

## Detecting Damage in Structural Components with New Infrared Technologies

**Small Business:** Fuchs Consulting, Inc.

**Principal Investigator:** Paul Fuchs, President

**Project:** ThermalStare Innovative Infrared Systems

**Funding Agency:** Federal Highway Administration

**Phase I:** \$100,000

**Phase II:** \$750,000

The U.S. Department of Transportation's (USDOT) highly competitive Small Business Innovation Research (SBIR) program awards contracts to small businesses to pursue research on and develop innovative solutions to transportation challenges. Small businesses that participate in the program have developed numerous innovative technologies that have benefitted the department and the public. Under the program, Fuchs Consulting, Inc. (FCI) developed condition assessment solutions using new infrared-based technologies. The technologies allow for greater cost savings, increased safety, and more accurate condition assessments.

### The Technology

With the support of the USDOT SBIR program and the Federal Highway Administration (FHWA), FCI developed a suite of infrared-based technologies that:

- Assess the condition of paint coatings
- Image subsurface damage in concrete
- Measure the level of stress in steel

These data are then used by customers to inform key decisions on maintenance and repairs.

### The Challenge

Deterioration in bridges and other structures commonly manifests from subsurface damage that cannot be detected through visual inspections. Once the subsurface damage is observed through visual inspection, deterioration has advanced to a stage where significant repairs or even replacement may be required.

Technologies that can detect the onset of deterioration in its earliest stages allow for prompt detection and repair that can save money and improve safety.



**The Infrared Coating Inspection System (IR-CIS) inspects the flight deck of an amphibious assault ship to detect defects that may result in damaging conditions for aircraft. (Fuchs Consulting, Inc. photo)**

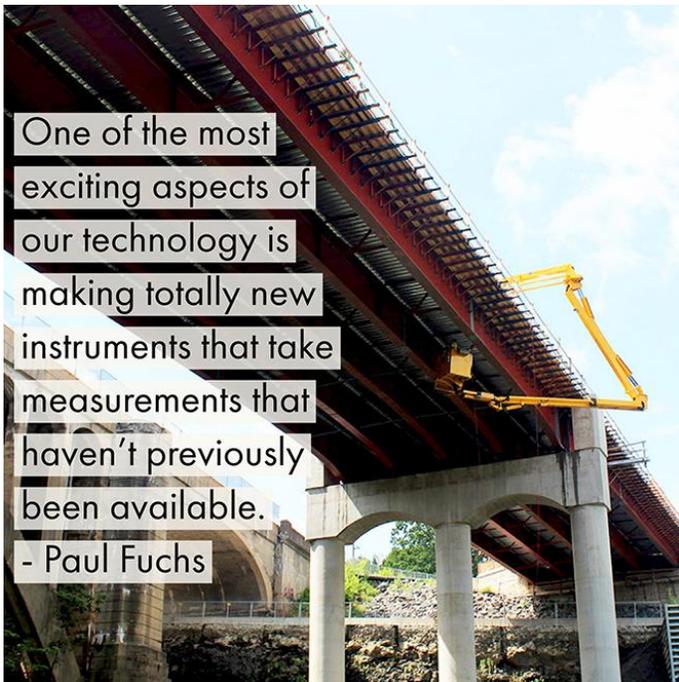
The suite of technologies developed by FCI addresses this need for early detection of damage and provides unique new measurements that were not previously achievable. The transformative nature of the technology requires new paradigms to make optimal use of the information provided, and FCI works closely

# U.S. DOT SBIR Success Story

with its customers to ensure the full benefits of the new ThermalStare technologies are realized.

## The Benefit

ThermalStare infrared technologies are being used by state Departments of Transportation, engineering companies, and military agencies to meet their most challenging inspection and condition assessment needs. New and innovative applications are being developed that capitalize on the unique capabilities of the infrared-based technologies developed by FCI.



**ThermalStare infrared technology being used to inspect a bridge for possible subsurface damage. (Fuchs Consulting, Inc. photo)**

The ThermalStare infrared technology ability to accurately detect and image subsurface damage in concrete improves highway bridge decision making for maintenance, repair, and rehabilitation. Without the need for traffic control, the new technology reduces the cost and disruption associated with detailed condition assessments while providing more accurate

information on hidden damage below the surface. The data's accuracy can help avoid the cost and disruption caused by project overruns and allow for early intervention to reduce repair needs.

ThermalStare technologies can also detect defects in specialized coatings used for military applications, which is critical to prevent damage to aircraft and ensure safe flight operations. The technology replaces subjective, time-consuming, hands-on inspections with a more accurate, repeatable, real-time measurement that documents the position and extent of damage.

Because the technology is more robust than current practices, repairs are lower in cost, have less operational impact, and can prevent accidents that may have otherwise occurred.

## The Future

FCI continues to support the development and commercialization of the ThermalStare technologies with the intent to increase the amount of inspection services it provides. The company continues to collaborate with a diverse customer base to develop specialized services.

## How SBIR Helps

The SBIR program has provided resources to develop, refine, and implement instrumentation that makes it possible for the ThermalStare infrared systems to be produced and sold commercially in the United States and abroad.



To learn more, visit: [www.volpe.dot.gov/sbir](http://www.volpe.dot.gov/sbir)