - Walk through of the CMS Control Room at Pt5, CMSCR
 - quiz



Outline – Prior to Your Shifts

- Before first ever shift
- Before first shift after > 4 weeks
- Before first shift in block of shifts

Prior to first ever shift

- The shifter must achieve all qualifications for working at Pt5
- The shifter must sign up for shifts
 - link
- The shifter must sign up for training
- The shifter must be trained and certified for CSC shifts
- Twiki page for shift preparation -
 - <https://twiki.cern.ch/twiki/bin/view/CMS/CSCOperationsPreparation>
 - This is also reachable from CSCOperaton Twiki page

Shifter Training and Certification

- Scope – The CSC Shifter must be able to perform all the duties of the CSC sub-system shifter during periods of Global running. During periods of non-global running the CEO or expert will be responsible for the shift and the CSC Shifter will assist as necessary.
- Certification
 - Each CSC Shifter must be certified prior to their first shift after an absence of more than 4 weeks
 - Each CSC Shifter will be evaluated during training, and during their shift duration. The shifter can be rated as a competent shift stander, or recommended for further training or tutoring at any time during these periods
 - A person or persons designated by the CSC IB will be responsible for giving the final evaluation
- Classroom Training
 - There is a weekly training session conducted at Pt5 on Monday at 14:00
 - Shifters should sign up for this training with the shift trainers – Fred at fredob@fnal.gov or Richard at breedon@ucdhep.ucdavis.EDU
 - Every attempt will be made to keep the class size to 1-2 persons.
- On the Job Training, OJT
 - Prior to the first shift the shifter should sit with a designated trainer for 2-4 hours on shift
 - This designated trainer may be Fred, Richard, the CEO or the person on shift
- Continued Training

Prior to first shift after > 4 weeks

- If you have not stood a shift for over four weeks you must have a refresher course
- The depth of the refresher training will depend on
 - How long ago was your last shift?
 - How often have you done shifts?
 - What has changed since your last shift?
- You should contact the shift coordinator and arrange for any necessary refresher sessions
- Every effort will be made to minimize the time needed for your refresher and maximize your shift effectiveness

Prior to first shift in block of shifts

- If a refresher was not necessary, you should review on your own the procedures
- Monitor the white board for up to a week before your first shift
- Check that your access is still current

Shift Environment

- The shifts are held in the CMS CR at Point 5, Pt5.
 - Directions for getting to Pt5, arranging rides, and needed equipment are given in the shift procedures, CSCOperations.
- At the CSM Control Room at Pt5, CMS CR, there are CMS wide shifters < Global > and sub-detector specific shifters
 - The Global Shift Leader is in charge of all activities concerning the CMS detector and all the shifters
 - The Global DCS shifter is in charge of the safety of the CMS detector
 - The Global DAQ shifter is responsible for data taking, starting and stopping runs
 - The Global Trigger shifter is in charge of the global trigger
 - The Global DQM shifter is in charge of the global DQM
- CSC Operations structure
 - The CSC operations leader is in charge of CSC operations
 - The CSC shift coordinator is in charge of the CSC shifts
 - The CSC Expert Operator, CEO (16-1972), is responsible for supervising the daily operation of the CSC sub-system
 - **The CSC shifter- you – are in charge of the safe and proper operation of the CSC sub-system during your shift**

Shift Duties

- 1st - Ensure the safe operation of the CSC sub-detector
 - 2nd - Ensure that the data is being collected and flowing
 - 3rd - Ensure the quality of the data collected
 - 4th - Keep an accurate and detailed record of activities, problems etc.
 - 5th - Be an active member of the CMS shift team
- **1st - The safety of the people and detector are of primary concern.** While on shift you must monitor the CSC DCS display for any alarms indicating problems with the detector. You should also monitor the Global DCS displays via the WBM.
 - 2nd - The Shifter is the first person in the chain of Data Quality. Here you monitor the data flow as it comes out of the FE, goes through the TF and FED, and when it arrives at the Local DAQ.
 - 3rd - You should monitor the online DQM display and watch for anomalies. You should also monitor the global DQM display for CSC.
 - 4th - A record of all significant activates and interventions should be posted to the online elog along with pertinent entries for each run and the run quality.
 - 5th - The CSC shifter is one of several persons in the control room. You should interact with the other shifters, and be aware of general trends or problems elsewhere in the detector. Also keep in contact with the Global shift persons especially the Shift Leader.

Safety of the Detector

- The safety of the detector hardware has four levels
 - Local protection built into the hardware unit
 - This includes local fuses, current limiters, thermal interlocks, etc.
 - Hard wired detection and response built into the Racks >> DSS >> the Detector Safety System
 - Computer based detection and response >> DCS >> the Detector Control System
 - People, both on shift and working in the area
- The first priority of each shifter is to insure the safety of herself, other personnel, and the detector.
- There are defined Safe Operational States for the CSC detector
 - The shifter must insure that CSC is in one of these states at all times
 - The base safe state is everything OFF, the other end of the spectrum is every thing ON and OK
- The DSS is set up to prevent damage to the detector or people, but its actions are often unfriendly to the system.
- The DCS is set up to alarm the shifter when an unsafe or undesirable condition exists. It can also take action automatically. It is also set up to preempt DSS action by taking action before DSS does in a more system friendly way.
- You should review the CSCOperation page sections that cover safety and follow the links found there on safety

Outline -- A typical Shift

- LHC Operations Outline
- LHC Physics Operation – CMS Global Running
 - LHC Fills
 - Injection
 - Putting the protons into beams 1 and 2
 - LHC ramping
 - Ramping the LHC magnets to full field for this fill
 - Beam preparation
 - Preparing the beam and establishing collisions
 - Stable Beam Operation
 - This when CMS Global Physics runs are taken
 - Between LHC Fills
 - Short between periods
 - Machine maintenance periods
- Beginning the shift
- End of shift
- Beginning / End of global run
- Monitoring the system during global run
- Beginning / End of LHC Fill
- Between Fill activities
- What to do if there are problems
 - Where to look for procedures
 - Who to call to advise or request assistance

Beginning the shift

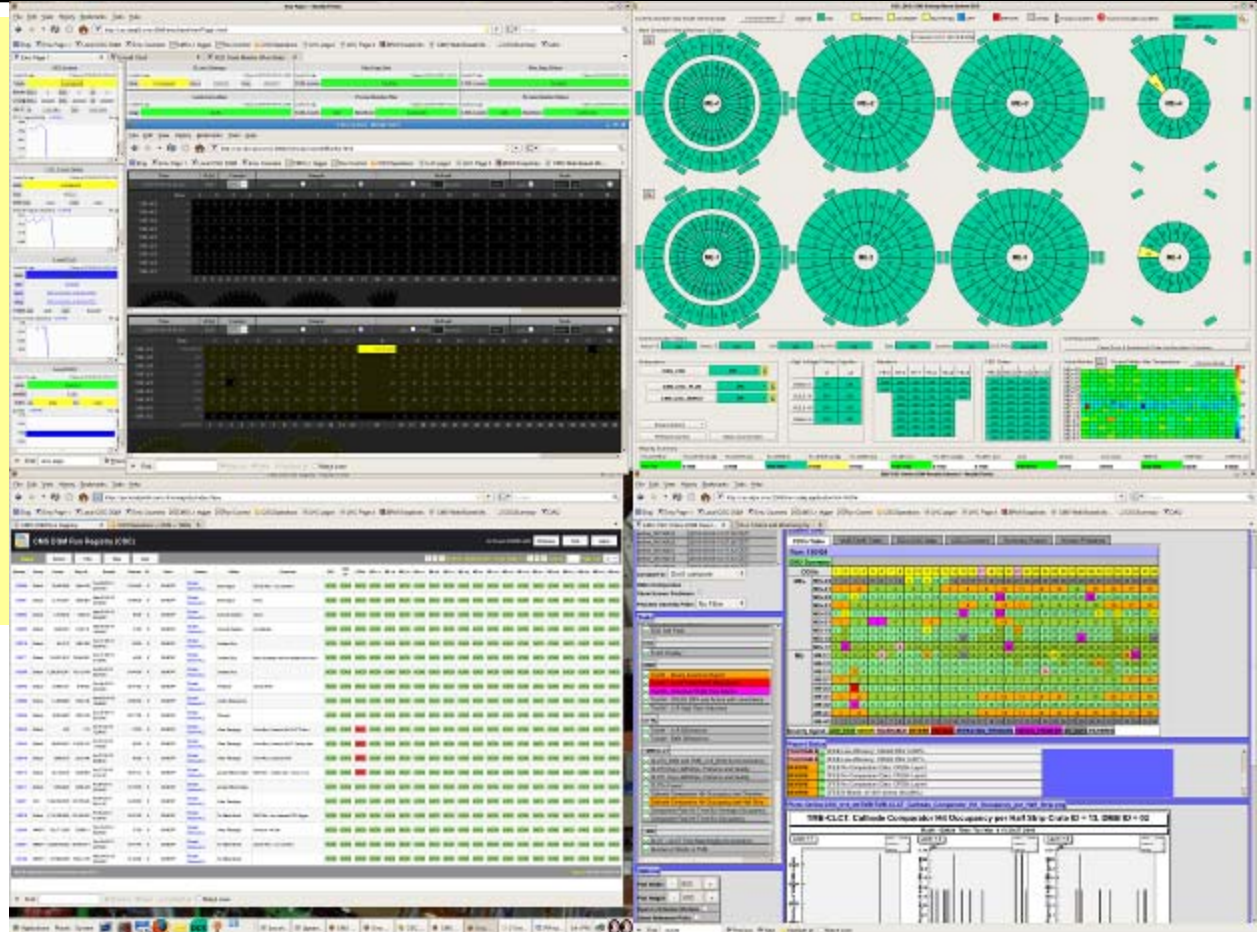
- Receive **briefing** from outgoing shifter
 - What is the CSC specific status
 - What is the current 'global' status
 - What are the plans for this shift
- Review the **CSC White board** for the CSC specific running plan
- Review the **Global White board** for the global running plan
- Log into the **eelog**
 - Establish the eelog template for the shift
- Open the **shift check off sheet** and begin filling it in
- Familiarize yourself with the windows open on the shift station
 - Close unneeded windows
 - Open needed windows
 - Clean up clutter
- Make yourself comfortable
 - Get a coffee
 - Say hi to the other shifters (probably should have done this first.)

Shift Environment

- The CSC Shift Station consists of two computers, the Main Station with 3 monitors on the left, and the Auxiliary Station with a single monitor on the right.
- The Main Station is devoted to the DCS display and the majority of the monitoring displays.
- The Auxiliary Station is devoted to the ELOG.
- Each station has its own keypad and mouse. When two shifters are present one shifter can utilize each.
- These computers are running CERN Scientific Linux, and the shifter should be familiar with the basic use of Linux
- The Shifter may use their laptop to augment the two stations.
 - There are wifi, and cable network connections available, as well as power outlets for the shifter's laptop.

Main Shift Station

- Main station has 4 monitors
 - UL > EMU Page 1
 - UR > DCS
 - LL > Run Registry
 - LR > DQM / Run Evaluation



Auxiliary Shift Station

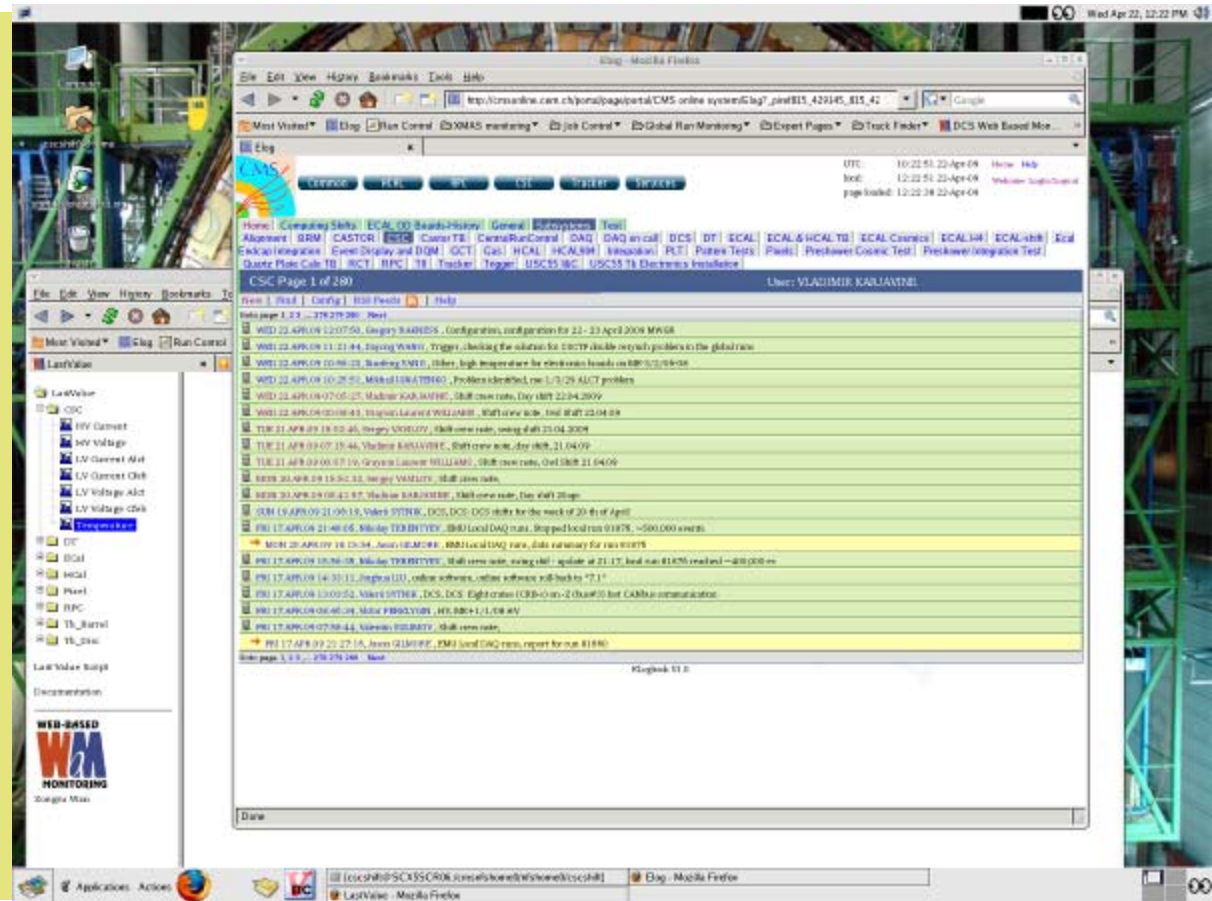
□ The auxiliary shift station (on the right) has 2 Monitors

□ Bottom

- The ELOG should be here

□ Top

- LHC Page 1
- Web Based Monitoring, WMB



Shift Check List

Done every shift

■ Begin shift

- Log into elog and create shift entry
- Receive brief from outgoing shifter
- Review white board for shift instructions

■ During shift

- xxx

■ End shift

- Write shift summary and close elog
- Brief new shifter

Done every fill

■ After fill ends

- Contact CEO to do pcrate firmware and configuration check
- Contact CEO to perform calibration runs if needed

■ before new fill

- Put CSC back into global running

Done periodically

■ Daily

■ Every Nth day

Running Conditions

□ Global Running

■ In fill

- Global run in progress
- Between Global runs

■ Between fills

- Global Run in progress
- No Global Run in progress
 - Free Time
 - All sub-systems released from global DAQ and Trigger

□ Non-Global Running

- LHC Down days
- CSC out

Monitoring the system during global run

- Watch for Alarms on the 3 main monitoring pages
 - 1st priority DCS
 - 2nd priority EMU
Page1
 - 3rd priority DQM
 - 4th priority monitor
other important pages
- Always address alarms in the above order
- For each of these
 - Procedures are in CSCOperations
 - A manual for shifters exists (or should)
 - Training slides exist
- NOTE: a single ‘problem’ may create alarms in more than one of these pages – always address in the order given

Beginning / End of global run activities

□ Prior to Global run

- Check that CSC is ready for the next run
 - Did the CSC DAQ or Trigger configuration change since the last run?
- be prepared to assist Global DAQ or Trigger
 - If called upon to address a CSC specific problem follow the procedures or contact the CEO

□ End run

- record the run parameters in the GR template
 - Include template in shift elog



Beginning / End of fill activities

□ Prior

□ Between



Between fill activities

□ Prior

□ Beginning

What to do if there are problems

- Where to look for procedures
- Who to call to advise or request assistance
- Global DCS
 - The global DCS shifter has access to all the infrastructure hardware
 - The global DCS shifter also has access to the CSC DCS
 - The global DCS shifter should contact you if he sees a CSC specific problem
 - You should contact the global DCS shifter if you see problems that may originate in the global environment
- Global DAQ
- Global Trigger
- Global DQM