



PLANT AIR COMPRESSOR SYSTEM PINION

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Background

A reliable supply of compressed air is vital in many industries. The pinion pictured below was part of a gear-reduction system used to drive a plant air compressor. Failure of the teeth in this and a replacement pinion occurred in the same machine within a short time-span, leading to concern regarding the overall reliability of the system.

Assignment

Stress Engineering Services was engaged to examine the pinion and determine the cause of the tooth failures.

Findings

Examination of the fracture surfaces caused by the tooth failures indicated that the teeth all failed by tooth bending fatigue, which is one of the most common gear tooth failure modes.

Conclusions

The pinion bearing surface damage observed suggested that the lubricity of the bearing surfaces had decreased, probably as a result of water that was detected in the lubrication system. This reduction in lubricity is believed to have caused increased loading on the pinion teeth leading to the initial tooth failure. Once the first tooth failed, the load on the next tooth in the direction of rotation would have increased causing it to fail and so on. It was recommended that efforts were made to ensure the system remained free of water.

