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UPGRADE OF THE ISIS MUON FRONT END MAGNETS: OLD AND NEW INSTRUMENT CONTROL SYSTEMS WORKING IN HARMONY

Background

- The European Muon beamlines at the ISIS pulsed neutron and muon source wanted remote control of their upgraded front end magnets
- Work undertaken by the instrument control team, who are in the middle of a phased upgrade of instrument control software from the old (SECI) to the new (IBEX), which the muon instruments were not ready for at that time
- Parts of the front end needed to be controlled only by individual instrument beamline, some values needed to be tuned to the best compromise available for all three beamlines

Figure 1: Upgraded magnets

The Blockserver configures an aliasing function for EPICS Process Variables, known as Blocks at ISIS

NDEMUONFE

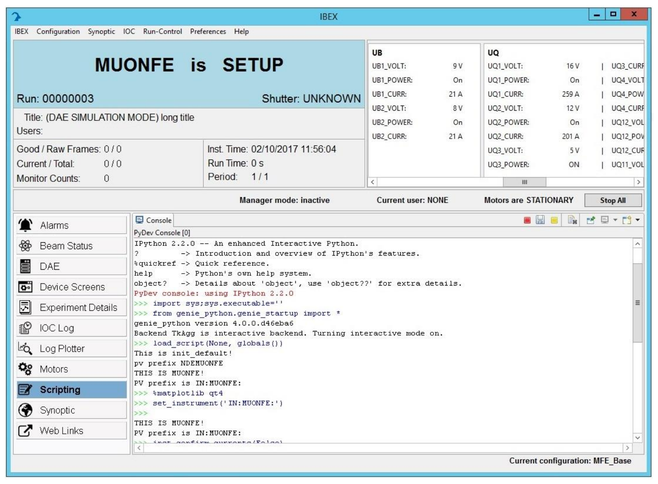

Figure 2: Screenshot of IBEX, EPICS based beamline control software

EPICS Input/Output Controllers communicate with the PSUs over Serial connections

Figure 3: Some of the Power Supply Units, 25 in total

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NDXHIFI

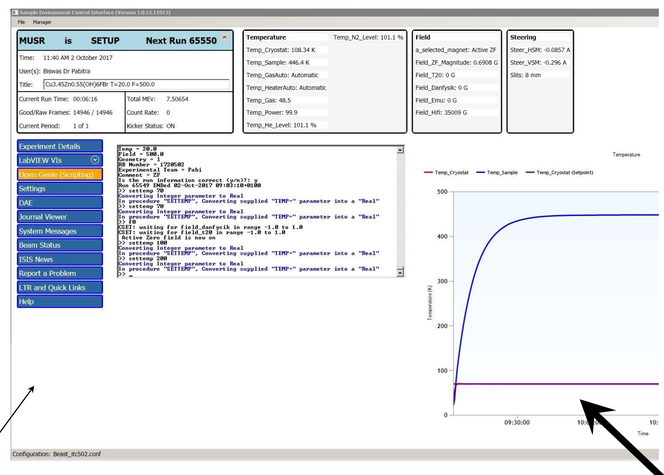
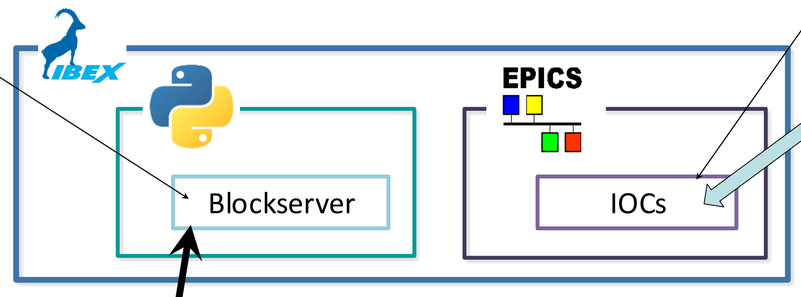


Figure 4: Screenshot of SECI, locally developed beamline control software

The NDX systems are used to set beamline parameters to ensure usable data is collected via the original ISIS Instrument Control Program (ICP) which interacts with the facilities Data Acquisition Electronics (DAE)



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Script

MANTID

For each magnet:
- Loop through a range of values:
  - Set magnet value via EPICS blocks
  - Wait for magnets to change
  - Collect data on all instruments
- Load the data files generated
- Analyse the results

Python-aware Mantid data analysis package loads in-house Python library genie_python, which contains commands for automation of experiments at ISIS. This is used to run the tuning algorithm.

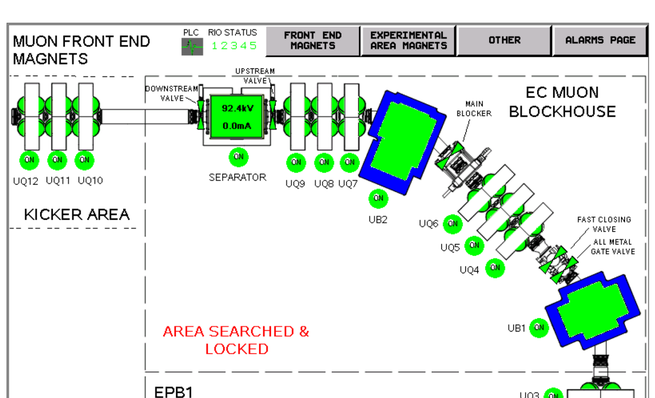

Figure 5: A screen from the PLC which complements the remote beamline controls

Future

- Replacement of more Power Supply Units
- Integrate the motion controller completely
- Add monitoring and control for other aspects of the front end beamline
- Provide the same functionality to the RIKEN muon beamline and Instruments at ISIS

https://www.isis.stfc.ac.uk/Pages/IBEX.aspx

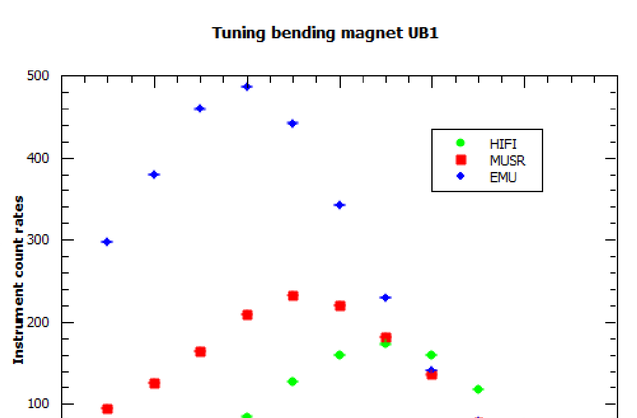

Figure 6: The rate of Muons collected vs. the settings of a magnet