

System Integration of Glass Sensors

IFF Weimar e.V.

Glass sensor engineering results implemented in constructional design solutions for large-area glass structures.

Laboratory-level testing of prototypes for constructional aspects.

A functional model and software have been developed to communicate with sensors and actuators for:

- Acquisition and logging of measured data
- Evaluation of preset limit values
- Powering connected actuators via an interface box

An integrated graphical user interface visually presents current and previously logged sensor data and facilitates convenient input of limit values that are subject to monitoring.

Functional Model

Post & ledger façade with integrated-sensor
TILSECURE composite safety glass



Awards

- Gold medal
- Bronze medal



Project partners



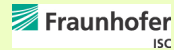
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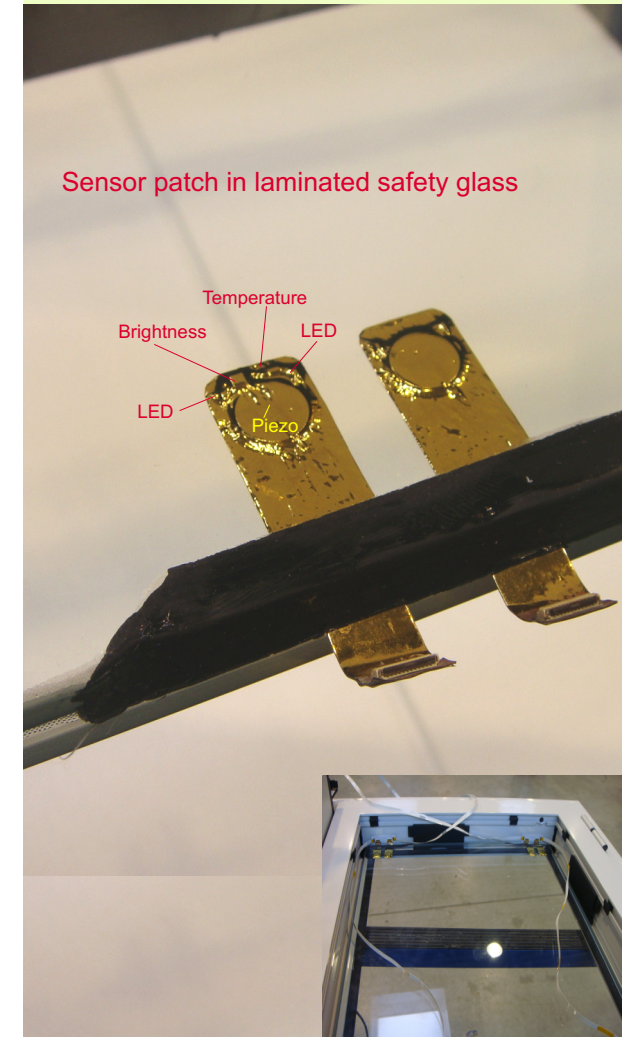
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Integration of continuous-monitoring, multi-purpose control functionalities in shell structures with large-area glazing - glass sensors



R&D Project for Glass Sensors

Large-areas of glazing dominate modern architecture. However, following numerous cases of damage or loss, their safety performance is coming under closer scrutiny.

Four partners from industry and science have developed solutions to monitor glazed building shell structures and integrate multi-purpose control functionalities into building facility management.

Glass Sensor Technology Results

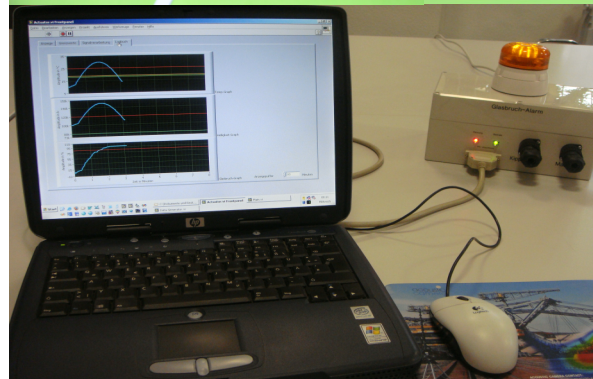
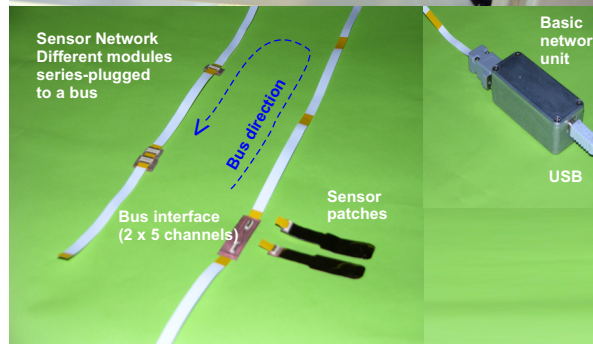
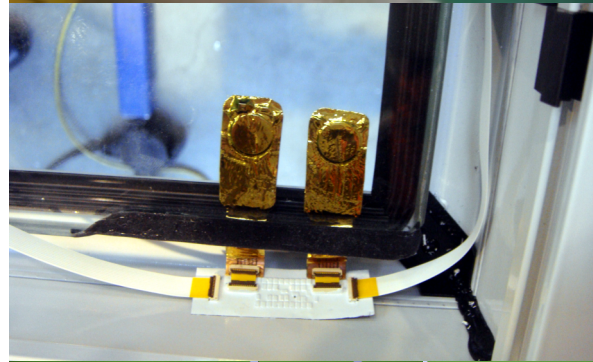
Integration of continuous-monitoring, multi-purpose control functionalities in façade or roof structures with large-area glazing sections has been achieved through extensive networking of local clusters that evaluate connected sensor chains.

TILSECURE design features:

- Multi-purpose, flat sensor patches
- Laminated safety glass with built-in sensors
- Modular, cluster-based data acquisition and evaluation system
- Software for sensor and actuator communication with integrated graphical user interface

Benefits

- Increased safety due to continuous monitoring of glazed façade or roof structures (increased personal security, reduced material damage)
- End-to-end quality control through supervision of sensor-integrating laminated safety glass panels to prevent damage for manufacturers, shipping companies and constructors
- Continuous monitoring intelligently combined with control tasks in order to tap saving potentials through bundled functionality
- Low-consumption electronics and standard interfaces for easy integration of local networks within a building structure or facility management system



Sensor Development

Fraunhofer ISC

Specific piezo-electric convertor design.

Cracks were introduced in sensor-integrating laminated safety glass in a selective manner and fault detection was tested using various methods of measurement. Ultrasonic analysis has clearly shown that initial cracks which extend over a length of 5 mm and more at the glass rim are reliably identified by such piezo-electric converters.

Composite Glass Sensor Technology

TILSE FORMGLAS GmbH

Manufacturing of sensor-integrated laminated safety glass types (VSG) as part of a polyvinylbutyral (PVB) compound.

Technology developed for embedding sensor patches in PVB.

Sensors must be able to withstand temperatures ≤ 140 °C and technological pressure loads. The adhesive which is used for sensor fixation must not enter into any reaction with the foil and must withstand identical load levels to those during the sensor compounding process.

Solutions developed to protect terminal points and connecting cables.

Cluster-Based Evaluation System

KT-Systems GmbH

A fully cluster-based data collection and evaluation system has been developed for multi-functional sensor units to assess the quality of glass for facility management purposes in real time.

Development of flat sensor patches with:

- Piezo-elements
- Programmable LEDs
- Temperature sensors
- Brightness sensors

All sensor patches include terminals for connection with a bus interface that transmits the signals to an energy-saving basic unit via a sensor net bus. The basic unit in turn drives the modular sensor network with terminal points for power supply (5V with USB) and internal facility infra-structure communications (USB or Ethernet).