MICE Target Development

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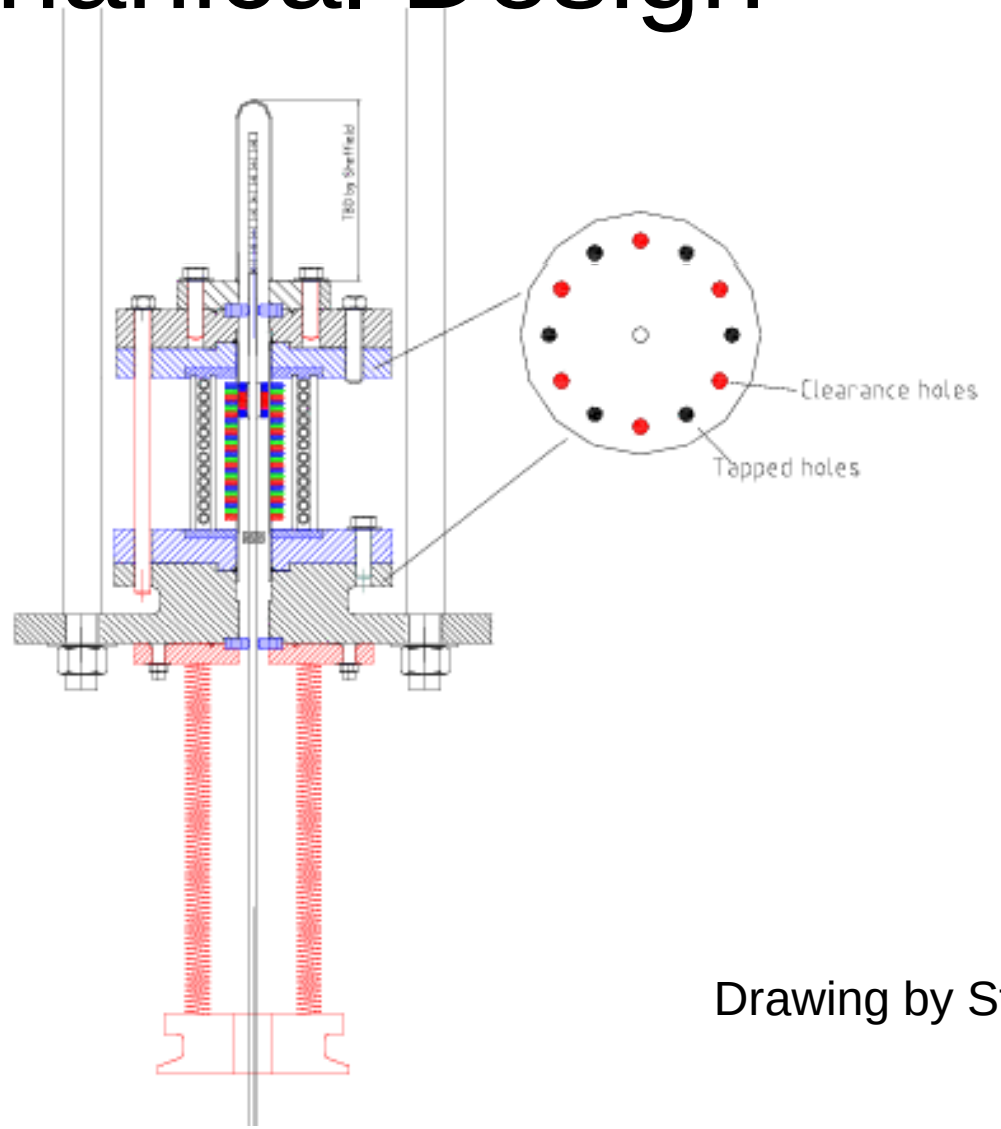
- Progress of mechanical design and assembly
- Development and future plans for electronics
- Optical readout system
- Software development
- Results

Mechanical Design

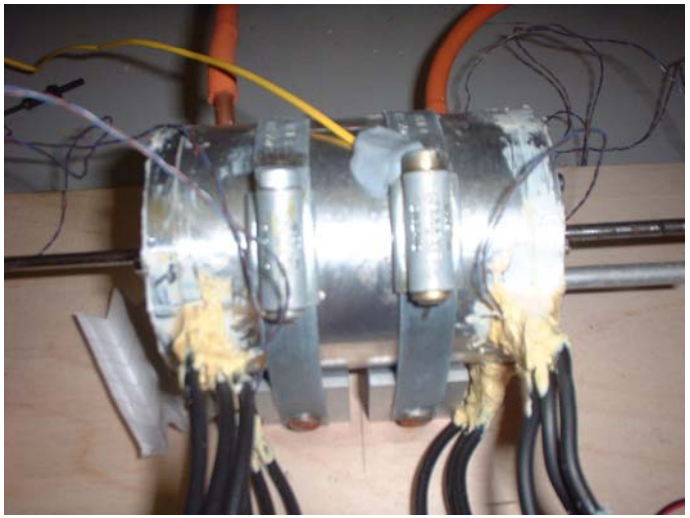


Drawing by Stephanie Yang

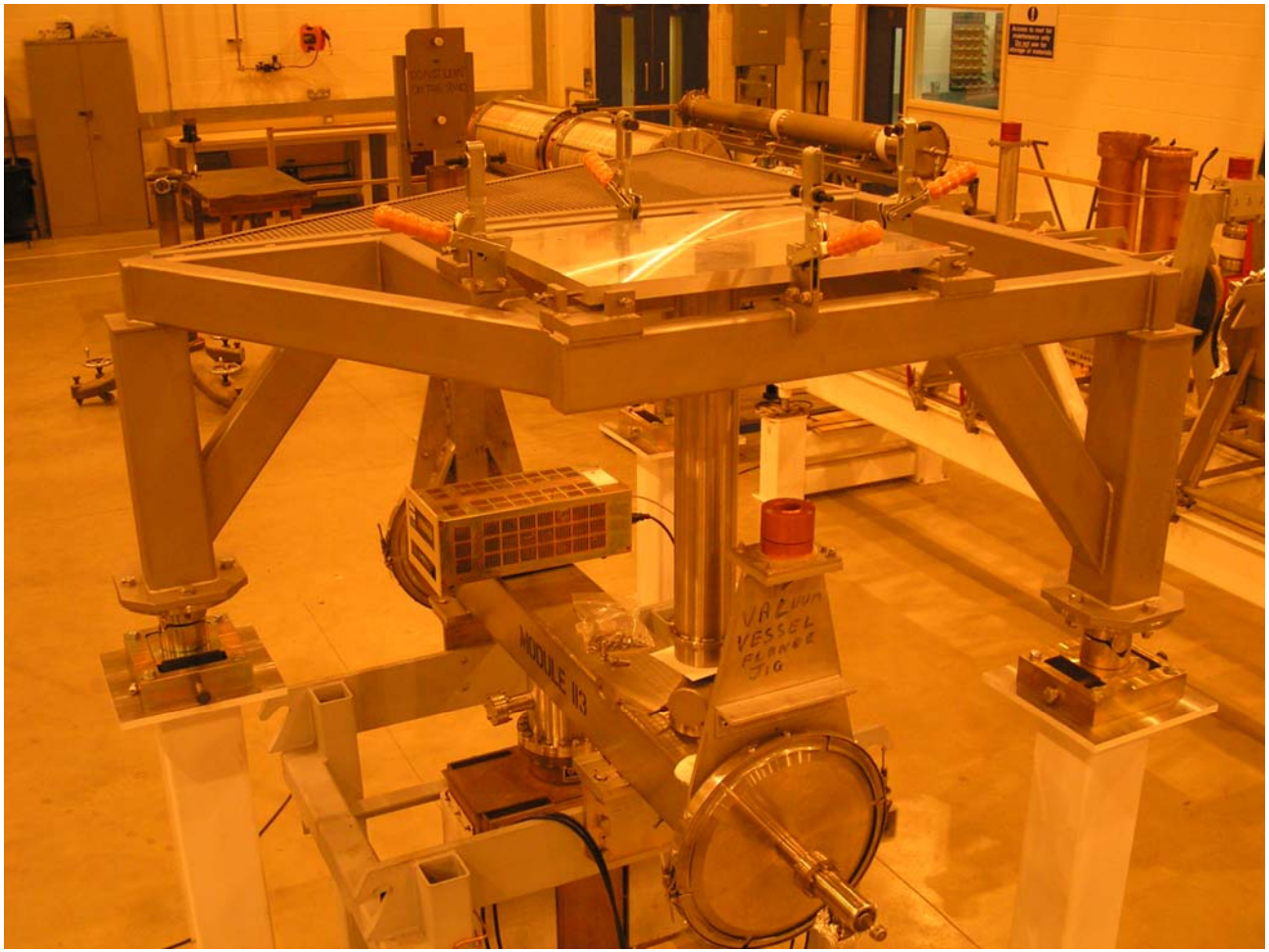
Progress on hardware

- 2 new shuttle bodies have been built
- 1 new stator body is complete, and the parts for a second are at Sheffield
- 8 ceramic tubes have been manufactured
- 1 shuttle body cleaned in ultrasonic bath and awaiting testing at RAL
- Indium seal test successfully carried out at RAL
- Work on support structure for target is underway at RAL

Actuator parts



Target stand

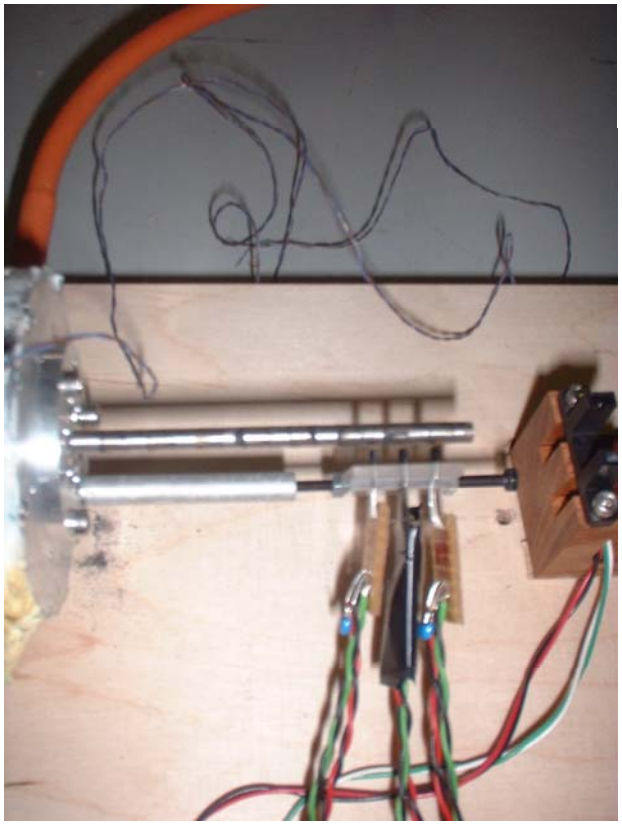


Power electronics

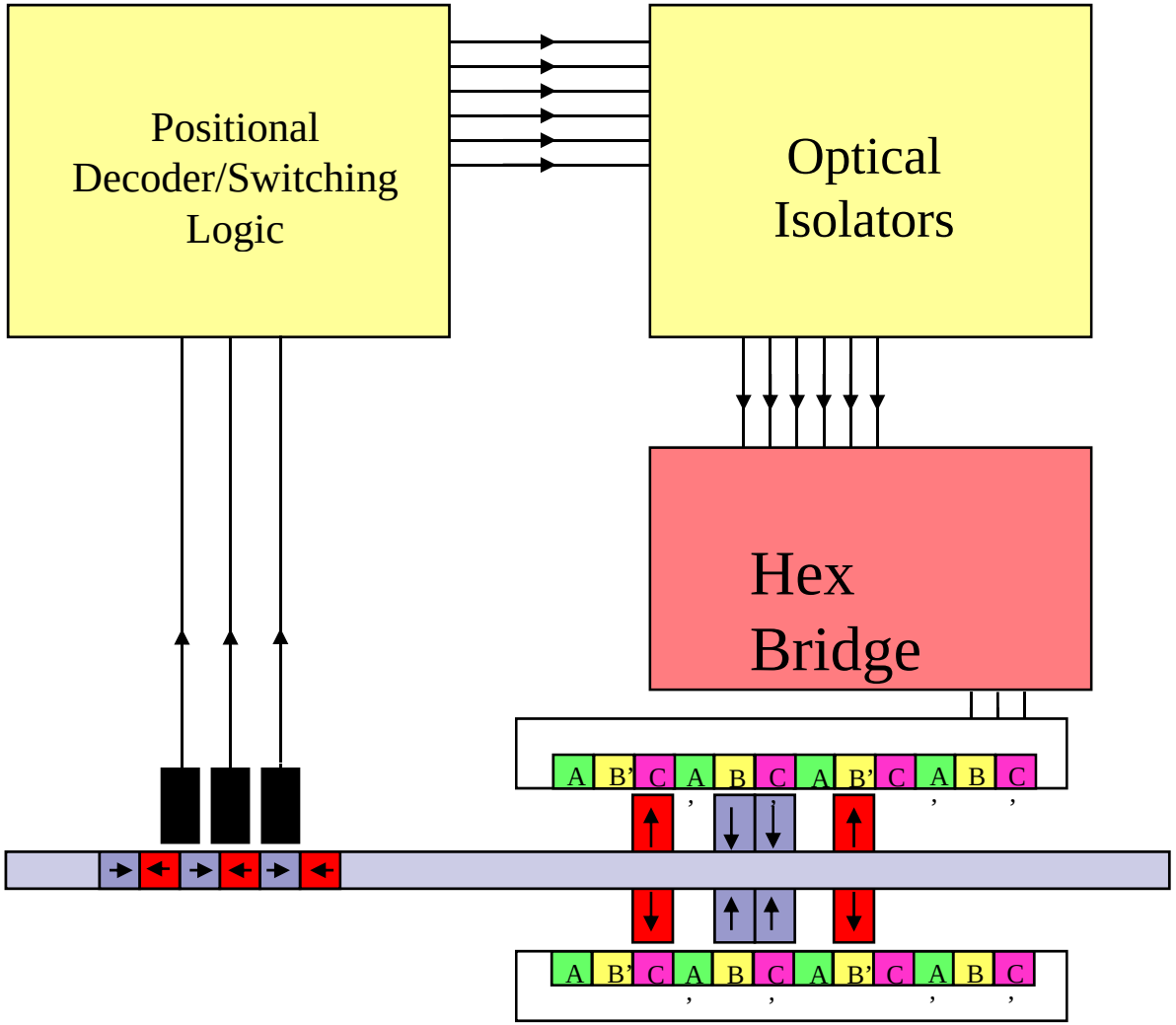
- After several prototypes a driver that could supply a current of 10A @ 20KHz to the actuator was built
- We will need an actuator that can deliver 40A plus for full acceleration

Control electronics

- Currently using hall switches to provide position used by control
- Now able to run in single pulse mode
- 4 modes:
  - Park
  - Hold
  - Activate Enable
  - Activate



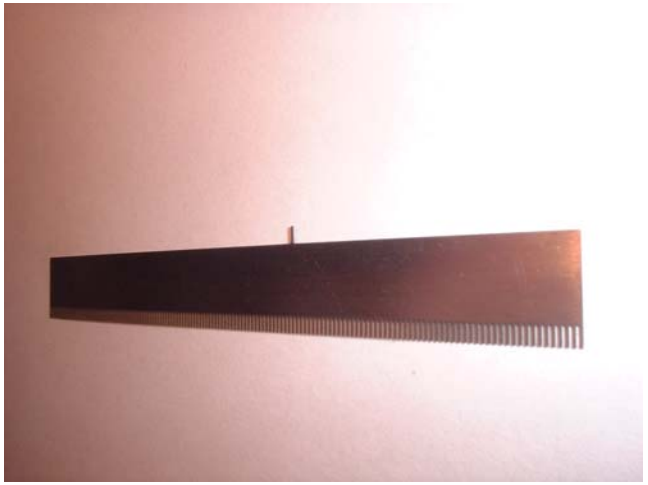
Current Electronics

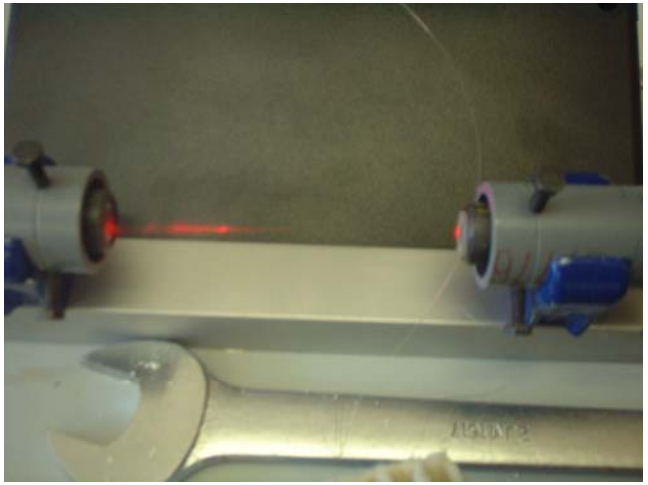


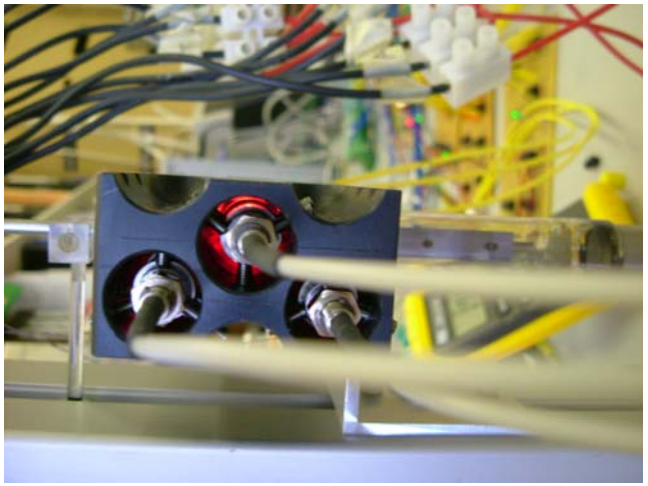
Optics

- An optical system has been developed to provide sensitive (0.15mm) position measurement
- The system consists of 3 lasers beams and a graticule
- One side of graticule has a fine comb and with 2 lasers provides position readings
- Other side has 1 fin and 1 laser and provides an index marker

Optics



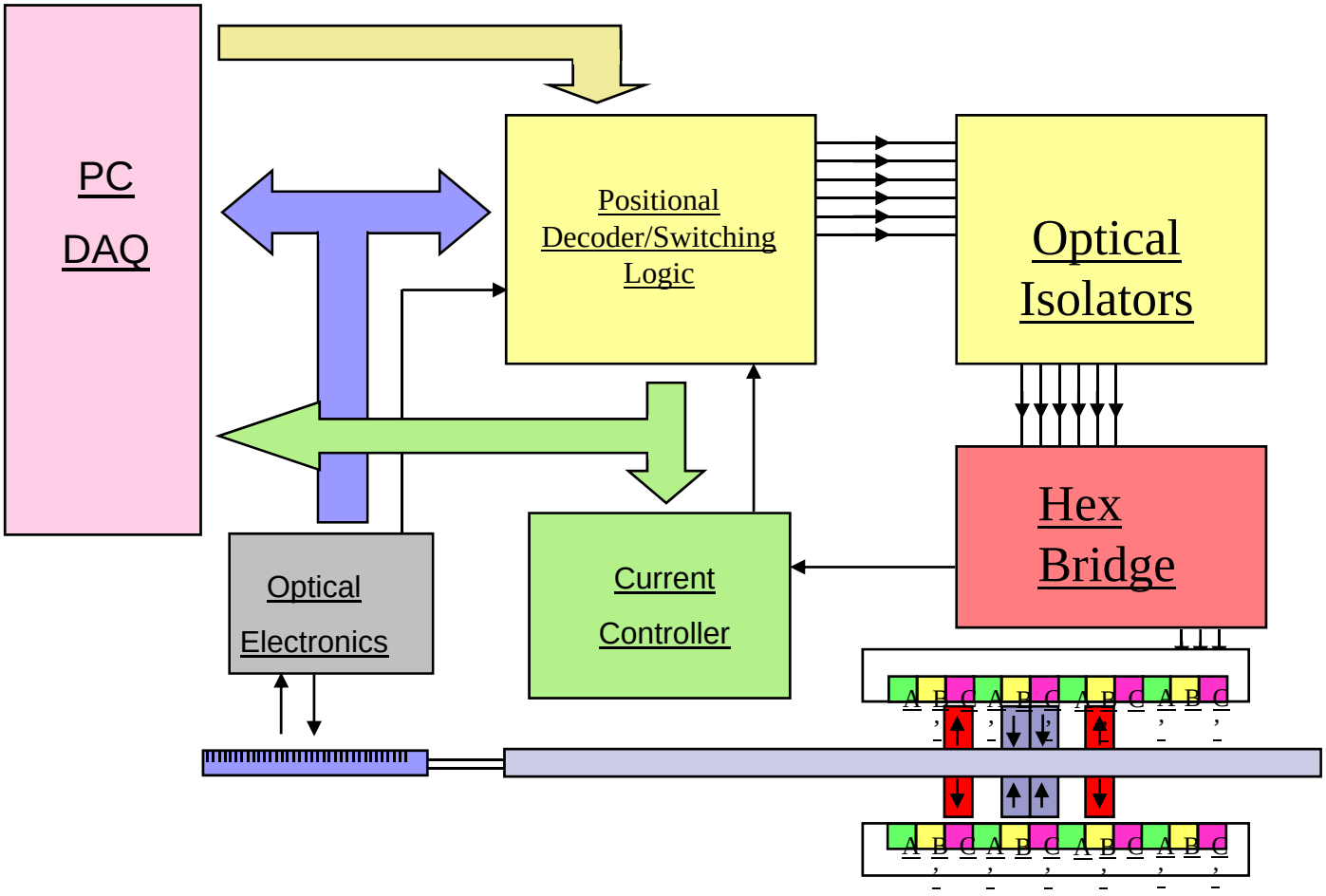




Electronics for optics

- Electronics has been developed to read optics channels and provide an 8 bit position measurement
- A free running clock which is latched everytime there is a change in position has also been developed

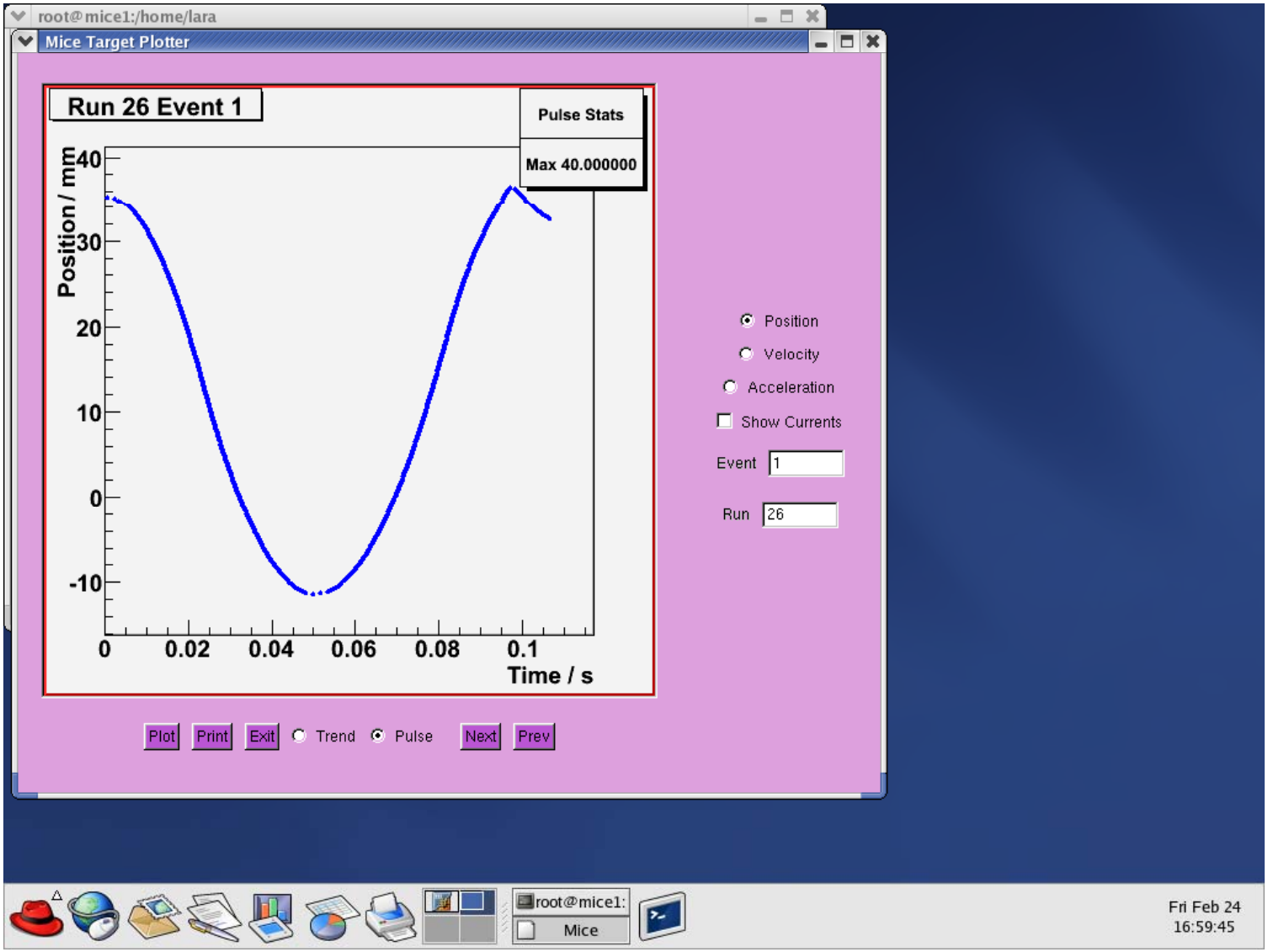
Future Electronics



Software development

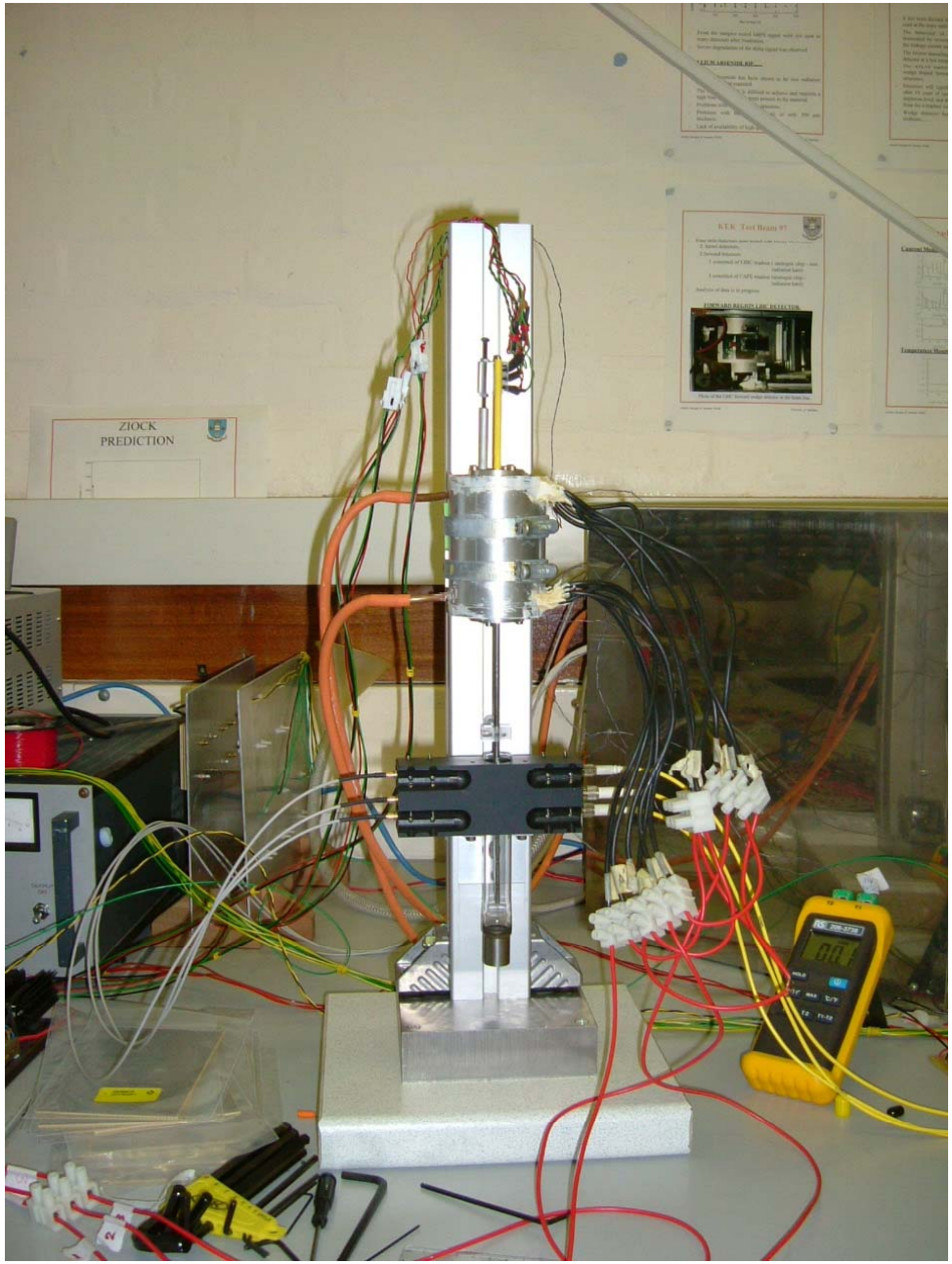
- DAQ writes individual pulses to file
- Online monitoring
  - Analysis of individual pulses
    - Position, velocity, acceleration
  - Analysis of trends over time
    - Dip depth, max acceleration…

Software

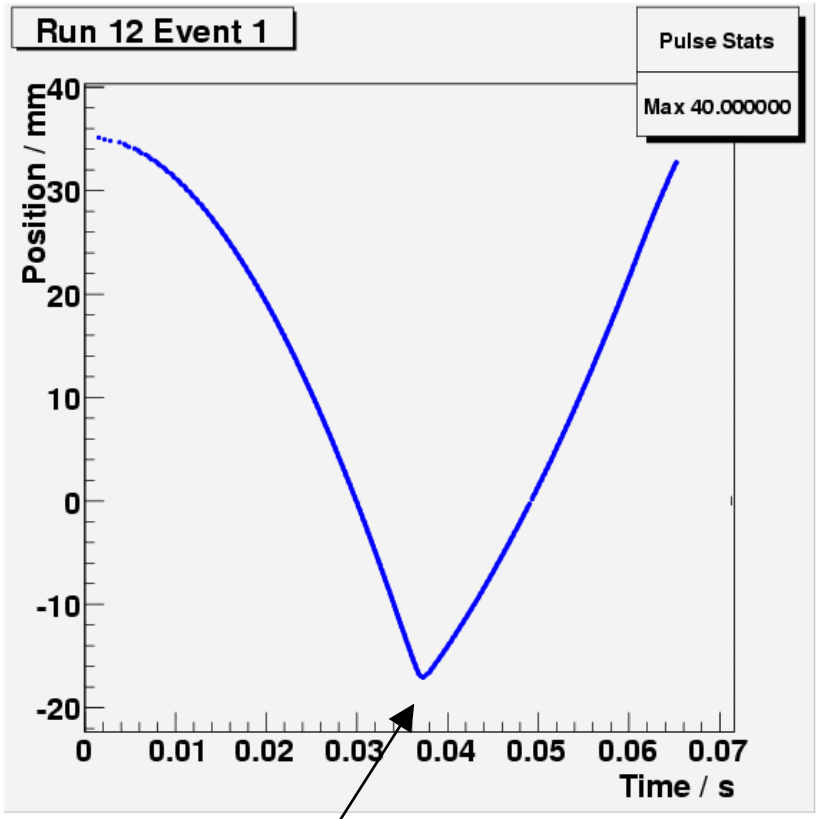

root@mice1:/home/lara
Mice Target Plotter
Run 26 Event 1
Pulse Stats
Max 40.000000
Position / mm
40
30
20
10
0
-10
0
0.02
0.04
0.06
0.08
0.1
Time / s
Position
Velocity
Acceleration
Show Currents
Event 1
Run 26
Plot
Print
Exit
Trend
Pulse
Next
Prev
root@mice1:
Mice
Fri Feb 24
16:59:45

New setup

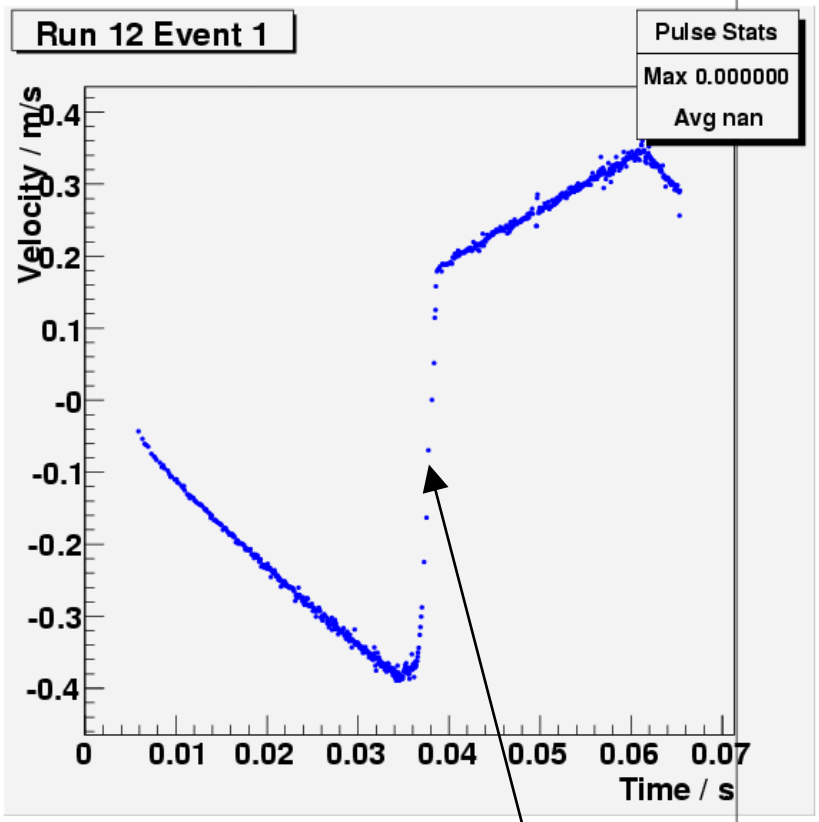
- Actuator has now been mounted vertically
- First results have been taken in the last few days with this setup



Results at 5A

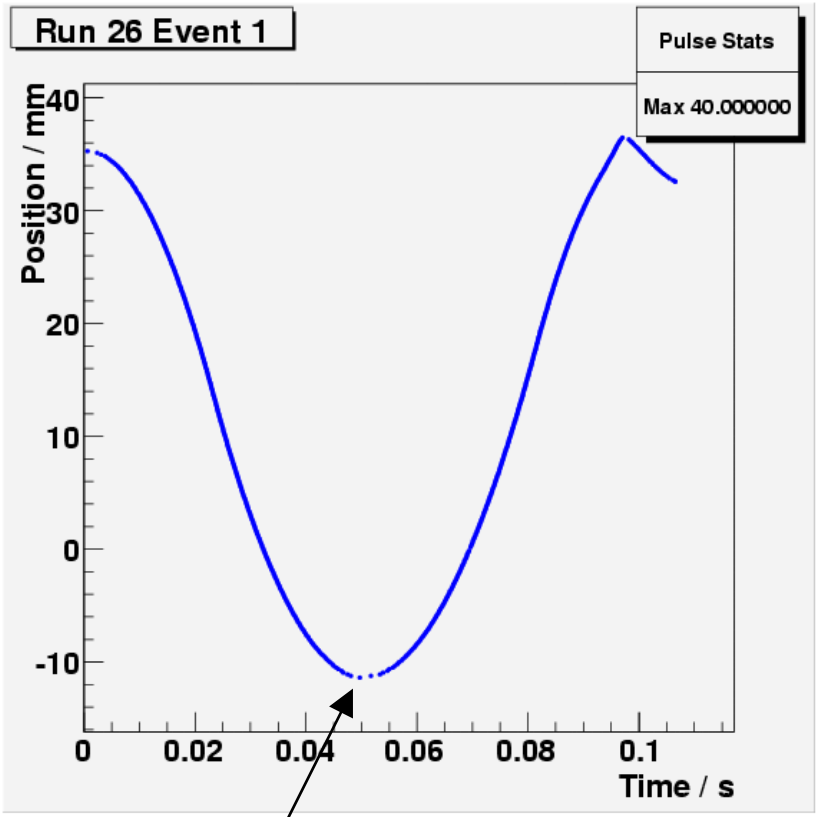


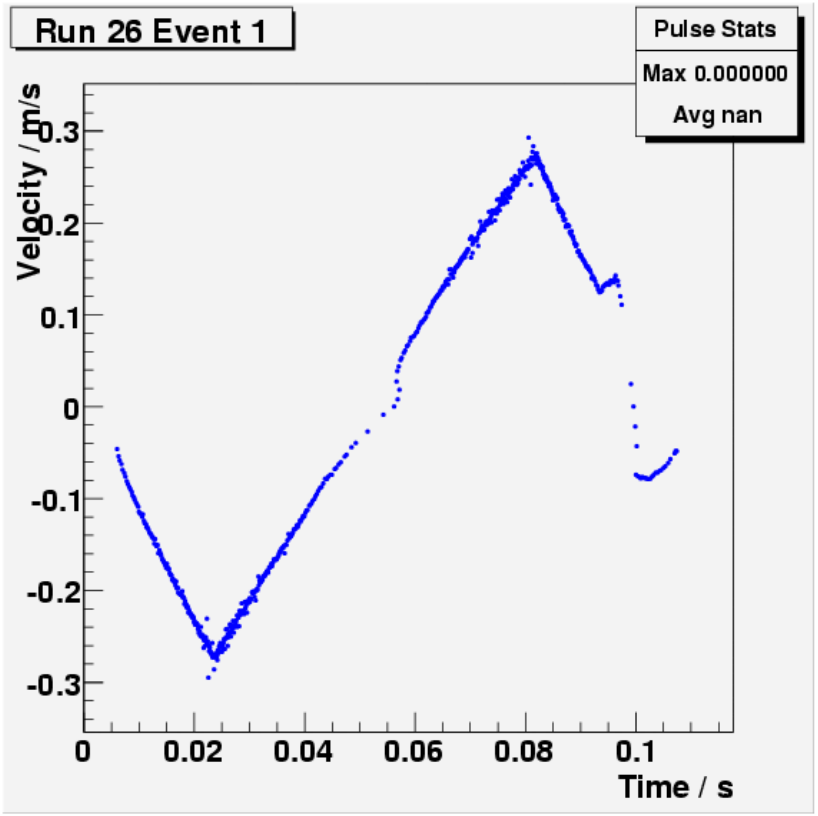
Shuttle hitting bearing



Results in sharp change
In velocity

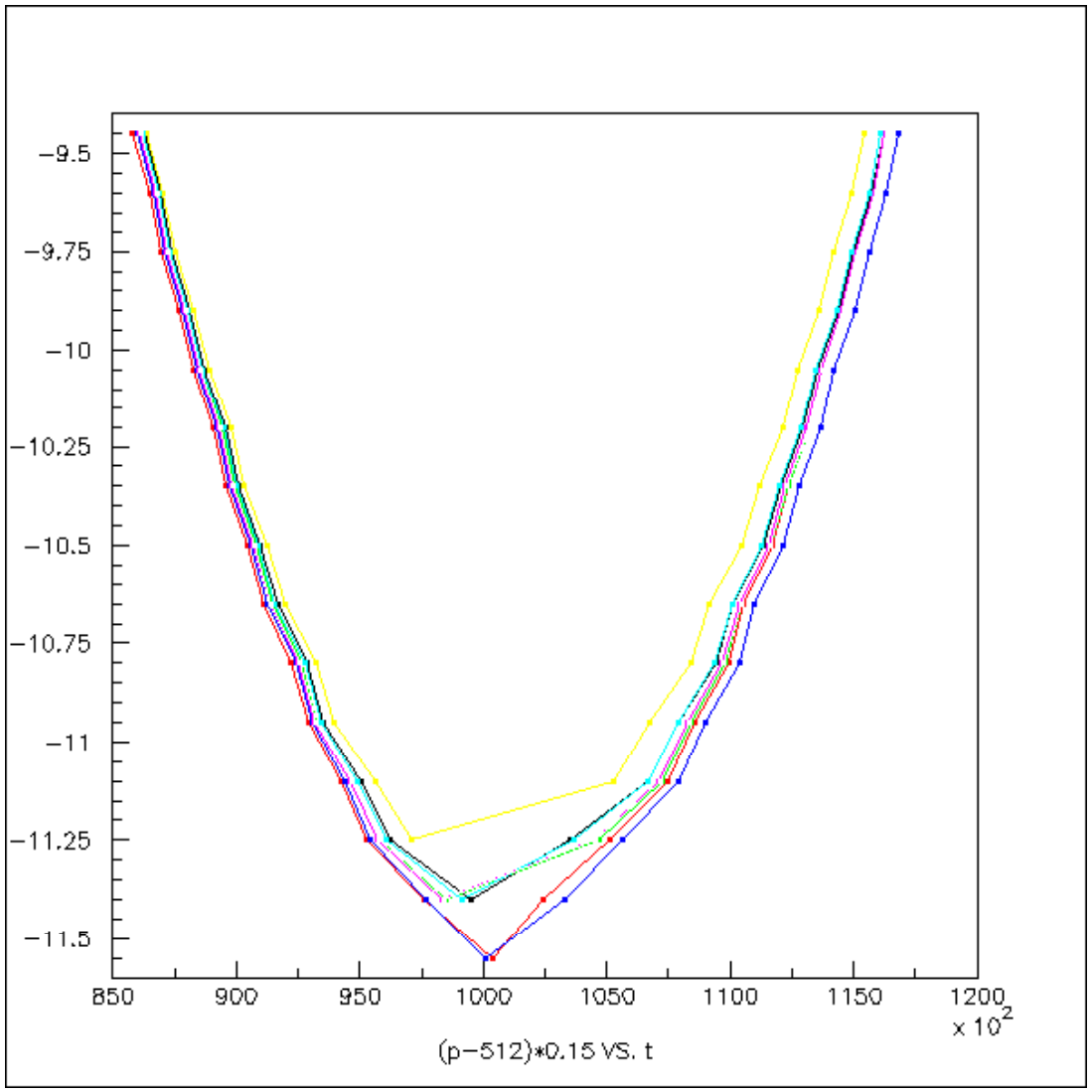
Results at 5A





Smooth pulse bottom achieved

Results - reproducibity



Conclusions

- Work on building a system suitable for use in ISIS is progresing
- Optics system successfully developed
- First results from this show:
  - Nice pulse shape can be achieved
  - Good reproducibility
- Next generation of control electronics should provide much finer control
- Next generation driver electronics is needed to achieve full acceleration