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Title of proposal:

Optimisation of Reciprocating Compressor Plants by using Flexible Couplings supported by Advanced Engineering Methods

Abstract:

Reciprocating compressor plants mainly consist of the compressor unit itself and a power-supplying drive unit, which in most cases is either an electric motor or a diesel engine. A coupling transfers the power between both devices.

An important aspect of reciprocating compressor plant engineering is the torsional vibration calculation (TVC). The aim is here to identify and to evaluate sources of critical vibrations, which may lead to magnifying response torques within the driveline or even to damage of the rotating elements. Besides geometrical boundary conditions, which are usually given by masses and inertia moments of the compressor and the drive unit, the operating parameters and load conditions of the compressor influence the unit behaviour with respect to the occurrence of vibrations.

This paper presents advanced computer-based engineering and evaluation methods helping to predict critical vibrations, taking into account the whole range of the possible operating parameters of the plant. With a view to maximum energy efficiency, this is important for both, full load and especially partial load conditions. It was found that the use of flexible couplings with natural rubber elements, which are state-of-the-art in a wide industrial field (like ship propulsion systems and electric power generation sets), often gives advantages over stiff steel couplings above all when considering variable operating speed ranges. The main reason for this is the fact, that with flexible couplings the torsional system can be easily tuned; in other words: the natural frequencies, which are typical of the basic dynamic behaviour of a compressor plant, can be shifted so that the required operating speed range is no longer critical. Thus, the compressor can be operated at parameters giving maximum energy efficiency for the actual load conditions.