LUNA
DEFYING IMPOSSIBLE

KEY FEATURES

- Multichannel measurements of strain - multiplex up to 200,000 measurement locations

- Flexible, lightweight and easy to install sensors reduce time to first measurement

- Passive, corrosion resistant, dielectric, flexible sensors go where other sensors can't - in bends, around corners, embedded inside materials

- Long sensor life - no drift or recalibration required, cycle counts >10^7

- Large strain range and high resolution allow for mapping of complex strain fields and large strain gradients

APPLICATIONS

- Characterize strain on/in new materials and complex structures

- Profile temperature in-situ to maximize the efficiency of critical processes

- Measure two- and three-dimensional strain fields to validate FE models

- Evaluate multi-material joining

- Embed sensors within materials to create "smart parts"
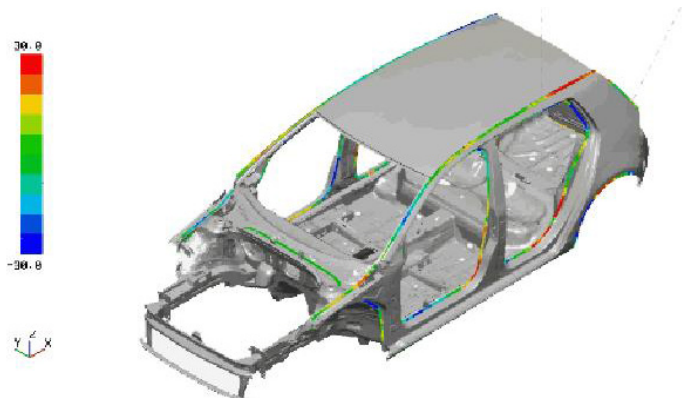
ODiSI 6100

Optical Distributed Sensor Interrogator

The ODiSI is a 21st century strain and temperature measurement system specifically designed to address the test challenges of 21st century advanced materials and systems.

The ODiSI provides more than 1000 strain or temperature measurements per meter of a single high definition fiber sensor. The high definition data can fully map the contour of strain or temperature for a structure under test.

The sensor is flexible, low profile, requires no electrical source, and can be bonded to sharply curved surfaces, embedded within structures, or mounted directly to electrical surfaces.

An automotive frame is instrumented with fiber and then tested under load. Test data is then superimposed on the CAD model.

ODiSI 6100 BASE CONFIGURATION

Included with Base Configuration:

- ODiSI 6100 mainframe configured with 1 to 8 active measurement channels
- ODiSI laptop controller laptop running single function Linux OS and ODiSI operating software and associated cabling
- One 50m, rugged stand-off cable per channel to connect ODiSI interrogator and one "remote module" per channel which connects ODiSI sensors to the stand-off cable
- Standard configuration also includes a rugged shipping case, sample fiber sensors (HD) and Luna's fiber optic sensor application kit

Additional Base Configuration Features:

Real-time streaming data

- Stream measurements in real-time at the maximum measurement rate to a file or via TCP-IP to another computer

Ease of Integration / Ease of Use

- Intuitive , easy to setup and use graphical user interface
- IEEE 1588 PTP (Precision Time Protocol) synchronization
- Json-based digital streaming data
- Sync output TTL pulse

Reliability

- Continuous automatic optical alignment without user intervention
- System and sensor health check ensures high data fidelity

Traceability

- Optical frequencies validated every acquisition for accurate measurements
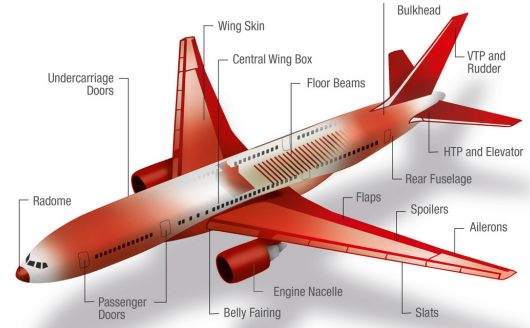- Strain sensors and associated coefficients calibrated with NIST traceable fixtures
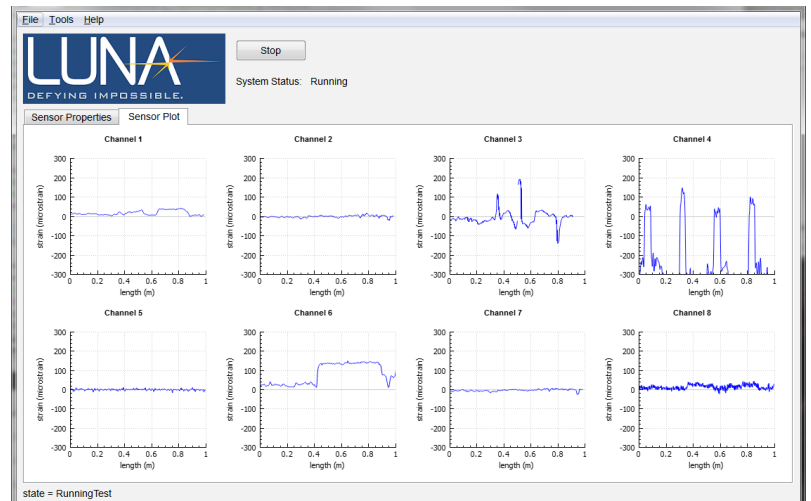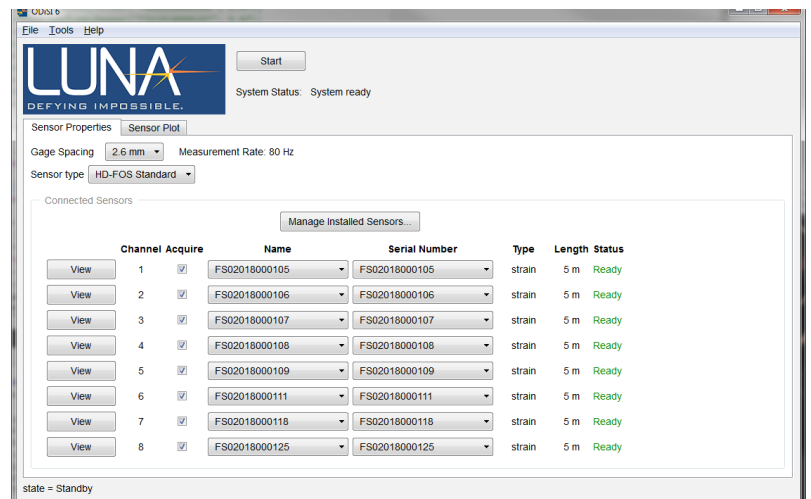
ODiSI 6100 Graphical User Interface

ODiSI 6100 STANDARD SENSOR CONFIGURATION

ODiSI comes configured to measure standard "Rayleigh" High-Definition Fiber Optic Sensors (HD-FOS). These are our most economical sensors based on measurement of the Rayleigh backscatter in optical fiber and are best suited for static or quasi-static applications. HD sensors are also perfect for measuring large strain gradients. The table below outlines the sensor lengths and associated resolutions one can achieve with the standard/base configuration ODiSI 6100.
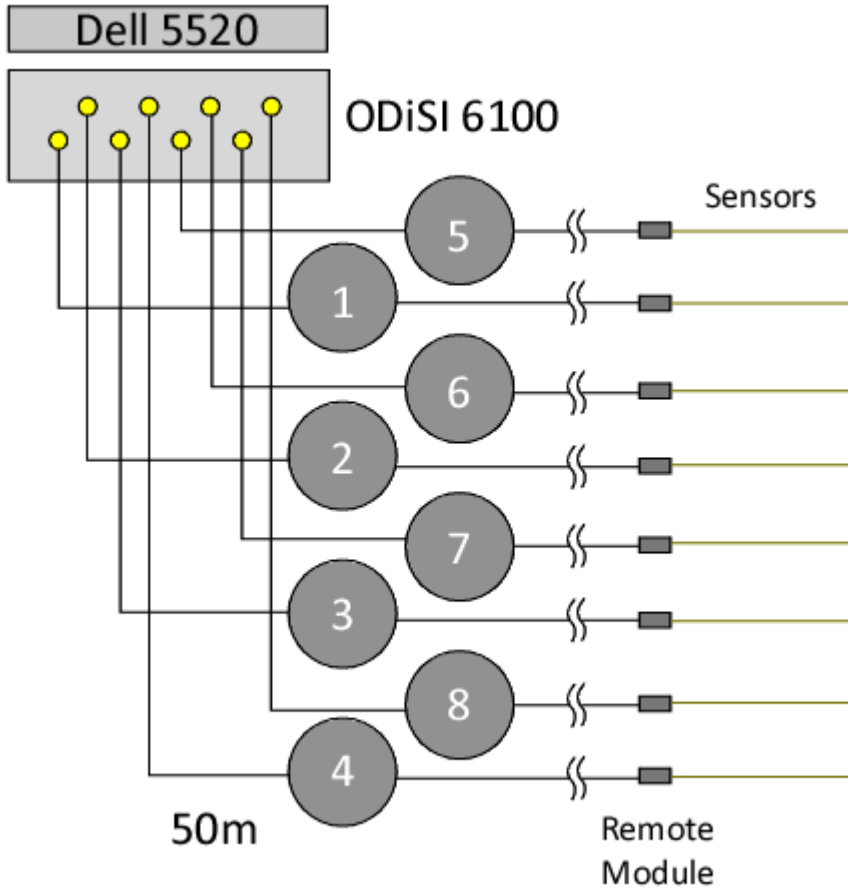
1-8 Standard Length HD Sensors - Measurement Rates					Strain Range
Max Length		2.5m	5m	10m	
Gage Spacing	2.6mm	62Hz	40Hz	25Hz	±12k µstrain
	1.3mm	31Hz	20Hz	12Hz	±12k µstrain
	0.65mm	15Hz	10Hz	6Hz	±12k µstrain

Graphical depiction of an 8-channel ODiSI 6100 (6108) configuration showing stand-off cables, remote modules and sensors
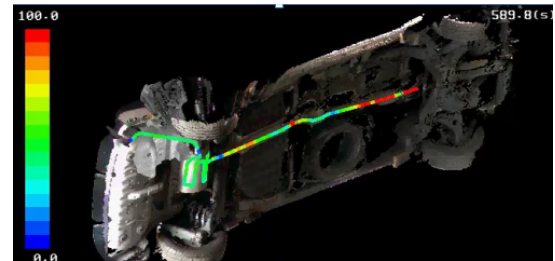

http://www.henkel-adhesives.com/

Transform Structural Testing

ODiSI is ideal for strain measurements on and in composite materials. From materials characterization, to FE model verification all the way to full scale test.

Accelerate Design

With continuous, high resolution mapping of strain and temperature, "hot spots" and large strain gradients are easily located and accurately characterized.

Sensor bonded on outer diameter of spring
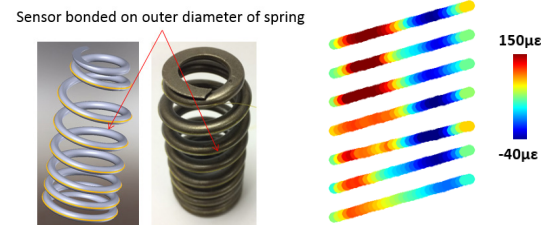
Ensure Quality

With no "line of sight" issues and the ability to bond to curved and otherwise difficult to gage locations, ODiSI sensors go where no other sensors can so you get the full picture of performance.

OPTIONAL FEATURES

EXTENDED RANGE FEATURE

This feature allows up to four channels of the ODiSI 6100 to measure strain sensors over lengths up to 50m.

- Adds 20m and 50m sensing length on 4 channels
- Channels must be purchased separately
- Each additional channel requires an extended length HD-FOS remote module (sold separately)

Extended - Measurement Rates				Strain Range
Max Length		20m	50m	
Gage Spacing	2.6mm	13Hz	5Hz	±12k µstrain
	1.3mm	6Hz	2.5Hz	±12k µstrain
	0.65mm	3Hz	X	±12k µstrain

HIGH SPEED CONTINUOUS FIBER GRATING SENSORS (HS-CFG)

This feature allows the use of Luna's continuous fiber Bragg grating (CFG) sensors. HS-CFG sensors provide enable larger signal to noise and higher speed measurements leading to higher performance in dynamic environments.

- Feature is available on all active channels
- HS-CFG sensors require additional, dedicated remote modules

HS-CFG Sensors - Measurement Rates				Strain Range
Max Length		2m	5m	
Gage Spacing	2.6mm	160Hz	100Hz	±3.3k µstrain
	1.3mm	80Hz	50Hz	±7.5k µstrain
	0.65mm	40Hz	25Hz	±15k µstrain

RAYLEIGH ACCELERATOR

This feature accelerates the measurement speeds for HD Rayleigh sensors (HD-FOS) by a factor of 4x. This option is ideal for applications that require the high data rates over large strain ranges. Rayleigh Accelerator is field upgradeable through a combination of software and the addition of a small, Thunderbolt® 3 expansion chassis with accelerator card.

1-8 Standard Length HD Sensors - Measurement Rates					Strain Range
Max Length		2.5m	5m	10m	
Gage Spacing	2.6mm	250Hz	160Hz	100Hz	±12k µstrain
	1.3mm	125Hz	80Hz	50Hz	±12k µstrain
	0.65mm	62.5Hz	40Hz	25Hz	±12k µstrain

| 1-4 Extended Length HD Sensors - Measurement Rates				Strain Range
Max Length		20m	50m	
Gage Spacing	2.6mm	50Hz	20Hz	±12k µstrain
	1.3mm	25Hz	12.5Hz	±12k µstrain
	0.65mm	12.5Hz	X	±12k µstrain

OPTIONAL FEATURES (continued)

3D VISUALIZATION SOFTWARE

ODiSI 3D Visualization Software allows strain or temperature data to be visualized in three dimensions directly on a CAD drawing of the test article. Load an .stl file of the test article, map sensor routing and view temperature or strain in three dimensions. Create movies of the evolution strain and temperature over time to gain greater insight into your design.

- Easily interpret and communicate complex data
- Visualize large data files using contour and 3D mapping
- Quickly focus on critical areas of interest in space and/or time
- Visualize and share ODiSI data mapped on imported .stl files
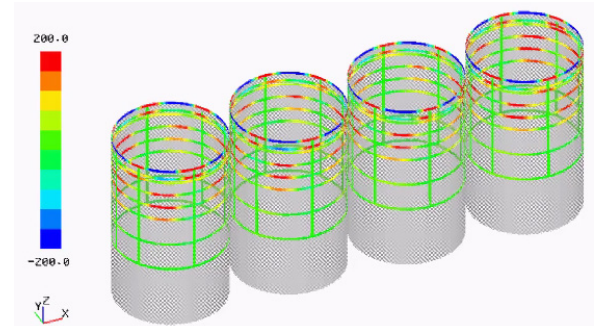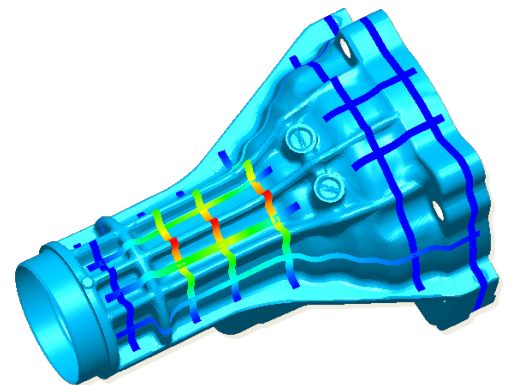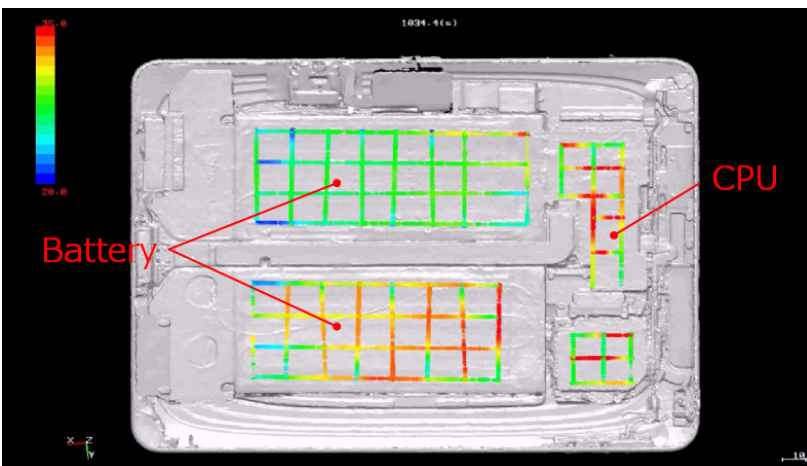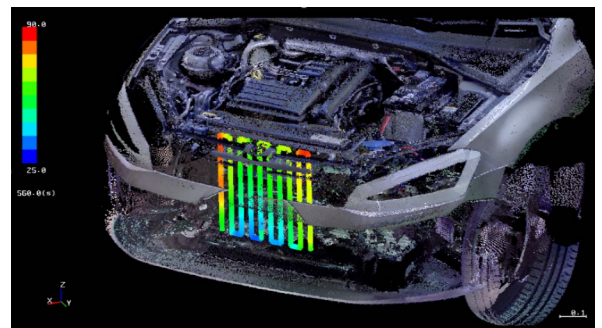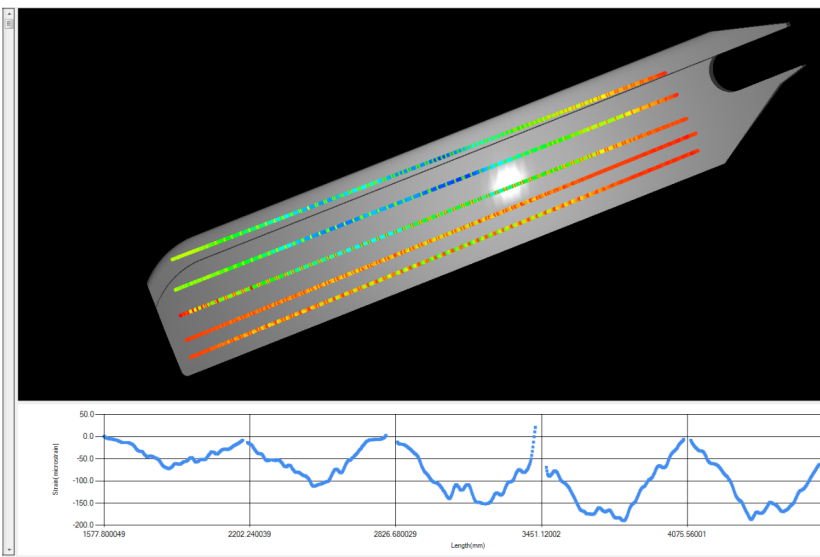
PERFORMANCE

PARAMETER	SPECIFICATION			UNITS
Gage Spacing	**2.6 mm**	**1.3 mm**	**0.65 mm**	
HD Standard Length Performance - Strain				
Range	±12,000	±12,000	±12,000	µε
Resolution	1	1	1	µε
Accuracy[1]	±30	±30	±25	µε
Repeatability at zero strain[2]	< ±5	< ±10	< ±20	µε
Repeatability across full strain range[3]	±0.15	±0.35	±0.55	%
Dynamic Loading Rate	5	2.5	1	Hz
HD Standard Length Performance - Temperature				
Maximum Temperature (Based on standard sensor. Custom sensors available upon request.)	300	300	300	°C
Minimum Temperature (Based on standard sensor. Custom sensors available upon request.)	-40	-40	-40	°C
Resolution	0.1	0.1	0.1	°C
Accuracy (consult factory)	-	-	-	°C
Repeatability	±0.01	±0.03	±0.06	%
HD Extended Length Performance - Strain				
Range	±12,000	±12,000	±12,000	µε
Resolution	1	1	1	µε
Accuracy[1]	±30	±30	±25	µε
Repeatability at zero strain[2]	< ±20	< ±30	< ±40	µε
Repeatability across full strain range[3]	±0.15	±0.15	±0.55	%
Dynamic Loading Rate				Hz
Continuous Fiber Grating Performance - Strain				
Range	±3,300	±7,500	±15,000	µε
Resolution	1	1	1	µε
Accuracy[1]	±15	±25	±35	µε
Repeatability at zero strain[2]	< ±5	< ±10	< ±20	µε
Repeatability across full strain range[3]	±1	±1	±0.5	%
Dynamic Loading Rate	10	10	10	Hz

NOTES

1. Accuracy reflects ODiSI measurements compared to NIST traceable extensiometer measurements. Data based on average of 150 scans at each of seven increments of strain, from 0 to maximum strain.

2. Repeatability at zero strain refers to offset from zero with no strain applied. NO filtering is applied.

3. Repeatability across strain range refers to average repeatability over full strain range. Repeatability is measured and reflects 2σ standard deviation from the mean with sample size of 150 scans. NO filtering is applied.

4. Specifications are subject to change at any time

ENVIRONMENTAL

ENVIRONMENTAL	ODISI 6100	ODISI CONTROLLER (LAPTOP)	RAYLEIGH ACCELERATOR	UNITS
Class 1 Laser	<10	N/A	N/A	mW
Operating Temperature Range	5 - 40	0 - 40	0 - 35	°C
Storage Temperature Range	0 - 40	-40 - 70		°C
Operating Relative Humidity (non-condensing)	10 - 90	10 - 90	20-90	% RH
Storage Relative Humidity (non-condensing)	10 - 90	10 - 95		% RH
Operating Altitude	-50 to 10,000 (-15 to 3,000)	-50 to 10,000 (-15 to 3,000)		ft (m)

PHYSICAL

PHYSICAL	ODISI 6100	ODISI CONTROLLER (LAPTOP)	RAYLEIGH ACCELERATOR	UNITS
Dimensions W x D x H	13.5 x 13.9 x 4.3 (34 x 35 x 11)	14 x 9.3 x 0.7 (36 x 24 x 17)	5.6 x 8.6 x 3.5 (14 x 22 x 9)	in (cm)
Weight	13 (6)	4 (1.8)	3.7 (1.7)	lb (Kg)
Power	50	130	60	W
Stand Off Cable	50	N/A	N/A	m

CERTIFICATIONS

ODiSI 6100

ORDERING INFORMATION

Catalog Number	Description	Includes
ODiSI 6100 ODiSI 6100-R	ODiSI 6100 Multi-channel Distributed Sensing Instrument. -R denotes rack mount option.	Instrument controller, one channel enabled, HD standard length mode (2.5m, 5m, 10m sensor lengths), one 50m stand-off cable, one remote module (to connect sensors), and ruggedized shipping case.
OPT6100-N	N additional ODiSI 6100 channels up to 7	Includes 50m standoff cable and remote module for each channel.
OPT6110	High Speed CFG Option	Adds high speed continuous fiber grating sensor option to all active channels. Includes one remote module.
OPT6115	Extended Range Option	Adds 20m and 50m HD sensing option on all active channels. Note: only 4 channels can be active simultaneously. Includes one remote module.
OPT6120	Rayleigh (HD) Accelerator	Increases measurement rates in HD/Rayleigh mode for 2.5m, 5m, and 10m modes up to 250Hz, 160Hz and 100 Hz. Includes Thunderbolt® 3 Expansion Chassis and Accelerator Card.

Catalog Number	Sensors Description
HDSXXLC220P	XXm HD strain sensor, LC2+connector, Polyimide coating, 220 °C
HDSXXLC300P	XXm HD strain sensor, LC2+connector, Polyimide coating, 300 °C
HSSXXLC200C	XXm HS CFG strain sensor, LC2+connector, Polyimide coating, 200 °C
HDTXXLC220P	XXm HD temperature sensors with Teflon sleeving, 220 °C

Luna Sales and Support Contact Information

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