Instrumentation and Data Acquisition

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Site Operations Manager

University of California, San Diego

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Instrumentation and Data Acquisition

Objectives

- ***Provide quality management system***
- ***Provide National and International recognized testing data and reports***
- ***Maintain a calibrated sensor and equipment inventory***
- ***Provide quality data to industry***

Instrumentation and Data Acquisition

Documentation

- ***Documentation Master Log File***
- ***General Documentation***
- ***Standard Operation Procedures***
- ***In-house Calibration Procedures***
- ***Sensor Inventory***
- ***Equipment Inventory***
- ***Calibration Records***

Instrumentation and Data Acquisition

In-house Calibration

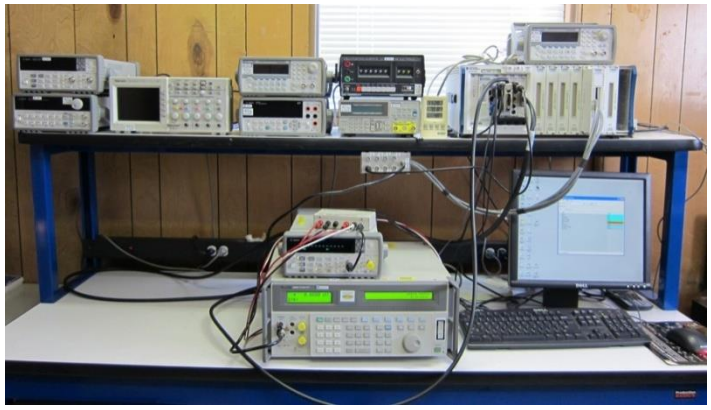
- ***DAQ Channels ➔ 768***
- ***Accelerometers ➔150***
- ***String potentiometers ➔100***
- ***Linear potentiometers ➔300***
- ***DAQ Cost outsource ➔768*100=$76,800***
- ***Sensors Cost out-source ➔ 550*100=$55,000***
- ***Reference standard calibration ➔$1,500***
- ***Labor in-house calibration 1mo ➔~$7,000***

In-house Calibration Equipment

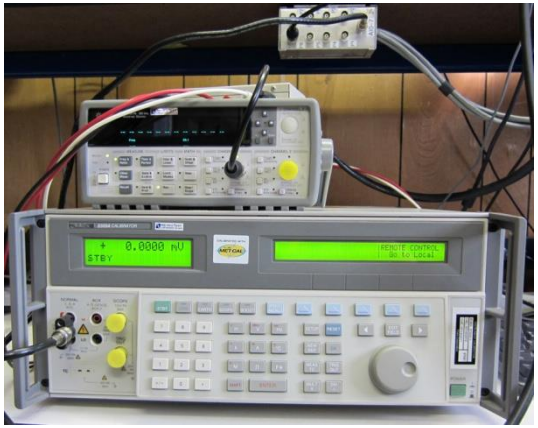
Accelerometer

Accelerometer Linearity

Displacement Transducers



DAQ SCXI 1520



Reference Rented Equipment

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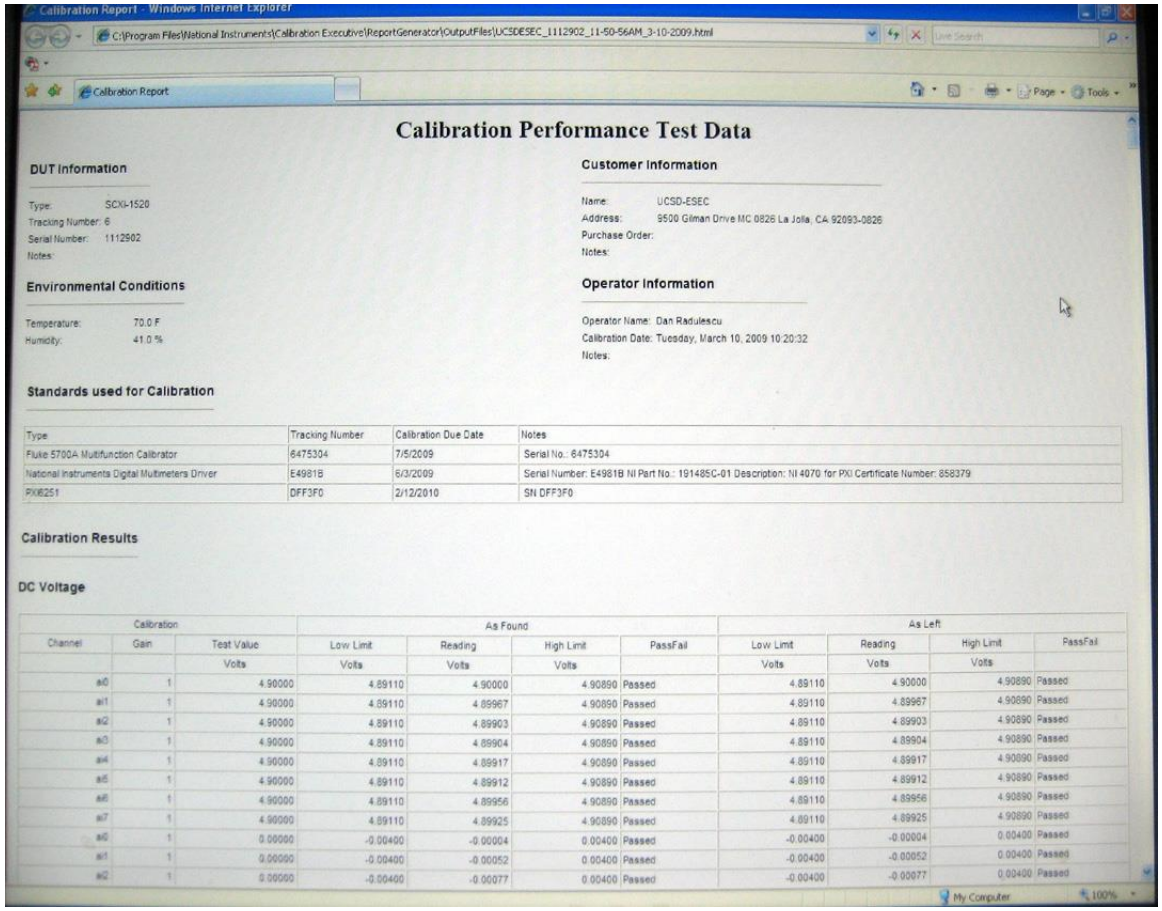
In-house Calibration Certificate DAQ



Calibration Report - Windows Internet Explorer

C:\Program Files\National Instruments\Calibration Executive\ReportGenerator\OutputFiles\UCSDESEC_1112902_11-50-56AM_3-10-2009.html

Calibration Report

Calibration Performance Test Data

DUT Information

Type: SCXI-1520
Tracking Number: 6
Serial Number: 1112902
Notes:

Customer Information

Name: UCSD-ESEC
Address: 9500 Gilman Drive MC 0826 La Jolla, CA 92093-0826
Purchase Order:
Notes:

Environmental Conditions

Temperature: 70.0 F
Humidity: 41.0 %

Operator Information

Operator Name: Dan Radulescu
Calibration Date: Tuesday, March 10, 2009 10:20:32
Notes:

Standards used for Calibration

Type	Tracking Number	Calibration Due Date	Notes
Fluke 5700A Multifunction Calibrator	6475304	7/5/2009	Serial No.: 6475304
National Instruments Digital Multimeters Driver	E4981B	6/3/2009	Serial Number: E4981B NI Part No.: 191485C-01 Description: NI 4070 for PXI Certificate Number: 858379
PXI6251	DFF3F0	2/12/2010	SN DFF3F0

Calibration Results

DC Voltage

	Calibration		As Found				As Left			
Channel	Gain	Test Value	Low Limit	Reading	High Limit	PassFail	Low Limit	Reading	High Limit	PassFail
		Volts	Volts	Volts	Volts		Volts	Volts	Volts	
ai0	1	4.90000	4.89110	4.90000	4.90890	Passed	4.89110	4.90000	4.90890	Passed
ai1	1	4.90000	4.89110	4.89967	4.90890	Passed	4.89110	4.89967	4.90890	Passed
ai2	1	4.90000	4.89110	4.89903	4.90890	Passed	4.89110	4.89903	4.90890	Passed
ai3	1	4.90000	4.89110	4.89904	4.90890	Passed	4.89110	4.89904	4.90890	Passed
ai4	1	4.90000	4.89110	4.89917	4.90890	Passed	4.89110	4.89917	4.90890	Passed
ai5	1	4.90000	4.89110	4.89912	4.90890	Passed	4.89110	4.89912	4.90890	Passed
ai6	1	4.90000	4.89110	4.89956	4.90890	Passed	4.89110	4.89956	4.90890	Passed
ai7	1	4.90000	4.89110	4.89925	4.90890	Passed	4.89110	4.89925	4.90890	Passed
ai0	1	0.00000	-0.00400	-0.00004	0.00400	Passed	-0.00400	-0.00004	0.00400	Passed
ai1	1	0.00000	-0.00400	-0.00052	0.00400	Passed	-0.00400	-0.00052	0.00400	Passed
ai2	1	0.00000	-0.00400	-0.00077	0.00400	Passed	-0.00400	-0.00077	0.00400	Passed

Instrumentation and Data Acquisition

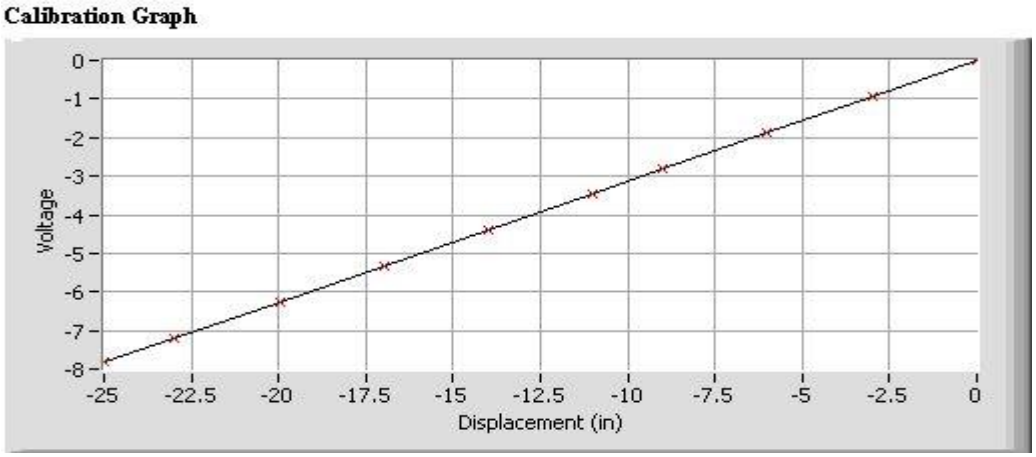
In-house Calibration Certificate Sensor

Date: Thursday, January 11, 2007 9:44:51 AM

Customer Information:
Name: UC San Diego Structural Engineering Dept.
Address: 9500 Gilman Drive
La Jolla Ca. 92093
Sensor Information:
Sensor Type: Displacement
Model No: PT8101-0030-211-1110
Sensor Full Scale Value: 30 in.
Tracking No: 175
Excitation Voltage: +10Vdc
Calibration Information:
Operator Name: Steve Morris
Notes: Temperature: 74.8 °F
Humidity: 45%
Equipment used for calibration:
Trimos V1002+ height stand
sn: 10312 / A
calibration date: 07.04.2006
due date: 07.04.2007

NI PXI 6251 DAQ
sn: DFF3F0
tracking no: DFF3F0
calibration date: 28sep2006
due date: 28sep2007

NI SCXI 1520
sn: CFD976
tracking no: 73
calibration date: 19oct2006
due date: 19oct2007
Standards:
Procedure no: SD400030
Version: 0
Date: 1/11/07



Displacement [inch]	Voltage [volt]
0.000	0.000
-2.995	-0.939
-5.993	-1.879
-8.989	-2.817
-10.986	-3.446
-13.984	-4.384
-16.983	-5.318
-19.981	-6.260
-22.980	-7.195
-24.980	-7.820

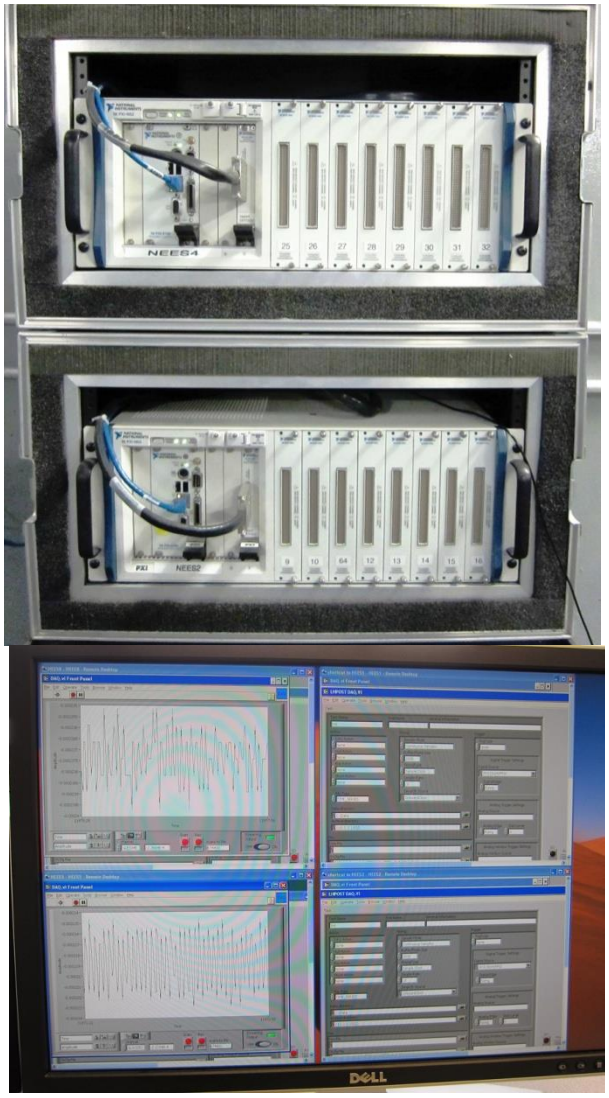
Sensitivity [V/in/Vexc]	MSE
0.031	5.211E-6

Data Acquisition System

Twelve (12) Data Acquisition Nodes with 64channels 16-bit resolution each. Each channel can be configured to accept any type of sensor (strain gauges, displacement transducers, accelerometers, pressure cells, load cells, etc)

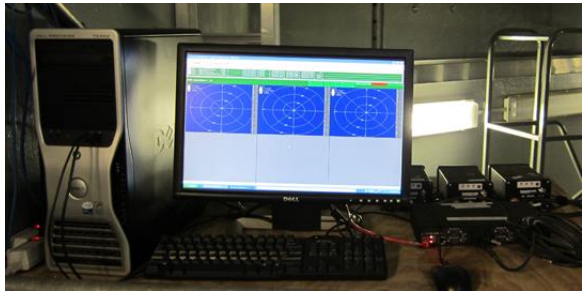
Top picture shows two nodes (hardware)

Bottom picture shows the corresponding DAQ software



GPS System

The GPS system uses RTD_NET software by Geodetics. A network of three NAVCOM ANT-2004T antennae (two mobile and one reference) provides dynamic displacement monitoring in three coordinates. The dedicated standalone computer allows continuous monitoring via three NAVCOM NCT2030M receivers operating at 50-Hz.

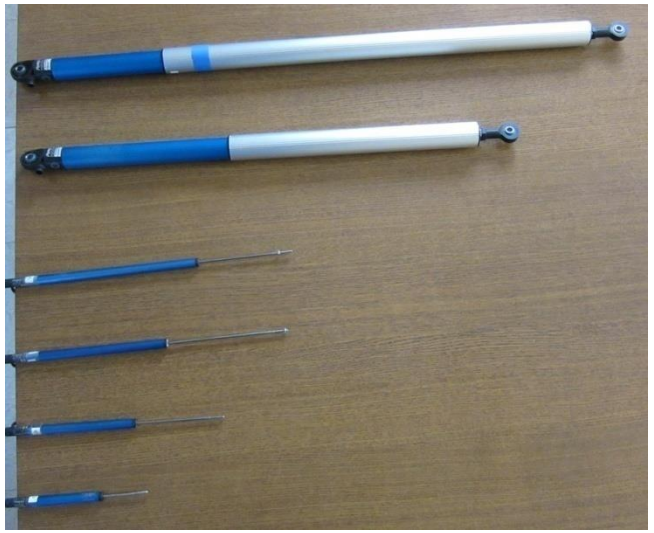


Relative Displacement Transducers

To measure displacement, the facility has a number of linear and string potentiometers.

A total of 100 linear displacement transducers with full-scale range from 12in to 2in.

A total of 100 string potentiometer transducers with full-scale range from 50in to 2in.

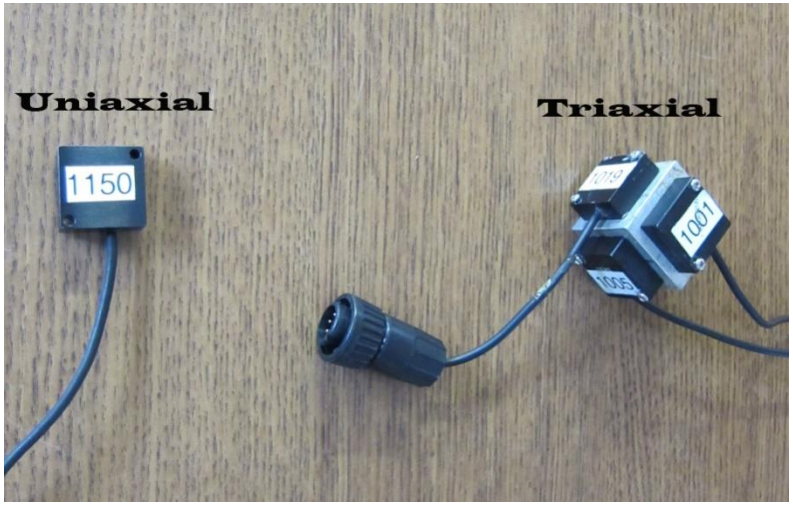


Accelerometers

To measure acceleration, the facility has a total of 100 MEMS based accelerometers.

Main parameters:

- Full-scale: +/-10g
- Freq. Response: DC to 200Hz
- Damping: 70%
- DC power: 8-30Vdc
- Output signal: 0.2 V/g

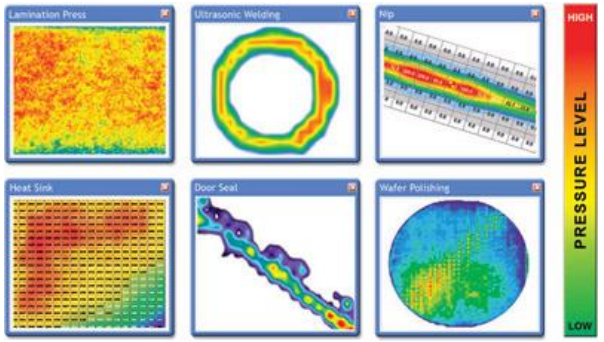


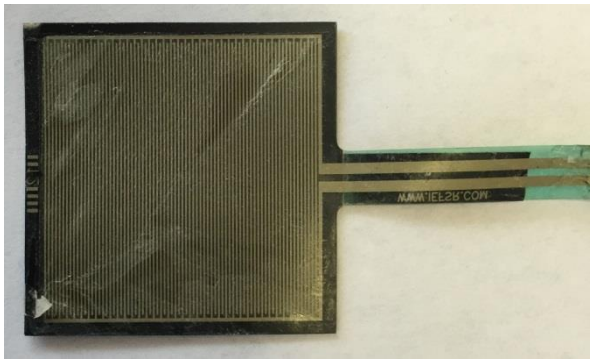
Soil Pressure Transducers

Tactilus system

After testing two systems, we decided to purchase one Tactilus system:

- 32 channels
- Data acquisition software
- 40 sensors





We are testing another soil pressure sensor PS-C Miniature Pressure Sensor manufactured by KYOWA:

- Strain gauge based
- Ultra-thin
- Installed by adhesives
- linear response

Site Accreditation

International Accreditation Service

CERTIFICATE OF ACCREDITATION

This is to signify that

ENGLEKIRK STRUCTURAL ENGINEERING CENTER
10201 POMERADO ROAD
SAN DIEGO, CALIFORNIA 92131

Testing Laboratory TL-356

has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005, *General requirements for the competence of testing and calibration laboratories*, and has been accredited, commencing May 3, 2015, for the test methods listed in the approved scope of accreditation.

Patrick V. McCullen
Vice President, Chief Technical Officer

C. P. Ramani, P.E.
President

ilac-MRA

IAS ACCREDITED

(see attached scope of accreditation for fields of testing and accredited test methods)

Print Date: 6/29/2015

11-04577

Thank you