

# the NEWS

## Refrigeration OEM Revamps Brazing Operation

Delfield able to cut costs and save time, while keeping quality high

*By Aaron Storie*



**PERFECT FLAME:** A worker uses the Perfect Flame™ to braze equipment on the production floor at Delfield. (Courtesy of Harris Products Group)

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Successful companies seem to have one thing in common: they're always looking for ways to improve operations. The Delfield Co., a provider of commercial refrigeration equipment and custom fabrication, recently demonstrated this commitment to quality and continuous improvement by taking an in-depth look at their brazing processes for refrigerant systems.

Delfield knows that the quality of brazed joints in refrigeration equipment is critical in preventing the leaking of costly refrigerants as well as protecting food safety. The brazed joints have to be able to withstand years of vibration, pressure, and other conditions that can impact the equipment.

To keep quality as a top priority, while also looking for ways to reduce manufacturing costs, Delfield worked with The Harris Products Group on a documented cost reduction (DCR) process. The report recommendations, which Delfield implemented, led to significant cost and time savings in brazing operations while also focusing on quality.

DCR involves an audit of every aspect of a particular process; in this case, it included a review of each step and piece of equipment used in the brazing of refrigerant coils: fuel gases, alloys, torches, operator performance, and training.

Harris, which manufactures brazing and soldering equipment and alloys, had several recommendations: standardize torch flame settings across the company; switch to alternate fuel (propane); convert to a high-silver brazing alloy to reduce the chance of valve failures; and use appropriate brazing tips to optimize flame Btu/performance.

Following the DCR audit, Delfield has put all of the recommendations in place.

## **ACHIEVING PERFECT FLAME**

One of the most impactful changes has been standardizing the brazing processes across three different facilities. To accomplish this, Harris recommended its Perfect Flame, a gas delivery system designed for high production brazing operations. It features built-in software that analyzes the flame, measuring chemistry, flow rates, temperature, Btu, and flame types to achieve the perfect flame for the particular brazing project being performed. These settings, which are defined by Delfield's production management, are then stored and can be reproduced anywhere throughout Delfield's operations where a Perfect Flame has been installed.

Delfield installed several Perfect Flame units at each of their three Welbilt facilities. Brazers now select the project setting, light the torch, and then proceed to braze without the need to make any adjustments to their torch settings.

“Having an engineered flame that is repeatable at all of our work stations, at three different geographical locations, has considerably reduced the possibility of brazed joint issues which could lead to leaks,” said Rick Waldorf, quality manager at Delfield. “We now have more peace of mind that the Perfect Flame is helping us produce the highest quality brazed parts possible.”

Proper brazing is critical in the prevention of refrigerant leaks, but because this is done by hand rather than automation, quality can vary depending on the experience and skills of the technician. Delfield has been able to drastically reduce braze inconsistencies seen with newer trainees, while

also saving time on the production floor.

Waldorf worked with technical specialists at Harris to implement the Perfect Flame systems initially at one location and then at two additional sites. Harris sent staff to each facility and conducted training sessions to make sure the process went smoothly.

Waldorf did have an initial concern, though.

“I wasn’t sure if my operators would be open to a new technology. Many have been here a long time and are proud of the work they do. But they were very receptive, especially when they saw how it saves setup time and reduces training time for new brazers,” he said. “There’s not a lot of interface they have to do to prepare the torch. It’s always the same flame.”

In the end, the production staff liked the fact that they didn’t have to make adjustments every time they lit the torch. They also saw the benefits of improved workflow and a new tool to help them succeed in their brazing work, knowing the system is set up for the best outcomes.

Delfield has a dozen or more work stations at each of their locations, with at least six different flame settings required.

“We tailored the Perfect Flame settings around the more seasoned operators’ preferences, as well as the applications and the temperatures required,” said Waldorf. “We were able to determine the best flame for each project. That’s what we liked about the initial setup.”

Waldorf said the time savings combined with fewer repairs or re-dos needed internally before being shipped have made the partnership with Harris a win.

“Quality brazing is critical to a long-lasting and leak-free refrigerant system, so it’s always top of mind at our company,” he said.

## **ALTERNATE FUEL**

Another recommendation Harris made was to switch from acetylene to either propane or propylene, so Delfield decided on propane. Converting to an alternate fuel not only saves money, but also improves heat transfer to joints. Propane is also a safer, more stable gas than acetylene.

Waldorf is enthusiastic about the switch to propane.

“Propane has a cleaner flame and doesn’t leave soot,” he said. “The propane flame wraps around the joint, giving you a better braze. Acetylene is a direct hit, with unequal distribution of heat. Switching to propane has been a real benefit.”

Another advantage is that propane comes in larger tanks so fewer changeouts are needed. One propane cylinder provides the same amount of Btu as five acetylene cylinders.

“That’s five less trips to bring a tank out, so it really saves time on the production floor,” said Waldorf.

Switching to alternate fuels isn’t always easy. It’s common for companies to struggle through an implementation period due to the trial and error that comes with operators trying to replicate the acetylene flames they were used to. But the Perfect Flame eliminates this costly time period and training, because operators can select the pre-saved flame setting for the torch for each job.

With the switch from acetylene to propane, new torches and tips were needed. Harris recommended the Model 50-10 torch, which is lightweight and less cumbersome than the torch used previously.

One of the learning curves with propane versus acetylene is the size of the flame. Acetylene has a shorter, tighter flame while propane has a longer, wavier flame. The majority of the Btu with propane is further off the tip, outside of the inner cone. Acetylene is hottest closest to the tip. After in-class training, hands-on training and a little trial and error, operators adapted to the new flame characteristics. Harris worked with the customer to find a tip that would shorten the propane flame since the majority of brazing was done inside the unit, close to heat-sensitive parts.

## **HIGH-SILVER BRAZE ALLOY**

To reduce any potential for failures on thermal expansion valves, Delfield made the recommended switch from a 5% silver alloy to Harris’ Safety-Silv 50N flux cored rod. Prior to this recommendation, Harris had brought multiple valve samples to its in-house metallurgical lab to evaluate brazed joints.

In the braze lab, Harris staff were able to replicate the same flame used in the Delfield plant. Following this testing, Harris evaluated cutaways of the brazed joints in its metallurgical lab, which led to the recommendation to use a flux cored silver alloy to ensure the highest quality brazed joint.

Another advantage of the 50N is its flux inner core. There is no manual flux application required, which provides time savings and eliminates the threat of flux entering into the closed loop system. It also has a more favorable temperature range than the 5% silver that Delfield had been using. The 50N will wet out through the joint at a lower temperature and provide better flow.

## **SUCCESSFUL PARTNERSHIP**

As part of the DCR program for Delfield, Harris created a formal brazing procedure for operators that includes training on the Perfect Flame equipment, as well as introduction to brazing classes on-site at Delfield’s multiple locations. The Harris training — which is completed annually —

includes theory, principles, and hands-on instruction in the braze process to give newer technicians a better understanding of their craft.

With turnover being a common problem in the industry, the training of new brazers needs to be ongoing and comprehensive, but also efficient. That's what Harris has been able to bring to Delfield, and they're seeing the benefits.

"We now have standardized braze quality and repeatability across three different locations, while spending fewer resources on training and set-up," said Waldorf. "We've also reduced gas fuel costs. All of these advantages help us deliver the best durable fabrication and refrigeration solutions to our customers and their kitchens."

KEYWORDS: [brazing coils and HVACR maintenance for HVACR refrigerant leaks refrigeration systems](#)

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