Blentech CORPORATION

Blentech Case Study

ENGINEERING · INTEGRATED SYSTEMS

Modernizing Legacy Cooling Infrastructure

Engineering a future-proof hydrocooler for Lyons Magnus



THE SITUATION

TWO DECADES OF SERVICE, AND AN ASSET AT END OF LIFE.

Lyons Magnus improved cooling efficiency by 17% and addressed significant recurring maintenance and repair costs by redesigning a legacy hydrocooler system with Blentech.

At their California production facility — producing a diverse portfolio of food and beverage products to high-volume production requirements — the company relied on hydrocooler systems originally installed in 2007. After nearly two decades of operation, the custom-built helical coil units were approaching the end of their serviceable life.

The facility faced significant recurring maintenance and repair costs — and the original equipment manufacturer was no longer in business.

Rather than replicating the legacy design, Lyons Magnus partnered with Blentech to engineer a more reliable solution within the same footprint: a redesigned single-coil cooling system optimized for mechanical durability, improved heat transfer, and long-term operational stability.

AT A GLANCE

Full
PRODUCTION THROUGHPUT MAINTAINED

2007
ORIGINAL UNITS INSTALLED

Diverse
FOOD & BEVERAGE PRODUCT PORTFOLIO

17%
COOLING EFFICIENCY GAIN

THE CHALLENGE

REPLACING AGING INFRASTRUCTURE WITHOUT DISRUPTING PRODUCTION.

The hydrocooler units serving the facility's North production area had performed reliably for many years, but included design characteristics that gradually created operational risk.

The original coils were fabricated from industrial piping and incorporated dissimilar metals that contributed to progressive corrosion. Internal pipe honing issues further accelerated wear. Over time, these factors increased mechanical stress within the coils and elevated backpressure throughout the system, placing additional strain on downstream pump stators.

Blentech engineers approached the project as a full thermal and mechanical redesign rather than a component replacement.

Replacement requirements

Because the hydrocoolers were integrated into an existing production line, the new system had to meet several strict requirements:

- Fit within the existing shell footprint
- Maintain cooling capacity for high-viscosity products
- Reduce backpressure impacting downstream pumps
- Improve equipment reliability and service life

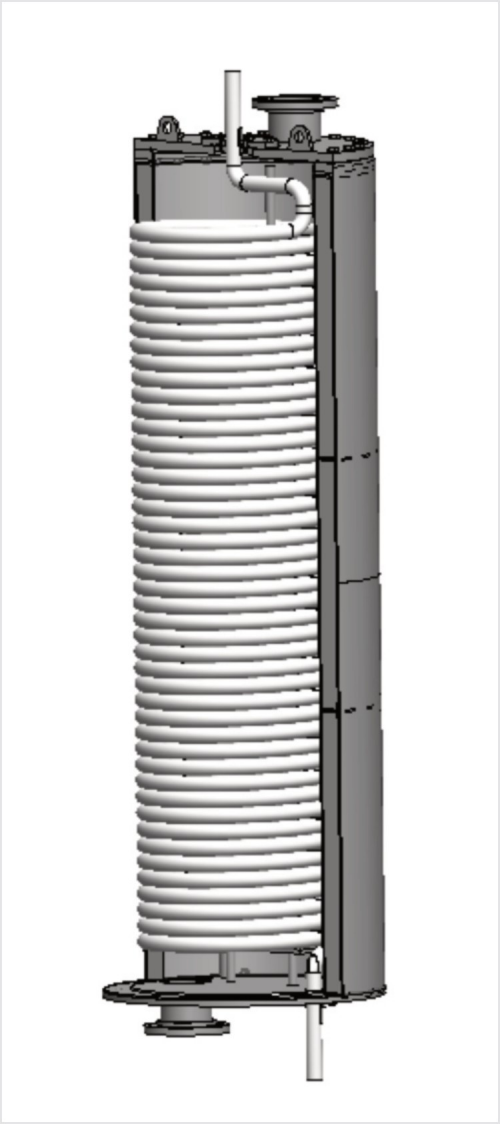


Image 1. Internal coil geometry — the helical surfaces a hydrocooler relies on for heat transfer cannot be reached once the tubing is formed.

THE SOLUTION

ENGINEERING THE SINGLE-COIL SOLUTION.

Blentech's engineering team, led by **Dr. Jerry Xue, PhD, PE**, redesigned the system using 2″ sanitary tubing in place of the original 1.5″ industrial piping — then validated every change with simulation before a single coil was fabricated.

FLOW

LARGER SANITARY TUBING

Moving to 2″ sanitary tubing improved flow capacity while reducing pressure drop across the cooling coil — particularly important for Lyons Magnus's high-viscosity syrups.

THERMAL — CFD

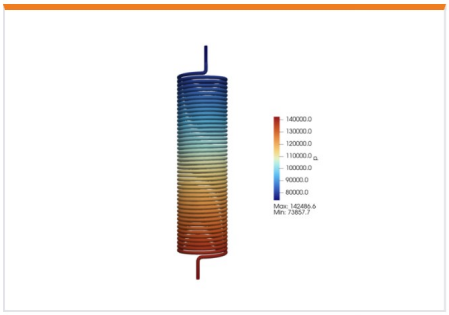
DEAN VORTEX MODELING

Computational Fluid Dynamics modeled the secondary flow created in curved tubing. These vortices generate cross-sectional mixing that disrupts laminar flow, improving heat transfer and reducing fouling.

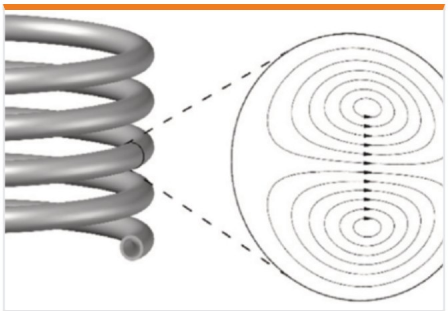
MECHANICAL — FEA

VERIFIED TO 250°F

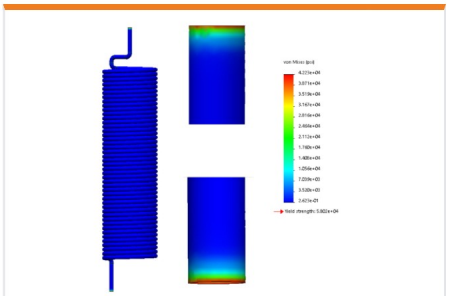
Finite Element Analysis verified the coil's mechanical integrity for operation at temperatures up to 250°F, within the stress limits of T-316L stainless — addressing the thermal fatigue that degraded the legacy coils.



CFD · PRESSURE
Pressure drop modeled along the full coil path in high-viscosity syrup.



CFD · DEAN VORTEX
Secondary flow in the curved tube drives cross-sectional mixing.



FEA · VON MISES
Coil stress stays well below the T-316L yield limit at 250°F.

ENGINEERING APPROACH

"A full thermal and mechanical redesign — not a component replacement. Fluid dynamics, stress analysis, and sanitary fabrication, validated together before fabrication."

FABRICATION

PRECISION FABRICATION FOR SANITARY PERFORMANCE.

Helical coils present a unique fabrication challenge: the internal surfaces cannot be accessed once the tubing is formed into its final geometry.

To ensure consistent sanitary quality, Blentech fabricated the coils using precision **orbital welding**, producing repeatable internal weld profiles along the full flow path. The result is smooth, consistent internal surfaces designed to support the facility's established cleaning processes.

The coil geometry itself was also optimized. By adjusting coil pitch and radius, Blentech maintained the required heat-transfer area while improving fluid dynamics within the same shell diameter.



Image 2. Precision orbital welding produces repeatable internal weld profiles along the full flow path.

THERMAL PERFORMANCE

MAINTAINING PROVEN HEAT TRANSFER.

While the internal coil design was modernized, the external shell-side configuration preserved what had proven effective in the original equipment. Blentech replicated the legacy baffle arrangement, maintaining the established zigzag flow path across the coil surfaces.

This maximizes convective heat transfer on the shell side and minimizes the cooling load placed on the facility's main chiller — pairing an updated internal coil with proven shell-side flow for both improved efficiency and operational continuity.

OPERATIONAL RESULTS

MEASURABLE GAINS IN RELIABILITY AND PERFORMANCE.

17%

COOLING EFFICIENCY GAIN

Improvement in cooling efficiency across the redesigned AL-2 line.

No recurrence

PRIOR COIL FAILURE MODE

No recurrence of the prior coil failure mode has been observed since commissioning.

Full

PRODUCTION THROUGHPUT MAINTAINED

Continued operation at full production throughput, same footprint.

250°F

MECHANICAL INTEGRITY VERIFIED

Mechanical integrity verified by FEA for operation at temperatures up to 250°F.

Key outcomes

- Reduced backpressure affecting downstream pump stators
- Sanitary tubing & orbital welds designed to support established cleaning processes
- Mechanical integrity verified by FEA for operation up to 250°F

> *"The results reflect exactly what we were aiming to achieve."*
>
> GLENN PEUGH · LYONS MAGNUS

A more reliable cooling platform

The project delivered more than a replacement for aging equipment. By combining fluid-dynamics modeling, mechanical stress analysis, and precision sanitary fabrication, Blentech transformed a legacy cooling system into a stable, high-performance asset.

Today, the upgraded AL-2 cooling line supports Lyons Magnus's diverse product portfolio with the durability and thermal efficiency needed for modern food production.

LEGAL

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We'd love to help.
Reach out to us at 1-707-523-5949 or
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