



Sentinel AI™

Structural Monitoring using AI-Driven Sensing during Construction

PRODUCT SPECIFICATION

Reduce Risk of Structural Failures with Automated SHM



StructureIQ's AI-driven SHM Service

Modern building construction operates under increasingly complex structural demands — accelerated project timelines, evolving material systems, higher-performance design standards, and exposure to dynamic environmental and load conditions throughout the build cycle. From high-rise commercial developments to large-scale mixed-use and infrastructure projects, structures experience variable loading, material curing effects, equipment-induced vibration, and weather-related stressors that periodic inspections and manual QA processes often fail to fully capture. For developers, contractors, and project stakeholders, the implications of undetected structural anomalies are significant: rework, schedule delays, cost overruns, and latent defects that can compromise long-term asset performance and safety.

StructureIQ deploys wireless sensor networks across critical structural elements — foundations, vertical load paths, slab systems, transfer beams, temporary supports, and high-risk construction zones — delivering continuous, real-time structural condition intelligence through Sentinel AI, its secure cloud-based SaaS platform.

Sentinel AI™



Key Highlights:

- **Continuous Structural Performance Monitoring:** Real-time measurement of structural response across all phases of construction, from load-in to commissioning
- **AI-Enabled Fatigue & Anomaly Detection:** Early identification of stress accumulation, fatigue, and abnormal behavior often missed by traditional inspections
- **Event-Based Notification:** Immediate alerts following impacts, load shifts, or seismic activity affecting the structure
- **Shutdown Cost Avoidance:** Proactive insights enable targeted intervention, minimizing unnecessary work stoppages and cost overruns
- **Rapid Post-Event Assessment:** Objective data supports fast, confident decisions on structural integrity and return-to-work timing

PRODUCT SPECIFICATION: StructureIQ AI powered SHM Service

Sentinel AI - SaaS Architecture

Xnode Wireless Smart Sensors

StructureIQ's wireless smart sensors provide real-time structural health monitoring by precisely measuring vibration and tilt. These ruggedized devices utilize onboard edge AI to filter raw data, identifying critical events. Data is transmitted via low-power protocols to a wireless gateway, eliminating the need for invasive and costly cabling across infrastructure.

Gateway and Cellular data

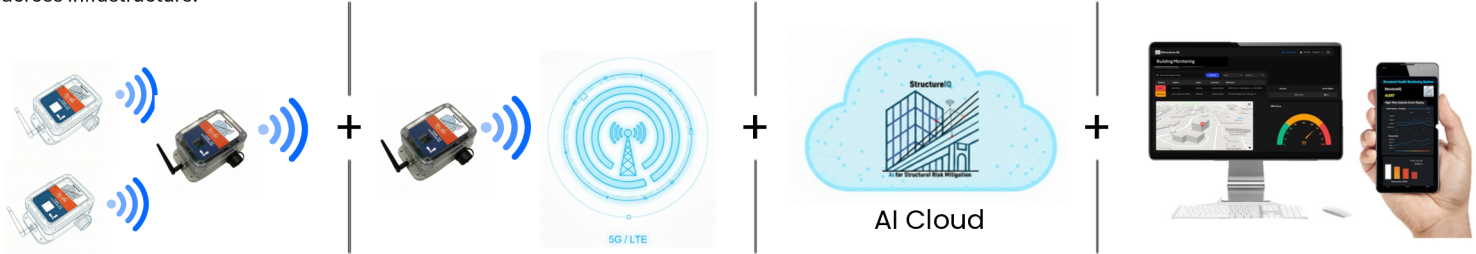
The StructureIQ Gateway acts as a secure bridge, collecting high-precision vibration and tilt data from wireless sensors via low-power protocols. After local verification and edge buffering, the gateway utilizes an encrypted 4G LTE/5G cellular uplink to transmit data through a private APN, ensuring cybersecurity.

AI Cloud & SHM Data Analysis

In the StructureIQ Data Cloud, AI algorithms de-serialize and normalize this time-series data. The engine then performs automated feature extraction to distinguish routine environmental noise from critical structural anomalies.

SHM data SaaS delivery

Insights generate real-time risk profiles and alerts delivered directly to the secure Sentinel AI SaaS dashboard for engineering and insurance assessment. The Structural Condition Index (SCI) score provides a single composite health metric per asset.



Core Capabilities

- Wireless smart sensor deployment – Rapid installation with minimal disruption
- Automated anomaly detection – Identifies deviations from established baselines
- Post-event structural assessment – Faster safety and occupancy decisions
- Secure cloud-based dashboard – Remote visibility anytime
- Secure SaaS delivery (no client IT infrastructure required)
- Scalable from single building to enterprise portfolio
- Subscription-based SaaS service model

What Gets Monitored

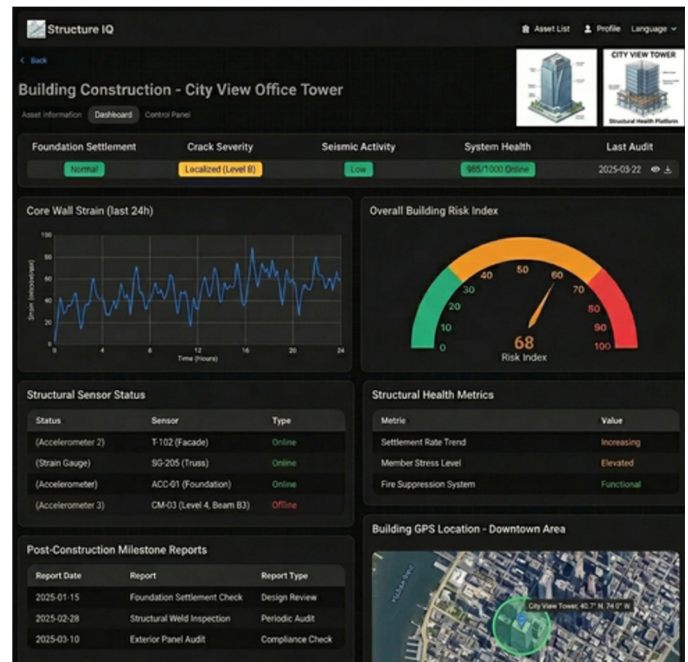
- Vibration (Acceleration), Temperature
- Tilt – Settlement, drift, structural movement
- Impact Detection – Ship/Vehicle strikes
- Trends – Deterioration and performance shifts

SaaS Features

- Real-time alerts (SMS, email, dashboard)
- Automated event reports
- Structural health scoring
- Multi-asset portfolio dashboard

Note: Cost and performance figures represent cross-industry benchmarks; terminal-specific performance data will be developed through initial pilot deployments.

Construction Dashboard



Sensor configurations shown are illustrative of monitored parameters; actual deployment specifications are tailored to each project.

