

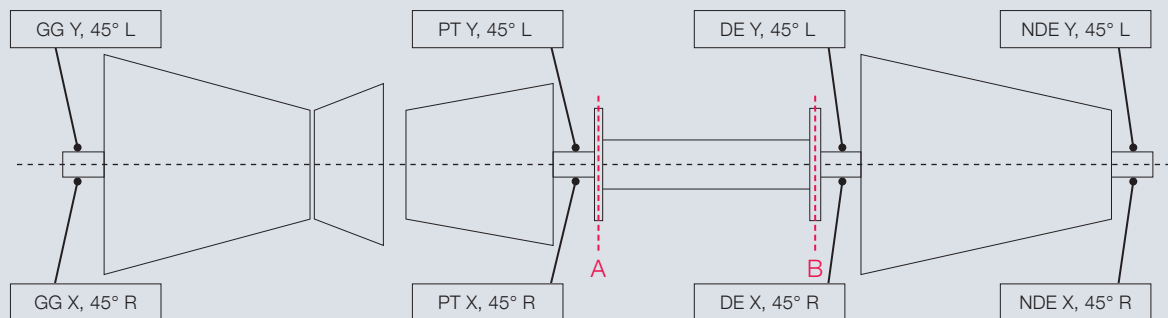
Vibration Analyses

Field balancing



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Coupling and balance planes in gas turbine-compressor train

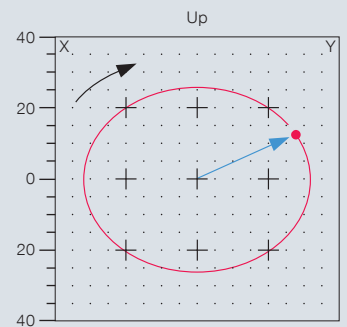
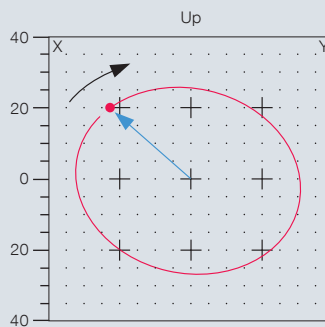
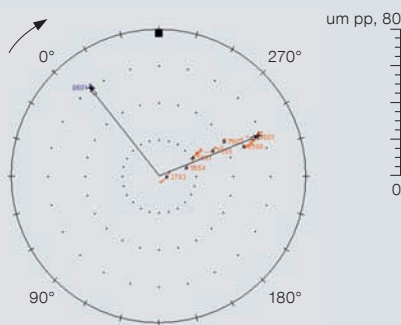
Excitations of the rotor train by imbalance forces are a common cause of increased vibrations of turbo machines. As plant operation at increased vibration levels leads to increased wear MAN PrimeServ recommends the regular assessment of the balance status of the unit.

Our compressors as well as our turbines typically represent core elements in the production processes of our customers. Unplanned downtimes can therefore lead to considerable production losses and related consequential costs. Thus, the reliable operation of his plant is of key importance for each operator.

Excitations of the rotor train by imbalance forces are a common cause of increased vibrations of turbo machines. Imbalances occur due to a radial displacement of the centre of gravity of the rotor train respectively of parts of the rotor train in relation to its axis of rotation. The resulting imbalance forces lead to a vibration of the rotor train with single rotational frequency.

All rotors are carefully balanced during manufacturing and maintenance and therefore possess a tolerable minor residual imbalance. Nevertheless, increased imbalance vibrations of the machine train can occur at a later date. A typical cause are the couplings between two rotors that can cause under certain conditions high imbalance forces and transfer them to the rotors.

In the course of the field balancing the experts from the MAN PrimeServ Field Diagnostic Team can identify the specific cause of the imbalance and remove it. Thereby, increased wear of the machine can be avoided and a high plant availability can be assured.



Polar plot and orbit assessment of the first and second test run

Procedure

During several test runs performed at identical operation conditions the reaction of the rotor train to the setting of trial weights at different angle positions at the balancing planes is assessed. Depending on the general conditions the field balancing can be performed either as 1-plane balancing or as 2-plane balancing in which besides to the static unbalance forces also dynamic unbalance forces can be compensated with little additional effort.

Analysis

During the test runs the vibration signals and the phase angle reference signal are read from the machine protection system. By analyzing the relative change of the imbalance direction between the individual test runs the optimal weight and the position of the final trim weights can be determined.

Prerequisites

In order to perform the field balancing successfully the rotors shall demonstrate a good balancing state, i. e. no damages to the blading, no missing balancing weights, no uneven deposits and no thermal distortion. Additionally, the rotor bearings shall be in a good condition and the alignment of the machine train has to be within the specified tolerances.

Benefits

Field balancing facilitates the targeted identification and elimination of the causes of imbalances. In this way increased wear to the machine can be avoided and a high level of reliability can be assured.

