STOP THE UNPLANNED SHUTDOWN

Now you can detect a structural failure in real time- before it happens.

While systematic monitoring has increased in importance, structural monitoring, including gasket, seal, diaphragm, pressure vessel and solid component structural health monitoring is only conducted after the failure occurs. As a result, once a breakdown happens, forced shutdowns must be initiated- which loses money and manufacturing time.

MCET has developed technology that can provide real-time structural monitoring of pressure and structural integrity by using non-invasive embedded sensor technology that uses multi-walled, nanotube technology.

MCET Cutting-edge Structural Damage Detection Technology

While structural failures represent both a financial and safety risk for a variety of industries, failure mode assessment is most likely undertaken after the structural failure occurs, and any repairs or recommendations are made because of the failure- and the damage has occurred.

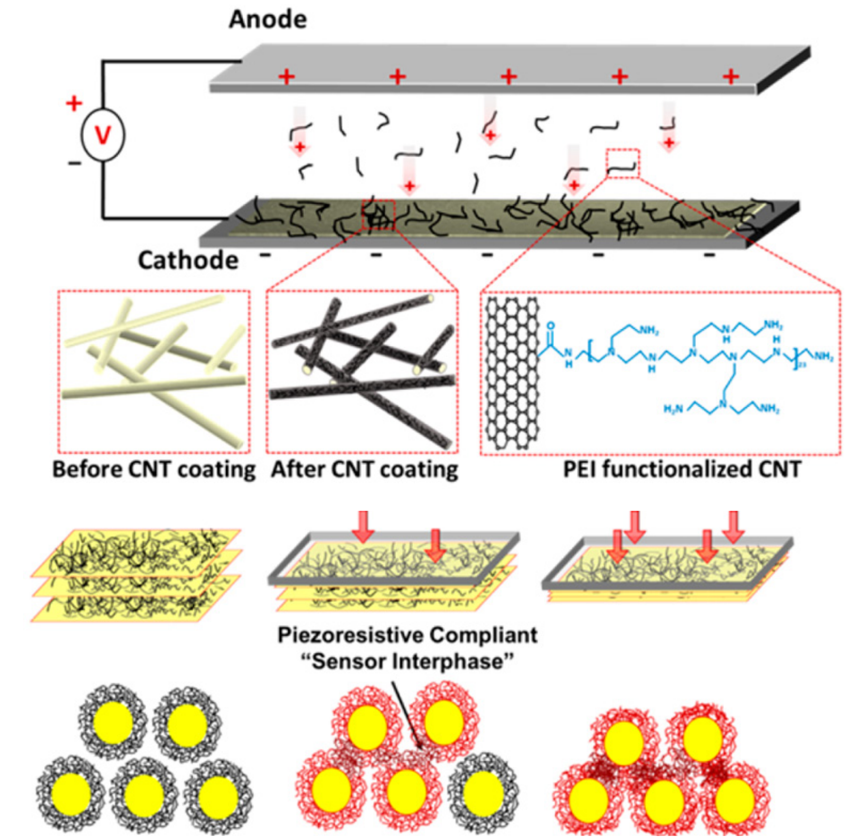
MCET Technologies has developed a series of patents that utilize multi-walled carbon nanotubes to be applied as a thin layer (less than 1mm) on a wide variety of fabrics, such as woven, non woven, or knit fabrics.

Some of our advantages:

- Non-invasive technology- no "foreign object damage"
- High temperature resistant
- Potential application on surface of structure- or on matrix within it
- Utilization of fibers as backbone of sensing network enables broad sensing area
- Pressure sensing range from 10 kPa - 40 MPa or more
- Able to withstand repeatable bending/multiple strains

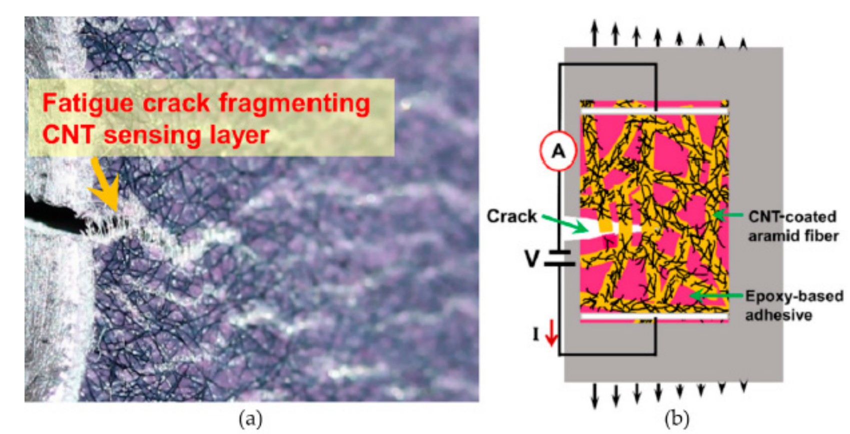
MCET technology can be applied to a wide variety of fabrics, such as woven, non woven, or knit fabrics that include multiple layers of randomly oriented short fibers in a variety of substrates such as glass, aramids, carbon, or other types. Our technology can also be applied to detect and monitor fatigue crack initiation and propagation in metal and concrete structures. The carbon nanotubes form an electrically conductive percolating network that is dependent on the contacts between the millions of nanotubes deposited on the fabric.

Carbon Nanotube-based Textile Sensors



The EPD technique enables the creation of a uniform carbon nanotube-based nanocomposite coating, in the range of 250−750 nm thick, of polyethyleneimine (PEI) functionalized carbon nanotubes on nonconductive fibers. In this work, nonwoven aramid fibers are coated by EPD onto a backing. Electrode followed by film formation onto the fibers creating a conductive network.

Fatigue Crack Monitoring: Structures



CNT-based thin films have been shown to work well as strain sensors. The small size of the nanotubes, combined with their ability to create electrically conductive networks offers the potential to detect deformation and damage of composite materials in situ and in real time.

Potential Applications

Potential application range or industry types for technology:

Heavy Industry/Energy

- Sealing Systems
- Valves/flanges
- Expansion Joints
- Critical Components
- Heat Exchangers
- Pipeline Systems
- Pressure Vessels
- Pumps/Compressors
- Gaskets
- Well Pad Monitoring
- Boiler Tube Monitoring
- Boiler Feed Pumps
- Diaphrams

Logistical Systems

- Critical Components
- Belts
- Valves

Pharmaceutical

- Valves/flanges
- Sealing systems
- Diaphrams
- Gaskets
- Pressure Vessels

Sagar M. Doshi, PhD

Dr. Doshi's research focuses on processing and characterization of nanomaterial-based hierarchical composites. Doshi has collaborated extensively with researchers from Civil Engineering, Biomechanics and Electrical Engineering to develop novel solutions for structural health monitoring of civil infrastructure and low-cost wearable sensors for human motion analysis.

Erik T. Thostenson, PhD

Dr. Thostenson's research focuses on processing and characterization of composite materials based on carbon nanotubes, graphene, and advanced fiber reinforcements toward the development of multifunctional composites. During the course of the research, he has developed novel processing and characterization techniques for the development of structure/property relationships and in situ sensors in nanotube-reinforced polymer and ceramic composites.

Dan Bryan

Mr. Bryan is a marketer and business development analyst with 20 years of experience of market research and analysis, concept design,Voice of the Customer, and product launches in industrial and and composite markets. A Black Belt in Voice of the Customer market research, Mr. Bryan has utilized an extensive knowledge of customer needs to develop products and strategies in industrial B2B and B2C markets.

MCET (Multifunctional Composites and Engineered Textile Technologies) is a spin-off company from the University of Delaware, Center for Composite Materials and Department of Mechanical Engineering. We focus on developing and commercializing textiles and advanced composite materials that are engineered with state-of-the-art nanostructured materials. Our major applications include smart textiles, wearable flexible and comfortable to wear sensors for rehabilitation monitoring and for structural health monitoring.

Our technology is based on 20+ years of research at the University of Delaware that has focussed on processing and characterization of nanostructured materials and their composites. MCET Technologies research leverages research funding from a variety of resources, including the National Science Foundation, Office of Naval Research, Army Research Office, Federal Highway Administration and National Institutes of Health along with industrial grants and collaboration awarded to Professor Thostenson's research group.

MCET

Technologies