

## Commissioning problems at a turbo compressor in Egypt

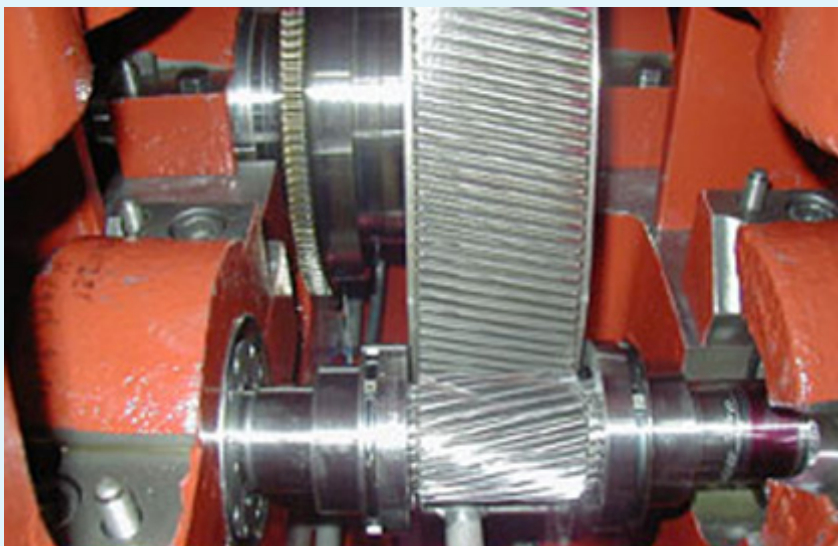
In a new chemical factory near Alexandria, Egypt the commissioning of a plant section was delayed. Repeatedly a defective mechanical seal at the pinion shaft of a turbo compressor caused the problem. This sealing system consisted of a stationary, spring-loaded seal and of a rotary counter ring (figure 2). The sealing face of these two rings slid contact-free. In the outer area of the rotary counter ring the gas to be sealed was fed and compressed due to the installed grooves.

To detect the physical context of the damage of the mechanical seal, a metrological investigation was carried out. Due to the damage history the focus was put on the dynamic of the pinion shaft and of the mechanical seal.

The measurement was carried out with nitrogen in closed-loop mode. As an important result, an increased level of the axial shaft vibration of the pinion shaft was detected. The guideline value for the axial vibration of the seal stated by the manufacturer was exceeded so that an overload of the seal could be reached.

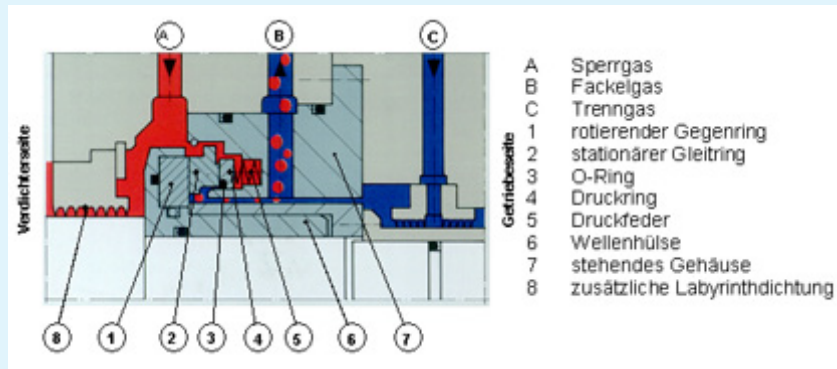
An imbalance in the slow running drive train was the cause for these increased axial vibrations of the pinion shaft and probably also for the repeated damage of the mechanical seal. After precise dynamic balancing at the coupling between the gear and the electric motor, the housing vibrations could be reduced decisively. At the same time, the axial vibrations of the pinion shaft and therefore the mechanical seal decreased by more than 50 % (figure 3).

Furthermore, the installed bidirectional mechanical seal was replaced by an unidirectional seal, insensitive to vibrations, which was already previously used at the compressor. After implementation of these measures, the compressor was put in operation without problems and was running without any interference.

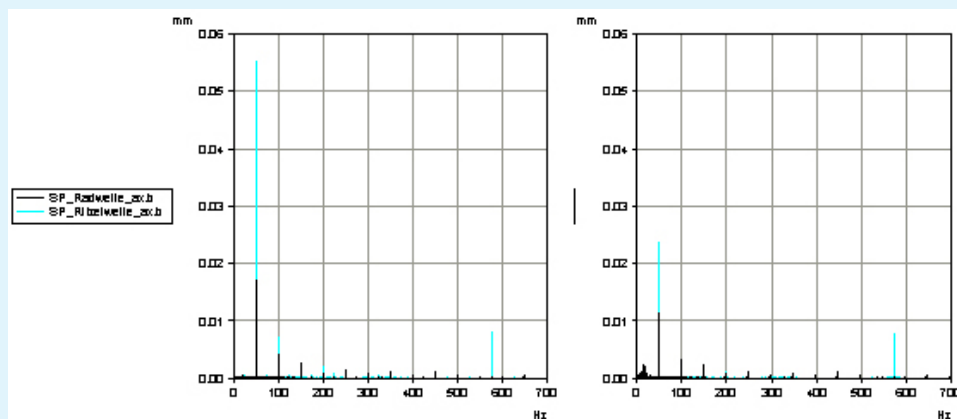


Pinion shaft and wheel shaft of the turbo compressor

MACHINE DYNAMICS



Mechanical seal system



Axial pinion shaft vibrations before and after the balancing



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