DEWESoft®

DYNAMIC BRIDGE MONITORING

WELCOME TO THE DEWESOFT EXPERIENCE. TOTAL SOLUTION: ONE SOFTWARE, ANY SENSOR.

DEWESoft®
7 YEAR WARRANTY

DYNAMIC BRIDGE MONITORING

STRUCTURAL HEALTH MONITORING OF BRIDGES

Dewesoft data acquisition systems are used in structural health and seismic bridge monitoring projects ranging from structural mechanics to continuous monitoring of large, complex bridge structures.

The monitoring systems provide distributed, high-channel-count and remote monitoring for highway overpasses, roads, buildings, and bridges. We provide a total solution from DAQ systems and data loggers to sensors and monitoring software.

TOTAL TURN-KEY SOLUTION

From very high dynamic range sensors to cost-effective solutions Dewesoft offers a tailored approach for virtually any structure with the possibility to monitor and analyse thousands of data points.

DYNAMIC MONITORING WITH ACCELEROMETERS

Low frequency, high sensitivity triaxial accelerometers for dynamic bridge condition monitoring. All data channels are synchronized well bellow microsecond accuracy, required for deep structural analysis. Devices are designed to be distributed under any condition. The cable can span up to 100m between DAQ nodes or virtually unlimited using EtherCAT to fiber-optic converters.

AWARD WINNING SOFTWARE

Our powerful software helps you speed up the transformation of data into meaningful results, improving decision making, risk management and structures safety.

DewesoftX software offers real-time diagnosis, pre-processing and data reduction with powerful math. A wide variety of storage options are possible with powerful visualization choices.

ANY STATIC SENSOR

Connect to any data logger and import data from any VW strain gage, temperature, water level, weather station, corrosion… sensor from any vendor.

PERFECTLY SYNCHRONIZED

All data channels are synchronized well below microsecond accuracy, required for deep structural analysis.

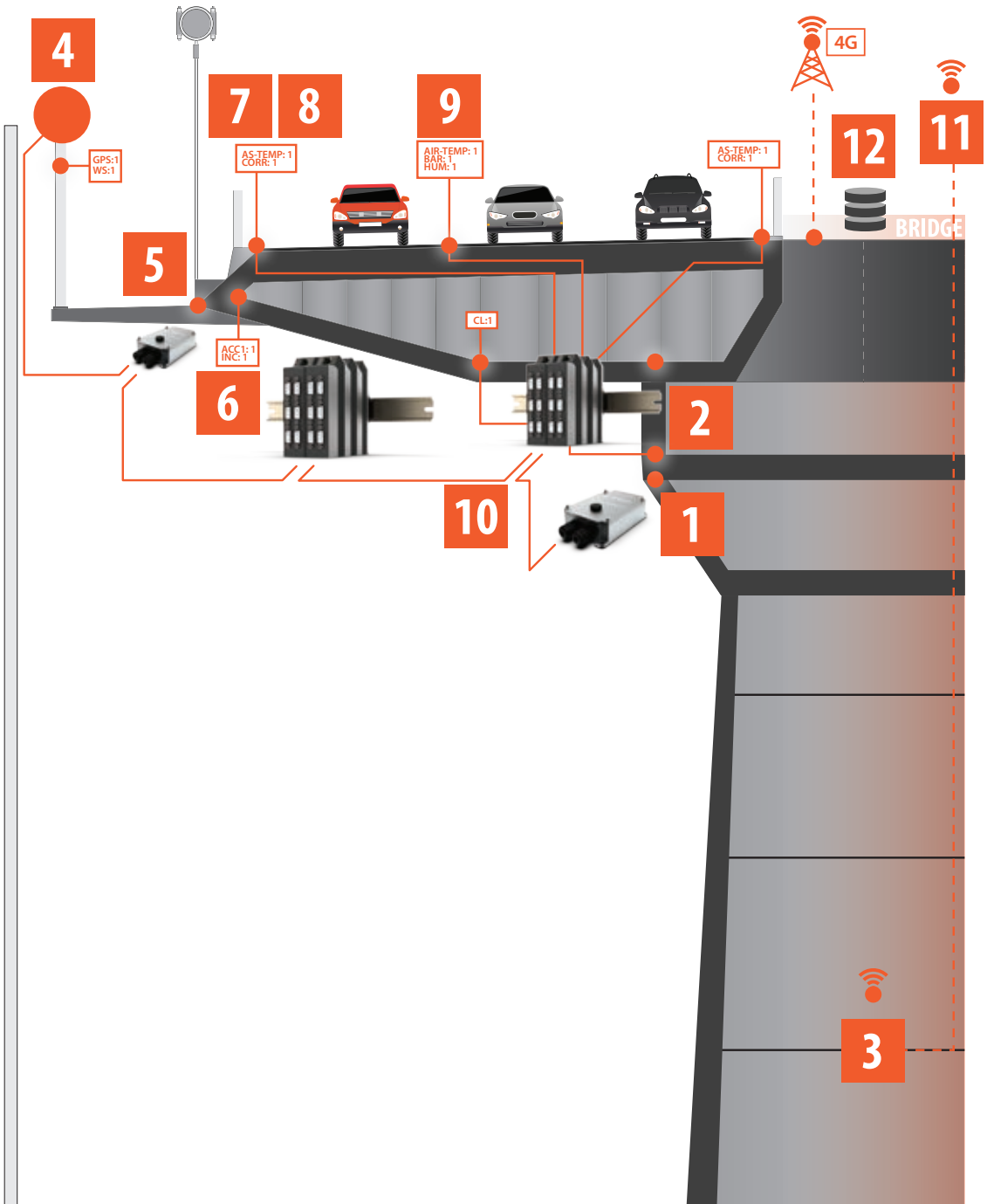
REMOTE OPERATION

the entire system can be remotely operated offering triggered storing, alarms, and other monitoring features with capabilities to store data locally or at distant remote locations.

OPEN INTERFACES

Using the Dewesoft software, data is available in a wide variety of formats, from exported data (for further OMA analysis) to live OPC UA interface or modern cloud data services.

INSTRUMENTATION SENSORS



SENSORS

1 - ACCELERATION AND INCLINATION MEASUREMENT: Dewesoft IOLITEdiw-3xMEMS-ACC-INC a Triaxial MEMS accelerometer and static inclinometer with EtherCAT interface, 8 g measurement range.

2 - DISPLACEMENT MEASUREMENT: Dewesoft IOLITEdiw-3xMEMS-ACC a Triaxial MEMS accelerometer that precisely measures displacement by integrating acceleration twice.

3 - STATIC STRAIN MEASUREMENT: Embedment vibrating wire strain gauge designed to be embedded into concrete structures for monitoring static strain of concrete.

4 - ALL IN ONE WEATHER STATION: Weather station providing a measurement of relative humidity, temperature, wind speed & direction, brightness, and twilight.

5 - DYNAMIC STRAIN GAUGE: Bolt-on dynamic strain gauge designed to be mounted on the structure.

6 - IOLITEDIW-3XMEMS-ACC: Triaxial MEMS accelerometer with EtherCAT interface and 8 g measurement range.

7 - ASPHALT TEMPERATURE MEASUREMENT

8 - CORROSION SENSOR

9 - AIR TEMPERATURE AND HUMIDITY MEASUREMENT

DAQ DEVICES

10 - IOLITED: From single-channel to multi-channel distributed data acquisition devices capable to read data from accelerometers, dynamic strain gauges, thermocouples, RTDs, weather stations, potentiometers, etc.

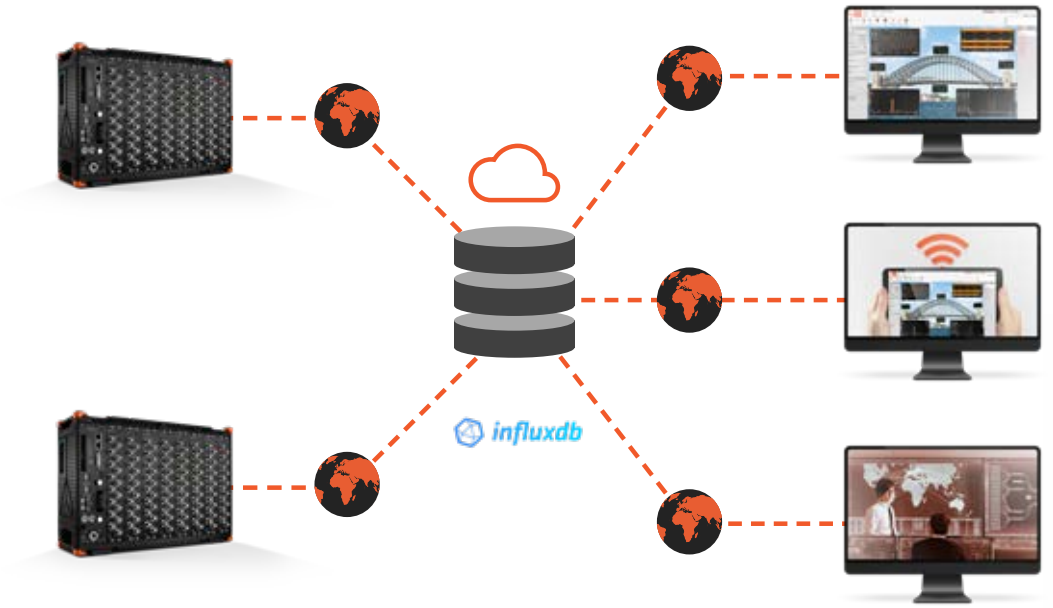
11 - VW WIRELESS DATA LOGGER: For reading the data from vibrating wire sensors.

12 - DATA LOGGER: An embedded data acquisition system and data logger all in one.

STRUCTURAL HEALTH MONITORING SOFTWARE

Dewesoft Structural Health monitoring software is composed of the following components.

- Client software
- High-level web-based software (optional)
- Dewesoft Historian - time-series database storage (optional)
- Wide variety of data formats to interface with 3rd party clients (optional)



RUGGED & DISTRIBUTED DATA ACQUISITION DEVICES

Dewesoft provides very rugged data acquisition systems that can work flawlessly in a wide temperature range (-40°C .. +85°C), under big stress, and even in very humid and wet environments. Our rugged systems provide IP67 environmental protection and 100 G shock protection.

The devices can easily be distributed so you can place them close to the sensor placed on the structure. This means shorter sensor cabling which increases signal quality, decreases chances of cabling errors and cabling cost. DAQ systems can be distributed down to a single channel.

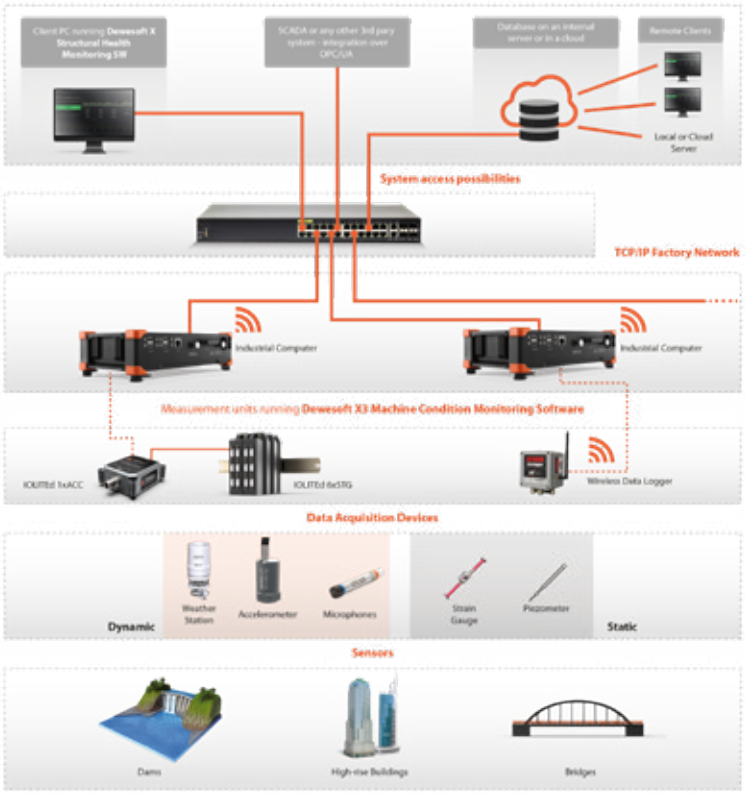
EtherCAT protocol provides easy distribution of devices over large structures. Devices can span up to 100 meters from node to node. Single power is used for data, power, and synchronization. This can be further expanded using EtherCAT to fiber optic converters.

MONITORING SYSTEM ARCHITECTURE

Dewesoft Data Acquisition systems with their wide range of analog and digital inputs, offer support for almost any kind of 3rd party sensor used in Structural Health Monitoring.

All EtherCAT compatible devices (IOLITE, IOLITEd, KRYPTON) can be connected to the same network giving the possibility to build a virtually unlimited channel chain by using a single cable delivering power, synchronization, and data. The whole EtherCAT chain is synchronized to 1us no matter the distance. Node-node distances can be up to 100m.

All the raw data from data acquisition devices are collected and processed by measurement units running the DewesoftX data acquisition software. Processed data is sent over the TCP/IP network to the factory or cloud server. Data can be accessed and viewed on the client PC or stored in the time series database (Historian) and served to SCADA systems or Cloud Software using standard interfaces such as OPC/UA or XCP to truly support Industry 4.0 applications.



OPERATIONAL MODAL ANALYSIS

Various sensing techniques and methods are used for performing structural health monitoring. However, the most widely used is the vibration-based technique, also known as Operational Modal Analysis (OMA).

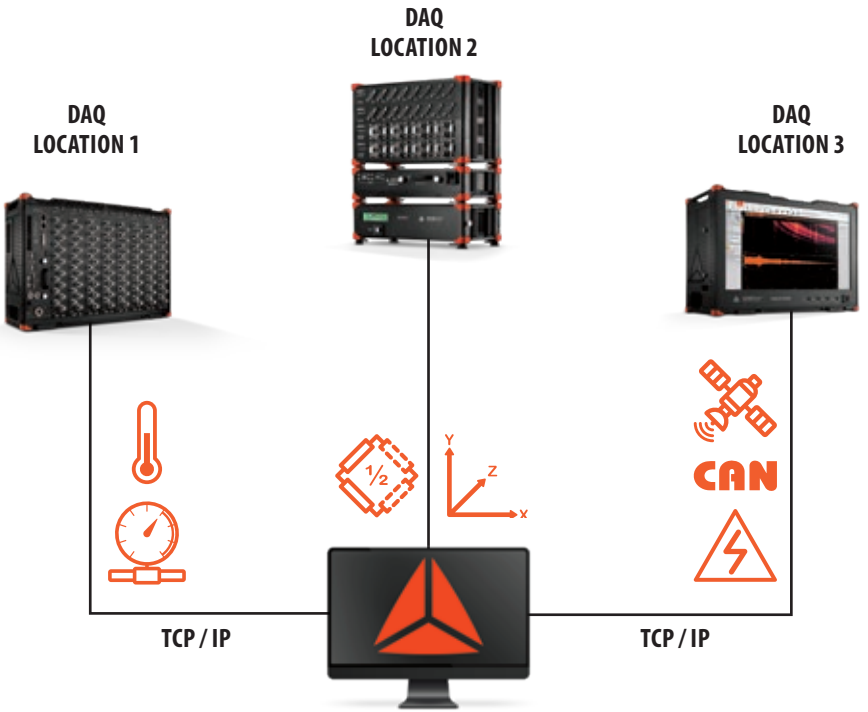
Operational Modal Analysis (OMA) is based on measuring only the responses of test structures under actual operating conditions for accurate modal identification. This is often the case in situations where it is difficult or impossible to control an artificial excitation. The complete dynamic behaviour of a structure can be viewed as a set of individual modes of vibration. Each has a characteristic natural frequency, damping, and mode shape.

Dewesoft joined forces with Artemis by offering a special bundle called Artemis plugin. It is including an Artemis license and a simplified export/import of the data from Dewesoft into Artemis OMA, saving a lot of time.

FLEXIBLE DATA STORAGE STRATEGY FOR BRIDGE MONITORING

DewesoftX software offers easy and flexible configurations for your data flow. You can store data locally near the structure itself, or use any of the standard interfaces like OPC UA to send and store data remotely in the cloud or database. There is really no restriction on how to set up your data flow.

Our flexible licensing allows you to connect an unlimited number of desktop or web-based view clients to monitor data in real-time without any additional cost.



DEWESOFT HISTORIAN

DEWESOFT HISTORIAN TIME-SERIES DATABASE STORAGE FOR LONG-TERM MONITORING

The Historian software package adds a time-series database for long-term or permanent data storage. The database can be either located locally, on the remote server, or in the cloud. The solution is based on the InfluxDB time-series database open source project.

Historian provides several useful features for your historic data:

- **Raw and reduced data:** while raw data is always stored on the measurement unit for an in-depth analysis, a Historian takes the role of long-term reduced data storage into the cloud database.
- **Data safety and retransmit:** if the connection between the measurement hardware and the database is lost, the data is safely stored locally on the measurement unit and then retransmitted to the database when the connection is available.
- **Trending and analysis:** historical data can always be recalled and loaded from the Historian database and used for trend analysis as well as for in-depth analysis and root cause identification.

CASE STUDY

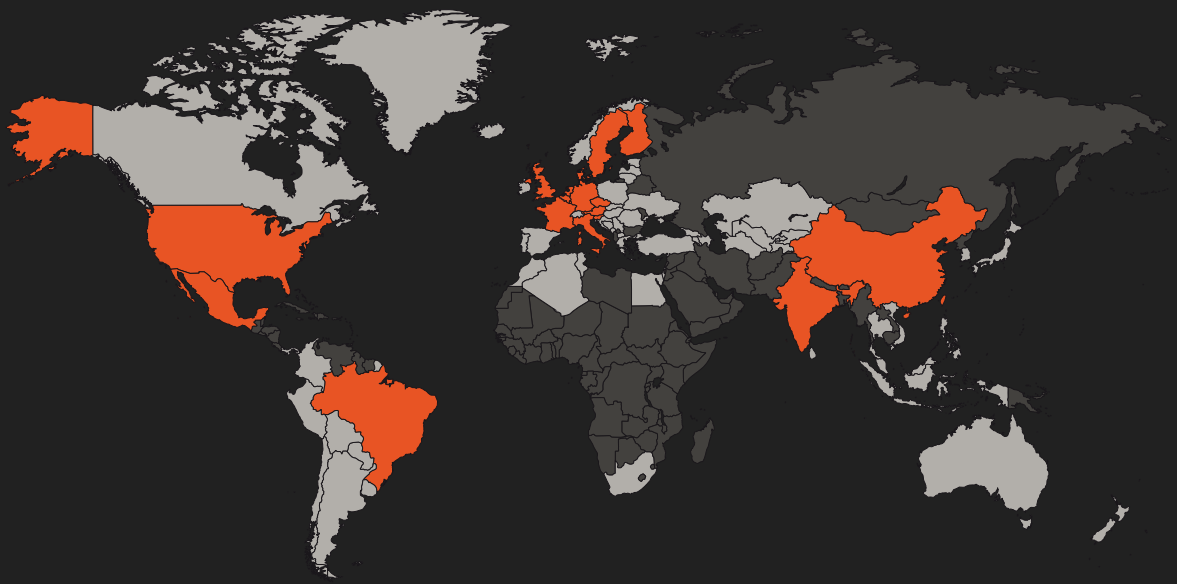
HONG KONG - ZHUHAI - MACAO BRIDGE

(source:https://dewesoft.com/case-studies/distributed-monitoring-on-world-longest-hong-kong-zhuhai-macao-bridge)

The Hong Kong–Zhuhai–Macau Bridge (HZMB), officially the Hong Kong–Zhuhai–Macao Bridge, is a 55-kilometre (34 mi) bridge-tunnel system consisting of a series of three cable-stayed bridges, an undersea tunnel, and four artificial islands. It is both the longest sea crossing and the longest fixed link on earth. The HZMB spans the Lingding and Jiuzhou channels, connecting Hong Kong, Macau, and Zhuhai—three major cities on the Pearl River Delta. With a total length of 55 km, the Hong Kong-Zhuhai-Macao Bridge is regarded as the longest sea bridge in the world.

One part of this monument's structural health monitoring system is the measurement of tri-axial accelerometers at the navigation spans. The purpose is to detect the occurrence of the ship impacting as well as to determine the global dynamic characteristics of the structure's viaduct bridges.

200 highest precision acceleration channels are needed, distributed over several kilometers. These channels are clustered into six independent data acquisition subsystems. The data of each subsystem are stored locally and in parallel to a database engine running on a central server.



DEWESOFT® WORLDWIDE: SLOVENIA, Austria, Belgium, Brazil, Czech, China, Denmark, Finland, France, Germany, Hong Kong, India, Italy, Mexico, Singapore, Sweden, UK, USA and PARTNERS IN MORE THAN 50 COUNTRIES

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