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NANYANG TECHNOLOGICAL UNIVERSITY

URECA *Undergraduate Research Experience on CAmpus*

Category: 5
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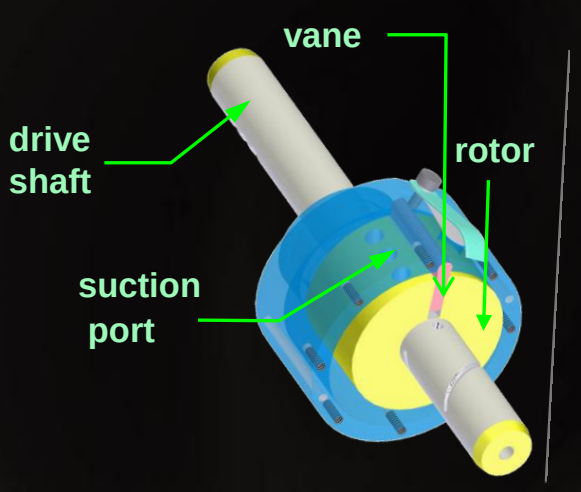
Revolving Vane

A Radical Design of Rotary Compressor



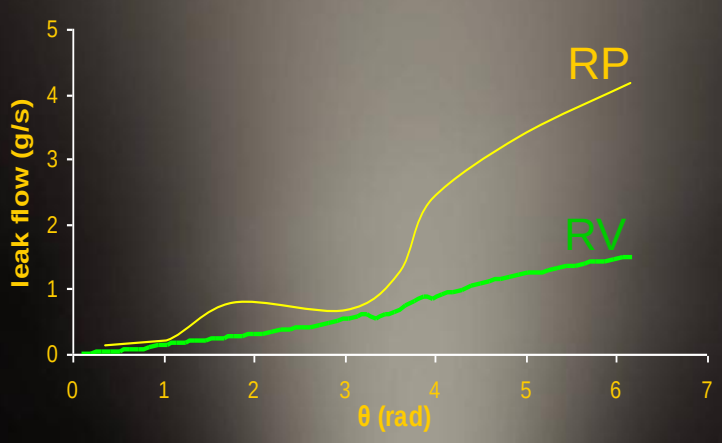


Figure 1. Instantaneous leakage mass flow rate

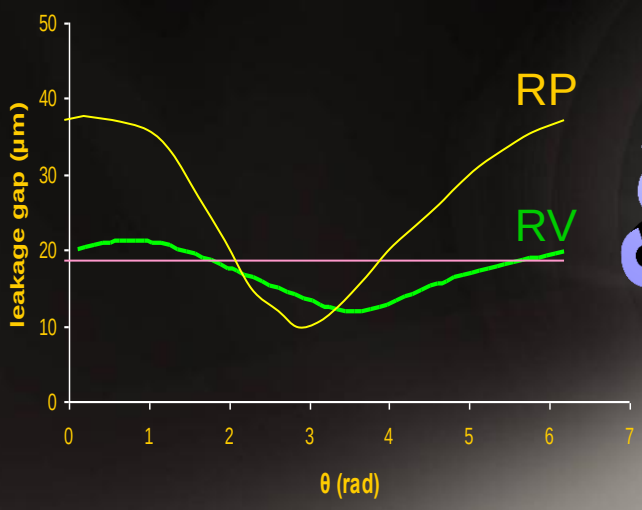
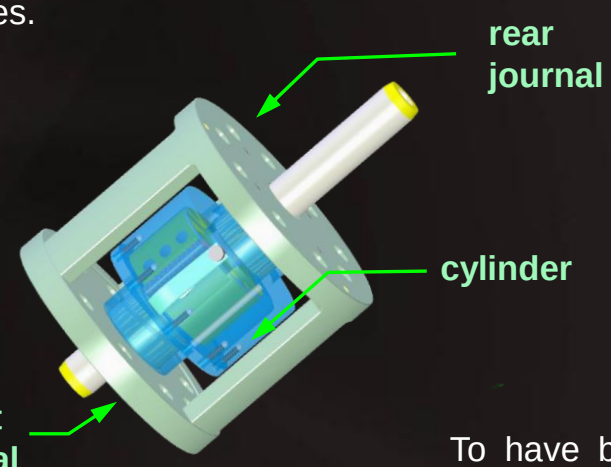


Figure 2. Changes of Piston Radial Clearance

Introduction

Efficiency is the most important factor affecting the performance of a compressor. Mainly, there are two types, i.e. mechanical and volumetric efficiency. The former is indicated by low frictional losses, while the latter by low leakage losses.



To have both requirements fulfilled, this poster proposes a novel compressor mechanism named 'Revolving Vane compressor'. This compressor radically employs a rotating cylinder which greatly reduces relative velocities of the rubbing components, thus substantially improves overall performance and reliability.

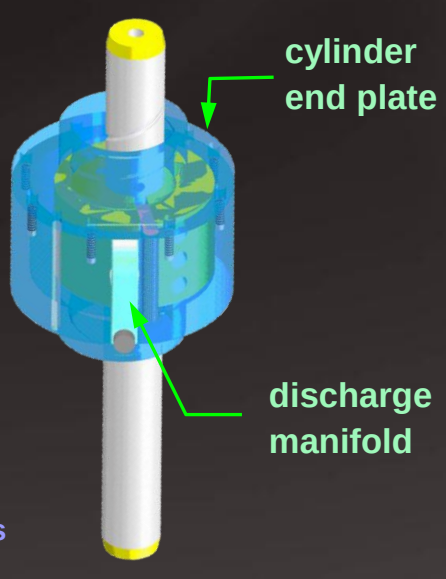
Introduction Comparison Conclusion

RV

Comparison

Losses (W) @	RV	rolling-piston (RP)	rotary sliding-vane
Vane Tip	Negligible	10.61	134.86
Vane Sides	30.25	48.59	19.86
Bearings	56.03	28.45	19
End Faces	Negligible	37.36	3.69
Total	**86.3**	**125.01**	**177.41**

Table : Comparison of frictional losses of rotary-type compressors



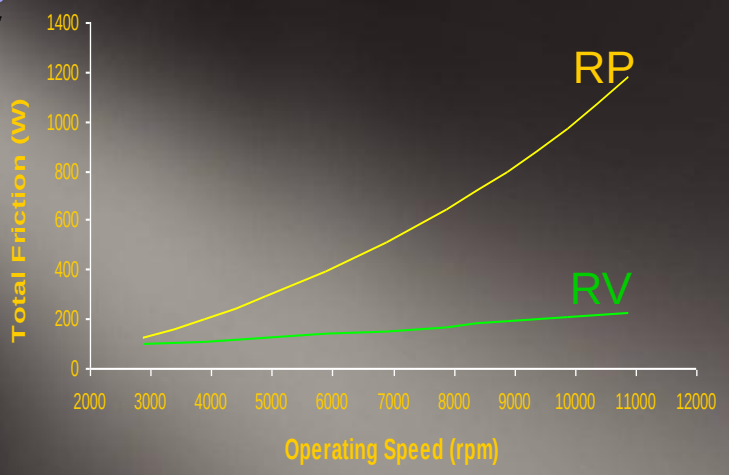


Figure 3. Comparison of friction losses at various speeds

Conclusion & Development

- The novel use of a rotating housing
- Significant reduction in frictional losses
- Dramatic decline in leakage losses
- Improvement in valve performance
- Extreme simplicity in geometry and ease of fabrication
- Good performance at high speed
- High potential for further development of micro-compressor

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