Improvement of Compressor Concentricity for the Elimination of Labyrinth Seal Interference

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Sponsor: Dresser-Rand

Background:
Dresser-Rand is a leading supplier of rotating machinery. Currently there is a concentricity initiative on all manufactured compressors to increase efficiency. These compressors are often used in coal power plants to sequester CO₂ which can take up to 12% of the total power plant output. Improving efficiency on these compressors will decrease the cost for compressor operation, leading to both economical and environmental benefits.

- Diaphragm (Both inner disks)
- Return Bend (Outer Casing)
- Both parts are stationary within the Compressor

Project Objective:
To design a method for adjusting the positions of the diaphragm in the return bend within the specified parts’ tolerances. The final design must be able to:
- Withstand 400 psi internal pressure gradient
- Adjust a 350 lb. diaphragm in .001” increments within return bend.
- Adjust the diaphragm a total distance of .030”

Concept Evolution:

Final Design-Adjustable Wedge Shim:
The adjustable wedge shim design is simple in nature. It is designed to sit between the return bend and the diaphragm. It will be screwed into the return bend. Adjusting the screw vertically allows for horizontal displacement of the diaphragm. The simple design has low manufacturing costs and is able to withstand high loads. Its angled face allows for high accuracy adjustment with fewer measurement iterations.

- 410 Stainless Steel
- 1.5” x 1.0” x .75” with 85° face
- 2” Hex Head bolt
- 1/3 rotation of screw adjusts diaphragm approximately .001”

Conclusion:
By using our adjustable wedge shims, Dresser Rand will save **15% of the total cost** to align the compressor which will equal **$375,000 per year.**