

Fugro Structural Monitoring

BRIDGE IMPACT DETECTION SYSTEM



Due to the ever-increasing amount of traffic on our roads today, the problem of accidental vehicle collision of bridges, has never been greater. Bridge impact is a major problem to the Railways Industry; each impact must be assessed, and this causes severe disruption through delays.

Fugro Structural Monitoring's (FSM) Bridge Impact Detection Systems (BIDS) accurately identifies vehicle collision, providing the time, location and severity, thus allowing for quick and efficient damage appraisal. This results in minimum disruption to services, as in many cases, closures of the bridge during investigation can be avoided.



APPLICATIONS

- Railway Bridges and Viaducts
- Motorway Bridges
- Bridges susceptible to damage from shipping
- Through adaptation can also be used for freight speed and freight load monitoring.

ADVANTAGES

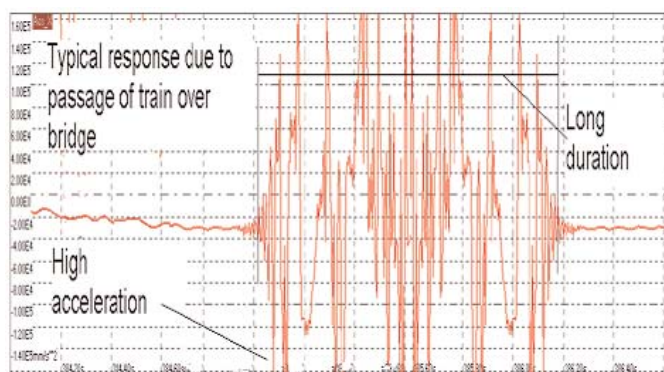
- Cost effective monitoring of Bridge
- Quick and accurate analysis of damage
- Minimum disruption to services
- Can be linked to camera technology, helping with the pursuit of third party damage costs
- Capability of monitoring several bridge spans with one system.

TECHNICAL APPLICATION

Through the use of accelerometers, bridge vibration is measured perpendicular to the bridge span and vertically. Signal cables from these accelerometers are run back to an enclosure mounted on the bridge. The enclosure is mounted with discretion and security in mind and contains a signal conditioning unit and an industrial PC. The PC acquires signals from the accelerometers in the range of 0.01 - 200 Hz. Communication with the system is via a modem and telephone.

The system PC runs a specially configured version of FSM proprietary software SIMS-NT. This is a Windows NT based data acquisition software package. This package has been used in many similar untended monitoring projects in the past.

The Bridge Collision Detection system measures the vibrations due to the impact force. When impacted the structure will resonate. It is likely that the resonance will last a very short time and will decay shortly after the impact (say half a second). A typical impact acceleration waveform is shown above. The other sources of vibration, such as rail and road traffic, are likely to have much longer duration associated with them. Typically it takes a 2 carriage train travelling at 60mph, 1-2 seconds to pass over a short railway bridge.



DETECTION

Impacts on the bridge will be defined in a number of ways. These will include vibrations above a pre-set level, and duration of vibrations above a pre-set level. These detection methods are adapted from existing offshore structure collision detection systems.

To provide a visual account of collisions the system incorporates the use of cameras mounted at suitable locations, on or near the bridge. On detection of a suspected collision the system will be set up to make a video record, of a set period, before and after the incident. The images from these cameras can be sent directly to a monitored central location and will be stored on the system for future reference, and possible use in any claims for third party damages.

The Fugro Group is an international organisation with around seven thousand staff in over fifty countries. Our major disciplines are Geotechnics, Environmental Services and Survey.

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