"Sizing Low and High Compression Stages of Reciprocating Compressor for Optimum Vapor Injection Performance in Economized Cycle“

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Presentation Outline

Basics of Economized Cycle

Compressor Design for Economized Operation

1st vs 2d stage Displacement for Optimum Operation
Vapor Injection (Economized) Cycle

\[ m_{\text{evap}} \cdot \Delta h_{sc-2-3} = m_{\text{ec\_average}} \cdot \Delta h_{ec-7'-6} \]
Two Stage Reciprocating Compressor Flow Schematic for Economized Operation

1st stage

Interstage

Discharge

2d stage

Vapor Injection

Interstage

CRANKCASE CHAMBER

1st stage

Suction
Each operating condition has optimum stage ratio
Higher pressure ratio operation benefits more from economized cycle
Increase in 2d stage displacement always results in increased capacity.
Higher pressure ratio operation benefits more from economized cycle.
Increase in 2d stage displacement reduces interstage pressure
Increase in 2d stage displacement increases vapor injection mass flow rate
Conclusion

Use of economizer (HE or flash tank) increases system capacity and efficiency.

Proper selection of 1st vs 2d stage displacement achieves best performance.

High lift operation benefits most from economized operation.
Questions?