

Services

Machine diagnosis

- Consulting
- Vibration diagnosis
- Torque measurement
- Diagnosis reports
- Torsional vibration analysis
- Measurement techniques
- Training courses



 ***We keep your drive running!***



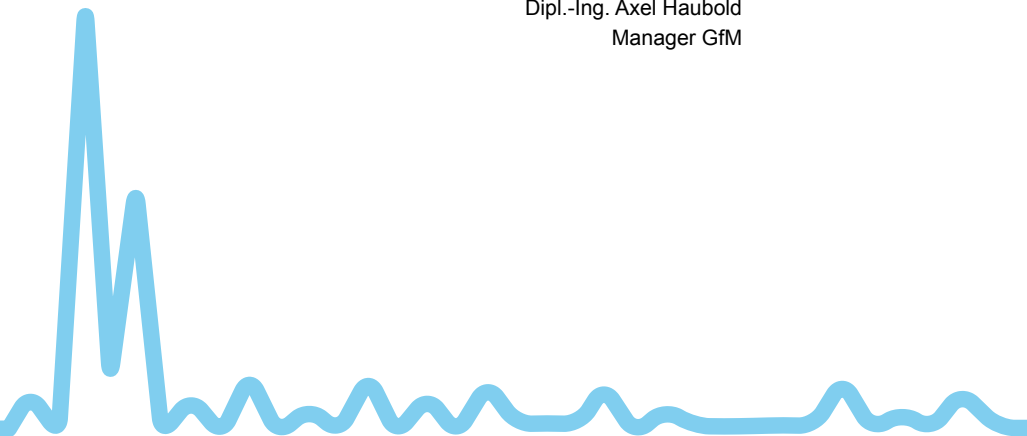
GfM offers competent services

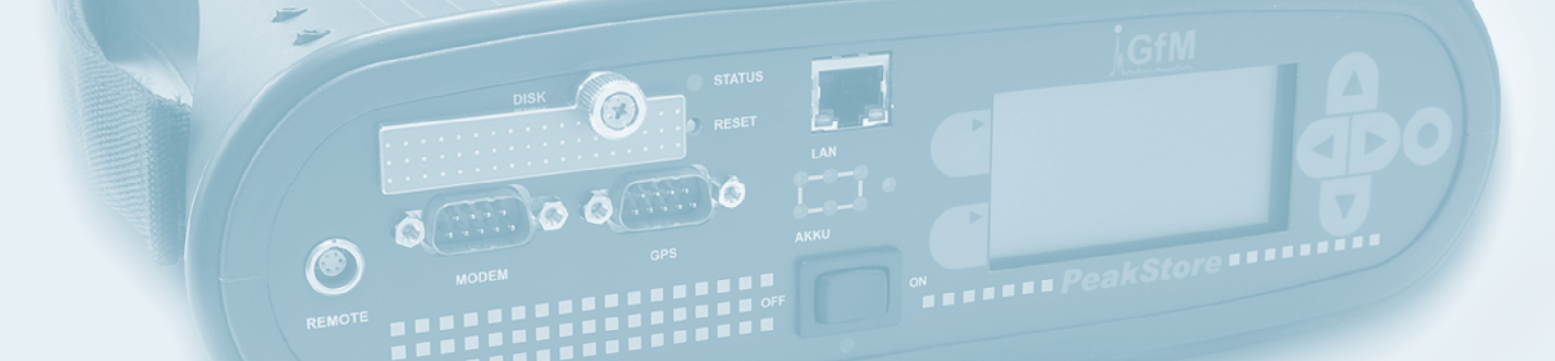
- On-site measurements at drives
- Ongoing online-analysis
- Evaluation and recommendation
- Report/documentation
- Training courses
- Complete supervision of the software and devices
- Service and maintenance



„We offer our customers an all-around service with our services.“

Dipl.-Ing. Axel Haubold
Manager GfM





GfM-vibration diagnoses

Vibrations „hear“ and „feel“

At the vibration diagnosis two human senses namely the hearing of high frequent vibrations and the touch of low frequent vibrations are recreated and evaluated by objective methods. Since already the smallest mechanical procedures – also minimal damages – in machines manifest themselves by vibration, they can be detected reliable.

If there is a damage e.g. at the outer ring of a rolling bearing it could be a pitting damage. This is a damage which arises due to material fatigue over a longer period. This damage is mostly localised and at first very small. Since all rolling elements pass this small damage an impulse is created every time.

The energy of these impulses is very low. Certainly the shock cannot be heard with ears. But the sound will be conducted to the surface of the machine. This sound can be measured by means of accelerometers.

The signal is recorded and if necessary processed. In the created spectrum or rather in the envelope curve spectrum the damage can be clearly visualized.

A similar effect appears if the tooth flank of a gear stage is damaged. The following tooth has to collect the non-transferred energy and this also causes a shock. This is a local toothing damage.

Furthermore, all damages which appear over the whole circumference at gears or rolling bearing components can be detected reliable.

„As experts of vibration diagnosis new challenges excite us again and again.“

Dipl.-Ing. Kai Uchtmann
Manager GfM

Your use:

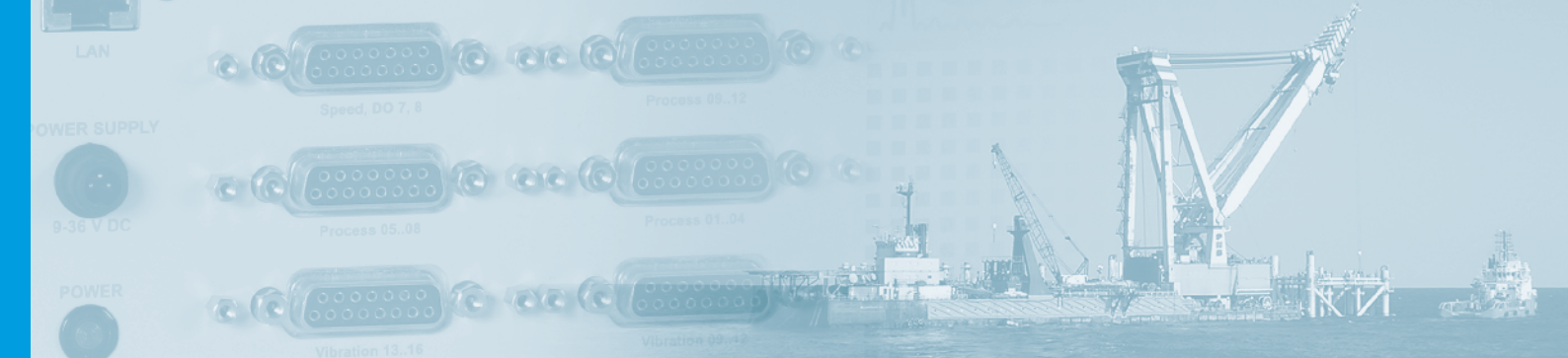
- early detection of irregularities at mechanical drives
- better planning of maintenance work
- increasing plant availability
- avoidance of unplanned standstill
- reduction of operation and maintenance costs
- reduction of the replacement part stock

The vibration diagnosis takes only a few minutes. The accelerometers are normally fixed with magnets and the drive operates under representative conditions.

„At a roll stand of our cold rolling mill were abruptly abnormal noises. Our experienced staff could not find the noise at this complex drive and also not the cause for it. Dipl.-Ing. Kai Uchtmann of GfM was able to analyse fast and clearly with his instruments: The outer ring raceway of a cylindrical roller bearing had a discontinuity. Due to GfM the damage was found very quickly and could be repaired.“

Maintenance manager of a cold rolling mill
long-time GfM customer

We keep your drive running!



GfM-torque measurement and torsional vibration analysis

Forces act on rotating shafts or on whole drives. These influences are induced from the outside and arise in the shaft or in the drive as a consequence of movements. Within the drive construction these forces are calculated and estimated. Sometimes real circumstances differ from the estimation.

The exact measurement of the torque helps by
→ confident and also economical measurement of a drive
→ troubleshooting if overload is supposed
→ efficiency determination.

Part of the acting forces or torques change periodically. Torsional vibration arises. This often appears in connection with the resonance appearance when the torsional natural vibration of a shaft or a drive is activated.

Simultaneously with torsional vibration mostly rotational vibrations occur. Between those two a causal interrelationship can exist.

The GfM torsional vibration analysis defines exactly the torsional vibration of a drive. In this way it is possible to separate the torsional vibration of other vibrations for instance the flexural vibration or housing vibration. GfM defines also the torsional natural vibrations.

Moreover, we can define and describe qualitative and quantitative technological conditional oscillating forces and torques.

The torque can be defined and measured by means of the measured electrical power with little effort. But this is not sufficient for some drives. As soon as the torque of inertia of rotating masses appears, the measurement of the mechanical torque is required.

An application of a measuring point is needed for the torque measurement. About four hours shutdown are necessary.

The data collection depends on the definition of the project. We work together with you to clarify the following questions:

Under which circumstances should be measured?

At which time should be measured?

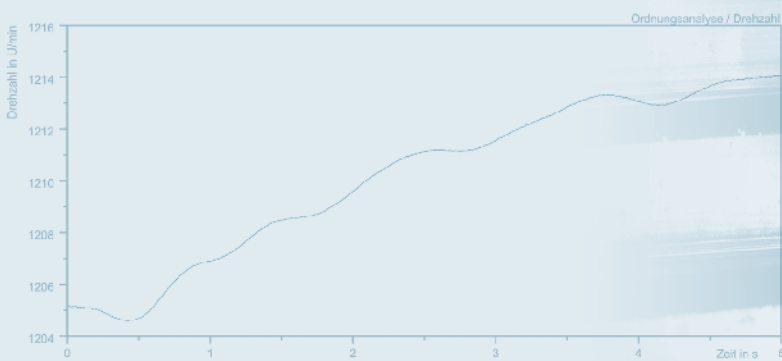
How high should be the number of measurement values per second (resolution)?

The definition of the optimal resolution is the determining factor for the quality of the analysis.

The speed is measured simultaneously. With this speed we calculate the kinematical relations of the drive. Moreover, the speed is required for the diagnosis at speed variable drives. Therefore we use the order analysis.

Your use:

- Optimization of the drive's operation mode for an ideal service life
- Sourcing for overloads
- Detection of vibration causer
- Description of the propagation and effect of torsional vibrations



Diagnosis report with recommendation

Results of torque measurement

Typical parameters of the drive can be determined as a result of the torque measurement. These are for instance the average and maximum torque during a certain production process.

Often it is useful to collect a major number of measuring data over an adequate longer period. The data has to be compressed for a better handling.

The counting of exposure time enables a statistical overview of the classified signal. The range pair counting is also very informative. This provides the frequency of the passed range of the torque. The rainfall classification belongs to the two-parametric methods.

The representative classification gives more detailed information about the life cycle or failure probability for several applications as stating the effective load and operation ratio. If the real load is not known, a determination by means of a torque measurement and signal classification will be advisable.

Results of the torsional vibration analysis

If the time signal of the torque undergoes a frequency analysis you will receive a torsional vibration spectrum. There can be taken out information of the vibration behaviour of the measured component and information about the vibration which are impressed outside. That way damages can be detected at drive-specific components in the torsional vibration spectrum.

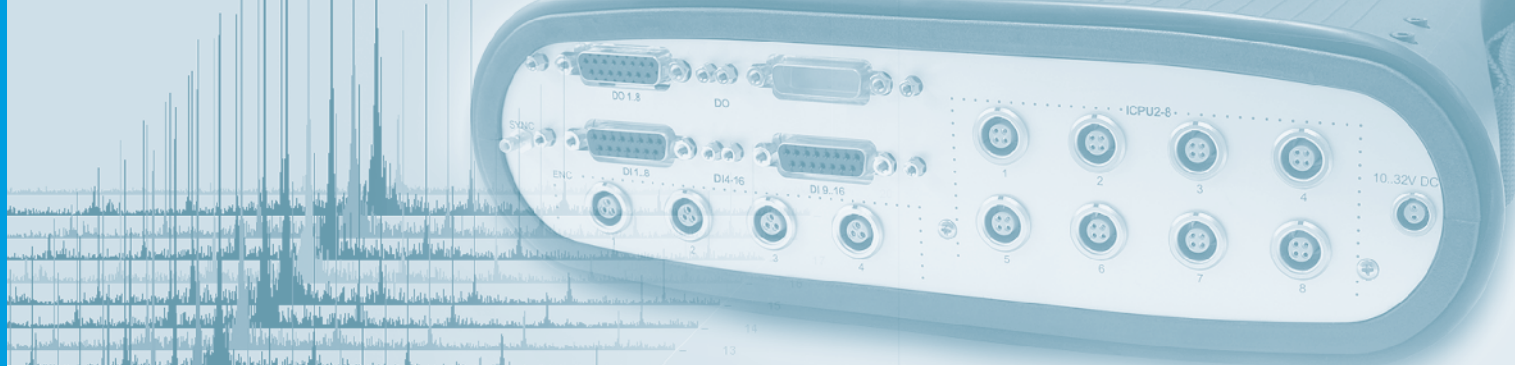
The measured torsional vibration signal can undergo an analysis against time or speed. The result can be an experimentally generated resonance diagram.

The results of our qualified measurements are summarized in a diagnosis report. That way you will receive detailed information about the measurement conditions and the measurement results. On the basis of the report the measurement and diagnosis results are exactly comprehensible for experts. Our GfM-diagnosis reports will give you precise recommendations.

We are happy to provide you with a hardcopy of the report, a CD-ROM or we also will send you the report by E-mail.

„The precise recommendations in the GfM-diagnosis reports have always been very helpful for us.“

Maintenance manager of a cement mill,
long-time GfM customer



PeakStore

the portable eight-channel vibration data collection system



Applications:

mobile vibration measurement at drive trains

Result:

mobile and high-quality measurement results

Characteristics:

- fast mobile on-site measurement
- 8 channels for 8 accelerometers for the data collection
- additional speed measurement
- easy-to-use also for laymen
- sturdy design
- suitable for connection are:
 - accelerometers
 - inductive displacement sensors
 - resistance strain gauge via telemetry
- simultaneous speed collection for order analysis
- battery-operated
- only about 3 kg weight

Piezoelectric accelerometers, inductive displacement sensors or resistance strain gauges (via telemetry) are possible as sensors. The speed can also be collected for speed variable drives.

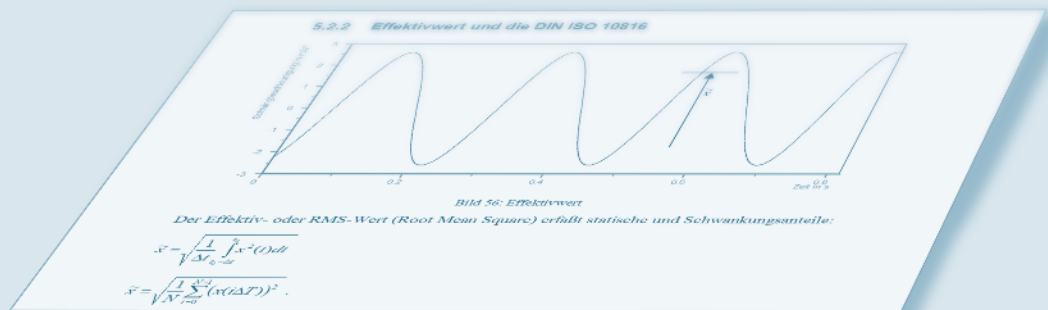
The setting up of the sensor configuration as well as the sensor sensitivity will be realised via a personal computer. These settings will be transferred to the PeakStore and obtained as long as the settings are overwritten.

The vibration data are collected with 50 kHz per channel and are stored directly on a customary intern changeable memory card. Additionally the measured speed is stored which is required for the order analysis.

Normally the PeakStore has one memory card. That way it can be operated as an autarkic measurement system. A personal computer will not be necessary for a measurement. The amount of the stored data depends on the size of the memory card. Later the data can be transferred to a PC via LAN or direct read-out.

For long-term measurements with very large mounds of data a permanent connection to a PC during the measurement can be expedient.

The software PeakStoreCalc which is also delivered by GfM enables the calculation of spectra, order spectra, envelope curve spectra and envelope curve order spectra for normal vibration measurements.



Trainings

„GfM offers enormous transparency with its seminars – that’s not a matter of course.”

Seminar participant

Target group of GfM trainings

- Operator of manufacturing plants who would like to monitor their drives independently by means of the Peakalyzer
- Maintenance service provider who would like to offer their customer an online-condition-monitoring-service
- Manufacturer of drives and manufacturing plants who would like to ensure their customers a highqualified plant
- support and insurer who ask for condition-monitoring as a maintenance method (e.g. for wind turbine generators).

Course instructors

The qualified GfM training team is partly complemented by extern experts.

Training example 1

„Machine diagnosis for predictable maintenance“

Use of seminar:

The participants are able to

- choose competently a suitable diagnosis method for their company
- diagnose unerring and comprehensively drives in their company
- judge extern diagnosis services provider comprehensively.

The seminar „Machine diagnosis“ offers the participants the basis know-how of the following topics:

- Predictive maintenance
- Damages in the mechanical drive engineering
- Vibration causes
- Signal theory
- Housing vibrations
- Collection and digitalisation of vibrations

On the basis of praxis reports the possibilities and limits of machine diagnosis are clarified. Every participants will get a GfM vibration signal library and the GfM practice CD with signal examples of real damages.

Training example 2

Software training „Peakalyzer“

Use of seminar:

Safe operating application of the Peakalyzer with its comprehensive functions.

The software training „Peakalyzer“ includes the following topics:

- Housing vibration diagnosis
- Order analysis
- Automatic operation method of the Peakalyzer – DVS analysis
- Installation of the hardware
- Communication connection
- Working with the software PAAS
- Creating and editing the monitoring configuration
- Working with the logbook
- Identify the alarm state and acknowledge the alarm
- Data transfer
- Analysis of time signals and spectra
- Automatic data management via PNM (Peakalyzer Network Monitoring)
- Service measurements

Evening program

At seminars lasting several days, we invite you at the evening of the first day to discover the interest places of Berlin and to let the day die away homely together with us.

Are you interested in our trainings?

We would like to send you some detailed information.

We are looking forward to hear from you.

GfM Services

GfM Gesellschaft für Maschinendiagnose

We keep your drive running!

- Since 10 years your reliable partner
- the engineer office for state-of-the-art machine diagnosis
- the developer and producer of the Peakalyzer
- our independence guarantees objectivity



Dipl.-Ing.
Kai Uchtmann
Managing Associate
Sales office west

Dr.-Ing.
Rainer Wirth
Managing Associate

Dipl.-Ing.
Axel Haubold
Managing Associate

Are you curious to know more about our services?

You are welcome to contact us.

We would like to meet your challenge.

Our experienced experts operate from two locations in Germany.

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