



Structural Risk Assessment And Management

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Imagine a diagnostic device so sophisticated that it could look inside an artery or spinal structure and evaluate not just the current state of its health but also the rate at which that health is changing. And, even more remarkably, does so without disruption to daily activities. That analogy comes closest to illustrating the uniqueness of STRAAM.

MISSION

Enhance the safety of infrastructure through **a)** revolutionizing the way in which precise **structural integrity assessment** is achieved and **b)** bridging the gap between the design and engineering of a structure and the reality of its current structural integrity/strength

STRUCTURAL INTEGRITY ASSESSMENTS

- Non-invasive, non-destructive techniques that combine technology, invention and experience
- Does not require operations to be shut down, diverted, or otherwise altered from "normal" daily state
- Does not require additional stimuli - ambient vibrations are all that are needed

STRUCTURES THAT CAN BENEFIT FROM STRAAM SERVICES

Structures that degrade over time due to natural causes (water, salt, wind, sun, seismic, storm) or manmade (truck, train, car or ship accidents; flammable materials or destructive materials, excavations, poor craftsmanship or design)

- Rail Bridges
- Roadway Bridges
- Roadway Signs
- Dams
- High Rise Towers
- Historic Buildings
- Cranes
- Power Plants
- Hyperbolic Cooling Towers
- Wind Turbines
- Mission Critical Facilities
- Transmission Towers
- Off-Shore Platforms
- Jettys/Docks

Seismic Response Program

- Through the continuous monitoring of a structure, a real-time assessment of a structure's ability to perform safely after a seismic event
- Provides a science-based opinion to owners, operators and structural engineers permitting informed decisions about safe operation
- Identification of "structural integrity fractures" (hidden damage)
- Interruption to commercial business is minimized
- Minimizes loss of life and property damage
- Information gained through seismic event monitoring can be used to ensure that post-event repair achieve its goals, and that post-event construction is designed by incorporating the structure's previous response to an "event"

Pre and Post Rehabilitation Programs

- Prior to the beginning of a rehabilitation or a strengthening of a structure, a structural integrity assessment is made and the resulting "Dynamic Signature" is placed into the STRAAM "Dynamic Signature Vault"
- Upon completion of the work, another set of measurements are taken and another structural assessment is made – a comparison of the pre and post-repair dynamic signatures provides a science-based opinion as to whether or not the repairs achieved the design goals

Railway and Roadway Bridge Repair Prioritizations

- Rapid inspection of similar bridge types to prioritize repair according to safety threat level

Virtual Load Tests

- A structural assessment will be performed, and the results will provide an analysis of structural deficiencies and serviceability deficiencies
- Vulnerability assessment: current dead load; planned future dead load; current traffic loads; planned traffic loads; earthquake loads
- Hazard assessment: determines the magnitude of existing and potential future loads described in the vulnerability assessment

Emergency Response Programs – accidental (car, truck, barge, ship), flood or storm (tornado, hurricane, tsunami), or blast (terrorism, chemical)

- A structural integrity assessment is made and the resulting "Dynamic Signature" is placed into the STRAAM "Dynamic Signature Vault"
- Immediately after an "event", a **STRAAM SKG™** is brought to the scene and one hour of data is collected
- A comparison of the pre and post-event dynamic signatures provides a science-based opinion to owners and operators permitting informed decisions regarding the reopening of the structure, it's repair, or it's demolition
- Identification of "structural integrity fractures" (hidden damage) can be ascertained
- Post event repair can be compared to pre event structural integrity levels to ensure the "fix" worked

Continuous Monitoring Programs

- Designed specifically for structures that are threatened by nearby excavation, construction, demolition or ongoing structural stress (dams, off-shore platforms, buildings or bridges adjacent to construction sites, wind turbines, power plants, etc.)
- A structural integrity assessment is made using an **SKG DCS™** and the resulting "Dynamic Signature" is placed into the STRAAM "Dynamic Signature Vault™"
- An **SKG CMS™** is placed into/onto the structure and the resulting 24/7 monitoring is made available in real time to key personnel, regardless of where they may be (utilizing text messaging, emails, wired or wireless)

SKG DCS™	Data Collection System	Portable system used to turn ambient vibrations into usable data and then place that data onto local storage media for analysis.
SKG CMS™	Continuous Monitoring System	Permanent or semi-permanent system used to analyze real time ambient vibrations and instantly report on the structure's integrity through the generation of programmable alarms. Alarms may be sent through SMS text messages, email, or other wired or wireless broadcast techniques. A Dynamic Signature of the structure must have already been created.
SKG FLS™	Fault Location System	Portable system used to identify the location, nature, and severity of structural faults. A Dynamic Signature of the structure must have already been created.
SKG ERS™	Emergency Response System	Portable system used to quantify the severity of structural damage after an event (e.g. earthquake, barge or truck hitting a bridge, a terrorist blast). A Dynamic Signature of the structure must have already been created.
SKG NCS™	Network Control Center	Real-time control center monitoring one or more SKG CMS systems in the field. Connections may be wired (Internet or Intranet) or wireless (broadband or narrowband). Multiple SKG NCS centers in disparate geographic locations may be simultaneously monitoring a single SKG CMS or multiple SKG CMS systems/locations. Password and authentication secure.

SKG™ PRODUCT SPECIFICATIONS:

- Linear Servo Accelerometers (respond to tilt and acceleration)
- Frequency range: 0 Hz. To 50 Hz.
- Operating temperature: -18 degrees to 70 degrees Celsius
- Maximum non-linearity 0.03%
- Cross axis sensitivity 0.002 g/g
- Dynamic working range: Eight orders of magnitude (military spec.)
- Anti-aliasing filters: 10 Hz. Low pass, 30 Hz. Low pass, switchable (3 models)
- Earth-loop sensitivity: Protected
- Data recording rate: Switchable from 10 Hz. to 100 Hz.