

# CASE STUDY

ABEC COOLING BAFFLES IMPROVE HEAT TRANSFER AND PRODUCTION



## THE CHALLENGE

An ABEC customer acquired a new facility and needed significant upgrades to the cooling and mixing of two 70,000-gallon (15ft diameter, 80ft tall) stainless steel vessels to run their process. The existing heat transfer was not robust enough to effectively cool their product to the degree needed, and the consistency of the product also made for challenging mixing. In addition, the customer determined, modifying and extending each vessel sidewall by an additional eight feet could increase overall production capacity.

The customer contacted ABEC for an expedient solution that would effectively cool and mix the product at greater capacity. The ABEC team went to work turning this problem into a solution.

## THE SCOPE

- Conducted heat transfer calculations to confirm required thermal performance.
- Used structural calculations to design custom gussets reinforcing the skirt base ring for added agitator loads and liquid levels
- Conducted dynamic FEA to ensure resonance would not affect the modified vessel and baffle design.
- At ABEC Springfield, MO, manufactured four cooling baffle assemblies per vessel (eight total), two new top heads, and 8-foot shell sections to increase vessel volume.
- In the field, ABEC service technicians modified the vessels to prepare for the complex installation.
- In-vessel work included locating and welding about 200 reinforcement pads, eight baffle assemblies, and two sparge rings across two vessels.
- Exterior work included removing existing top heads and welding fittings, ring gussets, and skirt manways.
- During installation, baffle assemblies were crane-lifted into the vessels and aligned with reinforcement pads; ABEC's custom spargers, customer-supplied outlet valves, and a steady-state bearing for the large agitator were then installed.

## THE BENEFITS

- **Product Improvement:** The proven patented cooling baffle solution solved the heat transfer need and vessel modifications increased capacity and extended the life cycle of the vessels
- **Process Improvement:** Design and engineering calculations and analysis improved the process performance
- **Fast Time to Market:** Working in concert from design through fabrication and installation, as well as coordination day and night shifts, enabled a much faster time to market than anticipated
- **Excellent Site Safety:** All site safety requirements were met without incident, including deployment of trained and certified confined space entry (CSE) service technicians, meeting full compliance to industry code and regulations



## THE RESULT

ABEC's 45+ years of experience and capability to design, engineer, and manufacture the new baffle assemblies, and the ability to modify the existing equipment solved the customer's problem and exceeded expectations in all aspects of the project from concept to delivery.

The large cooling baffles were designed and engineered to dissipate agitator energy, enhance mixing and simultaneously cool the fermentation broth. In addition, the baffle assemblies nested inside the vessels add durability, providing the customer a long-term return on investment for the life of the vessels.

ABEC's knowledge, wealth of resources, and capacity, resulted in the successful delivery and installation of a customized solution. The ABEC solution solved the heat transfer problem, improved the process performance and was delivered on a timeline only ABEC could achieve.



## Maximizing Customer Productivity, Controlling Costs, and Reducing Risk

ABEC's service team is highly trained and experienced, working for customers to maximize productivity, control operating costs and mitigate risk. In every way, we strive to eliminate unscheduled shutdowns, while bearing in mind all factors associated with maintaining and improving bioprocess production operations and equipment. Our expertise and capability to address your specific requirements, in line with your schedule, make us the first choice for bioprocess services, no matter the location, the scale of the task, or the original manufacturer.

