ACELLENT technologies, inc

Structural Health Monitoring & Nondestructive Inspection Solutions

security monitoring

aircraft

submarines

oil drilling platforms

Products and Services

biosensing

nuclear power vessels

homeland security

ships

satellites

pipeline

bridges

automobiles

space transportation

buildings

www.acellent.com

ACELLENT technologies, inc

www.acellent.com

Profile

We are the leading developer of a revolutionary breakthrough technology in the emerging field of Structural Health Monitoring (SHM) and Nondestructive Inspection (NDI).

Acellent Technologies, Inc. develops, markets and manufactures sensor networks, hardware and intelligent diagnostic software (SMART® products) for real-time structural integrity monitoring. Our sensor and imaging technologies can examine beneath the surfaces of man-made structures (and humans themselves) to detect problems and test their soundness.

Our miniature sensors are easy to install, our rugged state-of-the-art hardware is extremely lightweight and portable, and our diagnostic software ensures data reliability and accuracy regardless of the environmental conditions.

Services

Every customer has a unique situation that requires a knowledgeable and customizable solution. As a result, we provide complete, customizable and comprehensive service packages to meet our customer's needs for a variety of structural applications.

1). Customization

Acellent's patented SHM systems can be specifically modified to obtain the desired results for your application. Utilizing our expertise in structural design and algorithm programming, we can produce detailed and easy-to-read diagnostic images to monitor your unique applications. We can build your customized SHM system you can have confidance in. We will manufacture all hardware and software modules to ensure an effective system.

2). Consulting / Research & Development

Our highly knowledgeable staff has more than 60 years of combined experience in the field of Structural Health Monitoring and are able to offer a variety of solutions for your specific application. Our Structural Health Monitoring systems can be modified to incorporate a variety of sensing types to ensure that the final design meets your requirements. We work closely with you to ensure a full understanding of what is required to deliver and implement the full utilization and benefits of our system.

3). Training

We provide a comprehensive training program for sensor network installation and system usage. Our trained personnel will be able to assess overall structural health and be able to make intelligent decisions regarding maintenance and repairs.

Contact us at: (408) 745-1188 or email at: support@acellentsensors.com

Structural Health Monitoring System

SENSORS

SMART Layers®

The patented SMART Layer® is a thin dielectric film with an embedded network of piezoelectric actuators and/or sensors. The layer can also incorporate other types of sensors such as strain and moisture sensors. The monitoring layer can either be surface-mounted on existing structures or integrated into composite structures during fabrication. Both options provide built-in nondestructive assessments of the internal and external states of the structure.

Features:

- **Ease of installation**
- **Consistently repeatable signals**
- **Shielded to reduce EM noise**
- **Robust hardwire connections**

Options:

Standard SMART Layers®

Standard SMART Layers® come with pre-designed piezoelectric transducers. Current purchasing options include:

- SL001 SMART Layer with 1 piezoelectric transducer
- SL005 SMART Layer strip with 5 piezoelectric transducers
- SL008 SMART Layer strip with 8 piezoelectric transducers

Single sensor

SMART Layer strip

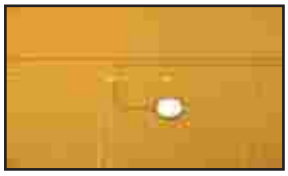
Custom SMART Layers®

Custom SMART Layers® can be customized to suit the needs of the application. The SMART Layers® can be manufactured in a variety of sizes, shapes and complexity. They vary in complexity from 2-sensor flat strips to multi-sensor three-dimensional shells. The layer can also incorporate other types of sensors such as strain and moisture sensors. Our experts can work with clients to customize the SMART Layers® to their specific application needs.

Bonded repair patch monitoring layer

Layer for complex hot-spot region

Hybrid PZT/fiber-optic layer

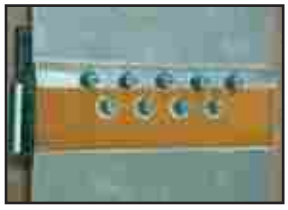


Multiple sensor wire connections to enhance SMART Layer® reliability

Installation

Installation Acellent provides standard installation kits that include installation manuals, adhesives, pressure pads and other accessories for fast and easy installation. Custom installation services are also provided for long-term applications. For more information contact Acellent personnel at: (408) 745-1188 or email: support@acellentsensors.com

Integration with new and existing composite structures

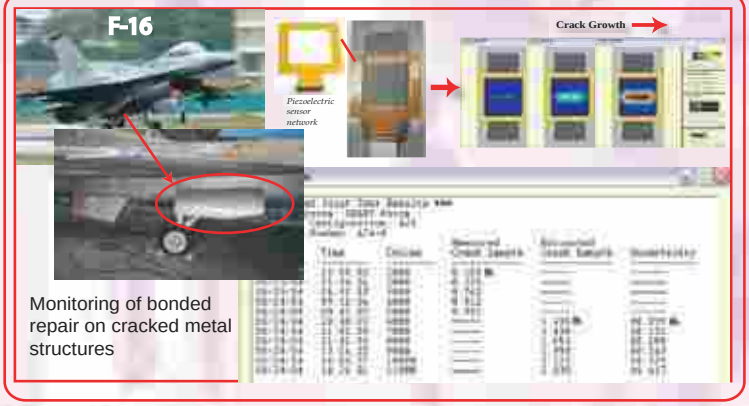


Surface mounted on metal structures

APPLICATIONS

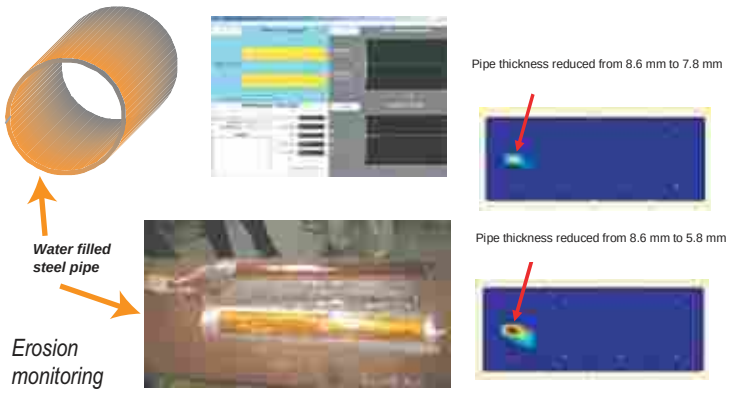
Acellent's Technology can be used for monitoring the integrity of structures in a variety of applications in the aircraft, spacecraft, automotive and civil markets. Primary applications include:

1). Damage Detection



Monitoring of bonded repair on cracked metal structures

SMART Layer® patches can be mounted on the surface of bonded repair in order to monitor crack growth beneath the repair patch. Potential applications for these patches include repairs conducted on aging aircrafts.



Erosion monitoring

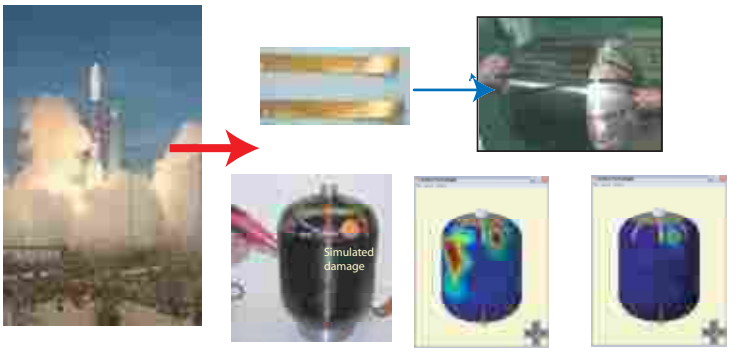
Erosion, corrosion and associated damage in pipeline structures can be monitored continually in hard-to-reach and labor intensive areas. Potential applications include all types of natural gas, water and oil pipelines, aircraft and ships.

DAMAGE DETECTION: Acellent's active system can be used as a nondestructive inspection tool for monitoring of damage in critical structural areas on both metal and composite structures. The active hardware is used to automatically instruct actuators to generate pre-selected diagnostic signals and transmit the signals to neighboring sensors whose response can then be interpreted in terms of damage location and size. The system is easy to use on any type, shape and size of structure and the sensor network layer can be installed in minutes* in both acessible and inacessible areas using standard adhesives. The hardware can be plugged in at anytime to obtain structural information. Diagnostic imaging tools help detect and track damage growth in the structures.

Salient applications include monitoring of:

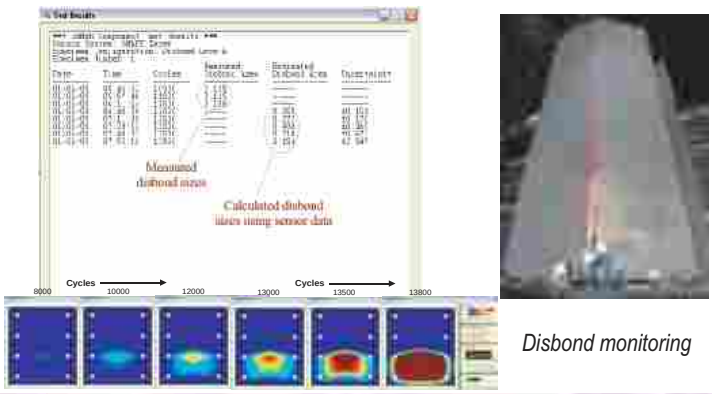
- Crack initiation and growth
- Impact damage
- Environmentally induced damage
- Disbonds and delaminations
- Corrosion/Erosion

* installation time varies with size of structures



Damage & environmental monitoring

SMART Layer® strips can be designed and embedded inside filament wound composite structures during manufacturing itself and co-cured with the part. Impact damage inflicted on the part can be visualized using customized software developed at Acellent. Potential applications include monitoring of solid rocket motors and liquid fuel structures.



Disbond monitoring

The technology can be used to track and size disbonds and delaminations occuring in composite structures and bonded joints. Potential applications include any type of composite structure, bonded repairs and joints.

APPLICATIONS

2). Impact Detection

Monitoring of Impact on composite and metal structures

Large area monitoring

Composite and metal structures can be monitored for damage caused by external loading conditions such as impact, and ballistic damage. Potential applications include manned and unmanned air vehicles.

Large areas can be monitored for damage occuring due to external forces that can lead to catastrophic failures. Potential applications include missiles, thermal protection structures and other space structures.

IMPACT DETECTION: Acellent's Impact Detection System can alert you to potentially serious external impact events. Using the innovative and revolutionary SMART Layer® network with Acellent's Passive Diagnostic Hardware and Software, large areas of a structure can be continually monitored and will identify external impact events in real time. Information given by the system includes:

- The location of impact on structure
- The time of impact
- The force of impact
- The magnitude of impact
- The severity of impact

The system can be used in a variety of applications ranging from crash sensing in the automotive market to impact event detection for large missile structures-

The impact detection system can be used for crash sensing in automotive applications. Potential areas of application include pedestrian crash sensing, front and side crash sensing.

Monitoring of Wind Turbines

Wind turbines subjected to damage from external impact can be monitored using an on-board impact detection system.

SOFTWARE

Acellent's software comes with a variety of data aquisition and user-friendly display functions to simplify the structural monitoring process. With the push of a button, the software can instruct the hardware to actively interrogate the structure (using the SMART Layer®), collect the diagnostic data and then display the data in real time.

Whether you are monitoring crack growth of ballistic impact damage in an airplane wing, assessing corrosion damage in buildings and bridges, or doing preventive maintenance on automobiles, our software their corresponding SMART Layers® can be tailored to meet your specific needs.

For example, it can be used passively to detect impact events occuring in real-time, to fix the location of sensors and actuators in position, to display the location and severity of various types of hidden structural damage and to predict catastrophic failure before it occurs.

1). ACESS

The basic version* provides the user with a simple tool to help configure the sensor location and acquire data during monitoring. Multiple diagnostic wave types can be generated using the software including 3-peak, 5-peak and 10-peak narrow band frequency waveforms as well as chirp, random and user-defined wave types. Basic features include:

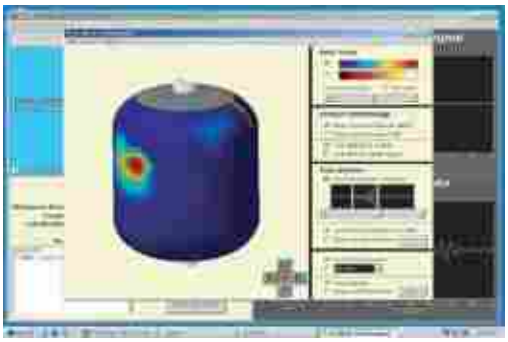
* Diagnostic imaging module for real-time visualization of structural changes.
* User-friendly interface
* Built-in data processing and visualization
* Easy-to-use data management tools

* also available as Advanced, contact our customer service for details.

2). SmartComposite

For detection of impact-induced damage or delamination/ debonding in large composite structures. Features include:

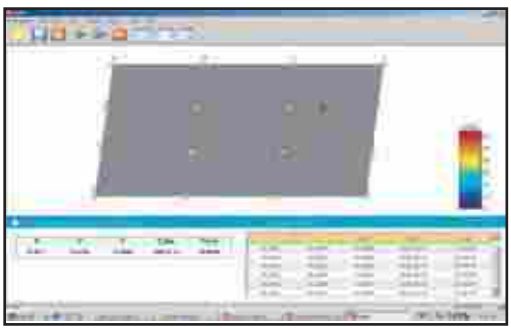
* Automated easy-to-use software to provide users with data with minimized input.
* User-friendly sensor layout GUI
* Damage quanitification with automated image of damage location on the structure
* Environmental compensation capability
* Reduced false positives & Sensor self-diagnostic capability
* Auto detection and compensation for degraded sensors.



3). AIM

Acellent's Impact Monitoring software provides the capability to utilize the system continuously in real-time to detect:

* External impact events
* Time of impact
* Location of impact
* Impact energy/force



DIAGNOSTIC HARDWARE

ACTIVE HARDWARE

Portable diagnostic instruments have been designed to interface with a network of piezoelectric transducers for active sensing. Using the latest technology for waveform generation and data acquisition, the active hardware interface with a SMART Layer® utilizes Acellent's intelligent software to provide a completely robust active SHM System. The hardware has the built-in capability to generate a specific waveform for structural diagnostics, can collect sensor data with high sampling rate and resolution, and has multi-channel capability to accommodate a network of sensors.

1). ScanGenie

The ScanGenie is ideal for use with the SMART Layer ® piezoelectric transducers and has the following features:

* Through Transmission (pitch-catch) mode
* Transmit
  - Programmable arbitrary pulsed waveform generator
  - Up to 700Khz transmit frequency
  - Maximum transmit voltage +80V
* Receive
  - 10khz to 5MHz Bandwidth
  - Programmable receiving signal amplitude equalization
  - Sample rate up to 48 MS/s, 12-bit resolution
  - Up to 4 channels for temperature sensors
  - Programmable recieve signal filter network
* Sensor self-diagnostic capability
* Standard 64 channels
* Standard cables and connectors
* USB 2.0 connect to notebook computer
* 1-year warranty

2). SCS4300

SCS4300 Acellent's ultra-high speed system can generate arbitrary waveforms at the conversion rate of 300MHz and acquire data at the sampling rate up to 400MHz in single-channel mode and up to 200MHz in dual-channel mode.

* 12-bit data acquisition
* 12-bit waveform generation resolution
* Data acquisition software
* Operating System: Windows
* 1-year warranty

PASSIVE HARDWARE

The diagnostic hardware for use in passive/impact sensing. The system can be customized to any form factor.

PSS6400

The PSS6400 has 64 channels to simultaneously connect to 64 piezoelectric transducers. PSS6400 comes with the following components:

* Wireless passive instrument with dimensions 8" x 4.25" x 8.5"
* Connection block to connect the hardware to the SMART Layers®
* Laptop
* AIM Software
* 1-year warranty

ACELLENT technologies, inc

www.acellent.com

Getting Started

Acellent's premium SHM System is offered in many configurations:

SMART Packages®:

Our 2 SMART Packages® include the following:

- ScanGenie 64 Channel Active scanning Hardware
- Switch Amplifier
- Laptop with remote control software (specfically required)
- 3m long 37 pos to 15 pos extension shielding cable
- 2m long 25 pos to 25 pos cable (ScanGenie-SA)
- ***Either*** (1.) 16 individual Single Sensors or
  (2.) 2 SMART Layers® of 8 sensors
- Advanced ACESS with diagnostic imaging tools

CUSTOMIZED SOLUTION:

All of the above fully customized to suit your specific and individual application(s).

Our Goal

* **Improve public safety**
* **Increase structural reliability**
* **Reduce costs for structural analysis and evaluation**
* **Reduce structure or vehicle downtime for inspection**
* **Reduce life-cycle costs with improved maintenance scheduling**

For more information, contact us at:

Acellent Technologies, Inc.
835 Stewart Drive
Sunnyvale, CA 94085
Tel: (408) 745-1188 *Fax:* (408) 745-6168
Email: support@acellentsensors.com