

SALT BEC MEETING #60

SAMS Progress Report
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SAMS Project Team

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Phase 1 Test Results

A single continuous closed loop test run with a 24 day duration has been achieved over a temperature span exceeding 20 ˚C including sub-zero temperatures.

The figure below summarises the results of the test, which was highly successful.

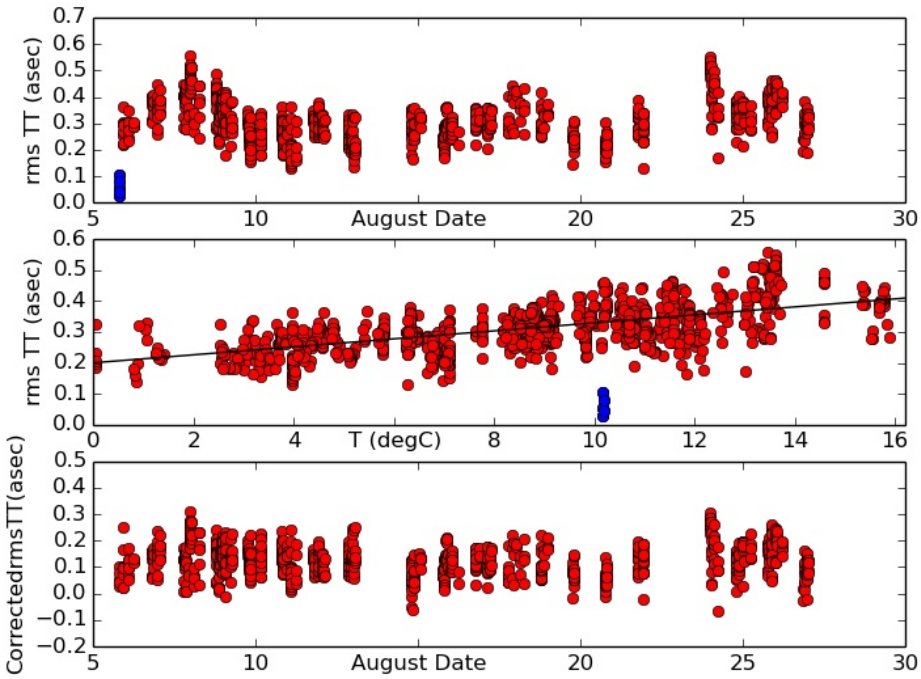
The top panel shows the rms tip/tilt as recorded at intervals through the night from 5 August to 27 August. The blue points at the beginning show the initial alignment at twilight on 5 August, where rms tip/tilt was 0.07 arcsec. The temperature experienced by the mirror array during night-time tests was from 0 ^{o}C to about 16 ^{o}C. On some days the temperature was higher or lower than these end-points, and the total range experienced in the test period was from about -2 ^{o}C to about 20 ^{o}C.

The scatter in the plot is related entirely to CCAS measurement errors.

The second panel shows the rms tip/tilt as a function of temperature. There is a clear linear relation. There are several possible reasons, but a simple fix would be to apply a scale factor to the GroC corrections applied by SAMS, which are based on temperature. If SAMS were not in control, the rms tip/tilt would have changed by about 1.4 arcsec over the temperature range shown.

The third panel shows the rms tip/tilt after correction for the temperature effect.

SAMS has clearly maintained control of the central 7 segments for the entire period.



Sensor Production

Following the sensor bonding training Jonathan Love received at Fogale, the following points became evident. The sensor bonding process requires highly skilled operators to ensure consistent quality. The bonding process took approximately 90 minutes which is unreasonable given the quantity of sensors required for the SALT array.

The tooling supplied had several short comings which made the bonding process more complex than necessary.

The project team decided that it was essential to redesign the tooling and update the bonding procedure in order to improve the quality of the bond, reduce the cycle time and de-skill the operator requirement. The redesign of the tooling and the process took approximately 3 months.

With the new tooling and process we are now able to produce bonded sensors of consistent quality at a rate of 50 per week per station which is double the rate previously attainable. We are now in the process of manufacturing three bonding stations which will bring our capacity to 150 L-brackets per week.



The development of the first prototype tool concluded with the 2 bonded sensor pairs. These pairs were tested in our environmental chambers to validate the quality of the bond and the process.

Environmental tests conducted on the 2 test sensors show excellent agreement in the behaviour of the 2 sensors with respect to each other, demonstrating good consistency in the bonding process.

The response of the two sensors to temperature and RH is also within specification with regards to temperature sensitivity, RH sensitivity and hysteresis. An automated test program currently under development produces a summary of the result; the summary for Sensor 1 is presented in Appendix A.

The manufacture of the additional bonding jigs is underway to meet the required production rate of 150 sensors/week.

Bush Bonding

The bush which attaches the L-bracket to the underside of the sensor requires bonding with epoxy to the segment.

This task is progressing at the required rate of approximately 1 segment per a day; 30 segments have now been bonded.

Schedule

The development of the sensor bonding tooling has taken 2 months not originally accounted for in the schedule. The tooling does however halve the time (compared with the original Fogale developed system) required to bond a sensor. The overall schedule and the expected completion date of April 2016 remain unchanged.

The manufacture of sensors, cabling and electronics by Fogale is tracking slightly ahead of schedule. All 480 flex sensor pairs required for the complete array have been delivered to SALT, several weeks ahead of schedule.

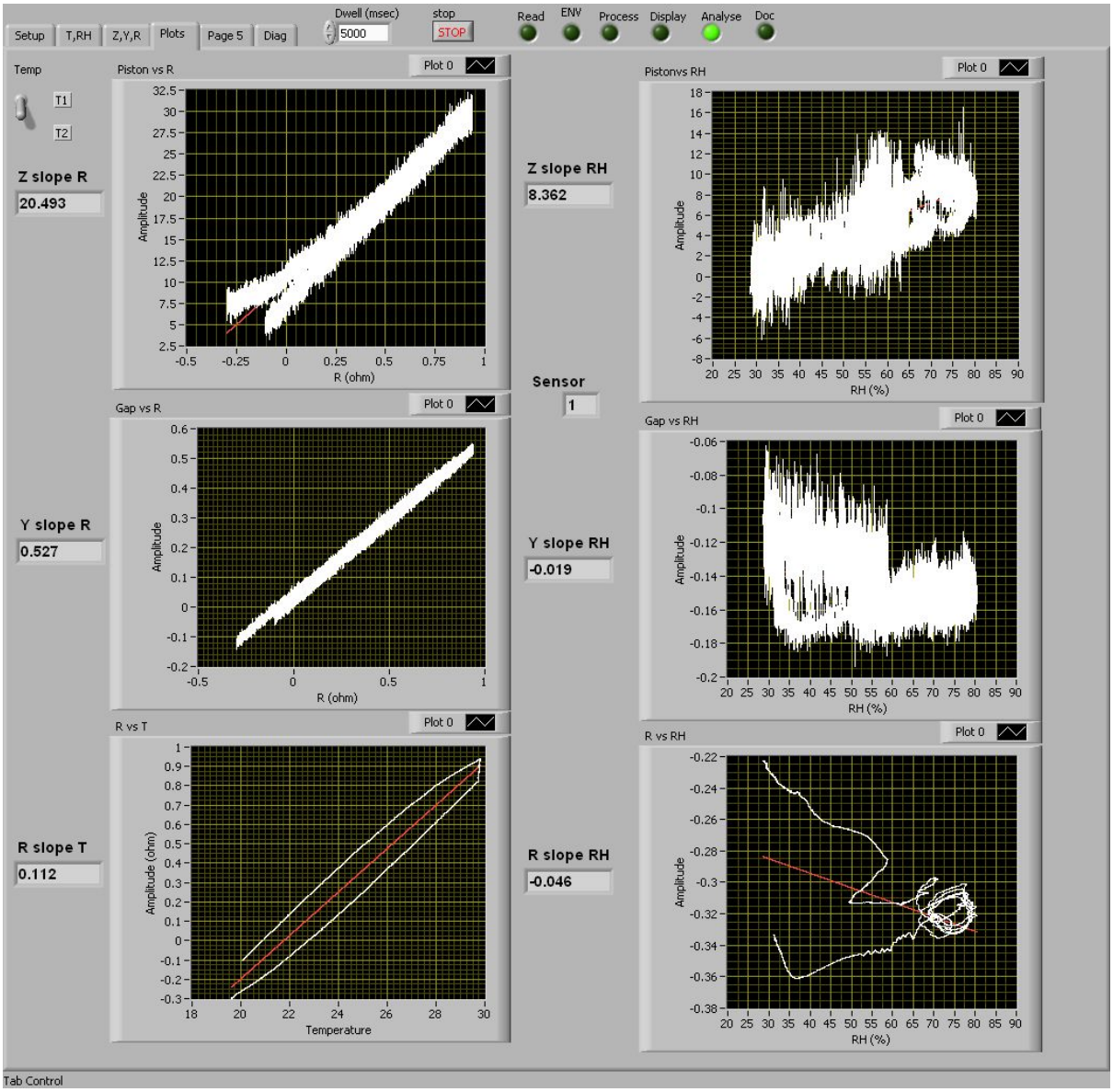
Cost to Completion

The cost to completion is still within the R500k requested during the May Board meeting.

Appendix A

Sensor Validation Test

Technician	**Tech 1**	
Test Date	**2015/10/05**	
Sensor RX ID	**RX**	
Sensor TX ID	**TX**	
Small Cable ID	**K00993**	
Principal Cable ID	**P809893**	
Sitall Base Block ID	**base**	
Base Block Position in Chamber	**basePos**	
Position on base block	**Small Block A**	
Log file name	**2015/10/01**	
Setup notes		
Parameter	**Result**	**Pass/Fail**
R24 PISTON nm/ohm **Temperature Sensitivity**	**18.94**	**PASS**
R25 GAP um/ohm **Temperature Sensitivity**	**0.51**	**PASS**
Z T Hysteresis nm	**14.38**	**PASS**
Piston RH coeff nm/50%	**10.44**	**PASS**
Z RH Hysteresis nm	**8.27**	**PASS**
Result Notes	**dZdR**	
Analyst	**JWM**	
Date	**2015/10/05**	


Setup
T,RH
Z,Y,R
Plots
Page 5
Diag
Dwell (msec)
5000
stop
STOP
Read
ENV
Process
Display
Analyse
Doc
Temp
T1
T2
Piston vs R
Plot 0
Amplitude
R (ohm)
Pistonvs RH
RH (%)
Z slope R
20.493
Z slope RH
8.362
Sensor
1
Gap vs R
Gap vs RH
Y slope R
0.527
Y slope RH
-0.019
R vs T
Amplitude (ohm)
Temperature
R vs RH
R slope T
0.112
R slope RH
-0.046
Tab Control