

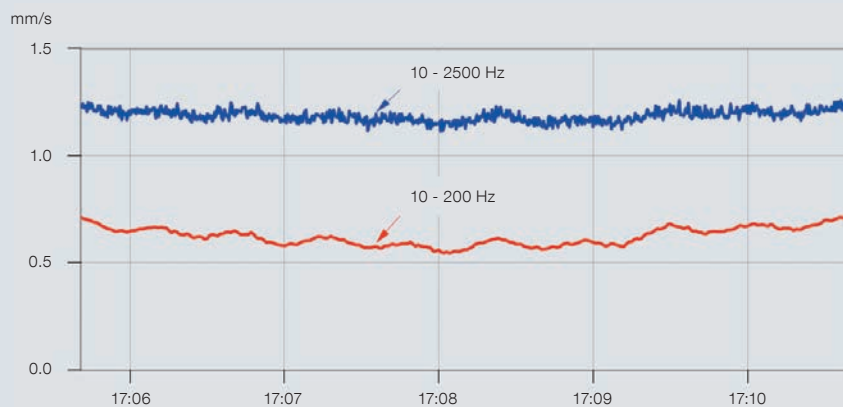
# Vibration Analyses

Casing vibration diagnosis



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Based on their long-standing experience in the assessment of vibrations and the use of the latest measurement and analysis methods the experts from the MAN PrimeServ Field Diagnostic Team provide you with reliable support in the analysis and assessment of the vibration behavior of your machinery.

Our compressors as well as our turbines normally represent core elements in the production processes of our customers. Unplanned downtimes can therefore lead to considerable production losses and related consequential costs. It is therefore of vital importance for every operator to know the status of his equipment at all times in order to be able to take early action to counteract unplanned downtimes.

The measurement and analysis of the vibrations occurring at the casing components is a proven method for the reliable assessment of the running behavior of the machine. Casing vibration measurement is particularly used with units without shaft vibration monitoring system or for further investigations in addition to rotor dynamic analyses. As the machine casing also

transfers high-frequency vibrations very well, the casing vibration diagnosis can also be used to measure gear meshing frequencies at the gears or blade passing frequencies of the turbomachinery which because of the mass inertia of the rotors would not emerge otherwise in the shaft vibration spectrum.

The skilled analysis of the vibration behavior by the experts from the MAN PrimeServ Field Diagnostic Team allows precise conclusions regarding the machine status and the cause of changes in the vibration behavior – both through preventive vibration analyses and through the assessment of sudden vibration problems. This allows the operator to adjust his maintenance schedule on-time and therefore to ensure high plant availability.

## Procedure

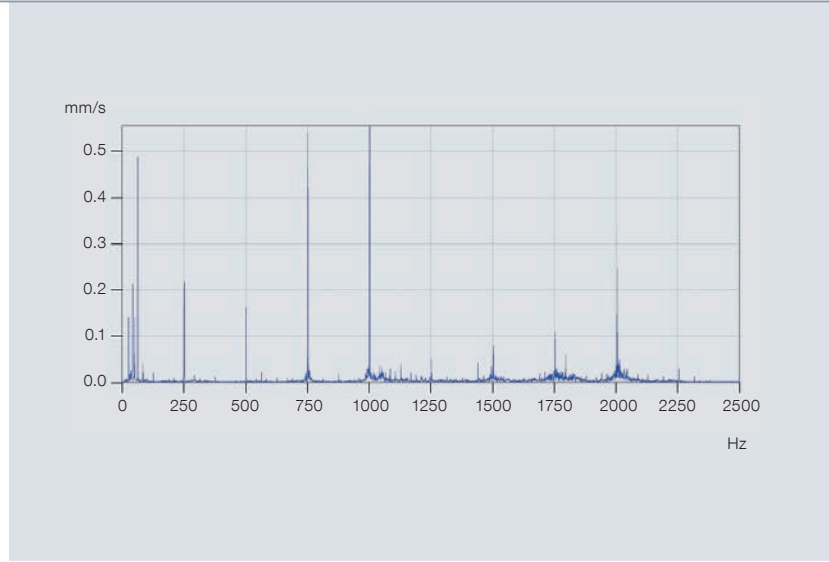
In addition to the measurement signals available in the machine protection system mobile vibration sensors are positioned as required on the casing by means of a magnetic holder or an adhesion system. Therefore acceleration probes are used which can be connected directly to the 16-channel frequency analyzer and do not need an additional power supply or measurement amplifier. The sensors can be attached during live operation if the unit is accessible without risk.

## Analysis tools

The vibration speed measured in mm/s is defined in the relevant regulations as an assessment variable for the general mechanical running behavior. Within the analysis the acceleration signals are converted in the measurement devices into vibration speed signals by means of time integration.

## Assessment

The recorded total values are initially globally assessed using threshold values as described e. g in DIN ISO 10816 and VDI 3836 for different machine types and sizes. In addition, vibration spectra are formed from the measurement signals for the detailed analysis of the running behavior. The differentiated spectral vibration assessment requires a precise knowledge of the machine specific and the plant-specific frequencies as well as of the criteria for assessing the measured discrete amplitudes. Direct access to the structural and design data aids the precise machine assessment and the specific development of optimization measures. In addition, earlier casing vibration measurements taken as fingerprint after commissioning or an overhaul represent an important reference value.



*Casing vibrations frequency spectrum*

## Benefits

In addition to identifying vibration-phenomena which cannot be discovered – or can be discovered only with difficulty – in the machine protection system, regular rotor-dynamic analyses also enable the identification of gradual changes in discrete frequency bands. Thereby, conclusions can be drawn about the cause of the changed vibration behavior and suitable maintenance measures can be planned at an early stage.

