Impeller Shrink Fit Study

Overview

There are a variety of ways to mount impellers to their shafts. Dresser Rand uses a shrink fit method, but in order to prevent the fit from being too strong they use what is called a toe fit, where the shrink fit occurs over the front third of the impeller bore. Their parent company Siemens uses a heel fit where the contact is over the back third of the impeller bore. We have been tasked with modeling both fits, and simulating operating conditions to determine which fit yields higher contact stresses.

Objectives

Our goal was to simulate both fits, and determine which yields higher contact stresses, and thus which can withstand higher torques.

Approach

- Acquired knowledge from Dresser-Rand about torque specifications for axial compressors through a sponsor visit and conference calls
- Developed a list of variables to change during simulations
- Developed two models with variable mesh sizing to run simulations in Ansys software
- Ran simulations for heel fit
- Ran simulations for toe fit
- Evaluated each simulation for contact stresses to determine the best fit