The history of microbulk

How a few passionate companies changed the distribution of packaged gases around the world.

By Tim Neeser

So what else was going on back in the soaring 1990s, other than the tech-bubble preparing itself for busting? Well, in the small world of the industrial gas space, a little gas company in the UK, and an innovative cryogenic equipment company in Minnesota got together and started brainstorming a better way to deliver liquid molecules to the smaller user.

The gas company was CryoService, and the manufacturer was Minnesota Valley Engineering (MVE) Chart® Industries. The discussion revolved around the question of, "why can't MVE make a small liquid delivery system for atmospheric gases like it did 10 years earlier with bulk CO_2 for McDonald's® restaurants?"

MVE had pioneered the use of fill-on-site liquid CO_2 systems in restaurants as an alternative to exchanging high pressure cylinders on a full-for-empty basis. The reduction in cylinder handling and storage, as well as the elimination of residual losses, turned CO_2 from a challenge into a utility. End-users embraced the convenience and safety benefits of a fill-on-site solution. At that time, the old delivery unit technology for atmospheric gases had pressure-building circuits and bolt-on pumps, and it desperately needed efficiency improvements.

MVE took this challenge back to the US where the Applied Technologies team had just finished the development of an LNG dispenser using a submerged pump that facilitated vent-free, rapid filling of vehicle LNG fuel storage systems. The three primary objectives in developing small liquid delivery of atmospheric gases were: **1**) Delivery vehicles with an onboard submerged pump that supported a large number of small quantity deliveries per day. **2**) Thermally efficient, stationary cylinders at the end user site that could be filled without venting. **3**) Technology to interface the cylinder to the delivery vehicle and permit automatic fill termination and indoor cylinder placement.

The concept began to blossom with all the benefits surrounding the driver and the delivery vehicle so they could make up to 10 deliveries per day using an accurate flow meter for small drops, with a single-hose no loss transfer. To complete the system, the team incorporated a Flowcom flow meter on the vehicle and a float shut-off device on the fill line of the cylinder. Activation of the float shut-off as the cylinder filled would trigger a flow reduction, which the flow meter controller would sense to shutdown the pump.

The intricacies of this design proved to be more challenging than expected in the early years of development. Nonetheless, the ensuing development teams prevailed as they continued to work on the system in the MVE lab and with CryoService in the field.

So why call it ORCA? The Applied Technologies team saw disruptive drivers for both internal and external customers. To get their attention, they wanted them to be afraid. Afraid of what? Afraid of 'Eat Lunch, or Be Lunch', the controversial marketing plan. The target audience was clearly the small independent gas distributors, who needed a new way to grow their businesses and what a better way than by delivering molecules to the point of use, instead of perpetuating the existing full for empty supply mode. The team needed to put the fear of loss into them – if they did not get on board with this new concept, they would be lunch!

To provide the customer with all the benefits of bulk in a small package, it needed telemetry. By this time, telemetry had made its way into the bulk supply chain because of technology and it had a high ROI. However, the microbulk market needed it more as the expectations were the same – gas convenient as tap water, but microbulk did not have the molecule reserve like bulk, if the demand increased between deliveries. The development team knew this, but just could not carve out the time out to get it completed with the initial launch. It took another five years to really get telemetry rolling and it started with the introduction of the Cyl-Tel® liquid level gauge in 2000. Shortly after, key telemetry suppliers like Scully Signal Co., Data Quest (now DataOnline), Level Devil®, and Chart's own system, Onsite®, were all needed to launch exploratory low-cost telemetry solutions.

Early adopters

Praxair was one of the first movers with microbulk in California. It understood the concept and how the business model was a perfect fit for its market. It offered a dramatic reduction in material handling and an overall better way to serve the customer.

Converting packaged gas accounts to microbulk with a gas contract was a win-win for Praxair's business and its customers. Three other benefits were discovered during this time to help mould the product line. One, the necessity that the Perma-Cyl storage had to come configured to match the end-user's application, and be equipped to meet the distributor's business model. It had to be installation-ready. This was accomplished with a configure-to-order programme that Chart still utilises today.

The second key driver was how to sell it. Praxair understood the value proposition to drive the mode change. It developed a process to quantify the benefits by totalling all the current costs of the customer's packaged gas supply, and then got the customer to use these savings to pay for the Perma-Cyl storage tank rent. The third key driver was the flexibility of the Perma-Cyl asset. It had to be high pressure to cover almost any application and have a low installation cost. Adding a metal pallet design to the larger sizes keeps the installation cost low by replacing a crane with a forklift, and making the concrete pad optional. Now, if the distributor has to upsize the customer, add more tanks, or remove the Perma-Cyl altogether, these costs are controlled. With the microbulk system hardware complete with the Orca, Perma-Cyl and Cyl-Tel, the four-legged stool of MicroBulk Solutions® just needed the addition of marketing sales tools to make it stand on a solid growth platform.

As the first major gas supplier to adopt this new concept, it's fair to say that microbulk may not have survived the rough road of development from concept to reality without the support of Praxair. At this point in history, we also have to give credit to multiple key independent gas distributors in the US, along with CryoService. Those early-adopter distributors that bought into the concept were, SJ Smith of Davenport, Iowa (received Orca unit #1 in December 1996), General Air of Denver, Colorado, WESCO (now Airgas East) in the Boston, Massachusetts area, Bakers Gases in Detroit, Michigan, San Diego Welders (now WestAir) in San Diego, California,

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Tex-Air Cryogenics of Dallas, Texas (now Airgas) and Cee-Kay Supply out of St. Louis, Missouri, just to name a few. Cee-Kay Supply was so passionate about the concept, it routinely offered on-site demonstrations to other independents at its facility and promoted the microbulk business model.

Looking back at the seven years of innovative organic growth, were there any surprising results? Did Chart overlook the cannibalisation of its Dura-Cyl® liquid cylinders? Yes and no. The initial concept was the displacement of high pressure cylinders with small volume Perma-Cyl storage in the 230 litre and 450 litre capacity range. The reality was there was an equal opportunity to displace transportable liquid cylinders with larger Perma-Cyl storage vessels, which were developed.

Additionally, there was a concurrent trend of major producers not wanting to service bulk installations of less than 1,500 gallons capacity with conventional semi-trailer supply. This created an opportunity for independent distributors and the packaged gas groups within the major producers to serve traditional 'small bulk' customers with larger Perma-Cyl storage units. Finally, certain applications like laser cutting have either flow, pressure or duty cycle requirements that facilitated the development of larger Perma-Cyl storage vessels with special capabilities. The product line proliferated to serve a very wide range of end-users.

Global expansion

At the early turn of the millennium, Chart Ferox production in Decin, Czech Republic began to produce the Orca delivery system, and the Perma-Cyl storage tank to supply equipment for Europe. Soon after Ferox started production, Chart China in Changzhou began production for the Asian markets. Today, the Orca microbulk delivery system has been in operation from Australia to Dubai to Seattle.

The next generations

Soon the Orca delivery unit designs upgraded to include controls with more automated functionality, larger capacities, and greater pump speeds. Features targeted the original design drivers – making the Orca user-friendly, fast and safe for the operator when transferring cryogenic liquids.

The Perma-Cyl storage systems were getting larger, with more features to fit the ever growing applications. Telemetry continued to improve along the way, and is now generally sold as a standard feature of the system.

And so, in just 10 short years from 1996 to 2006, a few small companies were busy quietly changing the packaged gases landscape. Customer-focused development with passionate people leads to great things, including changing the world on how packaged gases are distributed and used today. gw

WITH THANKS

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