Overview
Conventional compressors have fixed inlet guide vanes and can only be optimized for one flow condition. When the flow condition changes, the operator must shut down the compressor to install inlet guide vanes at a different fixed angle. This causes a stoppage of a week or more for any processes involving the compressor. If movable guide vanes could be installed, the stoppage would be avoided.

Objectives
The goal was to design an actuation mechanism to facilitate the movement of vanes at different angles. A stress and displacement analysis was conducted and a working prototype was fabricated to accurately convey the design concept.

Approach
- A site visit was conducted at Dresser-Rand’s Olean, NY facility to gain a better understanding of the project requirements
- An extensive patent search was performed on existing compressor solutions and designs
- A customer needs assessment was performed and target specifications were established
- Next three concepts were generated and the Pugh Selection matrix was utilized to choose the best design
- Once the design was finalized, a SolidWorks model was created
- Parts were 3D printed while others were purchased, including an Arduino motor, breadboard, stepper controller, and jumper wires
- Finally a Von Mises Stress analysis and displacement analysis was performed on the model of the vanes

Outcomes
- Dresser-Rand could reduce downtime by not needing to shut down the compressor and replace the fixed vanes with new ones in order to operate at a different flow condition
- Increase potential revenue due to reduced downtime
- Automated mechanism will reduce man hours