

Electric motor with extraordinary vibration behavior

Due to increased vibrations at a drive motor of a forced draft fan in a chemical plant an inspection was carried out by the manufacturer. Diagnosis was a sideswipe in the bearing block as well as at the bent shaft. After repair, the trial to start the forced draft fan did not succeed due to increased motor vibrations.

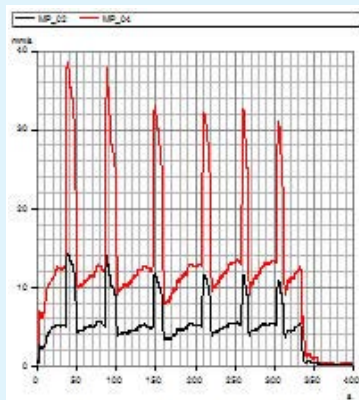
With standard methods this problem could not be solved. Therefore, it was decided to ask recognised specialists from KCE for support.

The analysis showed that the vibration situation at the motor changed periodically after 30 to 50 seconds. Figure 1 illustrates how the vibration velocity suddenly increased and changed after a short time towards lower values. At the whole time, the dominant vibration frequency was equal to the single-rotational frequency of the motor (figure 2).

It was striking that, when the vibrations increased significantly, also a sudden change in the phase position (angle between trigger and maximum vibration amplitude) of around 75° occurred (figure 3).

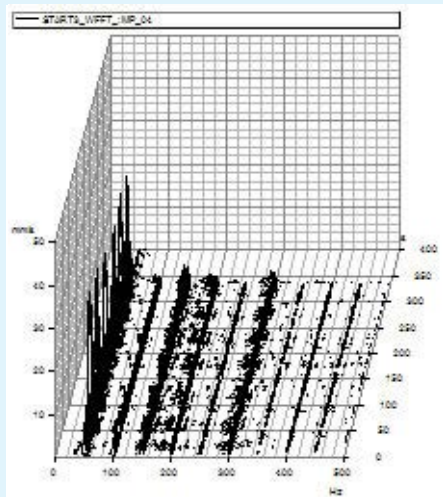
This behavior could only be explained by a sudden shift of masses at the rotor of the electric motor. Therefore, the motor was removed and checked again by the manufacturer. They found out that on the rotor some packages of sheet broke off. Depending on the position, the packages of sheet influenced the imbalance of the motor and therefore the phase position.

After repair, the forced draft fan was taken into operation without restrictions and was working without any problems.

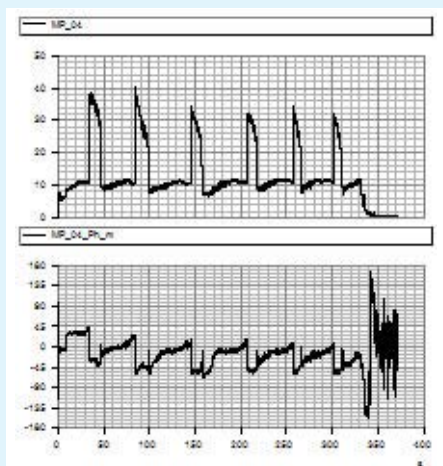


Effective vibration velocity at the bearings of the electric motor in vertical direction

MACHINE DYNAMICS



Waterfall display of the FFT-analysis of the vibration velocity at the motor bearing coupling side, motor speed 3,000 rpm



Time response of the effective vibration velocity (top diagram) as well as phase position (below diagram) at the motor bearing coupling side



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