

The Acoustic Emission Company



Permanent Monitoring / SHM

The Acoustic Emission System



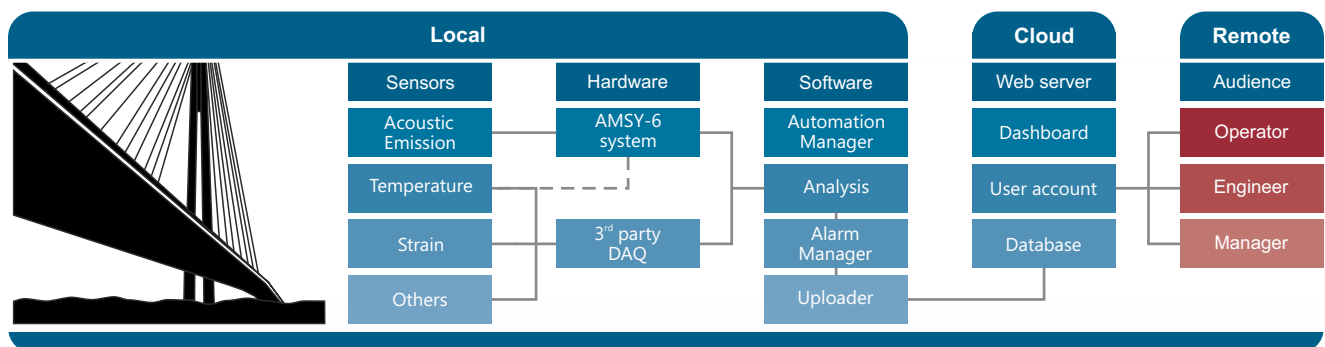
Think AE – Think Vallen!

Permanent monitoring using Acoustic Emission (AE)

Acoustic Emission (AE) testing has proven to be extremely capable of detecting and locating wire breaks in post-tensioned tendons in bridges. It is the only non-destructive testing method that can resolve individual wire breaks in time and space. Details about defects are provided in real-time. The monitoring system runs autonomously, gathering information 24/7. Operators, structural engineers, and interested audiences can get information

about critical events as they occur, ensuring a fast reaction to changes in the carrying capacity of the monitored structure. Permanent monitoring can be done for spatially limited areas of a bridge, so-called "hot spots," or for an entire structural element such as a longitudinal tendon or all load-carrying elements. AE monitoring is not restricted to bridges and can be applied to other structures as well: buildings, towers, dams, etc.

A modular system for many applications



Vallen Systeme provides a solution covering the entire measurement process, including data analysis, alerting, and information dissemination workflows. Third-party acquisition modules are supported, and their data can be integrated seamlessly into the Vallen software ecosystem. Expandable and versatile monitoring systems can be

configured using modular components and customized products where necessary. Vallen Systeme offers all of this from a single source. Products developed and manufactured in Germany, thoroughly tested before deployment, and fast customer service make Vallen Systeme the preferred solution provider for Acoustic Emission monitoring systems.

Highlights

► Self-checking sensors

Sensors are detected automatically, report their ID and can be part of a measurement point that has the ability to reliably and easily check the coupling sensitivity of its sensor.

► Automation Manager

A software that automates tasks related to permanent monitoring such as switching data files regularly, monitoring system resources, reporting and alarming.

► Vallen Dashboard

A cloud-based internet service that provides access to analysis data for a selected audience. The dashboard is fed with data from the acquisition PC and enables dissemination of results to interested experts.

► Configurable analysis

flexible and highly configurable data analysis can be adopted to specific requirements of any monitoring job. This makes it easy to distinguish relevant data from irrelevant ones – helping to save time and money.

► Enclosures for different environments

Enclosures are available for different environments, protecting the delicate electronics from severe/harsh environmental conditions; and for security, limiting unauthorized access.

► Remote control

Easily control the monitoring system and software from any place via internet. Disseminate results to a selected audience by the use of a dashboard that supports user roles.

AE Sensors

Sensors need to work reliably 24/7 throughout the monitoring period, withstanding varying and extreme environmental conditions, such as moisture and rain, as well as excessive heat and frost. Vallen Systeme provides



a special, low-frequency sensor line to meet the harsh demands of permanent monitoring. The sensors are optimized for the specific requirements of the application. The commonly used acoustic emission sensor for monitoring is the VS30-SIC-V2-0dB sensor or the specifically developed SHM-MP1 measurement point for structural health monitoring.

The SHM-MP1 measurement point offers a number of advantages over conventional monitoring sensors:

- Vallen Smart Line™ sensor technology with automatic registration of the device at the monitoring hardware
- Reliable self-checking of its function and sensitivity that can be automatically triggered in regular intervals or on demand
- Easy-to-install mechanical device for mounting the sensor and coupling check transducer to the structure
- Robust strain relieves for the connected cable
- Rugged lid for protection against environmental influences and vandalism

The SHM-MP1 measurement point addresses all possible issues/challenges with regards to sensor-technology in applications of permanent monitoring that require highest levels of availability.

Data acquisition hardware

Vallen Systeme has a proven track record of providing the highest performance, most versatile and reliable acoustic emission measurement systems of the industry. All systems can be configured flexibly and allow a user-friendly expansion at any time during the monitoring period. The system architecture, an adjustable 19" frame, and 24 VDC-powered electronics make it a perfect choice for installation in a 19" rack, control cabinet, or any other suitable outdoor enclosure.

Forty years of experience in designing and manufacturing acoustic emission measurement equipment culminate in reliable and mature products, that are fit for the purpose of operation.

The acquisition and primary analysis PC is an external device to the AE signal measurement device/system. This approach results in an extreme flexibility of configuring the required PC for certain applications and enclosures, servicing or upgrading it. It controls the data acquisition, stores the measurement data, provides the primary data analysis and manages the interfaces to the internet and GSM.

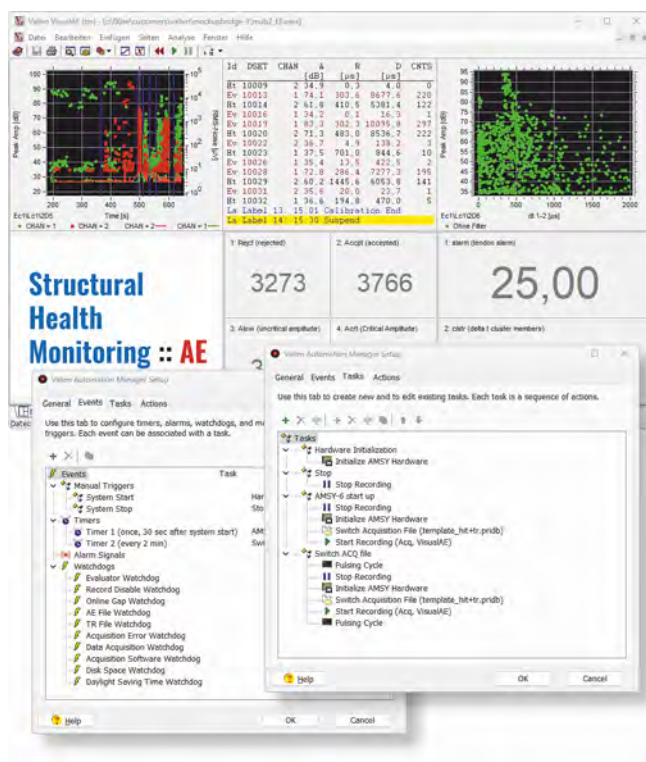


Enclosures

Vallen Systeme provides the acoustic emission system chassis compatible for 19" rack integration. Vallen Systeme can also supply complete solutions where the system's chassis and its accessories are integrated into a 19" rack or an outdoor control cabinet enclosure. Adjustable chassis sizes and chassis frames allow flexibility in choosing the correct enclosure for the job. Racks and enclosures are customized by Vallen Systeme. They can be equipped with

- rugged industrial PC: running the data acquisition, primary analysis and data storage
- redundant power supply: 24 VDC or 230 VAC
- power outlets for additional devices or maintenance equipment e.g. computer monitor, etc.
- data storage/backup systems: additional HD or SSD drives for a local data backup solution
- internet router
- GSM router, e.g. for using the short message services
- air conditioning or heating: ensuring that equipment inside the enclosure operates within specified limits
- Uninterruptable power supply

When selecting and designing an enclosure we can consider the need for additional space for third party equipment. Customized enclosures are rated IP54.

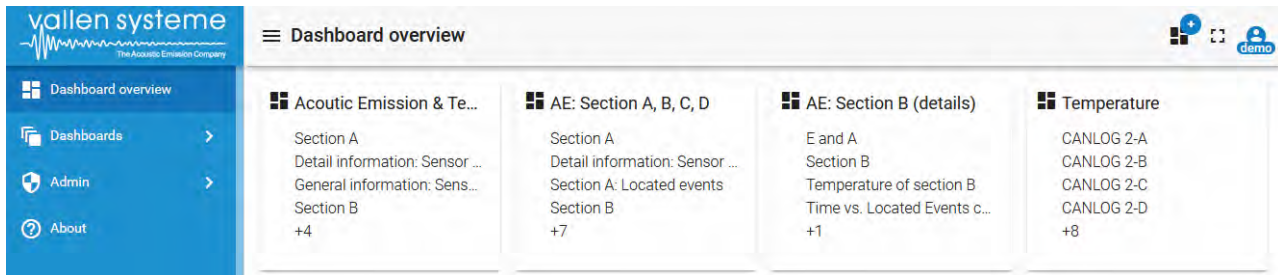


Software

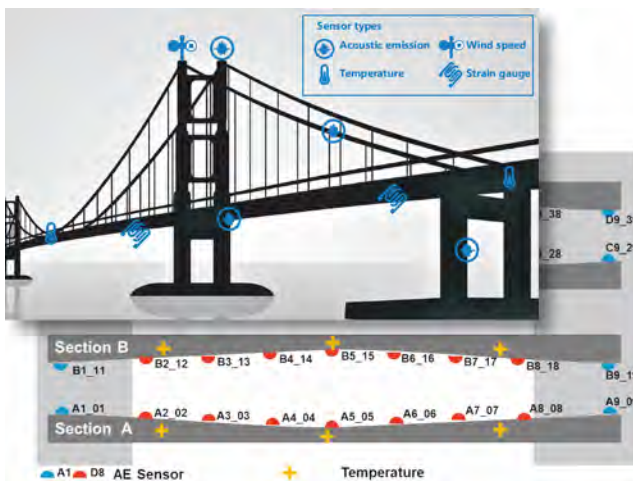
A reliable and state-of-the-art software that is constantly being improved complements the measurement hardware. It offers a flexible analysis that can be adjusted to the specific requirements of a job. Even user-specific evaluation routines can be implemented and executed during the measurement. A fast online location, even at high data rates from many channels, ensures real-time data analysis. Criteria for alarms and warnings can be set, and notifications can be received via email or digital output.

On top of this, there is the Vallen Automation Manager software. It enables autonomous operation of the data acquisition system and informs the operator or other selected audience about the general status of the system and extraordinary conditions as they occur. Among the simple tasks are the automatic start-up of the monitoring system after a power outage, the switching between data storage files at regular intervals, and carrying out sensitivity checks of the installed sensors.

Dashboard



The Vallen Dashboard is an important part of the software solution if the monitoring results have to be distributed amongst a broad audience. It provides an encapsulated and safe environment for viewing and analyzing data. Access and rights/privileges to this service can be restricted based on user roles. Data available in the dashboard has been transferred to it from the acquisition PC avoiding the necessity to log-on and possible manipulation of the running monitoring system.

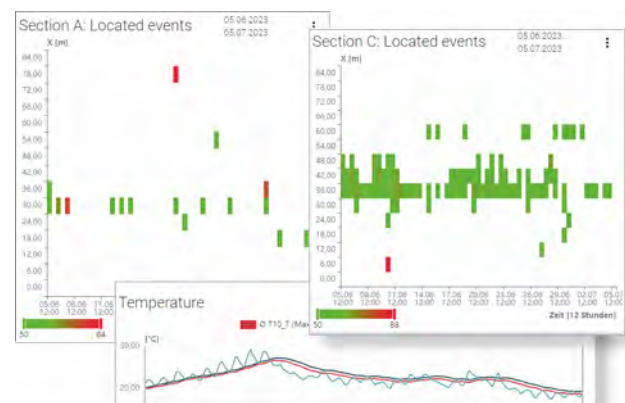


It can be hosted on any Linux Ubuntu server. This may be rented services from local providers or a company-controlled internet server. Rented services can provide guarantee for accessibility, data safety (back up, but also storage sites in one's country) and security (access). Via internet an encrypted connection is established between the dashboard and the acquisition PC.

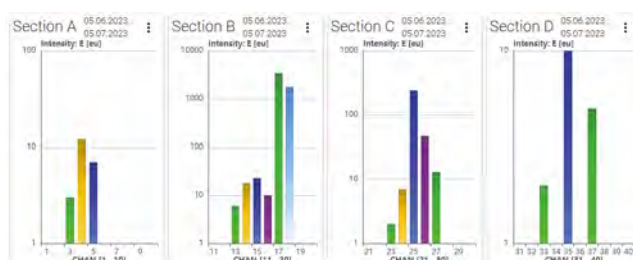
Data upload from the acquisition PC is automated. If the connection is interrupted upload data is cached and

transferred once the connection is working again. Needless to say, that the Dashboard engine informs selected users if the internet connection to the measurement system is lost. Under the hood the Vallen Export processor and Uploader program running on the data acquisition PC are responsible for supplying the dashboard with data. Both pieces of software can be configured to meet the requirements of the scope/job/user. One has full control of what is uploaded and how frequently it is uploaded.

The Vallen Dashboard displays the information in a user-defined layout. The dashboard and layouts can be easily



adapted and customized by the user. The administrator of the dashboard sets out the rules which information may be viewed and what actions are possible for certain users. Information can be displayed in bar charts, scatter plots, heat maps, line charts, tables, static images and texts. Data can be downloaded for archiving purposes or off-line analysis. The responsive front-end design enables an equally good access experience on PCs and mobile devices. The open API of the Vallen Dashboard provides the possibility to integrate third-party time-series measurement data to be uploaded, stored and fused with acoustic emission data. This data does not even have to come from the acoustic emission data acquisition system or PC. The Vallen Dashboard is a true multi-source, multi-channel data management, visualization and analysis tool from a single source.



The Acoustic Emission Company

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AE monitoring solutions from Vallen Systeme

Vallen Systeme is dedicated to progress, quality, and service. Our products are technologically advanced, of high quality, and supported over a long lifetime. We have been building and selling acoustic emission test equipment for over 40 years. All of our experience and knowledge is reflected in our products, of which we are very proud.

You will realize that Vallen Systeme is a trustworthy partner, when we provide straightforward knowledge transfer, pay attention to feedback, and act with concern. Through reliable products and prompt service, we help our partners succeed.



We deliver solutions that make a real difference: for our safety, our environment and infrastructure. This commitment sets us apart from other suppliers and makes us what we are: The Acoustic Emission Company.

Contact us now for more detailed information or consultation for a quotation optimized for your requirements!

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