Latest Solar
Gas Compressors

Martin Habel, Mgr. O&G Product Strategy
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• Impeller Design Philosophy
• Latest Compressors
  • Pipeline Compressors
    • C85
  • Production Compressors
    • C51
    • C61
    • C41
• Summary
Pre-Engineered Family of Impellers

Shroud Back
Hub
Vane

High Flow
Low Flow
Computational Fluid Dynamic (CFD) Tools

IMPELLER, DIFFUSER AND VOLUTE

FLOW LINES AT VOLUTE EXIT
Aerodynamic Test Facility (ATF)

- Scale Stage Testing
- Extend Aerodynamic Design Knowledge
- Detailed Measurements
  - Improve Prediction Capability
  - Understand Component Performance
Open - Loop Test Facility

- 2 Dedicated Test Cells
  - Centaur 50
  - Saturn 20
- Testing of All Production Compressors
  - Mechanical Integrity
  - Vibration
  - Aero Performance
- Update Predicted Performance and CFD Models
• Dedicated Centaur 40
• ASME PTC 10 Type II Compressor Testing
• Dedicated Titan 130
• ASME PCT 10 Type I or Type II Compressor Testing
Validation of CFD Using Test Data

IMMERSION FROM SHROUD

ALPHA4

0% 20% 40% 60% 80% 100%

CFD
Test Data
ASSUMPTIONS:
12,150 - 13,585 RPM
15% S.M. to -4.0 pts from BEP
Z=0.90 K=1.3 T1=70F SG=0.6

Phase 1
Phase 2
Phase 3
Phase 4
Performance

- Min Efficiency: 85%
- Flow Range: ACFM
  10,000 – 40,000
- Maximum Head: Feet
  30,000 (2 Stage)
- PRs up to 2.2
C51 Performance

- 20% More Head (work) per Stage
- Pressure Ratios: 1.5 to 4.8
- Same High Efficiency
- Platform Extended to New C61 and C41

Opal, Wyoming
• Scale up of the successful C51
• 155 bar (2,250 psi)
• Pressure Ratios: 1.5 to 4.8
• Gas Gathering & Boosting
• Test Results of the 1st Build
  •Performed close to predicted
  •Isentropic head met or exceeded
  •Surge line met or slightly exceeded
• 260 bar (3,750 psi)
• Pressure Ratios: 1.5 to 4.8
• Gas Storage, HP Gas Lift, CO₂ Injection & Storage
• Scaled C51 Aerodynamics
  • No Change in Performance
  • Same Range and Efficiency as C51

Drivers: Centaur 40 – Titan 250
C41 Comparison With C51, Similar Staging

C41 6-stage
C41MH DEV/11 C3-C3-C2-C2-C1-B3 X4110011 SD-34386
Cell 12 AIR TEST vs GCASE Prediction DB129 11-Nov-2010

C51 5-stage
C51ML C3-C3-C2-C1-B3 G5110151 SD-34235
Cell 12 AIR TEST vs GCASE Prediction 8-Oct-2010
• Ongoing Compressor Development
• Investment in Test Facilities
• Pre-Engineered Product Benefits
  • Proven Configurations
  • Predictable Field Performance
  • Consistency Throughout Product Life-Cycle
• Standard Replacement Parts