Making a HERO

The journey to market of a new argon-saving product

By Nick Parkinson

© S.J. Smith Company, Inc. **| Eric Smith, director of operations, S.J. Smith Company, Inc., and Ralph Johanson, owner, Industrial System Engineering, at the Davenport S.J. Smith location, home of the prototype Argon HERO, in front of the second-generation HERO installed in 2018**

The Argon HERO – new to market in 2020 – is attracting interest in the industry with its claims to save costs by preventing the loss of argon during transfer from bulk tanks to microbulk delivery systems such as Chart's Orca™.

Weldcoa has been involved with the development of the product and is the sales arm that will be overseeing the promotion, installation and long-term support of the HERO (as reported in our December issue). But how did the idea and design come about?

It all started six years ago when S.J. Smith Company, Inc., the provider of gas, welding, safety and industrial solutions, began to focus on how it could reduce its total gas losses. They collaborated with Industrial System Engineering (ISE), another Davenport, Iowa-based company, on reducing gas losses.

Ralph Johanson, ISE owner, said, "I designed and performed the applicable calculations, which suggested that the losses were significant and valuable. After running tests and additional calculations, I designed a prototype to test the theory and the actual results of the applied theory. Eric agreed to assist with funding and technical assistance to help see if we truly could reduce gas losses without any adverse effects to the operation. After about, oh, 200 to 300 hours of calculations, I built the prototype liquid argon cooler based on all these calculations plus some engineering, and some luck."

S.J. Smith began using a prototype

HERO in March 2015 at S.J. Smith's Davenport location.

"I remember being so excited because it was working!" Johanson told **gas**world.

"S.J. Smith used the prototype at their Davenport location for quite a while, helping to understand the system even more. The system did actually cool the argon, reduced argon gas losses and did not increase the time to fill, which fulfilled every requirement we had for the solution. Eventually S.J. Smith asked me to manufacture a permanent system to install at S.J. Smith's Decatur location. It took much longer to design and build a manufactured unit which used quite a different design theory to accomplish the work. I developed a design and had an appropriate company fabricate the unit. We installed the unit, and it has basically performed flawlessly ever since."

While the prototype continued to be used at the Davenport location after the first test in 2015, Johanson then built the first permanent system which was built and installed at the S.J. Smith location in Decatur in 2017. Later, Johanson manufactured a second system, which was installed in place of the prototype at the Davenport S.J. Smith location in 2018.

The system is now called the Argon HERO – the Heat Exchange Rate Optimizer – which reflects the technology used to get these results, according to Johanson.

"The general idea of the HERO is to run argon through pipes cooled by nitrogen, to take the heat out of the argon, which then enters the truck or cylinder super-cooled. The cost of the nitrogen cooling is much more economical and much less, gas-loss-wise, when compared to the argon loss," Johanson said.

"None of this could have happened without an amazing degree of collegiality, collaboration, cooperation and some risk-taking. Running tests on hundreds of thousands of gallons of argon is expensive - it's really nice to have a partner like S.J. Smith who is willing to share some of those risks."

© S.J. Smith Company, Inc. **| L to R, Bud Klotz, Vice-President, and Gary Schueman, of Weldcoa; Joe Kleiss, and Ralph Johanson, owner of ISE; Paul Schueman and Hector Villareal, President of Weldcoa, with the Argon HERO at S.J. Smith's Davenport location**

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Eric Smith, director of operations at S.J. Smith, says the HERO has reduced argon costs for his company.

"The HERO has really helped us control our gas losses," Smith told **gas**world.

"The HERO has driven our gas losses down. Since 2014, we have reduced our gas losses in dollars by 35%. Many factors have gone into this gas loss reduction, but the HERO makes up a large part of those savings. It's given us the flexibility to take those savings and re-invest in new and innovative solutions for our customers."

Can it be a solution of sorts to any argon shortage companies are experiencing?

"Using the HERO is just one way of conserving argon resources – you want to preserve everything you have, so you can supply your customers," Smith said.

"You're saving product, you're filling faster, and you have more product in your truck. It's helping remove waste and inefficiency from your process."

Gas loss has always been an accepted part of the filling process, but Johanson says he was stunned when he saw the numbers calculated.

"The gas loss is product you can never sell again," said Johanson, who has 30 years of experience in industrial gases, cryogenic fluids, and system design. "You bought the gas, and then you lost it due to thermodynamics. That loss directly affects your COGS and your profit. It is all of our responsibility to be energy efficient whenever we can."

Since the HERO units have been installed at S.J. Smith, Johanson has continued to work on the design.

"We all have learned a lot since that time, and I have modified the unit since then," Johanson said. "Concurrently with all of this, we have used the theories involved to continue to expand the applications and devices to save as much gas as possible."

As a result of the work and testing done at S.J. Smith, Johanson insists the HERO is very easy to use. "Operator training for the HERO should take less than two hours for someone familiar with filling an Orca or similar," Johanson said.

S.J. Smith, which celebrates its 70th anniversary this year and has 12 locations in Iowa, Illinois and Missouri, is so impressed by the HERO it is looking into expanding its use of the technology.

"At S.J. Smith, we'd like to expand how we use this technology, and we're working with Ralph to look at utilizing the technology to fill our liquid cans as well," Smith said. "I'm impressed at how Ralph has been able to take an idea that's out there, and implement it on a larger scale with advanced technology." gw