

Rotational Compressor Valve

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GE Oil & Gas



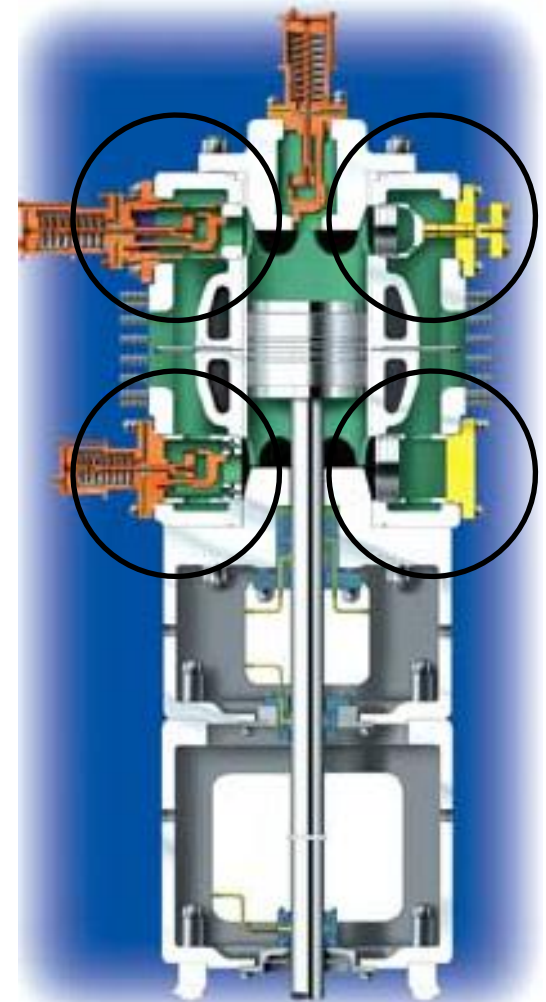
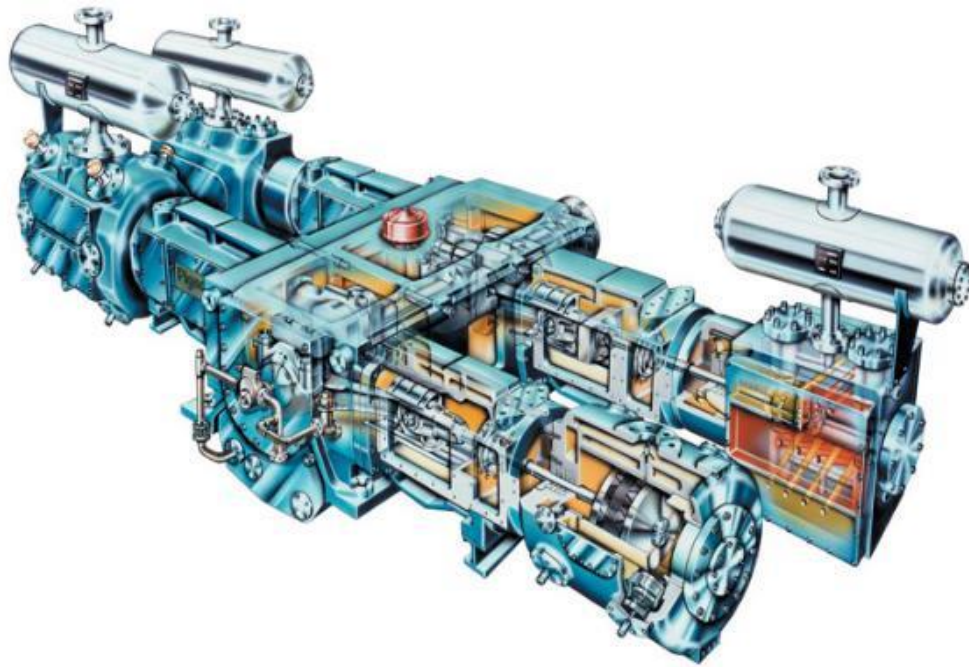
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Overview

- Application
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- Summary

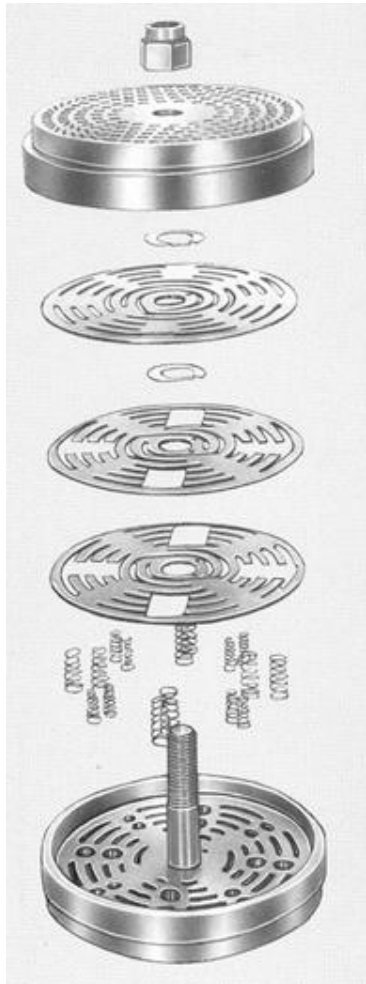


Application



Current Valves

Plate Valves



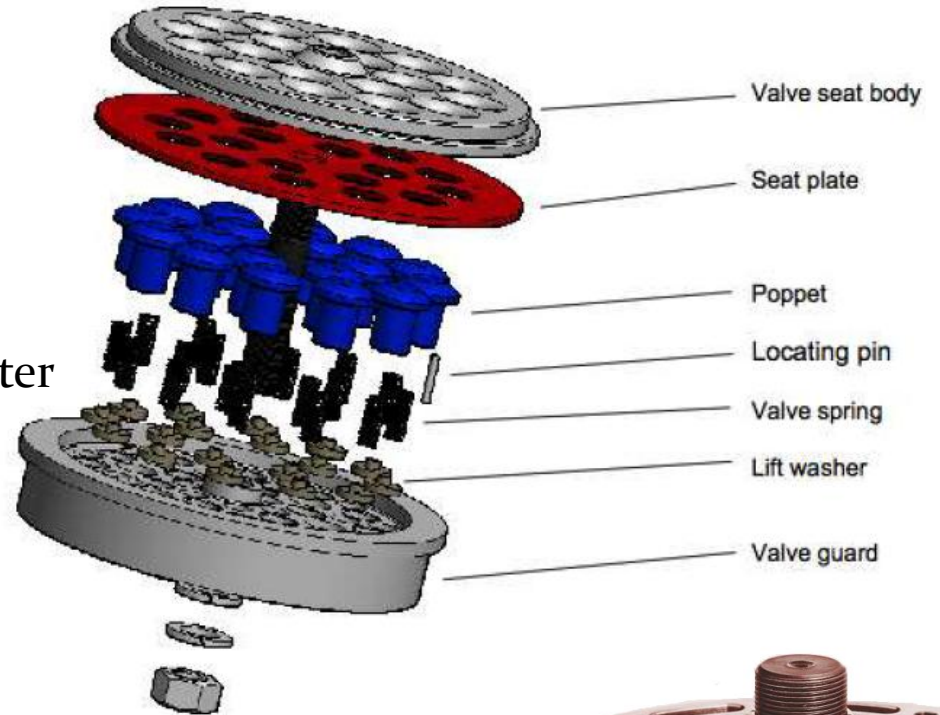
Poppet Valves

Valve Seat

Valve Shutter

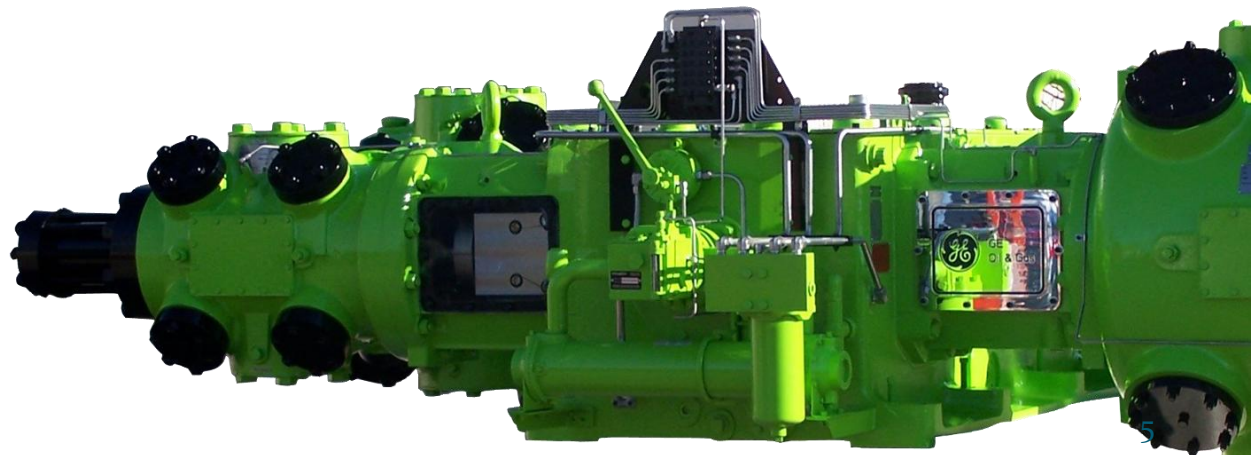
Valve Springs

Valve Stop



Problem Statement

- Reciprocating compressors move large volumes of natural gas
- Current compressor valves are reliable but inefficient
- Inefficiencies caused from indirect flow path
- Project Goal: Obtain direct flow with a rotational type valve



Project Scope

- Must operate in a rotational manner and obtain laminar flow
- Operate at pressures between 30 psi and 600 psi
- Materials must be able to withstand temperatures approaching 350F
- Modifiable to fit all current gas compressors used by G.E.
- Is to be easily replaced
- The valve is to outperform the volumetric flow rate of the current plate and poppet valve
- 2000\$ budget

Concept Selection

Impact Rating System

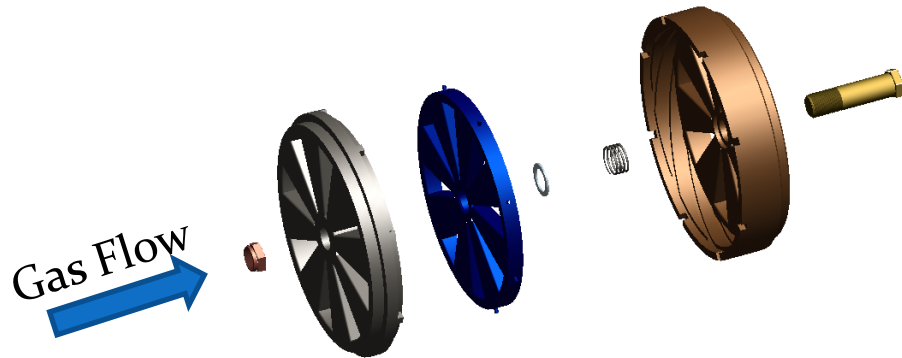
- 1 – Unsatisfactory
- 2 – Below average
- 3 – Satisfactory
- 4 – Good
- 5 – Excellent

	Solenoid/Distributor	Microprocessor	Mechanical Linkage	Pressure(Partial Rotation)	Pressure(Full Rotation)
Reliability (20%)	4	3	3	3	5
Cost (20%)	3	3	2	5	5
Ease of Construction (10%)	3	4	2	3	3
Ease of installation (25%)	3	3	3	5	5
Flow Rate (25%)	5	5	5	4	4
Total (100%)	3.7	3.6	3.2	4.15	4.55

Interim Designs

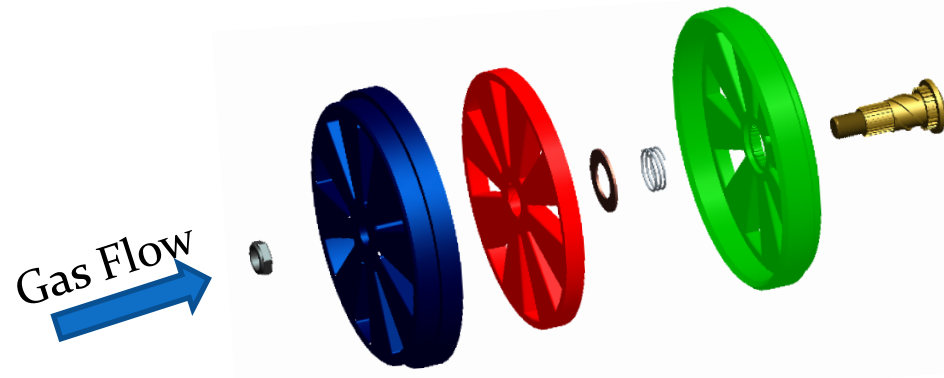
Housing Pitch Rotation

- Same basic concept as Design 1
- Threaded outside housing plate
- Simple retaining bolt



Inner Thread Rotation

- Fixed outer casing
- Rotating/translating center plate
- Splined and threaded center bolt
- Return spring



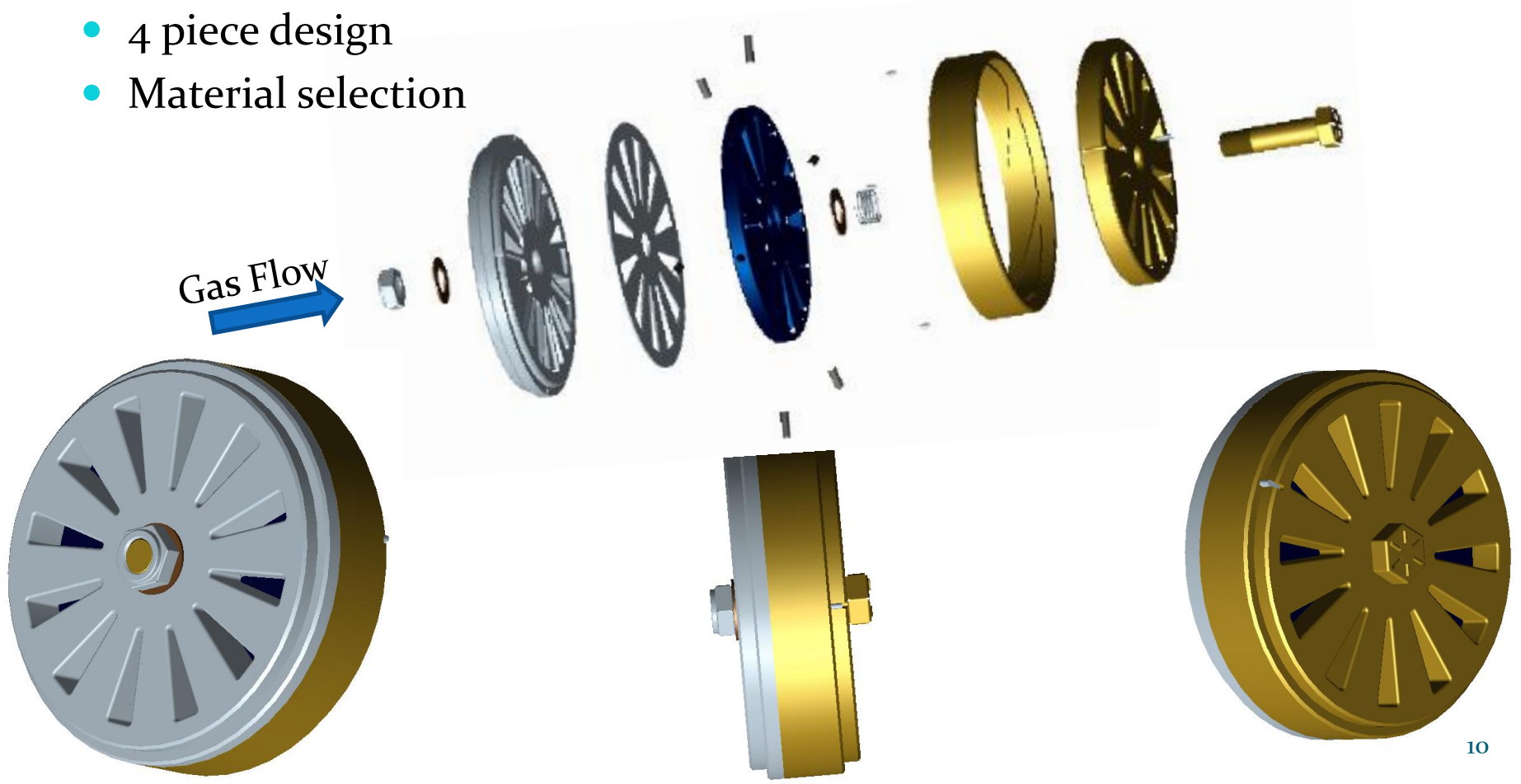
Final Design Selection

Criteria	Threaded Center Bolt	Threaded Housing
Chance for debris (15%)	3	4
Ease of machining / Tolerances (30%)	3	4
Pressure distribution on valve (15%)	2	5
Force on threads (15%)	2	4
Durability (25%)	2	4
Total:	2.45	4.15

Final Design

- Testing Parameters: Volumetric flow, temperature, and pressure
- 4 piece design
- Material selection

Gas Flow
→

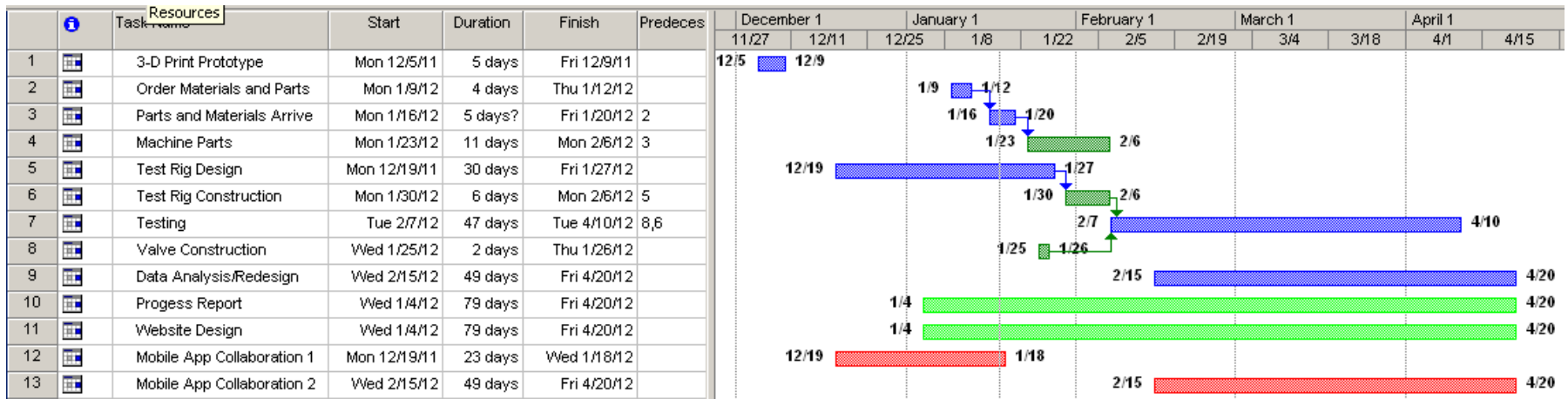


Current Progress

- Parts have been ordered and ready for pickup: 12" x 12" x 2" , 12" x 12" x 1" , 12" x 12" x 1/2" Steel plates
- Machinist contacted for machining advice
- Final Design changes have been made for ease of machining
- Test rig currently being designed

Future Scope

- Machining is to begin next week
- Test rig is to be constructed within machining time
- Rigorous testing will follow for the remainder of the semester
- During testing valve performance will be optimized



Summary

- 3-D prototype already implemented
- Design slightly changed for machining purposes
- Parts have been ordered
- Machining is to be started next week
- Test rig currently being designed
- Total Budget: \$2000
- Total spent: \$197.76
- Project is running within accepted schedule

Questions

