

MACHINE DYNAMICS

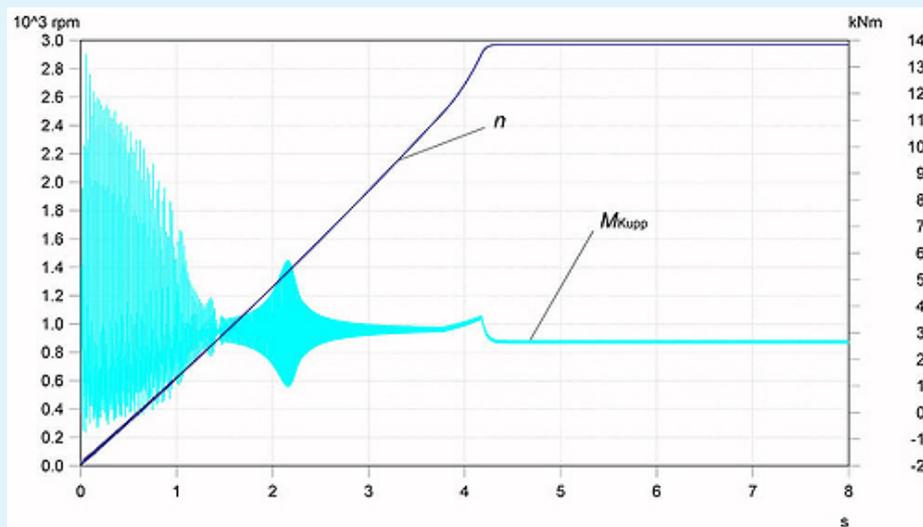
Dynamic torsion load too high?

Theoretical torsional vibration analysis of an engine with an elastic coupling

During the commissioning of a cooling unit, the elastic coupling between the screw compressor and the e-motor was destroyed in the starting process. Parts of the elastomer insertion broke out so that an overload of the coupling was suspected. The control of the coupling design by the manufacturer by means of simple analytic equations according to DIN 740 showed that the coupling was dimensioned properly.

To check if a critical torsional load of the elastic coupling especially in the starting phase of the compressor occurred, KÖTTER Consulting Engineers was charged with a calculation analysis of the torsional vibration behaviour.

The results of the computations showed that the maximum coupling load occurred during the starting phase of the electric motor until estimated $t = 1$ s. However, all calculated coupling torques were below the maximum admissible load of the manufacturer. In the worst case the admissible coupling moment was reached by approx. 90 %. Generally, the choice of a harder elastomer showed a lower maximum load of the coupling. Furthermore, it could be seen that from the start-up until rating speed also when traversing the resonance, no exceeded coupling load occurred. At rating speed the nonstationary load lay far below the inadmissible values. On the whole, the calculated results showed that the malfunction of the coupling was definitely not a torsional vibration problem in this case.



Curve of rotation speed / torque during start-up of the screw compressor



Contact:

Dr.-Ing. Jan Steinhausen
 Telephone: +49 5971 9710-64
j.steinhausen@koetter-consulting.com