Target Commissioning

Target installed in ISIS

"Demonstrator" target in R78

Initial commissioning plans

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Installed Target & Controls

Assembled in R78 14th – 16th January.

- Actuator, laser monitoring system, controls racks, data acquisition (Sheffield).

- Switched high-current supply, stepper motor & gate-valve controls (DL).

- Good vacuum (3.3×10^{-7} mbar).

- Target actuated 1000 times ok.

- Stepper motor & interlocks ok.

- Absolute target position measured w.r.t. beam pipe.
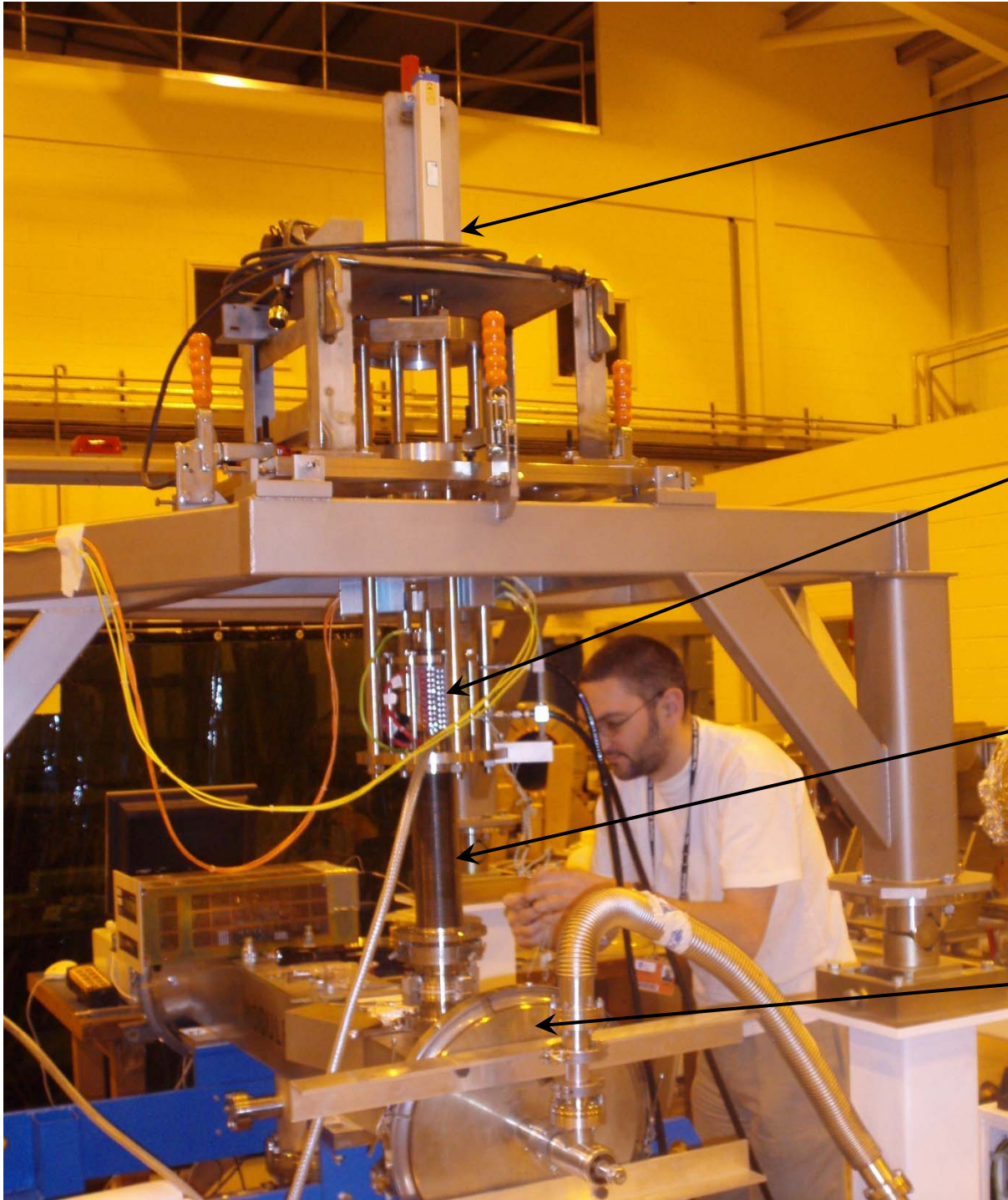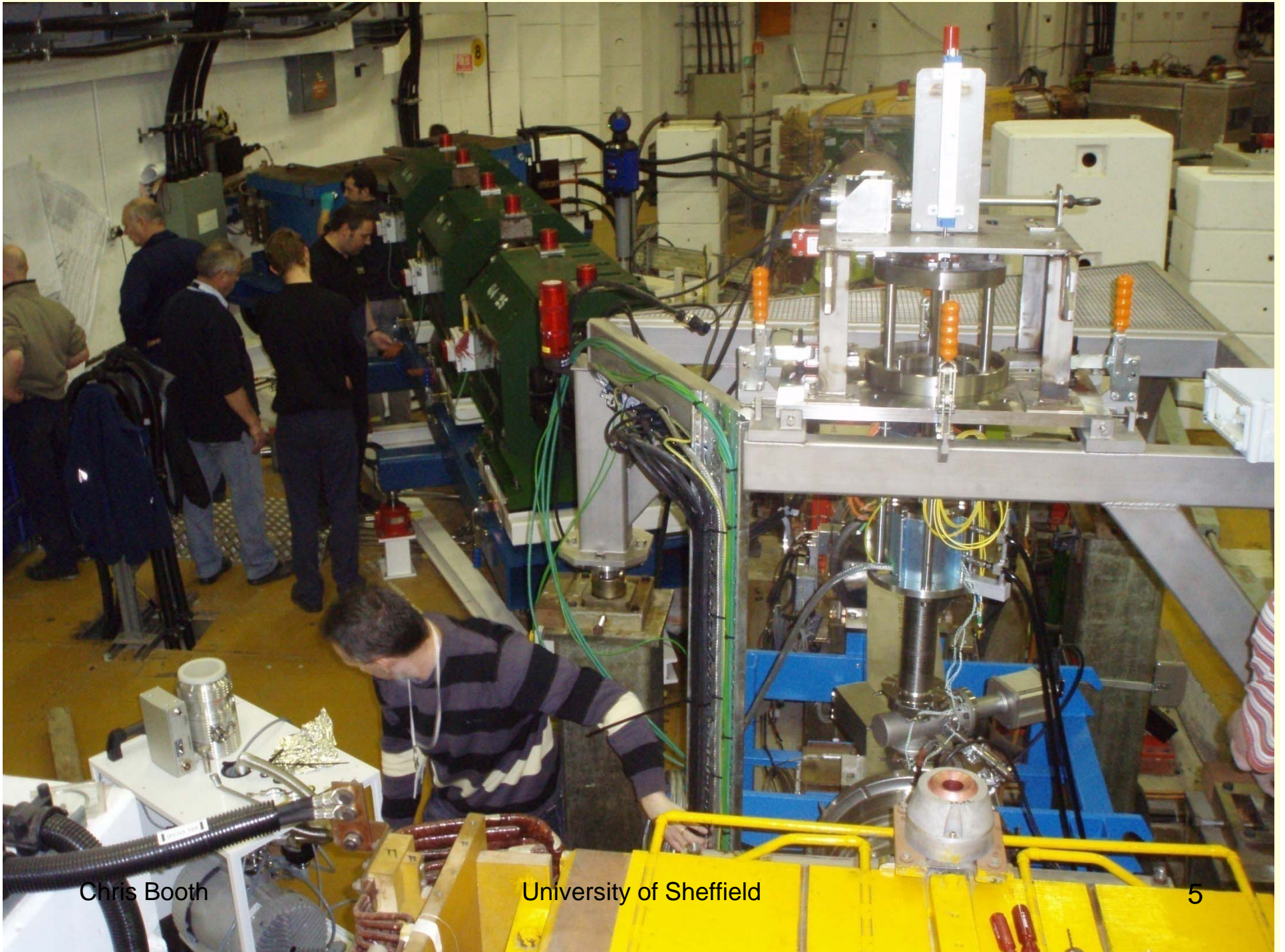
Stepper motor

Actuator

Bellows

New beam-pipe

Moved to ISIS (after problems fitting beam-pipe resolved) and connected Sunday 20th

- Several damaged fibres discovered. (Neither route nor protection were as had been requested.)

- Optics (approximately) set up.

- Stepper motor & interlocks checked.

- Target raised to magnetically levitated "hold" position & lowered several times.

- Operation from MICE LCR difficult without network.

Permission to operate (without beam) night of Thursday 31st

- Gate valve controls corrected and verified.
- *Local* network used to control power supply & stepper motor from MICE LCR. (Nice GUI provided by DL!)
- Target actuated in raised and lowered position (700 in total).
- Pulses recorded on target DAQ.
- Operating temperature measured with ISIS cooling. (77°C at 1 Hz, 44 mm dip-depth)
- Problem with stepper motor "sticking" at limit switches.
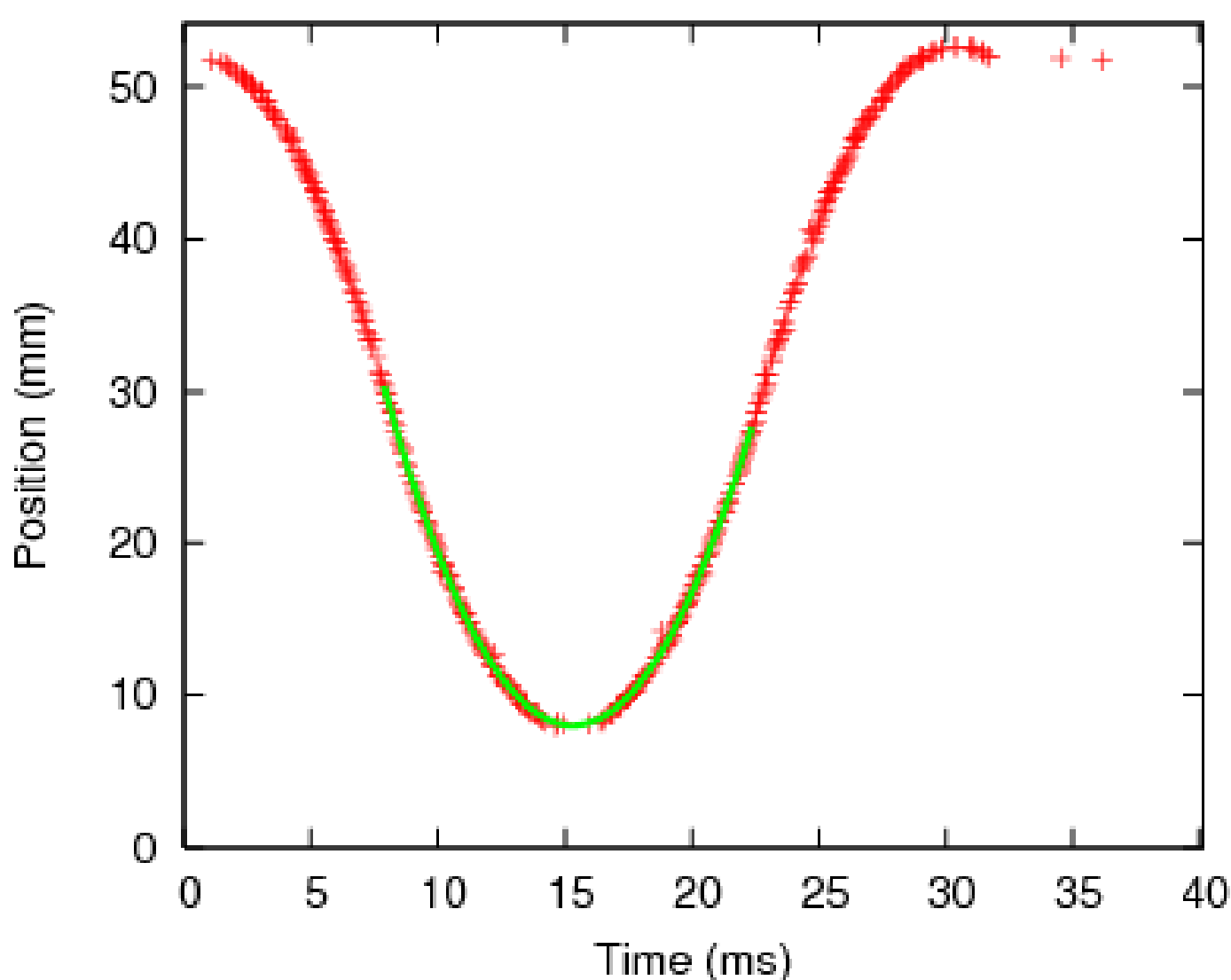
Requirements for Full Operation

- Cables and signals from ISIS: synchronisation (correct polarity), local beam loss, beam current, beam position.
- Need to match receivers to above signals (gain, termination, timing).
- Network – could only operate a local network.
- Gate valve to be open. (Was closed after tests. May need access to check vacuum.)
- Understanding of problem with stepper motor control (under investigation at Daresbury).
- Procedure for personnel protection. (Limit switch missing.)
- And, of course, permission from ISIS to operate! (Meeting with ISIS last Friday.)

"Demonstrator" Target

- ISIS requirement – we must run second target in R78 for at least 3 times as many actuations as target in ISIS. (Demonstration that dust problem solved.)

- Note: Should have been at RAL by now! Many technical problems – over half mechanical parts ordered via RAL & DL and produced externally were not to spec. – plus preparation was interrupted in order to operate installed target.

- Most parts have been recoverable, but this has meant extra machining work
  - Diamond-edge seals sub-standard.
  - Mounting holes incorrectly centred on upper & lower flanges.
  - Incorrect target orientation on shaft.
  - Magnet clamps incorrectly made.
  - Optics block (for second system) distorted.

Status of Demonstrator Target

Mechanics

- Stator wiring completed 25th January.
- Seals welded at Daresbury 29th January.
- Full assembly (stator, shaft, optics), plus individual optics channel alignments completed 30th January.

Electronics

- Control crate wired, checked (without actuator) 25th.
- New PCBs (quadrature amplifiers, 24-bit timer, PS crate) from DL 29th. (New design, not debugged, lots of problems …!)
- Problem with hex bridge (switched power supply) resolved Wednesday.

Status

- Full optical alignment completed. Reliability checks completed.
- External shielding (HV, laser) to be fitted.
- Crate front panels to be fitted.
- 14 hour run – 50,000 pulses recorded without problem.
- System to come to RAL next Wednesday.

Commissioning of Target (Basic minimum)

Start with stepper motor raised

- Operate for few hundred actuations
  - Check synchronisation with ISIS (50/64 Hz?).
  - Adjust timing.
  - Check readout of beam-loss and ISIS current.
  - Set to minimum dip depth.

Lower stepper motor to normal position and actuate

- Increase dip until see beam loss
  - Study stability of target and beam loss (how many pulses?)

- Gradually increase dip depth within allowed losses
  - Study correlation of loss with depth (and time?).
  - Other tests depend on readiness of beam monitors.
  - Do ISIS want a minimum number of pulses to check induced radiation?
  - Other tests??