

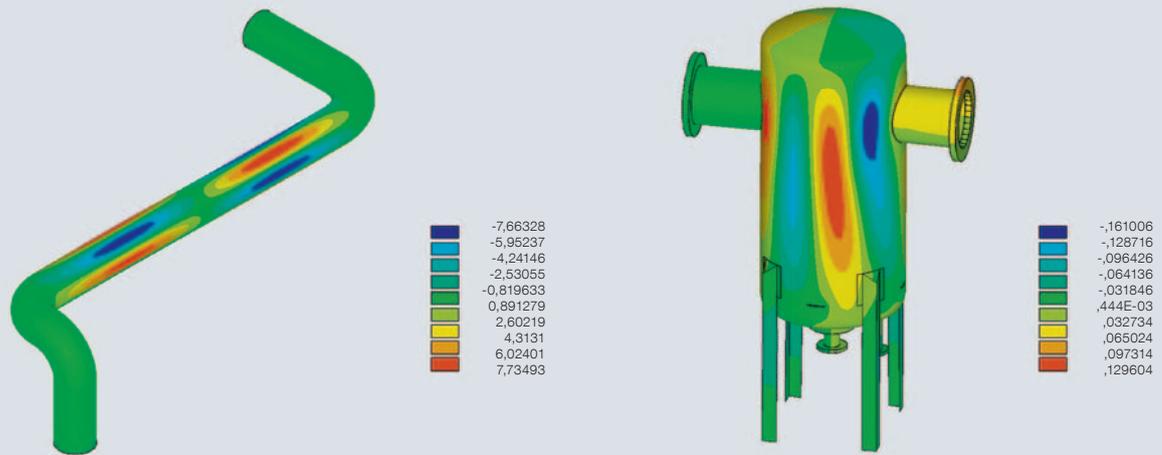
Vibration Analyses

Structural-dynamic analysis



Vibration Analyses

Structural-dynamic analysis



Modal and harmonic analysis using the Finite Element Method (FEM)

Due to the use of the latest measurement and analysis methods and the long-standing experience in the assessment of vibrations 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 and turbines are typically installed with all ancillary systems as fully functional units on base frames. As all the steel constructions, piping, apparatus and ancillary systems may be excited to vibrations due to design changes or new operating requirements, high vibration amplitudes may result in fatigue damage on the vibrating components as well as in negative impact on adjacent components.

Structural-dynamic analyses pursue the objective to determine the natural frequencies of a certain component and to measure and analyze its vibration behavior under specific operation conditions. These data allow the experts of the MAN PrimeServ Field

Diagnostic Team to determine the condition of the equipment and to recommend appropriate maintenance measures. Thereby, the operator can adjust the maintenance plan at an early stage to ensure a high availability of his equipment.

Analysis Tools

By means of the experimental modal analysis the natural frequencies and the therefrom resulting vibration patterns of a structure are determined. Additionally, operational vibration analyses provide valuable quantitative data allowing an evaluation of the actual vibration condition. Prior and concurrent numerical analyses (FEM) provide fundamental information for

the specific planning of the measurement tasks, the analysis of the measurement results and the evaluation of remedial actions and possible improvements.

Procedure

During the structural-dynamic analysis the vibration signals are recorded in a multi-channel setup. The recording can be performed either simultaneously with a fixed arrangement of the acceleration sensors or within several passages with different sensor positions. The recording of the vibration signals can be performed as well during operation or during standstill.

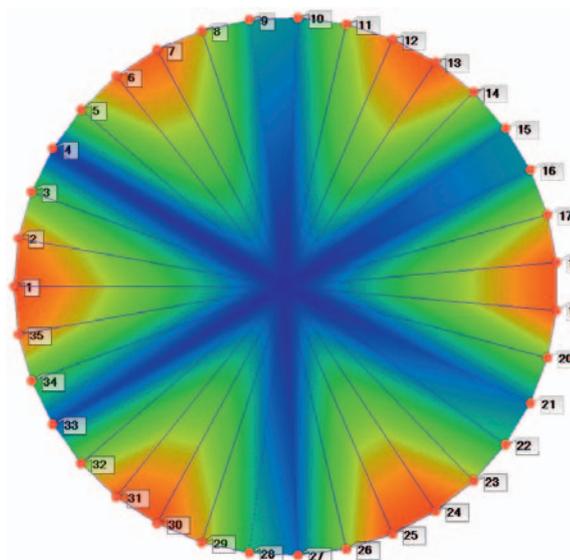
If the vibration signals are taken on the running machine, the vibration amplitudes and patterns are recorded at start up, normal operation and running down. During standstill, deliberate excitations using a modal hammer or shaker allow the precise analysis of the structural resonances.

Assessment

Using a specialized analysis software the measuring data can be animated so that even complex vibration patterns can be strikingly visualized. To obtain a differentiated evaluation of the structural-dynamic behavior intimate knowledge of the design of the equipment is required. The direct access to the design and layout data enables the Field Diagnostic Team to estimate the condition of the equipment precisely and identify specific optimization measures.

Benefits

Structural-dynamic analyses allow the identification and analysis of vibration effects which are difficult or impossible to be detected in the machine protection system. Thereby, reliable conclusions can be drawn on the equipment condition and suitable maintenance measures can be initiated at an early stage.



Animation of vibration patterns on a test point matrix for the analysis of the structural resonances of the high-pressure blading of a steam turbine rotor.

