How sensitive can you measure?

Measurement, analysis and evaluation of vibrations, noise and shock

Wölfel

Table of contents

The MEDA principle

MEDA

Package
Machine diagnostics

Package
Vibrations / noise

Expansion versions

MEDA BlueStack®

MEDA RedSens

MEDA USB 16/24/32

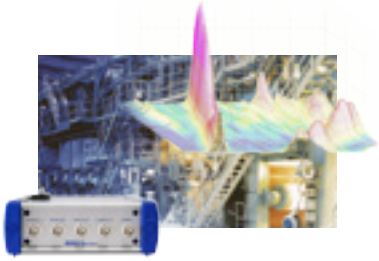
Front ends

BlueStack®: Run-up evaluation using the waterfall module

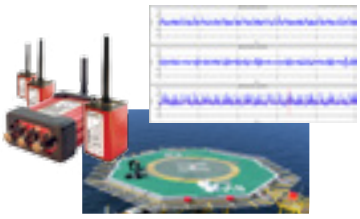
RedSens: Analysis of fast time signals in a printing machine

USB16: Multi-channel monitoring of a bridge

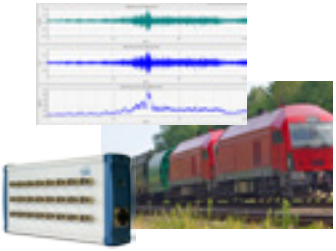
Applications



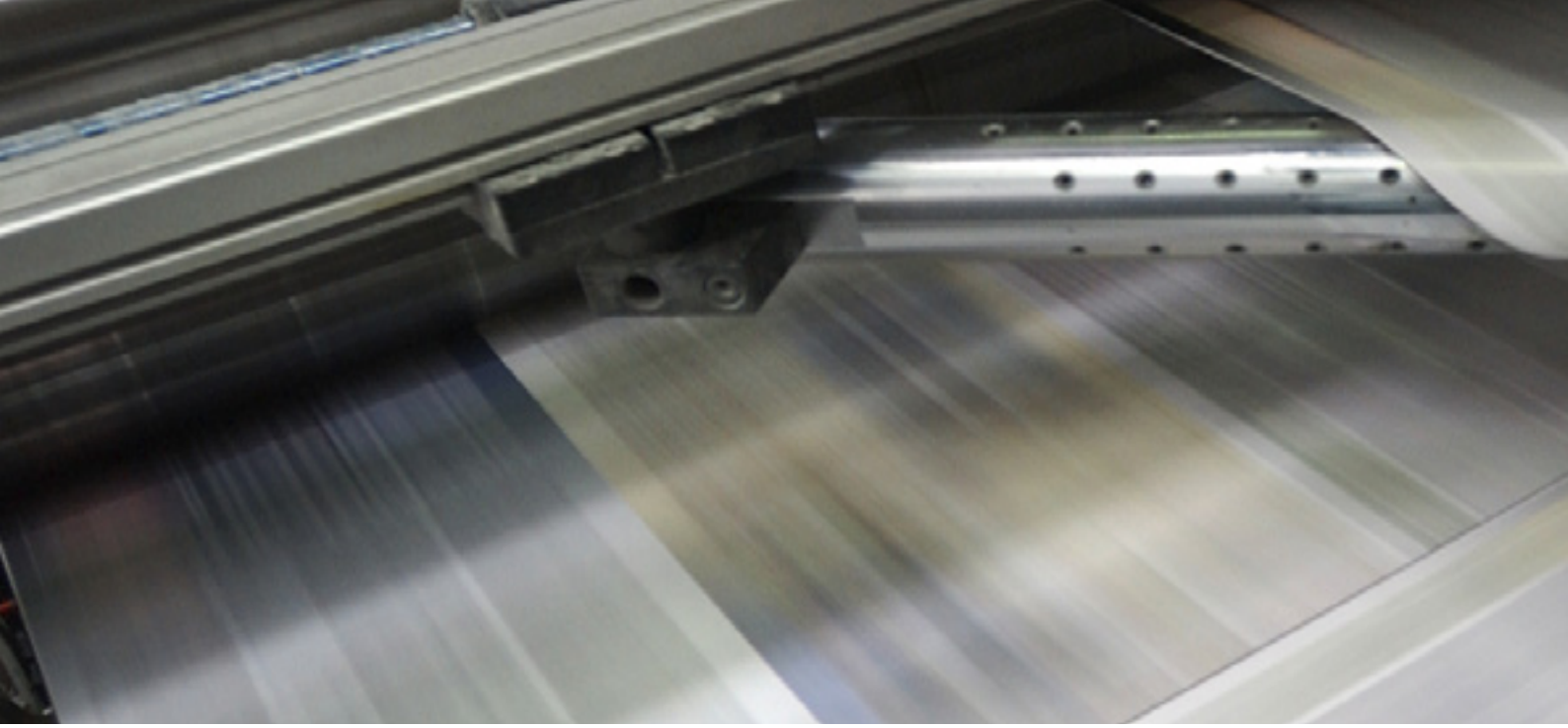
Machine diagnostics: Machine run-up in the paper industry



Measurement: Vibration problems on a helicopter landing site



Passing train: Documentation of the resulting vibrations



What is MEDA?

The complete system for vibration, noise and shock measurement, analysis, and evaluation.
MEDA combines software with measurement technology and is a system based on the many years of experience of our measurement technicians, engineers, and developers. This measuring system allows our users to start their work immediately and efficiently.

This means

- outstanding user guide, helping the user plan, take and completely evaluate a measurement
- possibility to combine the system with any existing or new sensors as desired
- steep learning curve, ready-to-use
- first-class evaluation options and measurement results documentation
- low TCO (total cost of ownership)
- open data interfaces
- directly accessible default settings
- wired and wireless measurements

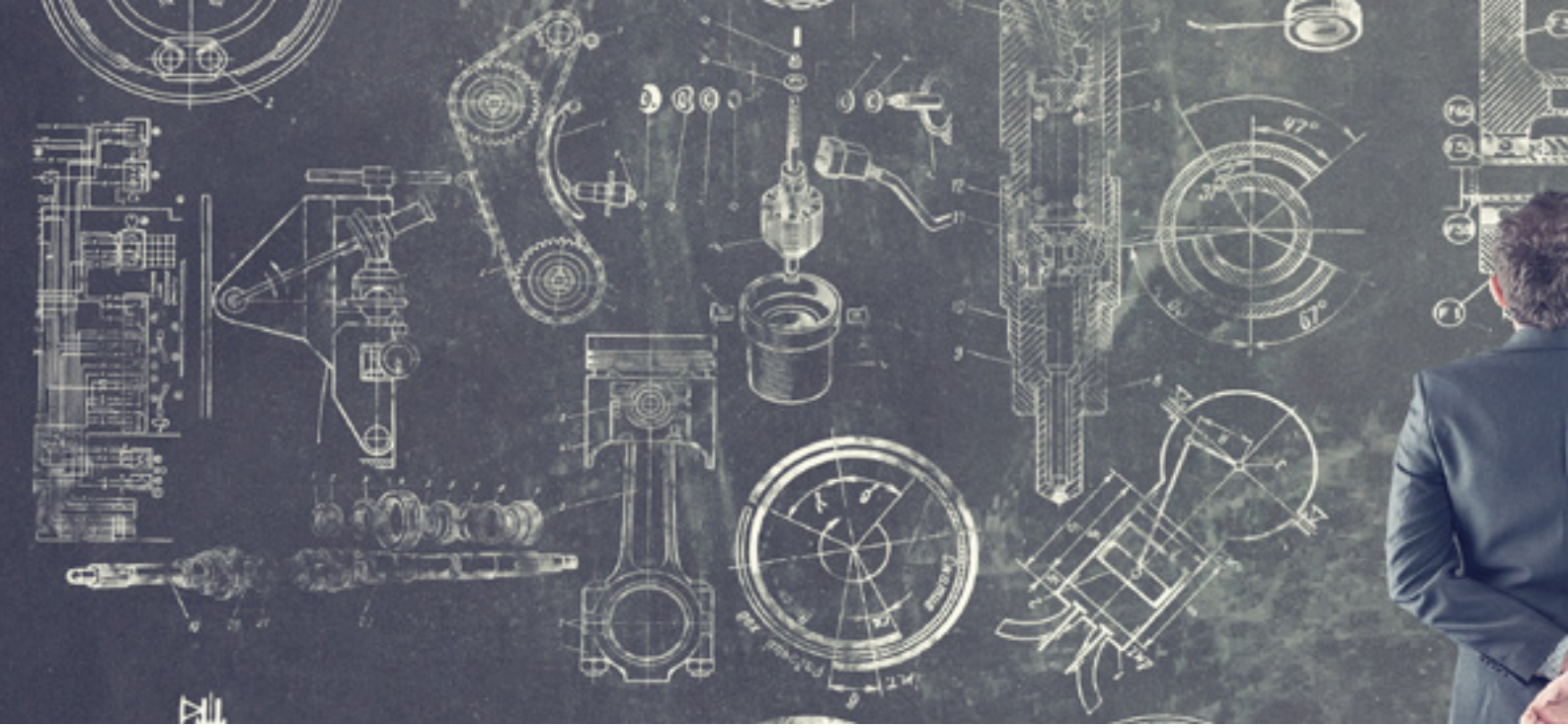
The main fields of application of MEDA are machine diagnostics, noise and vibrations, e.g., for trouble-shooting tasks or for constant monitoring.
When using MEDA, you can be sure to always measure, analyze, and evaluate in compliance with standards. Whether construction sites, traffic, factories, machinery or blasts – MEDA quickly yields significant results which help with the assessment of the situation in question.

MEDA is the ideal system when

- you want to have a system which measures vibrations and has constant monitoring functions according to recognized standards, without having to be actively involved,
- you want to carry out machine diagnostics, including roller bearing monitoring or waterfall presentations without incurring any problems,
- you prefer to concentrate on the measuring task rather than on setting up and programming your measuring system,
- you are looking for a system which allows you to collect qualified measurement data and subsequently process it using a multitude of functions,
- you wish to have a high level of documentation flexibility, but nevertheless want to implement your own layout ideas.

Modulares System

Featuring three different front ends, **MEDA BlueStack®**, **MEDA RedSens** and the modules of the **WMS-USB-X series**, MEDA provides a powerful range of data acquisition units. You can select these front ends to meet your individual requirements and expand them as necessary.
Specific modules for special tasks are available separately and add to the variety of ways MEDA can be applied.
You can use your existing sensors for deployment with MEDA, or choose the measurement equipment you need from our wide range of sensors and accessories.



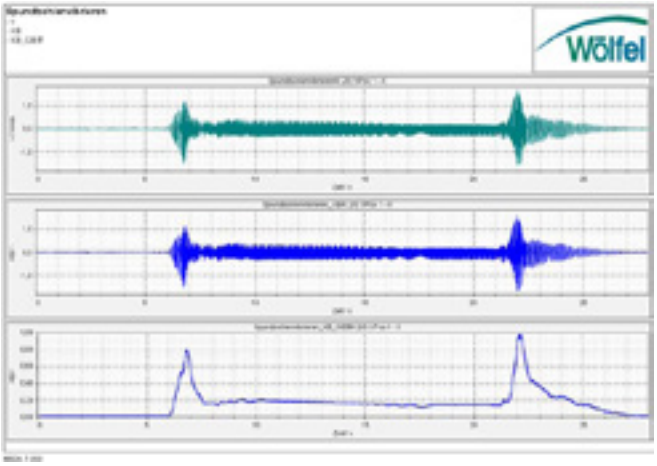
Mobile, multi-channel and wireless

MEDA can be used in many fields of application. All sensors transmitting a voltage signal that is proportionate to the respective measurement variable can be connected to a MEDA front end. MEDA is able to process these signals, thus opening up an almost unlimited application range. This range covers acoustics, quality assurance, state analysis, and monitoring.
We offer two versions of the MEDA expansion set:

Vibration / Noise

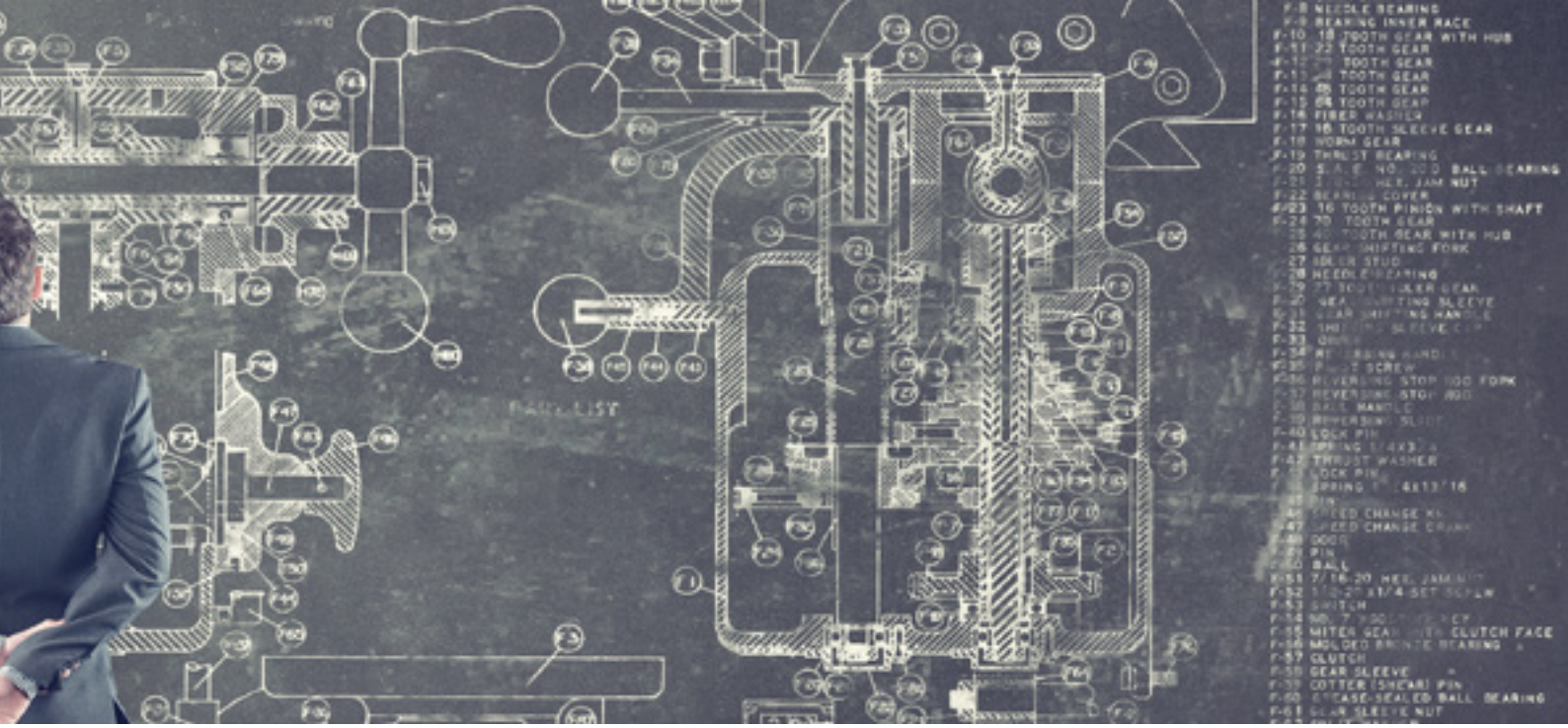
In the field of vibrations and noise, the focus is on measuring and monitoring functions.

- Measurement and evaluation of vibrations and noise
- Monitoring tasks on construction sites and bridges, or during blasts and tunnel excavations, using measurement technology
- Monitoring of vibrations caused by railway traffic
- Vibrations in industry
- Building measurements, property evaluation
- Quality assurance in industry
- Measurements according to DIN 4150 and other standards



Vibration measurement on a construction site

MEDA features many constant monitoring and remote data retrieval functions as well as cloud solutions for all applications.



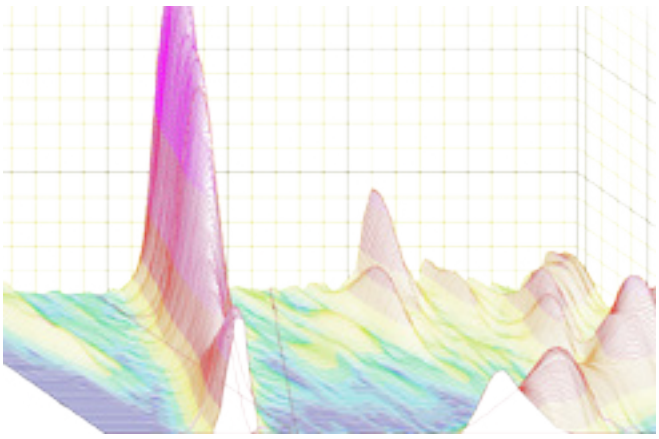
Machine diagnostics

In the field of machine diagnostics, MEDA is used for technical measurement tasks, such as research and development or troubleshooting tasks.

- Causal analysis of rotating machinery
- Troubleshooting by constant monitoring
- Acoustic examinations
- Machine diagnostics, even in highly complex systems
- Run-up measurements and order analyses
- Modal analysis and evaluation with Me'Scope

The machine diagnostics expansion version contains all performance features of the vibrations/noise expansion version and can be expanded with the following functions for use in other areas:

- Bearing diagnosis
- Balancing
- Waterfall analysis



Typical waterfall evaluation of machinery run-up

All you need and more

Good reasons to choose MEDA

We have developed and equipped MEDA with the highest degree of flexibility, modularity and customer focus. MEDA provides users with all functions they need for individualized measuring equipment. And MEDA can always be expanded as desired.
MEDA is optimally suited for being used in machine diagnostics environments (vibration analysis) as well as during noise and vibration measurements (noise impact protection).
MEDA users can be found in the fields of service, industry and research. Many service engineers, engineering companies, authorities and universities are using MEDA in their daily practice.

With its performance range, MEDA is convincing not only from a technical but also from an economical point of view:

- ready to use: easy and intuitive
- flexible: suitable for easy and complex measuring tasks
- well-proven: reliable in use for 26 years, continuously refined
- cost-effective: you only buy the equipment that you really need (e.g. software, front end of choice, sensor)
- low total cost of ownership in terms of purchase, operational readiness and application options as well as downtimes.
- user support through MEDA hotline – with option maintenance contract – always up-to-date

MEDA users are satisfied users – a statement which is documented by ample feedback.

References

"I've been using the MEDA measuring system for 20 years. The fast and reliable on-site measurement and the numerous subsequent evaluation options were and still are my main argument for MEDA."

Prof. Dr.-Ing. Dieter Heiland
Baudynamik Heiland & Mistler GmbH, Bochum

"BHS has been using the MEDA software successfully for more than 10 years. The various operations of the spectrum waterfalls for run-up and run-down processes that can be set up subsequently are excellently suitable for us."

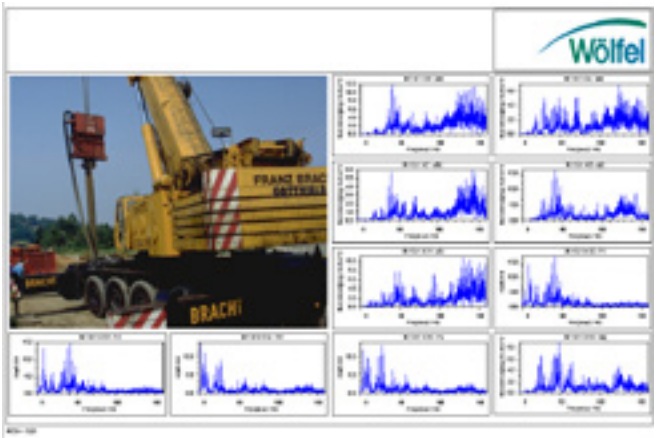
Heribert Reich
BHS Corrugated Maschinen- und Anlagenbau GmbH, Weiherhammer

"We are pleased to say that we are highly satisfied with MEDA. MEDA offers evaluation functions which give us a quick overview of the vibrations measured and let us understand the structural dynamics. But beyond that, Wölfel offers best services."

Thomas Jaquet
VICODA GmbH, Zeven

Full control with the project manager

Start your work with MEDA and the project manager. The project manager serves to manage all measurement data, calculation and evaluation results and all other measurement-relevant data of a project.
In addition, it provides access to the default settings of measurements that have already been taken.



Vibration measurement on a construction site: no impact on residents

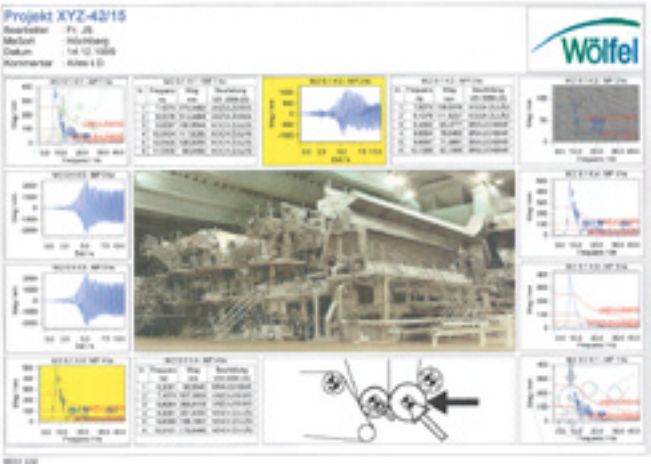
The use of predefined parameter sets and specified sensors allows fast, convenient and precise measurements. The sensors that are available for all measurements are listed in a sensor table.
Data acquisition is controlled by a large number of clearly grouped parameters. As a result, complex multi-channel monitoring tasks can be fulfilled as easily as single measurements.

"We have been using Wölfel Meßsysteme's products for more than 20 years and mainly appreciate the perfect coordination between hardware and software. The MEDA software features a clearly arranged user interface.

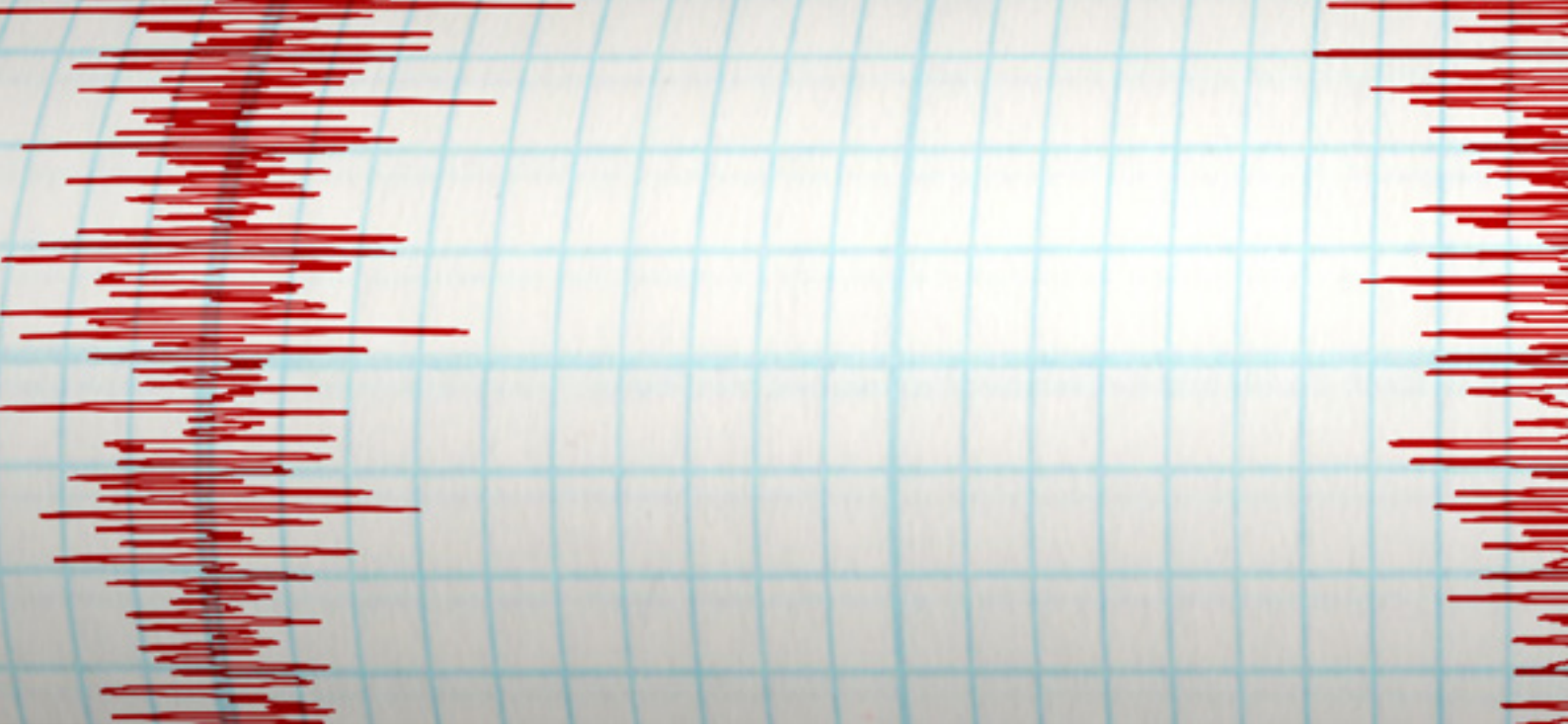
Its comprehensive evaluation options are extended on a regular basis and adjusted to match any individual customer requirements."

Dipl.-Ing. Klemens Pradler
BHM INGENIEURE – Engineering & Consulting GmbH,
6800 Feldkirch, Austria

An online display is available with any number of channels. The project manager can also be used to import and export data to foreign formats or to apply measurements or results from other projects to the current project. Measurement data can be acquired, evaluated and documented quickly and easily which means that MEDA can be used even under difficult measurement conditions.
Of course, the project manager can also be used to archive your complete measurement project. You can therefore conveniently save and manage all of your measurement data.



Troubleshooting on a paper machine: all relevant results at a glance



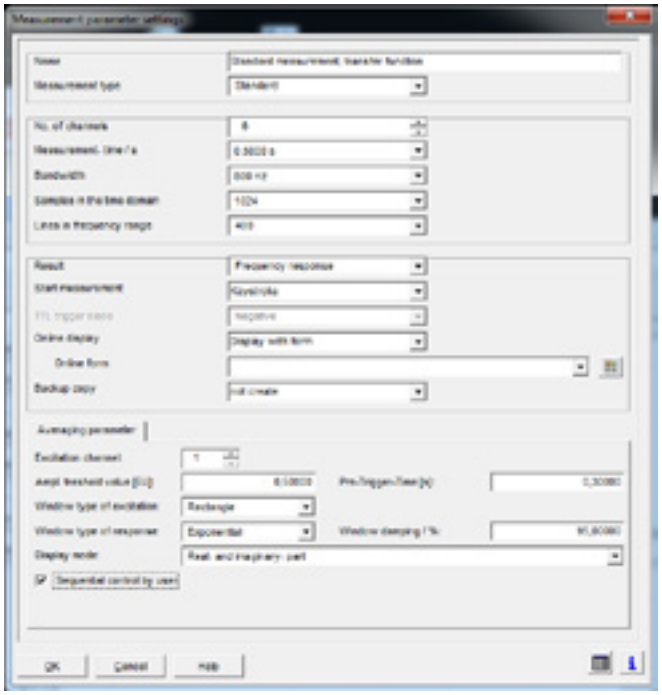
Starting a measurement

The proper setup for each task

Different measurement tasks often require different measurement approaches. MEDA therefore features the following five measurements methods:

- Standard
- Tape
- Waterfall
- Balancing
- Sound power

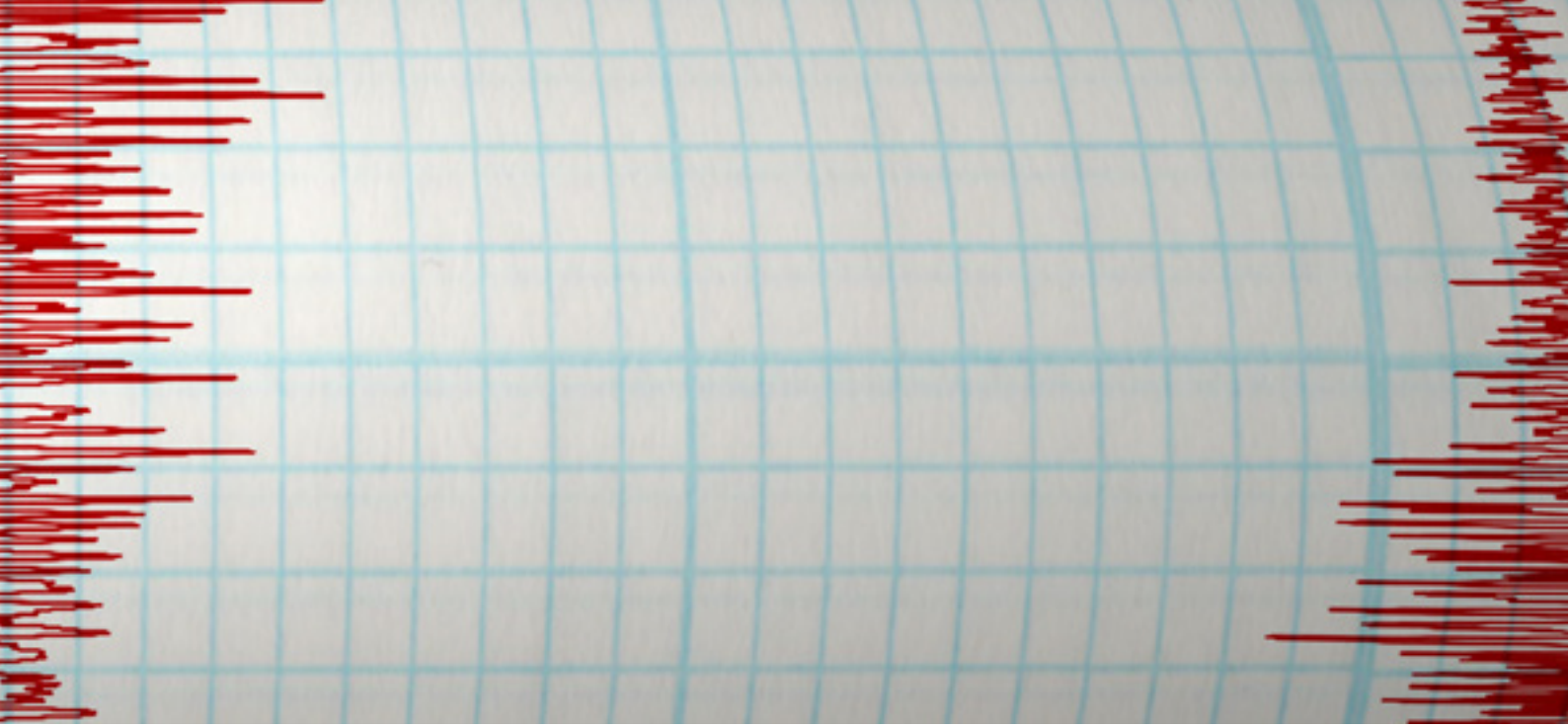
These methods optimally meet the user's requirements. The menu guide helps the user to set the parameters for a measurement. The measurement can be started very quickly with just a few entries and clicks.



Just a few clicks to set the proper parameters

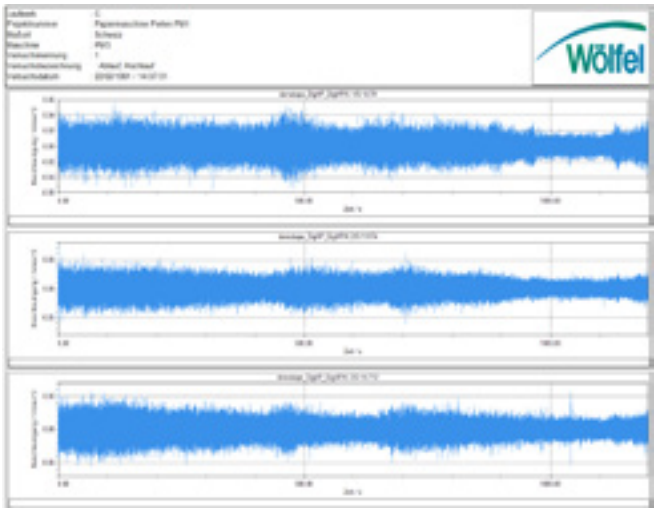
Standard

This measurement method covers the most important configuration options for standard measurements. These include, for example, the online spectrum averaging function (narrowband, third-octave and octave), controlled through the TTL trigger input or the set measurement time. This measurement method can also be used to measure transfer functions.



Tape

The most frequently used measurement method is the cyclical tape measurement which provides a multitude of trigger and alarm functions. Using MEDA, you can trigger to the amplitude level or to individual third-octave or octave bands in the measurement signal. Any exceeded values are reported by SMS or e-mail. Optionally, a flashlight or an audible signal transmitter may trigger an alarm directly on site. The tape measurement method is also ideally suited for complex and long-lasting monitoring tasks (interval recording of significant parameters, such as maximum values, third-octave and octave maximum values).



Measurement with tape

Waterfall

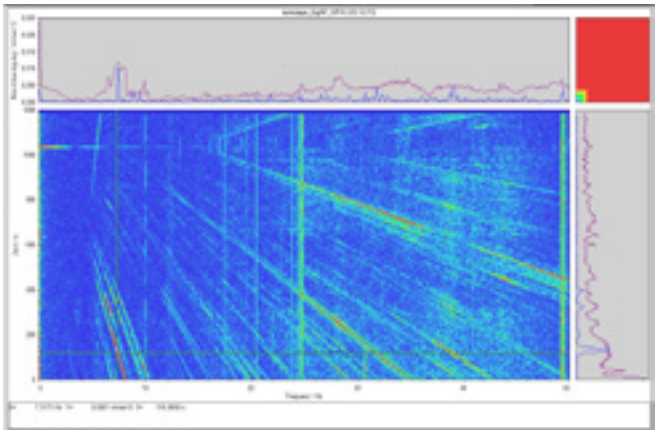
This measurement method can be used to directly measure waterfalls (e.g., machine run-ups) or to generate waterfalls and order curves from measured time signals in the post process.

Balancing

This measurement method can be used to directly measure waterfalls (e.g., machine run-ups) or to generate waterfalls and order curves from measured time signals in the post process.

Sound power

This measurement method supports the calculation of the sound power based on the enveloping surface method as per EN ISO 3744.



Waterfall from the tape measurement

Data acquisition

Online calculation and virtual channels

Virtual channels and online operations increase MEDA's performance spectrum by an essential feature.
MEDA allows applying online calculations to time signals during the measurement. That means that a multitude of mathematical operations can already be made during a running measurement (online) using the measured time signals while the results can then be stored directly as a measurement. These online converted time curves can of course also be used for the process measurement parameters, such as the analog threshold value trigger.
As a result, the user has access to a variety of data even during the current measurement. Furthermore, these virtual measurement results can of course also be saved as additional information while the original dataset remains as it is.

The following operations are available (excerpt):

- Scalar addition, scalar multiplication, addition, subtraction, multiplication, division
- Digital low-pass, high-pass, band-pass and band-stop filters)
- Integration, differentiation incl. conversion of motion values
- Resultant
- Square, square root
- Floating average
- KB filter
- Floating RMS value

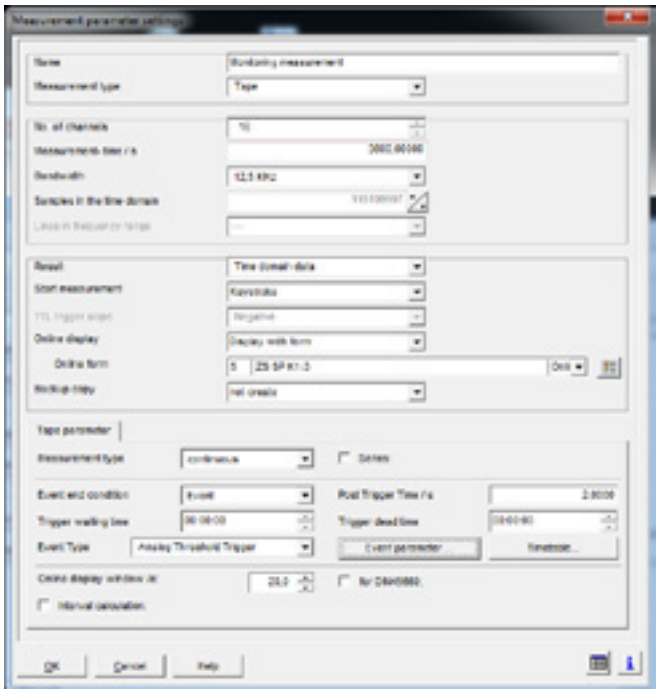
In addition to providing important additional information as early as during a current measurement, MEDA features an extremely wide spectrum of evaluation functions which are available for analysis, data processing and evaluation purposes after completion of the measurement..

Important performance features for a measurement (excerpt)

Time-signal-based data acquisition	✓
Results (examples)	Time signal, spectrum, phase, real part, imaginary part, coherence
Online display of all measuring channels	Parallel
Online spectrum (third-octave/octave/FFT)	✓
Averaged spectrum	✓
Auto-range	✓
Oszilloscope-function	✓
FFT-window	Hanning, flat top, rectangular, exponential
Measurement bandwidth	DC to 20 kHz or DC to 40 kHz
Maximum number of FFT lines	26 million
Measurement start	Manual, TTL trigger, STA/LTA trigger, threshold value, hammer impact, time control, calendar, third-octave and octave trigger
Stream on Disk	One-time, cyclic, measurement series
Trigger logic	AND, OR, excl. OR, user-defined *.DLL (Boole)
Averaging	Linear, square
Alarm if threshold values are exceeded, constant monitoring	Adjustable alarm levels, notification through e-mail/SMS
Digital output	✓
Data storage on hard disk	✓
Data storage in the cloud	✓
Virtual channels	✓
Online calculation	✓

"MEDA is an amazingly powerful vibration software that makes complex analyses become very easy at good time efficiency. I would recommend it to all vibration workers."

Simon Ng
Voith Paper Fabrics, Ipoh Perak, Malaysia



Evaluation of measurement data

Post-process data acquisition

MEDA provides approx. 100 post-process mathematical functions for evaluation of the measurement data acquired. MEDA provides all tools that are required for a fast and easy data analysis, including standard filter functions, frequency analyses and application-specific evaluation algorithms in the fields of mechanical engineering or construction engineering.

Evaluation – fast and automated

It is even possible to evaluate whole measurement series comprising several hundreds of measurements using the multi-selection function or the "evaluate all measurements" parameter. Moreover, the user can also combine several evaluation operations and run them consecutively using the "combination routine" function. For example, a recorded time signal can be subsequently band-limited within the required frequency range, the measurement variable can then be converted from acceleration into vibration paths and a third-octave spectrum can finally be calculated – with just a click on the "start calculation" button.

All of the evaluation operations are clearly grouped and sorted alphabetically.

In addition, the five operations last used are displayed and can be applied directly. It is therefore possible to make frequent evaluation operations quickly and efficiently. MEDA provides the following evaluation operations:

Evaluation operations (excerpt)

Standard

- Copying, scalar addition, multiplication
- Differentiation, sub-scanning
- Linear momentum conversion

Vibrations

- Measurement and evaluation acc. to DIN 4150
- KB filter, floating RMS value
- Frequency response correction
- Third-octave spectrum, train detection
- Vibration according to ÖNORM S 9012
- DIN 45669-1 - vB

Digital filters

- Digital low-pass, high-pass, band-pass, band-stop filters
- Human vibration

Frequency analysis

- Cepstrum, (inverse) FFT
- Third-octave/octave spectrum calculation

Statistics/Zwicker's loudness model

- Level statistics, statistic variables
- Polynomial fit

Levels

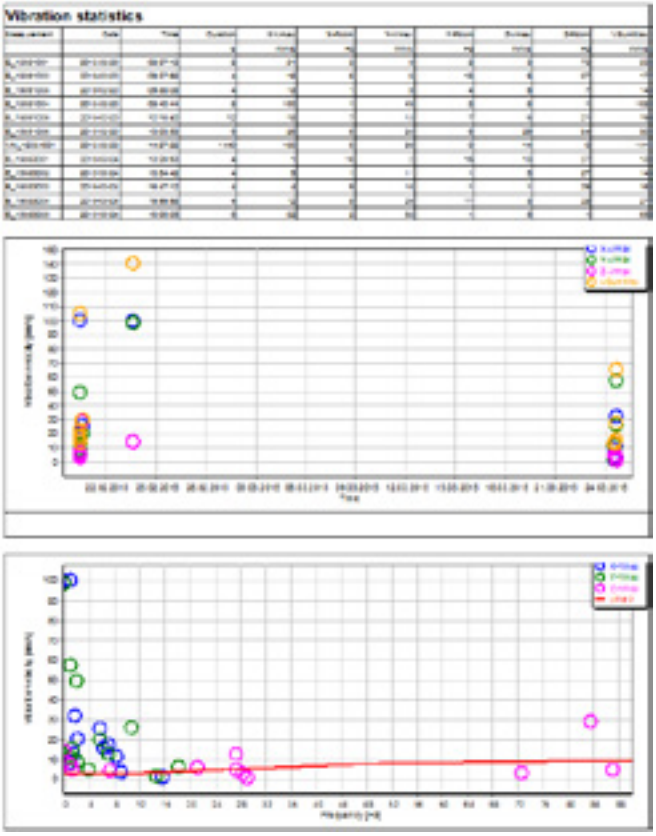
- Sound level, bar max level
- Tonal components according to DIN 45681

Correlations

- Auto-correlation
- Cross-correlation

Others

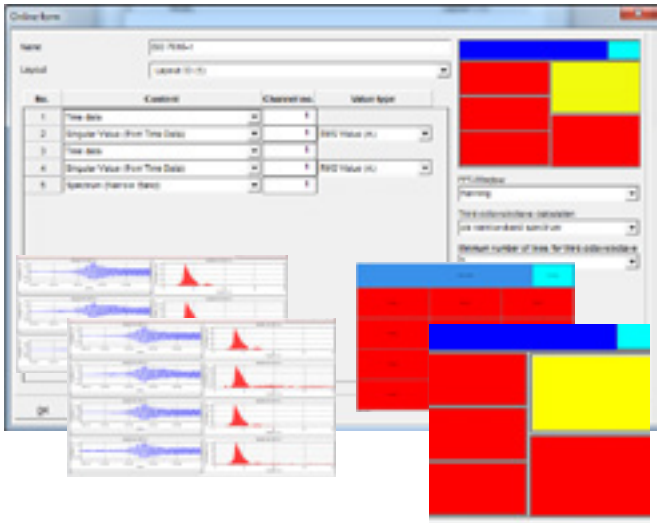
- Effective power, harmonic distortion
- Averaging, formula calculator
- Multi-purpose routine



Results of an evaluation operation: vibration statistics

Results that impress

In MEDA, measurement and calculation results can be displayed and presented in almost unlimited variations. That means that measurements and their evaluations are transparent and convincing for both users and clients.



Perfectly flexible: MEDA users can make their choice

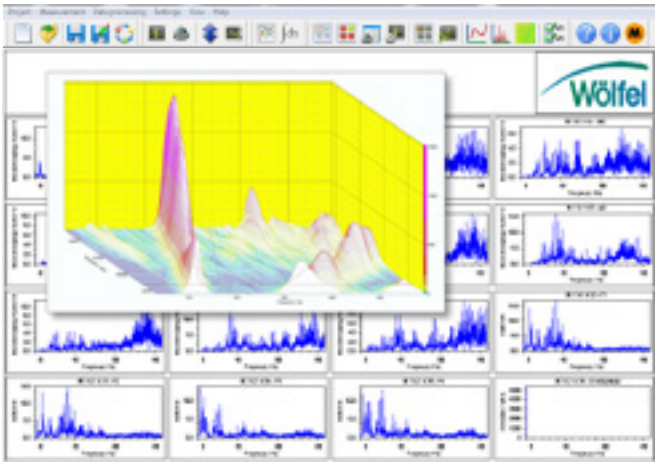
Individual and efficient

The extremely flexible presentation of measurement results, calculation operations and diagrams makes MEDA an important tool even after completing the measurement. MEDA combines the demand for neat documentation of measurement results with the user's requests for individual reporting.
And this reporting function is highly efficient. All layouts which are based on the forms for displaying the time curves or spectra can be fully edited.

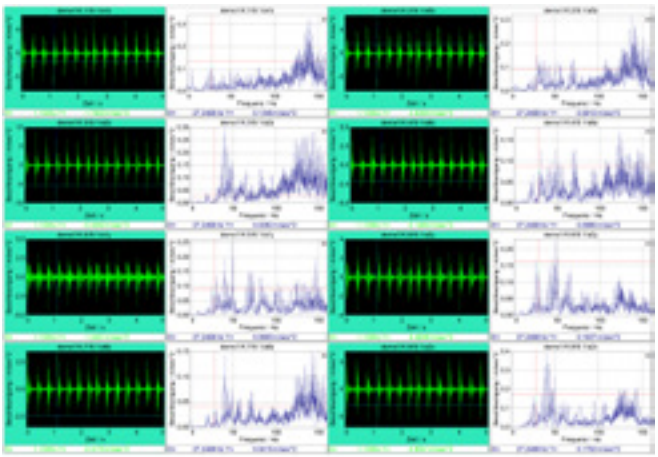
Just use the forms to create standard layouts, e.g., company logo, text documentation, incorporated graphics, etc. This considerably simplifies your documentation and simultaneously ensures a uniform and appealing visual appearance of your reports. There are no limits to the color, alignment and number of the various display fields. Another advantage: Once created, all layouts can be saved and are therefore available for the next presentation with just a mouse click.

Make your choice

Using the form manager, you can easily select the layout which best reflects the results of your measurement. You need just a few clicks to set the correct scaling of the measurement values, incorporate a picture of the on-site measurement situation and complete your first evaluation. And you now wish to display the results of your online calculation on this form afterall? No problem: Simply adjust the form, and you have access to additional information.



3D waterfall with spectra



16-channel measurement

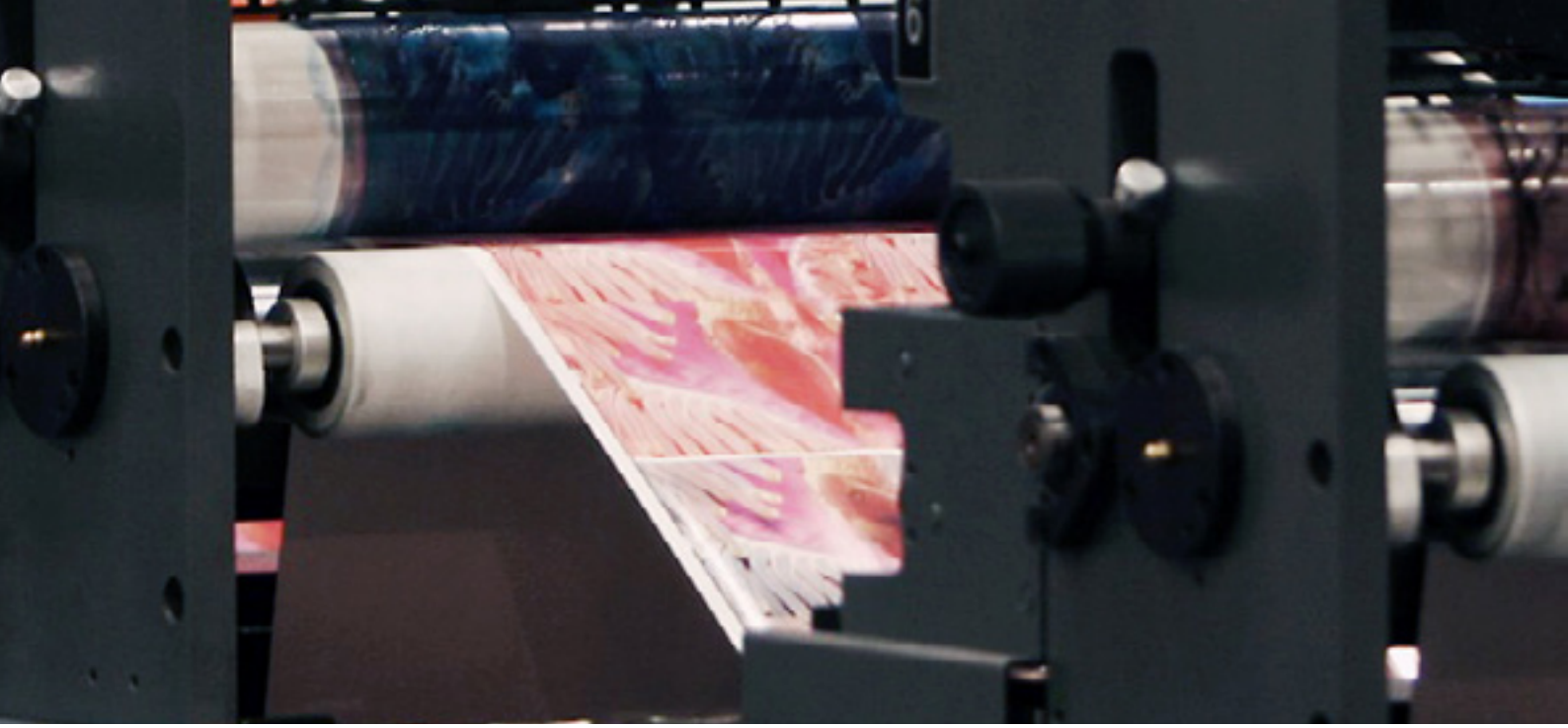
Front ends – MEDA hardware

MEDA BlueStack®

MEDA BlueStack® is a flexible wired solution for your measurement task. Whether 4 or 32 channels, single or cascaded, MEDA BlueStack® is a customized complete system for measuring, analyzing and evaluating vibrations and noise. MEDA BlueStack® provides measuring channels in packs of 4.

MEDA RedSens

MEDA RedSens is the ideal solution for all users who want to do without cables. Position your sensor directly at the measurement location and profit from the only available WLAN measuring system with full synchronism (!) across all connected channels.
MEDA Red-Sens provides measuring channels in packs of 3. Up to 10 modules, each with 3 axes, i.e., 30 channels can be operated without cable at the same time.



MEDA USB 16/24/32

MEDA-USB-X is a compact and robust multi-function data acquisition module for fast registration of measuring signals.
This USB front end features analog inputs as well as digital inputs and outputs. MEDA-USB-X is available in three expansion version, each with 16, 24 or 32 channels. Individual solutions with more channels are available on request.

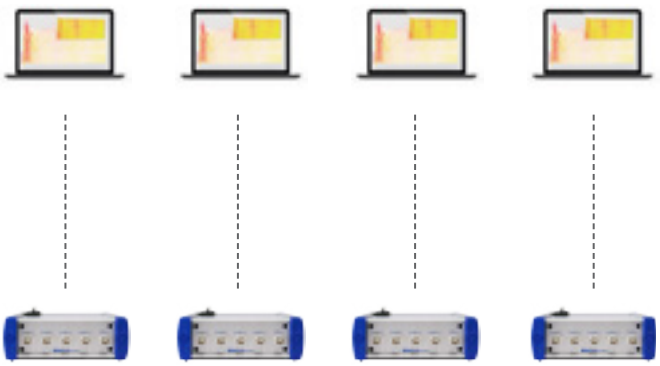
"Over the last 7 years MEDA has proved to be an excellent tool to tackle all vibration issues faced by the paper industry. The system is very reliable, intuitive and can be used with full confidence when it comes to results. Great software with a number of useful features standing out from other products available on the market. Definitely recommended!"

Maciej Krakowiak
Voith Paper EMEA

Single or cascaded

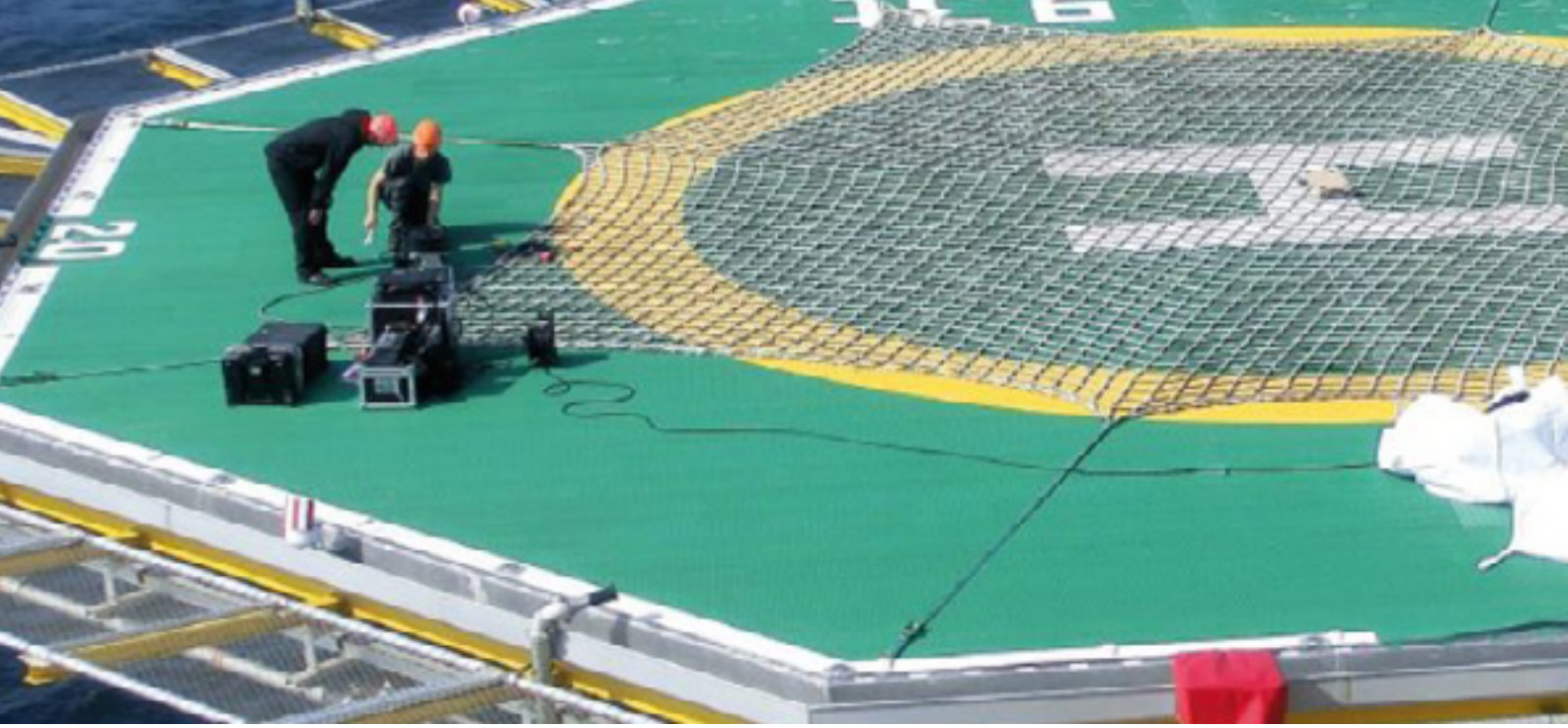
MEDA BlueStack® – Modular, compact and powerful

An analogy with sports gets to the heart of MEDA: Whether configured as a "lone fighter" with "four channels" or whether it is used in "concerted interplay", MEDA BlueStack® always shows its strength. The software-supported cascadable front end allows reliable and highly precise data application with 24-bit resolution.
Since the sampling rate is 50 (or 100) kHz per channel, high measuring bandwidths can be implemented, especially even for acoustic applications. Data are conveniently controlled, set, evaluated and diagnosed on a notebook or PC. Whether you use MEDA BlueStack® to monitor machines over a long period of time, to run the troubleshooting functions or the waterfall and order analysis functions in order to become familiar with the structural behavior of the machine – all settings can be made quickly and easily, and results are meaningful and informative.



MEDA BlueStack®

Number of channels	4 + 4 + 4 +4 or 8, 16, 24, 32, 64
Resolution	24 bits
Sampling rate	102,4 kHz or 52,734 kHz per channel
Sampling	Simultaneous
Anti-aliasing-filter	On board
Dynamics	110 dB
Measuring ranges	+/- 1 V ... +/- 10 V
AC/DC-coupling	✓
Speed input	External analog or 0 – 80 kHz pulse pattern
PC or notebook with interface	USB 2.0
Signal input	IEPE sensor feed-in (24 V, 4 mA), switchable
Connection	BNC
ICP supply	Can be added optionally
Operating temperature	0 ... 55 °C
Dimensions (mm)	245 x 145 x 61 (single measuring module)
Weight	Approx. 1.4 kg (single measuring module)



Absolute synchronism

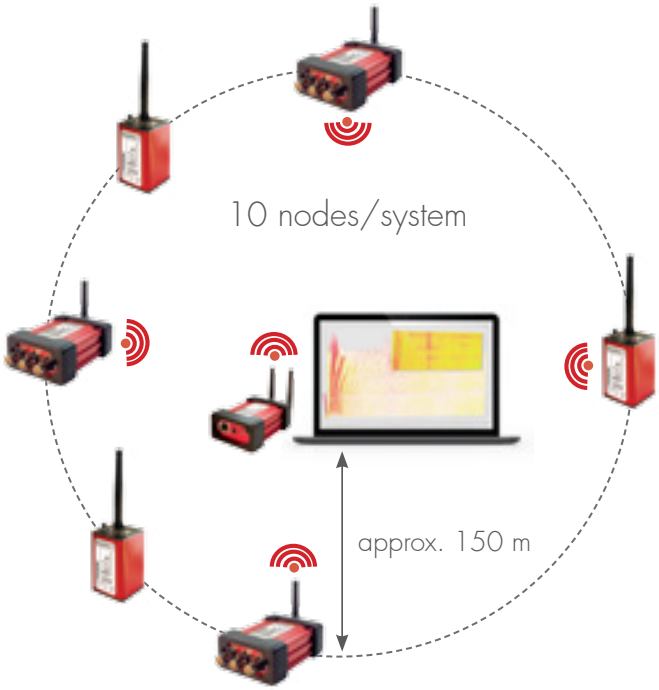
MEDA RedSens – Synchronous, fast and wireless

The MEDA RedSens system offers maximum flexibility with 100% synchronism at the same time. MEDA RedSens is the only presently available WLAN measuring system with full synchronism (!) across all connected channels. Up to 10 modules, each with 3 channels, can be operated without cables at the same time. You can choose between sensor nodes with 3 external signal inputs each and/or sensor nodes with built-in acceleration sensors (mixed operation). It couldn't be easier: cables do not have to be transported, pulled or connected.

And a resolution of 24 dB at 110 dB dynamics allows for the recording of even the smallest measuring variables. With its bandwidth of 5 kHz, the system is perfectly suited for all applications in mechanical engineering, vibration protection and automotive industry.

Synchronous wireless measurement

	RedSens external	RedSens internal
Number of channels per node, sensor input	3	3 (X, Y, Z)
Measuring range	± 1 V / ± 10 V	± 10 g / ± 100 g
Signal input selectable per channel	Voltage or IEPE	IEPE
Signal coupling selectable per channel	AC or DC	
Frequency range	DC – 5 kHz	
Offset	1 mV	0,01 g
Broadband noise	20 µV@ ± 1 V 40 µV@ ± 10 V	0,001 g
Resolution	24 bits	
Dynamics	110 dB	
Sampling across all channels	simultaneous	
Synchronism deviation max.	1 µs	
Data transfer rate	1 Mbits/sec	
Sensor nodes per system	1 – 10	
Free field range	140 m	
Energy supply	Internal battery or power pack	
Measuring time with battery (typical)	7 – 9 h	
Battery charging time	3 h	
Dimensions without antenna (mm)	114 x 64 x 30	40 x 40 x 80
Weight in grams	220	270



Supported by:
Federal Ministry for Economic Affairs and Energy
on the basis of a decision by the German Bundestag

ZIM
Zentrales Innovationsprogramm Mittelstand

8, 16, 24 or more channels

WMS-USB multi-function data acquisition

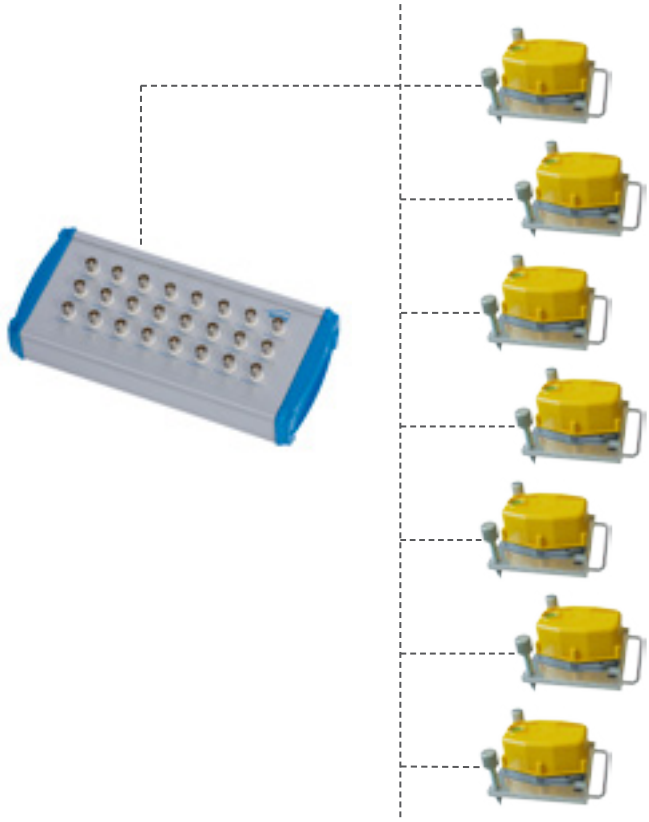
Even difficult measurement tasks can be easily fulfilled. The compact and robust multi-function data acquisition module WMS-USB has been designed for fast registration of measuring signals. In its basic version, it features 8 channels with a total sampling rate of 250 ksps.
16, 32 or more channels are available in additional expansion sets. All analog signal inputs and the digital inputs and outputs are provided via BNC sockets on the front panel. An optional lateral multi-port is available for the connection of the vibration rate measuring device WMS-VM116.

A USB 2.0 port is available for power supply and data communication with the MEDA software. An external power pack is therefore not required. This allows mobile use of the USB front end, e.g., in the field of vibration protection.

Equipment features

8 differential measuring channels	WMSUSB08D
16 differential measuring channels	WMSUSB16D
16 single-ended measuring channels	WMSUSB16S
Digital inputs	4
Digital outputs	4
Connection to PC	USB 2.0
Total sampling rate	250 kSps/s
Resolution	16 bits
Signal connections	BNC
Signal input	+/- 0,2 V, +/- 1 V, +/- 5 V, +/- 10 V
Weight in grams	850
Dimensions (LxWxH) in mm	270 x 126 x 46

The system is also available with a different housing size with 40 differential measuring channels or 80 single-ended measuring channels (WMSUSB40D or WMSUSB80S).



Useful things ...

Accessories and options

With MEDA, you choose a measuring system that has been developed from practice for practice. MEDA has proven its value in countless measurements around the world, because our engineers and measurement technicians put particular emphasis on the sensor system used.
For that reason, we can provide you with further proven and reliable accessories and supplements to your measurement equipment.

Sensors for measuring

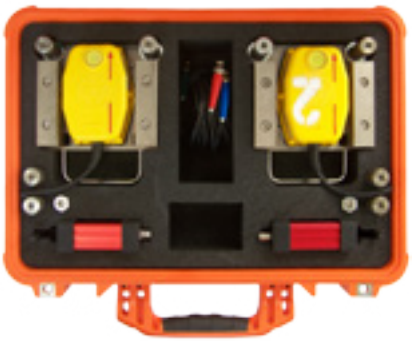
- Acceleration
- Velocity
- Distance
- Speed
- Pressure
- Sound
- Power

and equipment for data acquisition for special environmental conditions.

But we advise you not only when you have to choose your sensors for various fields of application but also when you have to purchase additional connecting cables, cable drums or power supplies. Sturdy industrial notebooks for measurements in harsh environments complete our MEDA range.

Vibration velocity transducers according to standards and more

We provide vibration velocity transducers complete with base plate, leveling tips (round and acute) and additional weights according to DIN 45669-2. Characteristic curves are linearized online during the measurement in the MEDA software. Please contact us when you have to fulfill special individual tasks. Further accessories are available on request.



WMS-GSM-WARN

If the set threshold values are exceeded during constant monitoring of a construction site or critical machine states must be signaled, the GSM warning interface generates a warning: MEDA allows separate activation of visual and audible signals by means of SMS control. The power-on time can be configured via SMS and ranges from 1 sec to 600 sec. A stable aluminum housing and a degree of protection of IP65 make operation possible even under extreme conditions.

WMS-DC power-supply

This battery-based power supply is especially suited for the off-line connection of the MEDA RedSens front end. With its 17 Ah, the maintenance-free Pb gel battery permits an extended operating time of up to 18 hours.

Shaker BD.5 / BD.10

Benefit from our shaker systems for universal vibration excitation and measure it with MEDA.
BD.5 and BD.10 are electrically dynamic shakers which can excite structures to vibrate in a controlled and precise manner. They are excellently suited for

- determining natural frequencies, eigenmodes and attenuation factors,
- making experimental modal analyses,
- determining transfer functions,
- determining mechanical input impedances,
- applying defined vibration loads to the structure or unit under test

Technical data

Hardware requirements

- Operating system: Windows® XP and higher, recommended Windows® 7 or higher
- 32- or 64-bit processor – multi-processor systems accelerate measurement and evaluation
- At least 1 GB RAM
- 400 MB unassigned hard disk storage capacity for program installation
- Monitor resolution: at least 1024 x 768
- Graphics card with 3D acceleration and MS DirectX
- Mouse and keyboard

Use MEDA in the laboratory or office on your PC in a network or in the open air on your notebook or sturdy industrial PC.

Equipment versions

MEDA is an expert system for professional applications and is available in the following expansion versions:

- Machine diagnostics
- Vibrations / noise

The waterfall, ball bearing diagnostics and balancing modules expand the machine diagnostics package with their additional performance features. They are included in the package price.
For special machine diagnostic applications, the sound power module is available at extra cost.

Interfaces / compatibility

MEDA supports data exchange with most of the MS programs and other file formats.

Online help / documentation

- Detailed online help for each function, accompanied by pictures and explanatory texts
- Examples and tutorials for getting started in MEDA easily and quickly

Technical support / maintenance contract

Conclude a maintenance contract to benefit from numerous additional advantages:

- Technical support by phone and e-mail to answer your questions about handling the software through our hotline
- Automatic delivery of all software updates
- Program configuration supplemented at lower prices
- Special conditions for participating in our comprehensive range of workshops and seminars

When you purchase a new version, you benefit from 6 months maintenance, free of charge. If you wish to continue our maintenance service thereafter, please conclude a software maintenance contract.

Support on our website / customer log-in

Customers have access to the internal sections of our website. There, you are informed about novelties, can download updates and obtain exclusive product information.

- News about MEDA
- Offers on the program
- Updates, manuals, documentations, and tutorials for download
- News ticker about workarounds, suggestions and tips
- Offers on the program

Scope of delivery

- Hard key (USB) for program backup and protection of your investment as a single-user or network license
- Manual on a CD
- 6 month warranty, incl. update and hotline service
- Optional complete sensor system

On request, MEDA is also available as a completely pre-installed version and is then immediately ready for use on your computer.

What moves Wölfel?

Vibrations, structural mechanics and acoustics – this is the Wölfel world. Here we are experts, this world is our home. More than 90 employees daily do their best for complete satisfaction of our customers. For more than four decades we support our customers with engineering services and products for the analysis, prognosis and solution of tasks in the fields of vibrations and noise.

Are vibrations really everywhere? Yes! That's why we need a wide variety of solutions!
Whether it is engineering services, products or software – there is a specific Wölfel solution to every vibration or noise problem, for example

- simulation-based seismic design of plants and power stations
- measurement of acoustic emissions of wind turbines
- universal measuring systems for sound and vibrations
- expert reports on noise immission control and air pollution forecasts
- dynamic occupant simulations for the automotive and aviation industry
- and many other industry-specific Wölfel solutions …

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MEDA-01-EN-10-2017