Printed Parts for Test Rig

Overview

Dresser-Rand uses a test rig for prototyping compressor parts subjected to high temperatures and pressures. The metal prototypes are machined, resulting in a long lead time. The purpose of the project is to replace these metal parts with 3D printed parts.

Objectives

The goal of this project is to analyze materials used in additive manufacturing to determine options that can withstand the high temperatures and pressures of the compressor test rig.

Approach

- Researched possible material options that could withstand the environmental conditions of the test rig
- Performed a finite element analysis on each individual part with different material options
- Constructed a flexural test rig that simulated a 3 point bend test in accordance with ASTM D790b
- Tested ULTEM 9085 and Polycarbonate (PC) materials in the flexural test rig while heated at different temperatures in an industrial oven
- Calculated the overall cost over 15 years for using ULTEM 9085 and PC

Outcomes

- Dresser-Rand breaks even after 6.9 years of operation
- Parts produced in ULTEM 9085 offer reduced cost, but requires a large initial investment
- Lead time would decrease from 2 months down to 2 weeks
- ULTEM 9085 is the most viable material