Introduction

Kobelco Kobe Steel Group was founded in 1905 and started building screw compressors in 1955. They construct all the main types of gas-powered compressors. Those include the rotary screw, centrifugal, and reciprocating compressors. In the 1990s, they started to use roller bearings, which became their new standard. Advances in technology and a growing demand for compressors in multiple industries, the natural gas industry for example, have helped motivate Kobelco to enhance their products.

This failure occurred on February 19, 2021, following the freeze that occurred during the prior week. The _____ of the project was to perform a root cause analysis to determine potential causes of the failure. In addition, the team modeled each individual part and assembled them in SolidWorks. A stress simulation was performed based off the assembly. SEM imaging was utilized to compare damaged and undamaged pieces of the rotors. Hand calculations were completed in order to compare them with the simulation results and add more depth to the project. Lastly, a data analysis was done to compare the compressor operation from January to the month of February.

1. 3000 RPM
2. Solid Shaft
3. Factor of safety is 8

Root Cause and Data Analysis

Based on the operational data, the fatigue life, torque, shear stress, and allowable stress were calculated for the rotor shaft. In addition, gears and bearings, along with the bearing life of both bearings. The results are shown in the tables below.

After inspecting the physical compressor and looking over the operational data, the following root cause diagram was created. The diagram contains only possible causes, but the team can't know for sure what the actual problem was.

For the industrial side of the project, the data from January was compared to the data from