The MICE Target

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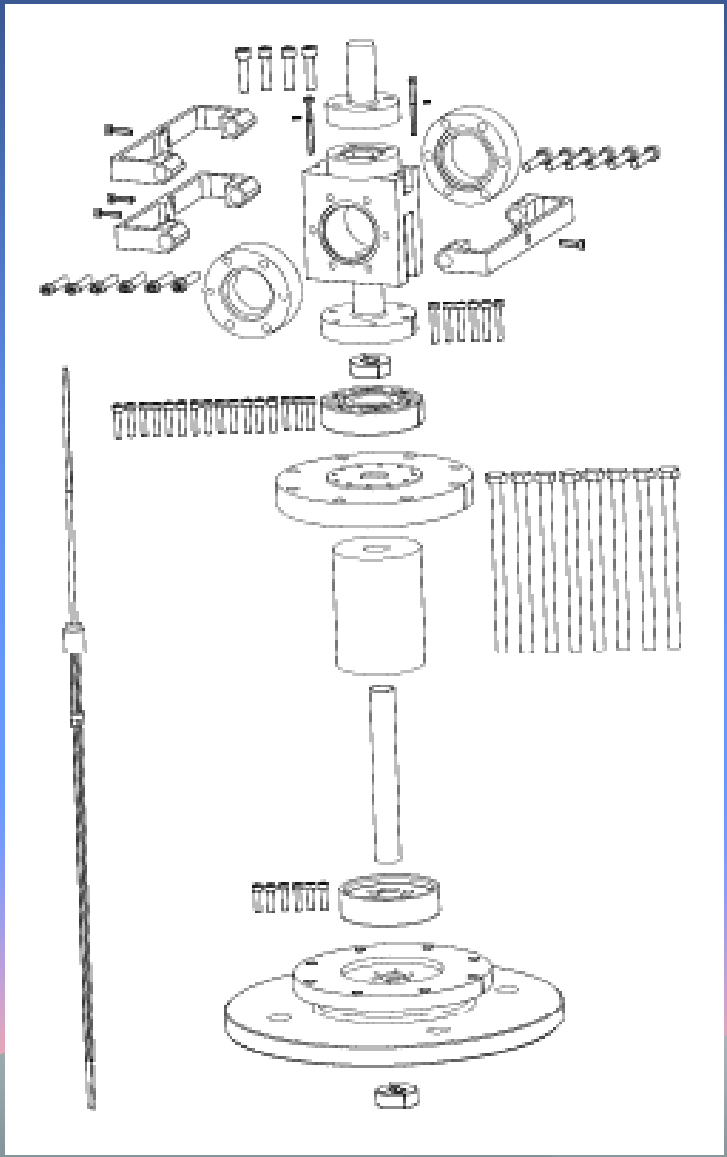
Overview

- Improvement to components
- Current performance of target
- Assembly tests at RAL
- Plans for November tests

Overview of components

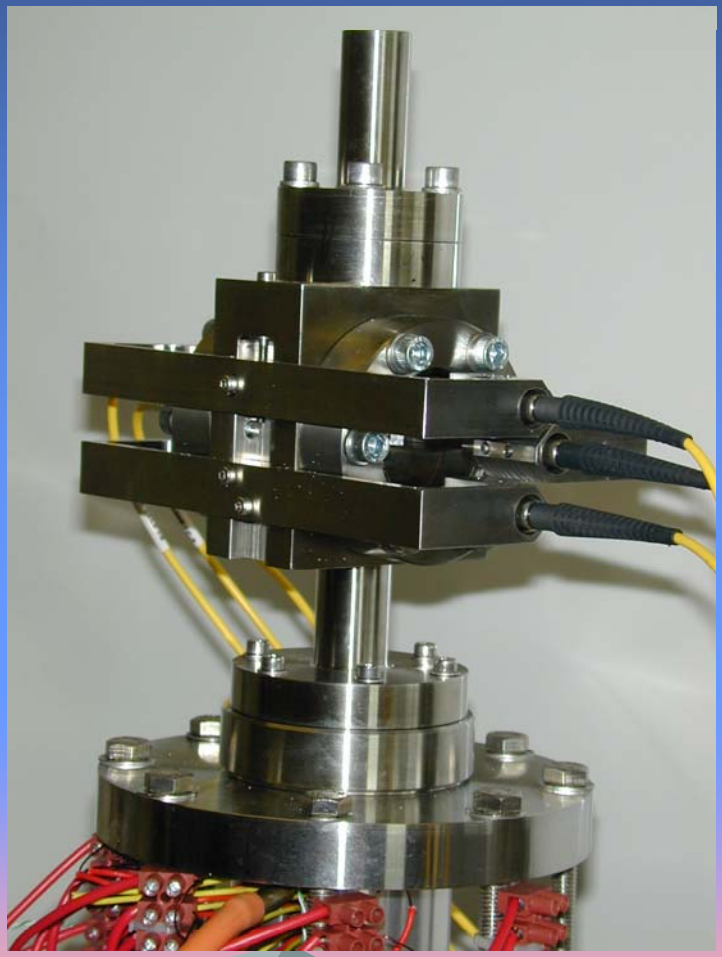


Flanges

- All flanges have been redesigned to give improved indium seals
- These seals have been tested under vacuum twice and have held vacuum first time on both occasions
- Robust – an assembled target setup has been transported from Sheffield to RAL without any problems in the vacuum seals

Optics

- A new optics system has been built
- Flat windows – meaning laser beams can all be parallel
- Arm to hold collimators machined from one piece means only minimal adjustment is required for alignment
- Robust – transported from Sheffield to RAL with no need for realignment

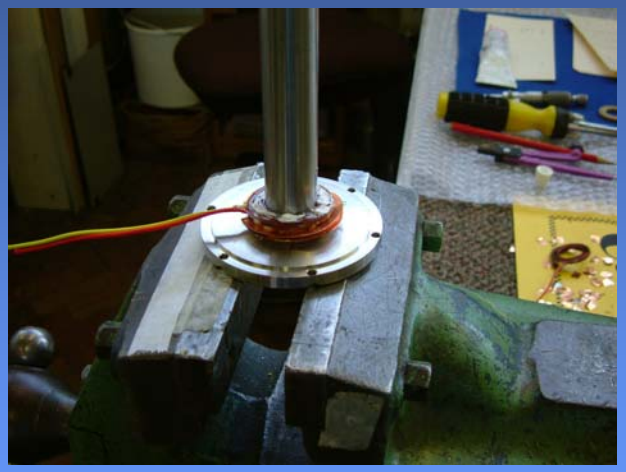


Shaft

- New cross shape shaft
- Machined from a single piece of titanium
- Only magnets and optics comb need to be attached

Stator

- Water cooling jacket has been redesigned bringing it much closer to the coils
- The stator can now be run at 1Hz and remain at a temperature of 25 degrees with cooling and 35 degrees with rt water



Control Electronics

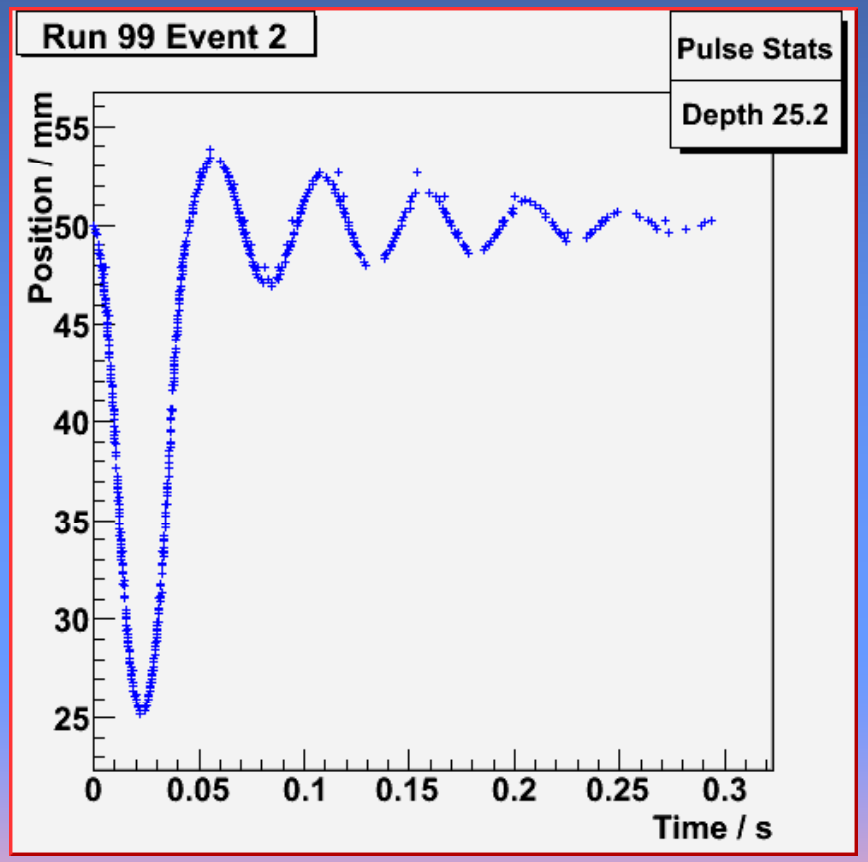
- Significant improvements have been made to electronics
  - Optical isolation between control and power electronics
  - Optical isolation between racks
- These give greatly improved stability
- Development of electronics for November tests
  - Digital to analogue converter of position information
  - Board to allow selected delay of ISIS signal

Full Power Electronics

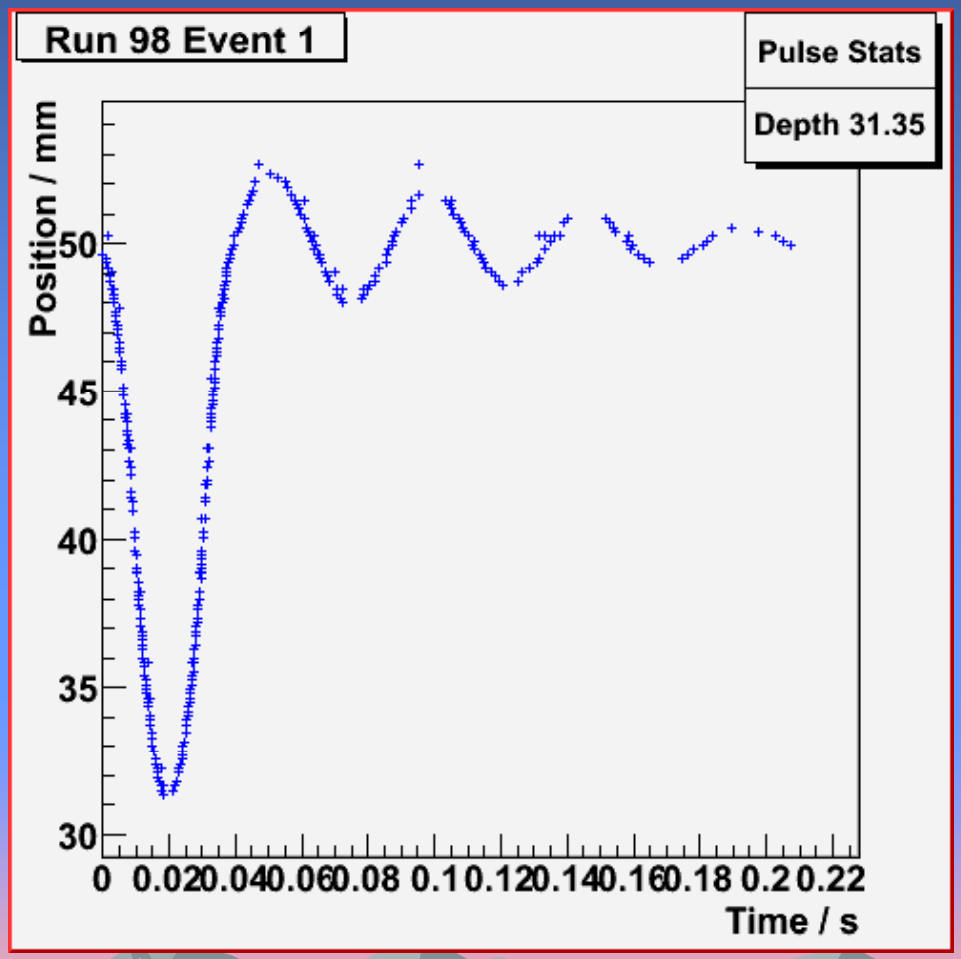
- Full power electronics is being produced at Daresbury
- This was brought to Sheffield during September and tested with the actuator
- There are some problems with the current control which need to be fixed before this can be used

Target Performance

- High stability of electronics has been achieved
- Over 50,000 pulses have been achieved without failure
- Target achieves acceleration of 16g with 10A

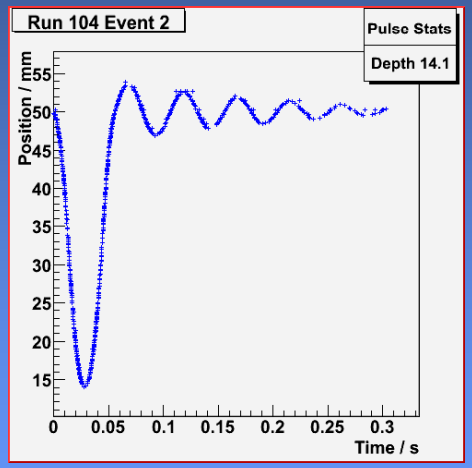


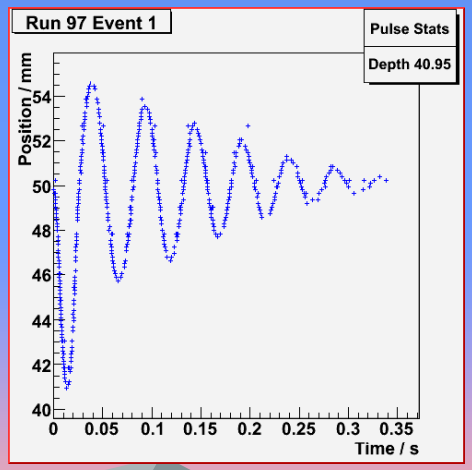
Closer look at a pulse



Target Performance

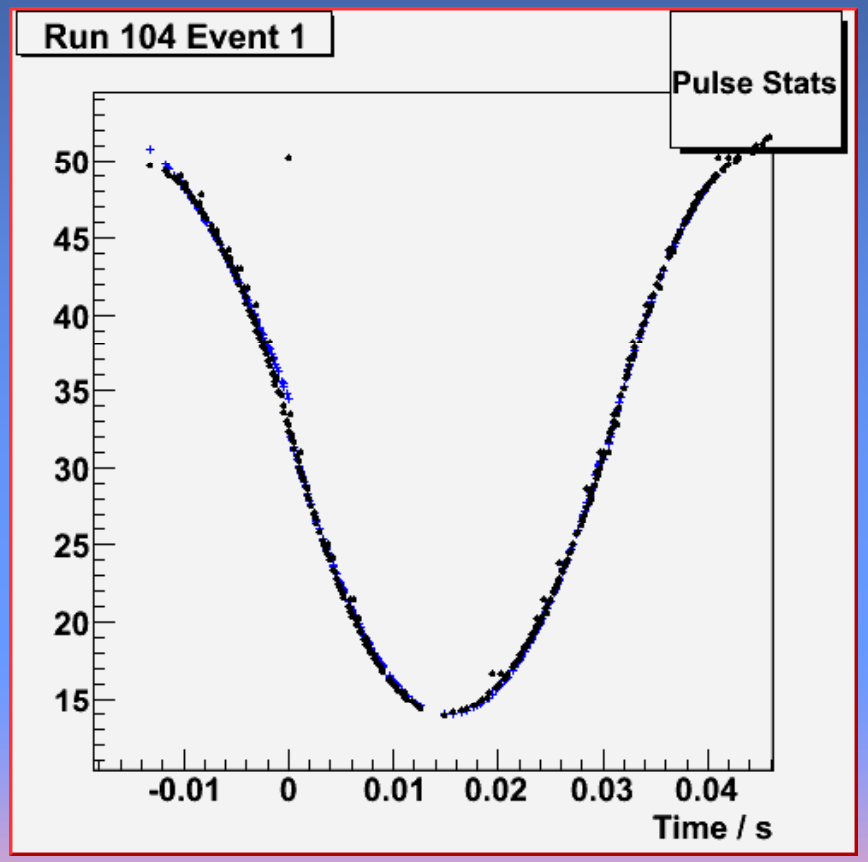
- Dip depths between 10mm and 45mm have been achieved
- Time for pulses 25ms to 65ms
- Adjustments of order 0.6mm are currently possible



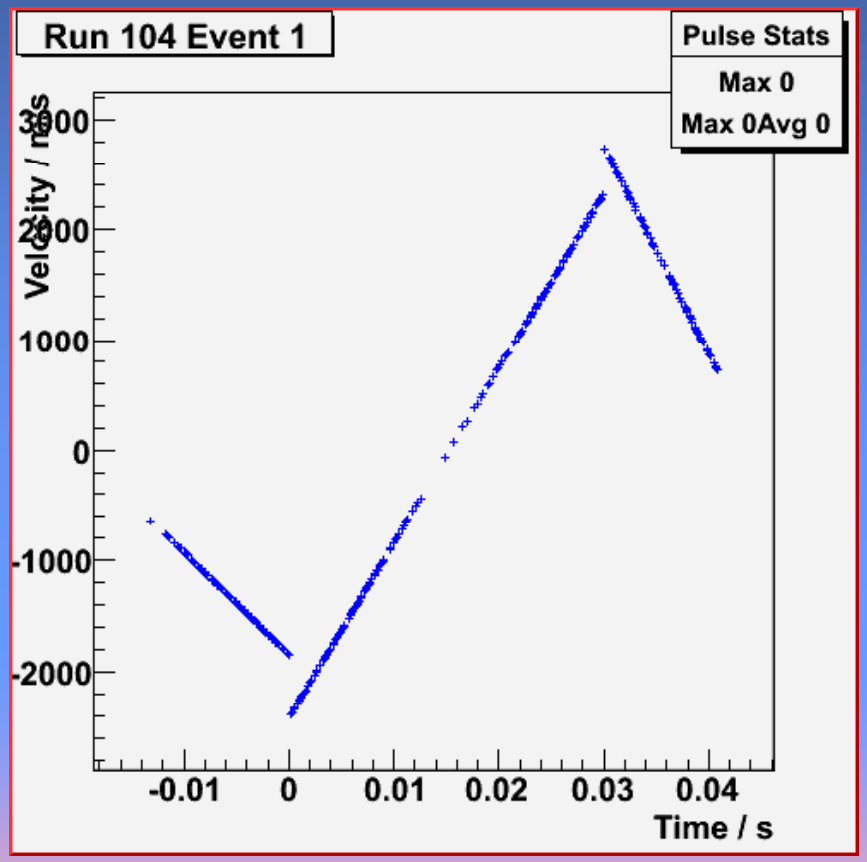


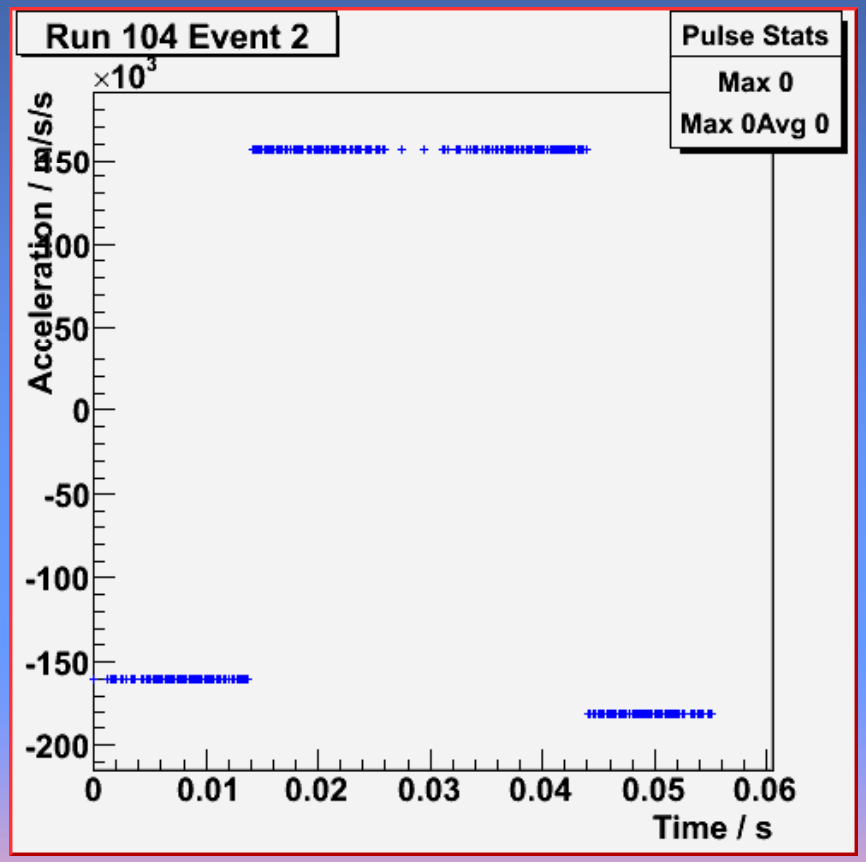
Fit to data

- Assuming flat acceleration in each section it is possible to fit the pulse shape to 3 quadratics
- It is then possible to look at velocities and accelerations



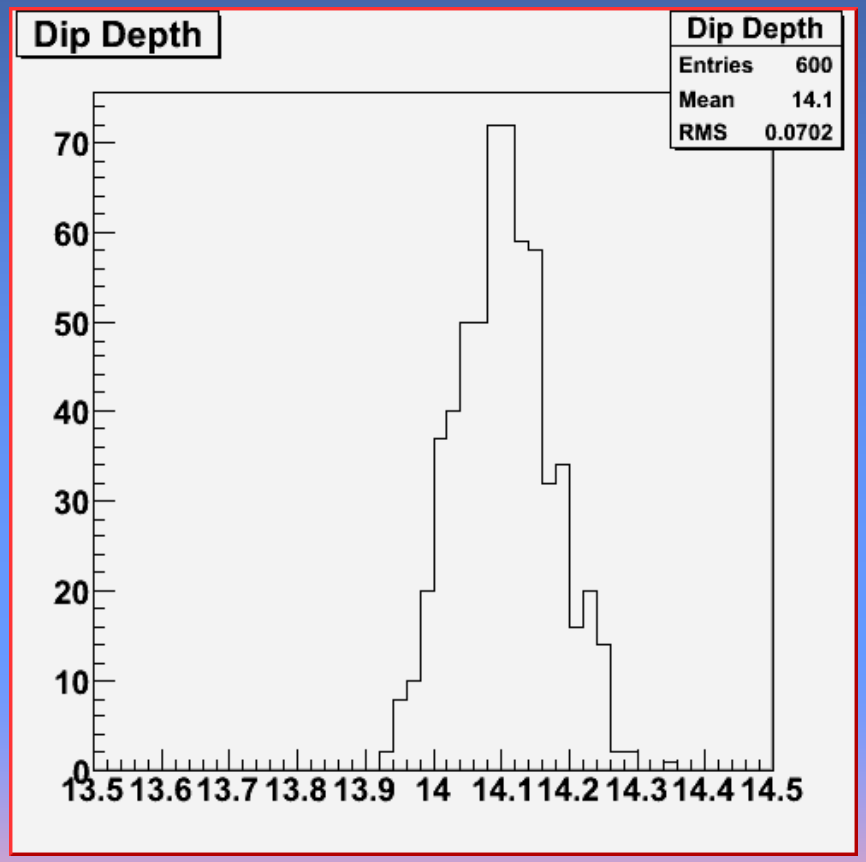
Velocity and Acceleration





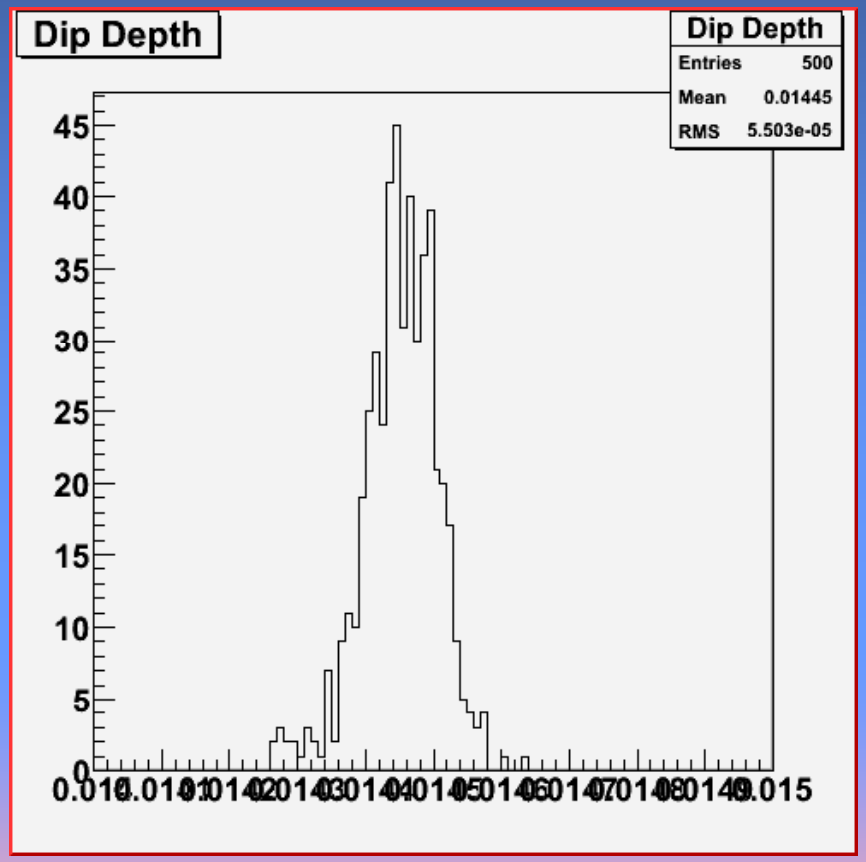
Error on dip depth

- Dip depths remains very stable
- RMS 0.07mm
- Granularity of readout 0.15mm



Error on time of lowest point

- Time stability is currently hard to ascertain due to problems with readout
- RMS for time error on ½ a pulse order of 50 micro seconds



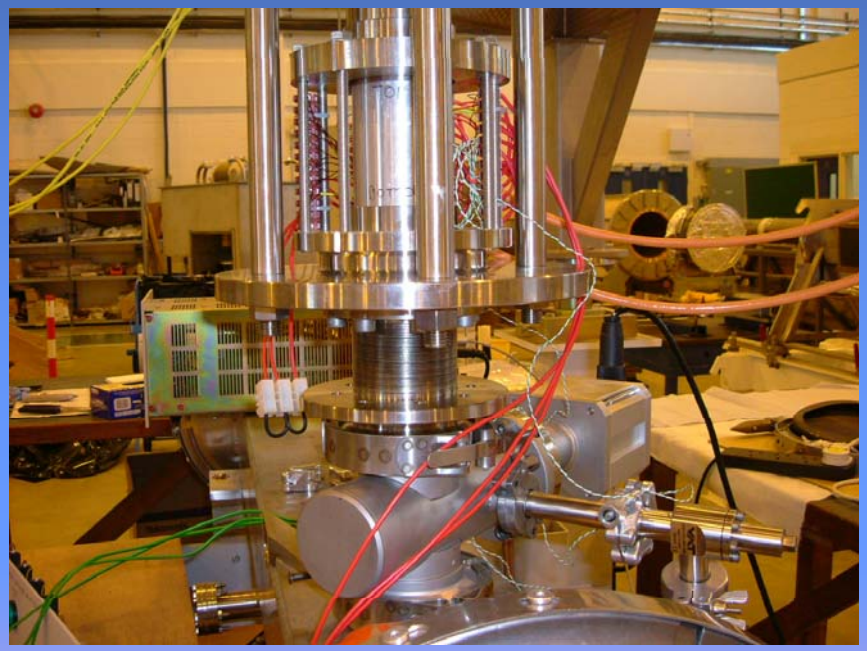
RAL Tests

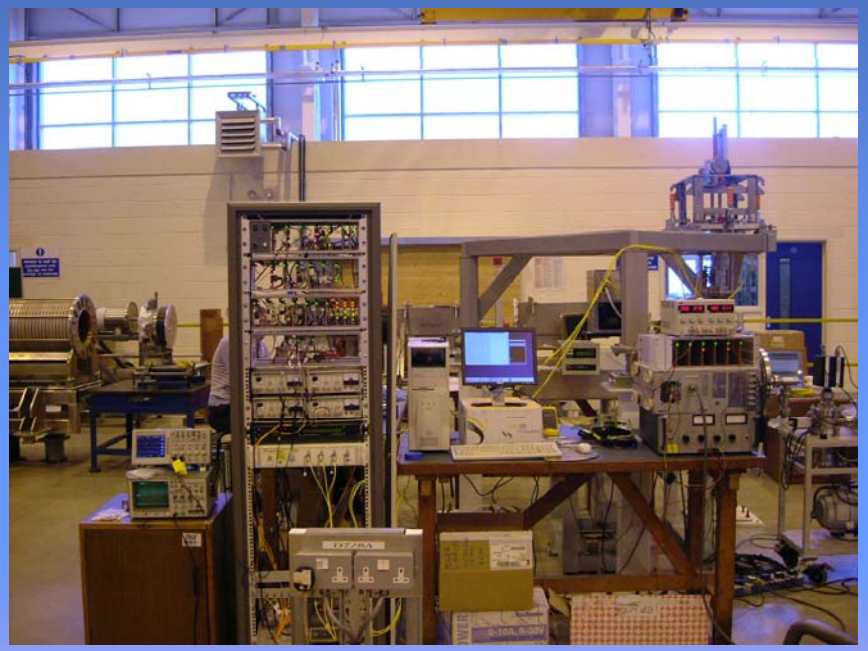
- Tests took place at RAL during September
- All mechanical and electronic equipment was transported from Sheffield to RAL
- All equipment worked without any adjustments being required
  - All mechanics
  - All optics
  - All electronics

RAL Tests

- Good vacuum achieved 2.6×10^{-8}mbar
- Over 10,000 pulses achieved under vacuum (1Hz 15mm)
- No changes to vacuum observed during operation
- Measurements taken to define absolute position

RAL tests



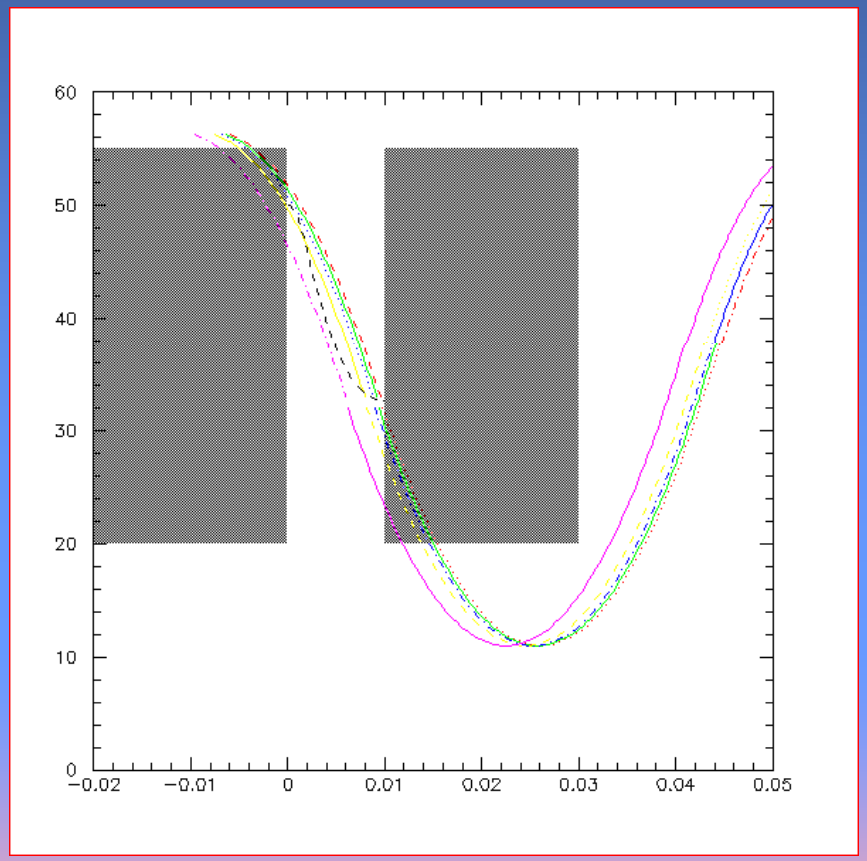


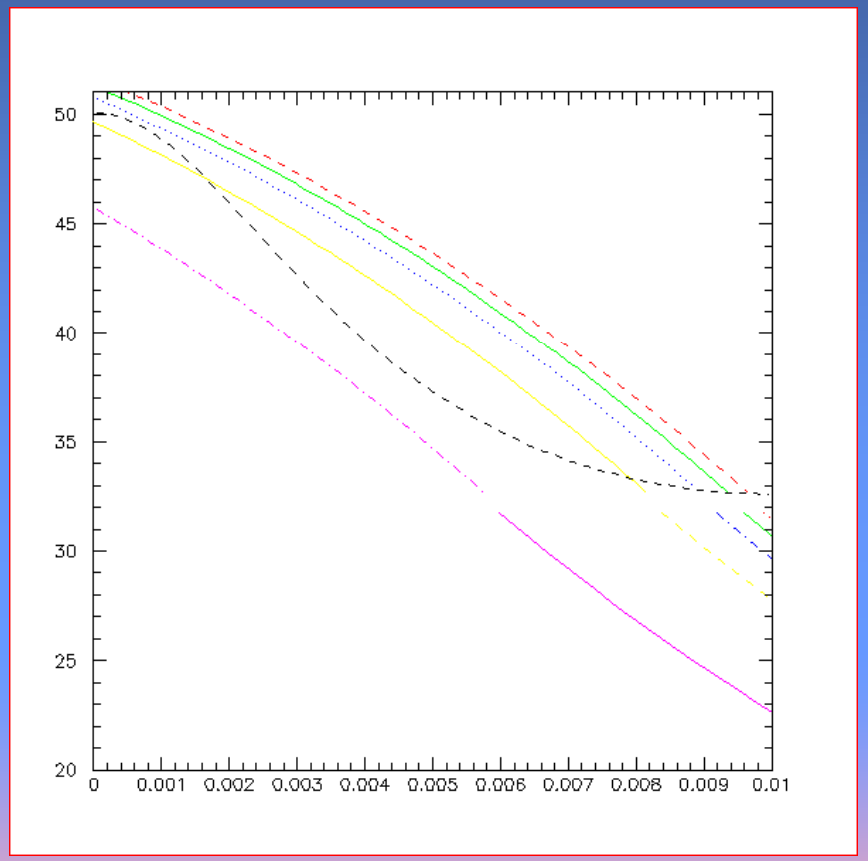
RAL Tests

Plans for November Tests

- We are currently all systems go for November tests
- Detectors and readout Bill Murray and Kenny Walaron
- Run plan discussed and agreed
- Target to be installed during shutdown 16th Oct-27th Oct
- 1 or 2 shifts in machine startup 28th Oct-2nd Nov

What we believe we can achieve





Conclusions

- New mechanical designs have solved
  - Problems with optics
  - Problems with indium seals
  - Problems with cooling
- Successful tests carried out at RAL in September
- Due to go in for target tests in November
- This should give as input for further optimisation of design