

Target Testing and Development

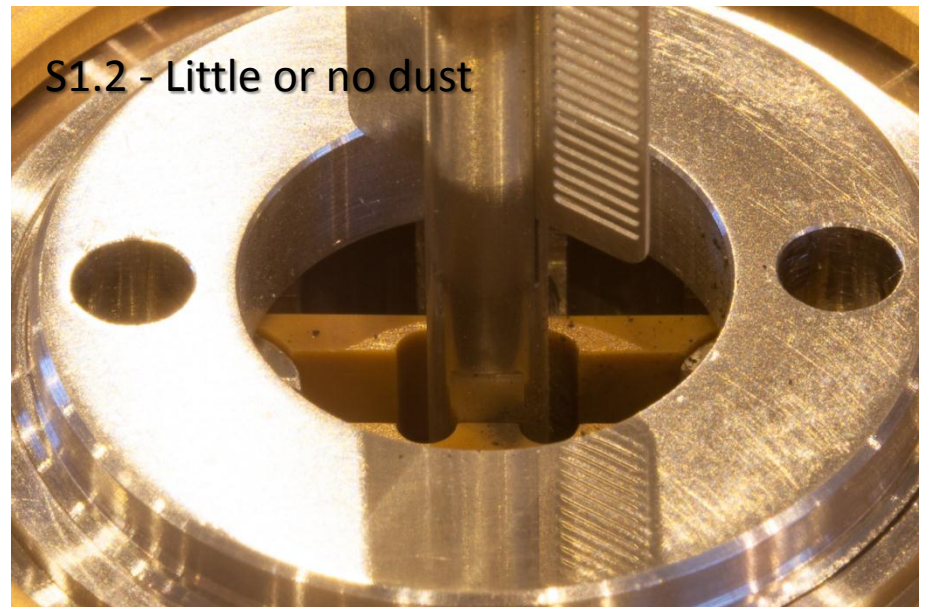
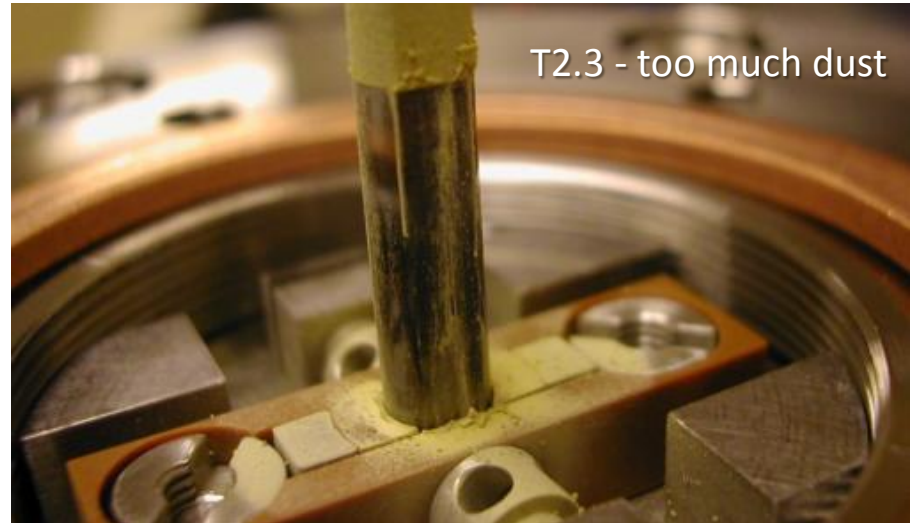
Target Workshop

07-01-2013

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Goals for Testing the Targets

- What are we aiming for in target performance?
- **Minimal dust production** over large number of actuations.
- What **minimal dust production** means is somewhat subjective but current levels seem to be acceptable to ISIS.



Goals for Testing the Targets

Large number of actuations.

- Large number of actuations means minimum of ~2 million without significant performance issues.
 - $0.5 \text{ Hz} \times 3600 \text{ s} \times 10 \text{ h} \times 5 \text{ d} = 90,000$ per week
 - So with a 1-2 million lifetime we can run for 10-20 weeks.
 - Long enough to reach an ISIS shutdown to allow replacement.
 - Obviously longer lifetime better, a yearly replacement cycle seems reasonable and possible.
- Above implies a goal of a minimum of 1 million actuations with no dust and better with over 5 million for year run.

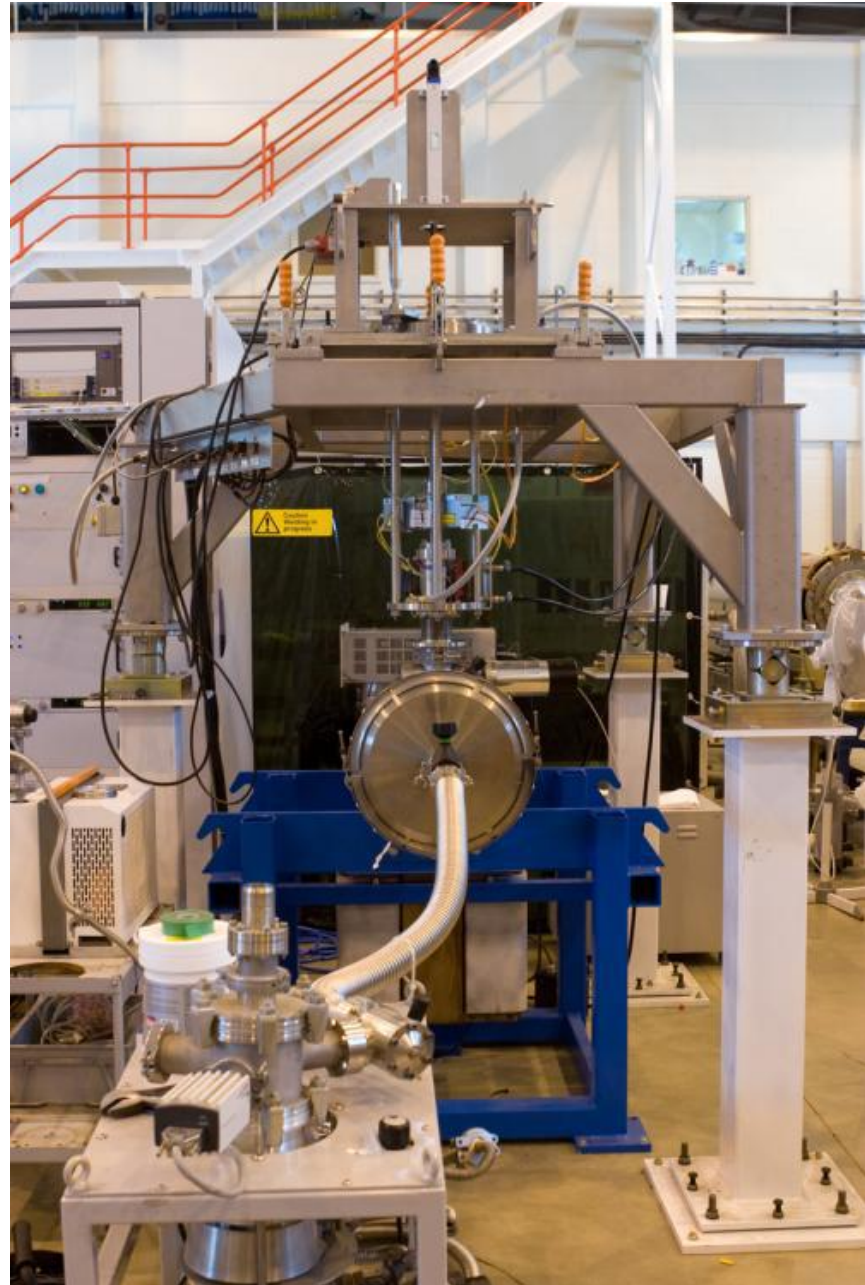
Testing the Targets

Run in R78 and closely monitor performance.

Aim is to reach 1-2 million (or greater) actuations with no significant dust production and no performance degradation (sticking etc.)

Run at ~ 1.0 Hz so accumulate 500k pulses per week

Need at least 1 months testing to validate a particular target.



Current Status of Target(s)

- T2.9 Installed on ISIS
 - Working fine, last exercised during shifts in December
 - Good for 1-2 million actuations
- T1.3 On the shelf as hot spare
 - Good for 2-3 million actuations
- S1.2 Under test in R78
 - Currently off, can restart this week (visit?)
- S2.X Under construction

Testing the S series Targets

- New design under test in R78 now.
- Improved coil winding.
- Improved cooling.
- Coils closer to magnets in stator body to increase force on shaft.
- Can reach higher accelerations at lower currents.

Testing the S Series Targets

- Initial problems with S1.1
- Clear evidence that the target was “sticking”

Target Performance Report - S1.1(R78)

Report Generated: November 6, 2012,

Last Actuation: 06/11/12 11:05:34

1 Operation Summary

	Last Shift	Total
Actuations:	59.9K	1478.1 K
Quadrature Count errors:	0	71
Fiber ADC errors:	0	3
BPS errors (during actuation):	0	1
(R78) Gaps > 3s & < 10s:	348	21634
(R78) Gaps > 10s:	76	4868
(R78) SP2 Corrections:	273	14453
(R78) Capture Over/Under shoots:	7600/392	167520/167912

Testing the S Series Targets

- Looking at S1.2
- Much improved

Target Performance Report - S1.2(R78)
Report Generated: December 19, 2012,
Last Actuation: 19/12/12 11:13:14

1 Operation Summary

	Last Shift	Total
Actuations:	67.1K	992.5 K
Quadrature Count errors:	0	0
Fiber ADC errors:	0	0
BPS errors (during actuation):	0	0
(R78) Gaps > 3s & ≤ 10s:	0	24
(R78) Gaps > 10s:	2	28
(R78) SP2 Corrections:	0	25
(R78) Capture Over/Under shoots:	22/1724	9486/11210

Future Testing

- S series target needs more testing.
- Need to establish the target lifetime.
- Need to understand and solve sticking issues
- Need to check reproducibility of construction
- Can we run at higher voltages and hence higher accelerations without increasing the wear rate/dust production ?

Testing Plans

- Restart S1.2 this week and continue to monitor.
- At almost 1 million actuations now.
- Open for inspection in 2-3 weeks if no significant change in performance.
- Run on to 5 million actuations if possible.
- Need to check if we can run at higher accelerations without increasing wear/dust production

Long Term Testing Plans

- Overall we are in maintenance mode....nearly
- Need to ensure that we make the S series targets as reliable as T series
- Will need to Construct and test S2.X so we have a backup target of the new design
- Should plan for continuing testing in R78 into summer 2013