Maximizing Kr/Xe Production

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Green Belt Six Sigma Project
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Executive Summary

MESSER Gases for Life

Problem & Importance	• **The process design is 1,629,360 L/year and 2022 production was 990,065 L/year.** • Production disruptions due to equipment issues and HC overconcentration. • Instability in the pure column affects production when temperature is colder than -220˚F.
Solution Developed	• Upgraded P-116's with Laby seals. • Adjusted HC flowrates, added spare CP-112. • **Stabilized the pure column temperature by 80%.**
Impact & Outcomes	• Improved daily production: Before 2,614 L; now 3,227 L (+19%) with less variance. • HE-105 challenge revealed enhanced equipment strategies through Vulnerability Analysis and Assessment (VAA). • **Estimated financial gain: $1,107,000/year (*+250,000 L/year*).**
Sustainability of Solution	• Introduced or enhanced SOP's for standardized operations. • **Shifted from tribal knowledge to data-driven, engineering focused approach.** • Ensured with regular stakeholder reviews.

Solutions & Implementation

Reliability Enhancements Led to 25.2 Day DT Reduction:

- Upgraded P-116's with Laby seals for longer life & fewer leaks.
- New CP-112: OEM maintenance & in-line spare capabilities for reduced downtime.

Performance Upgrades Led to 80% More Stability:

- Reduced HC accumulation by adjusting flow rate to 3.5 KSCFH & recalibrated system.
- Column stabilization: 26 PSIG suction pressure, component changes, and 3.5 KSCFH flow rate.

Stakeholder Involvement & Implementation Plan:

- Conducted root cause analysis with key personnel.
- Phased roll-out with clear change plans.

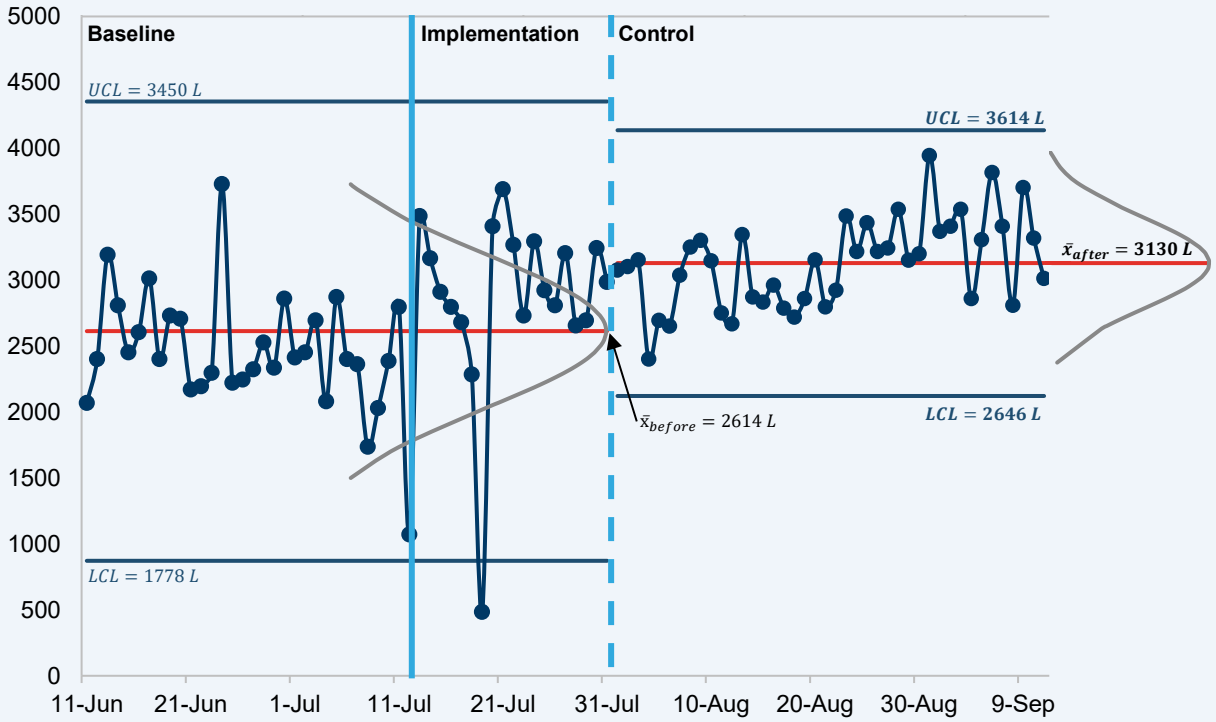
Risk Management:

- VAA: Actionable insights for equipment & process risks.
- New SOPs: Leak checks, absorber reactivation, cylinder changeout, P-116 start up, and deriming.

Project Results & Outcomes

MESSER Gases for Life

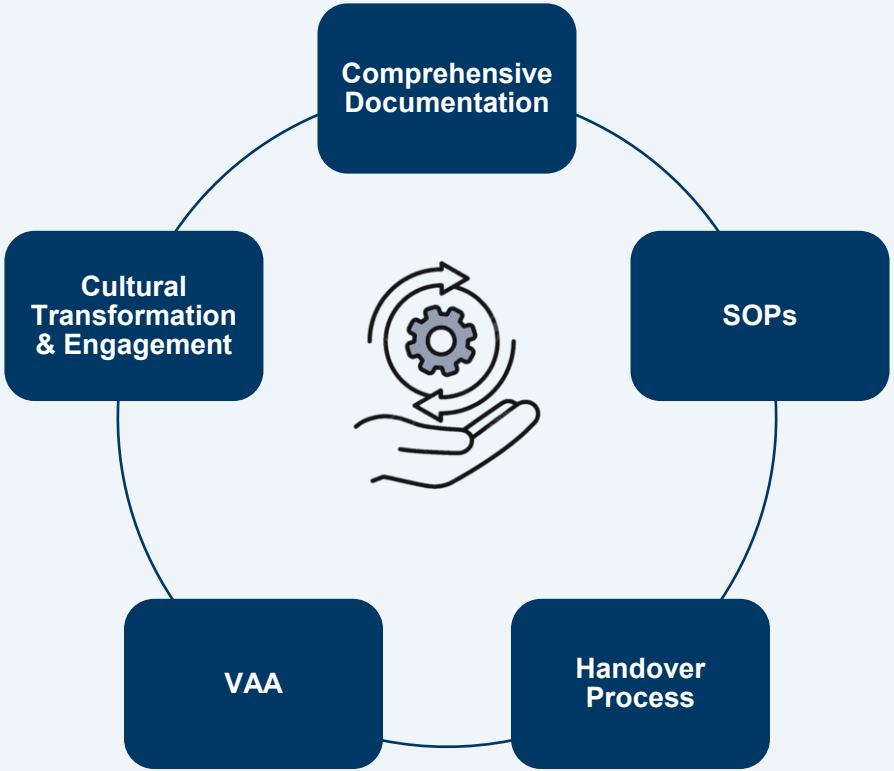
Control Chart Pre & Post Implementation
Jun-Sep 2023



Pure Column Stabilization Impact

- **Debunked operational myths**, raised warm skid flow to 3.5 KSCFH, and optimized suction pressure for efficiency.
- Achieved an average **daily improvement of 516 L** through pure column stabilization.
- **Slashed standard deviation by 245 L/day**, achieving a more consistent production output.

Project Close-Out & Sustainability



Future Implications and Scalability

Enhanced Neon Production

- Project successes set a robust precedent for Neon and other rare gas production improvements.

La Porte Replication

- Blueprint from this project can streamline and standardize operations in La Porte, TX.

Operational Longevity

- Leveraging VAA and strategic setups could significantly elevate Neon production efficiency and extend its lifespan.

Expanding Expertise in Rare Gas Operations

- Centralized expertise enhances rare gas operations and ensures operational excellence.

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