

A Bulked-Up Market for Cryogenic Tanks

by Brad F. Kuvin

Photo courtesy of Acme Cryogenics

The proliferation of LNG fueling stations and growth of high-pressure applications have nicely supplemented a burgeoning market for medical gases, so much so that manufacturers of bulk tanks for cryogenic gases exhibit optimism for the rest of 2005 and into next year. New high-pressure tanks on the market operate at up to 600 PSI. And if you don't want to pay for such capability but want the flexibility to handle high-pressure service when needed, with an existing lower-pressure tank, manufacturers have your solution, too: bulk-tank boosters.

"If you have a standard 175- or 250-PSI tank in the field and have a customer that needs high-pressure service—typically laser-beam cutting—you can use the booster and get pressure up to 500 PSI," says Scott Boyd, vice president of sales and marketing for Taylor-Wharton. The firm introduced its booster, the AutoFill, about a year ago. Boosters are portable but can be made stationary, and allow a customer to purchase or lease lower-cost lower-pressure tanks made of thinner gauge steel than the heavier-gauge high-pressure tanks. That's worth noting in this tight and high-priced market for steel.

Chart's Tim Neeser, director of marketing and new product development, notes a similar uptick in high-pressure bulk-gas sales.

The firm also recently introduced a new generation of the Trifecta, a 500-PSI pressure-boosting module for its standard tanks. Since its introduction ten years ago, the Trifecta has been well received in supplying laser-cutting assist gases.

"There's definitely more high-pressure business out there," Neeser says. Two years ago, to meet projections for that part of the cryogenic bulk-tank market, Chart also developed a new concept for high-pressure tanks called the HP² (high pressure, high performance) that uses what Neeser calls a three-in-one external va-

porizer and an automated control system. Its technology cuts blow-down and venting losses and increases holding time.

"The HP² employs a totally new and innovative flow schematic," he says, "that allows the pressure builder to recover at a rate of 100 PSI/min. after a refill. This gets the end user back up and running as quickly as possible. Also, less heat is introduced into the tank so the liquid stays colder, diminishing losses and time during depressurization before refilling."

LNG Applications on the Rise

Continued growth in the LNG industry remains a bright spot for Chart. Says Tom Drube, director of engineering: "Today, after more than 20 fill-station installations, the LNG bulk tank has evolved into a specially engineered piece of equipment with the necessary safety systems to meet industry requirements and the customized plumbing to meet market demands. Installations now use one or several 15,000-gal. bulk tanks."

New growth areas for Taylor-Wharton are tanks designed for LNG and hydrogen applications. These new tank designs hit the market late in 2003 and include all stainless-steel piping, among other features specific to LNG and hydrogen use.

"We work with Northstar on these applications," says Boyd. "They build the dispensing equipment and fueling station, and purchase the bulk tanks from us."

Taylor-Wharton's LNG bulk storage tanks are available in configurations for both fuel-station and infrastructure applications, in vertical and horizontal designs with capacities from 1500 to 100,000 gallons. Standard features include top and bottom fill lines and a dual safety relief system. Options include a pressure-building coil and economizer circuit and submerged transfer pumps.



Photo courtesy of Chart Industries.

Chart recently introduced a new generation Trifecta, a 500-psi pressure-boosting module for its standard tanks, designed for laser-cutting assist gases.



Photo courtesy of Taylor-Wharton

Taylor-Wharton's auto-fill laser pack is completely weatherized and the all stainless steel plumbing adds additional protection against hostile elements.



Photo courtesy of Taylor-Wharton

Taylor-Wharton's LNG bulk tanks are available for both fuel-station and infrastructure applications.

Medical Field Full Speed Ahead

Of course, the bread and butter driving the bulk market over the last 18 months or so continues to be the medical industry—hospitals, long-term care facilities and surgery centers.

“The medical field continues to go great guns,” says Dave Edge, sales manager for Acme Cryogenics, who’s Resale Division provides a variety of tank remanufacturing services. “Along with oxygen, we’re seeing a lot of activity in tanks for nitrous oxide, CO₂ and nitrogen. At the end of 2003 and into 2004, we saw a much needed market upturn—2004 was a rebuilding year.”

An indication of the turnaround: Early in 2003, Acme Cryogenics had more than 600 tanks in its yard, being stored for a variety of major gas companies. Once upon a time, its yard held maybe 100-150 tanks. But through the early years of this century, tanks were being removed from slow, or in some cases out-of-business end users at a rate exceeding demand for tanks. The upturn began late in 2003 and continued through 2004 and into this year, and has reduced the firm’s inventory to some 540 tanks, according to Acme’s operations manager Jim Payne.

“Our rehab work is picking up nicely,” says Payne. “A growing market for our tank-rehab business has been an increased need for retrofitting upgraded overfill protection to older tanks. In the last several years, pump manufacturers and trailer builders have begun to use hydraulic pumps that are more efficient and pump at higher flow rates and higher pressures. Because of this, it has become possible to pump liquid into a tank more quickly than a traditional relief valve can relieve it. This has created the danger of overpressurization, a major safety concern.”

To address this safety issue, the Compressed Gas Association (CGA) published, at the tail end of 2004, PS-8, CGA Position Statement on the Protection of Cryogenic Storage Tanks from Overpressure During Operator attended Refill. It’s intended for owners of cryogenic storage tanks, industrial gas companies and carriers that fill these tanks. It recommends how to prevent overpressurization during refill.

“We addressed this concern,” says Acme’s field service manager Scott Crosley, “by upsizing our reliefs and burst disks. And, in some cases, we limit the flow that can go into a tank by putting on orifice plates or other devices into the inlet line.”



Photo courtesy of Chart Industries.

Four 15,000 gallon ThermoSiphon LNG storage tanks, installed June 2003 at Los Angeles, Bureau of Sanitation, East Valley Refuse Complex.

CGA Directives Driving Need for Technical Support

The last 12 to 18 months has been an active one for CGA, which during that time has issued a handful of position statements and standard requirements for the bulk-tank industry. This year already, it has issued P-8.3 Edition 2 on Perlite Management (published on January 20, 2005), a general guide covering the use of perlite in cryogenic vessels, with a focus on safety, design, operation, maintenance etc.; and G-6.1 Edition 6, Standard for Insulated Liquid Carbon Dioxide Systems at Consumer Sites, which includes the minimum requirements for design, construction, installation, operation and maintenance of insulated bulk liquid CO₂ supply systems. It also addresses equipment such as vaporizers and vapor heaters, pumps and relief devices.

With so much new information available on tank operation and maintenance, safety and other issues, vendors of cryogenic tanks and other equipment continue to upgrade their technical service staffs and add to the services they offer.

“Onsite repair is a growing market,” shares Taylor-Wharton’s Tim Miller, North American director of sales. “We started off 2005 by introducing our Cryo-2-Go service initially aimed at onsite



Photo courtesy of Taylor-Wharton.

Taylor-Wharton’s Cryo-2-Go brings cryogenic vessel repair services directly to the customer’s location to perform bulk tank and liquid cylinder repairs on-site.



Photo courtesy of Chart Industries.

Chart recently introduced Tank-Tel, a telemetry-ready unit, which calculates level and pressure—no need to consult a calibration chart.

fit to existing tanks.

“We’re showing customers how they can get rid of the headaches of dealing with regulators,” says Chart’s Terry Rezac, vice president of standard bulk systems, “thanks to a new regulation system that employs two ball valves with super-high flow capabilities and a

liquid-cylinder repair, and have expanded that service to include bulk tanks. Cryo-2-Go services are now servicing customers east of the Rockies and further expansion is planned for later in 2005 for customers in the eleven western states.” Taylor-Wharton offers wireless telemetry on its bulk tanks, as well as on its microbulk line of tanks.

On-site tank maintenance and upgrade activity at Chart has grown too, driven in part by its introduction of a new pressure-regulation system and a new digital telemetry system, both capable of retro-

operate from a PLC that monitors the pressure. The precision is a welcome result to many customers—if, for example, you have a 500-PSI relief valve, you can run that at 465 PSI on the high end and down to 455 PSI on the low end and it will hold in that range.”

Along with PLC pressure-regulation control, Chart recently introduced Tank-Tel, a digital gauge for level and pressure. The telemetry-ready unit houses internally the calibration charts needed to calculate level and pressure for any of the five cryogenic liquids—LIN, LAR, LOX, CO₂ and nitrous oxide—no need to consult a calibration chart and do the necessary math. The user simply inputs tank diameter and height, its orientation and the type of liquid. The gauge outputs in liters, gallons, cubic feet, cubic meters, PSI, bar and other common units.

A New Breed of Tank Ownership and Management

Such technology is opening up new markets for bulk-tank ownership. Some hospitals, comfortable with safety being built into tanks as well as the accuracy and ease of use of new gauging tied to reliable telemetry systems, are now looking to purchase tanks outright.

Also noted is a renewed interest for electronic-grade tanks and equipment, and corresponding tank ownership by the end user. Years ago, the electronics market was big for tank manufacturers. Then it slowed, as chipmakers tended to use standard tanks with filters downstream to ensure the required gas purity. Now there’s some movement back toward specially outfitted tanks—electronic-grade plumbing with all stainless-steel construction—in the search for the purist attainable gas stream.

“The major gas producers are much more careful and sophisticated regarding their purchases of bulk tanks than they were, say, six years ago,” says Ken Paul, Chart’s vice president of engineered bulk systems. “The real news in the bulk-tank market has been the attitude of gas producers toward asset management, which has forced manufacturers to look for new markets, the biggest of which has been the microbulk market that has us transposing gas-cylinder business for microbulk liquid.”

New CO₂ Tanks Show Improved Toughness

From the CO₂ side of the cryogenic fence, bulk tanks have been consistently getting larger and larger, as tank manufacturers now enjoying demand for new tanks, due to CGA’s safety concerns with older tanks, can also satisfy market demands for increased tank capacity. The CGA PS-5 position statement issued in March

2003 on the Suitability of Carbon Steel Containers for Stationary Low Pressure Carbon Dioxide Storage has led to significant decommissioning of tanks built prior to 1976. New tanks coming onstream to replace these older tanks, manufactured from SA-212 and SA-515 carbon steels that can become brittle over time and use, are five to 10 times larger than their older brethren. One builder of bulk CO₂ tanks, TOMCO, now builds tanks to 120 tons.

“A 50-ton tank now has become more or less the standard for many applications,” says Dan Templeton, TOMCO vice president of sales and marketing for industrial sales. “A 50-ton tank is ideal since the gas companies can drop an entire 22-ton load from their transports into the larger tanks, something many of the gas companies have pushed their customers to allow them to do. So even if the 50-ton tank has a significant amount of liquid inside of it, it can still accept a complete transport load.”

New tanks for CO₂ are now made of steel alloys designed for increased toughness and less likelihood to become brittle. TOMCO and other suppliers use SA-612 steel, normalized to optimize toughness. TOMCO offers several different models and sizes of CO₂ storage units. The single walled units are urethane insulated which is highly efficient even in areas of high heat and humidity. These units are available with or without refrigeration, as are the double-



Photo courtesy of TOMCO

CO₂ Storage unit with capacities from six tons to 120 tons. New tanks for CO₂ are now made of steel alloys designed for increased toughness and less likelihood of embrittlement.

walled vacuum insulated units.

“Now we use stainless steel in place of carbon steel for nozzles,” adds TOMCO’s Ray Sartor, vice president of operations, “a design change we made 10 years ago or so to avoid problems with corrosion. And, a segment of the beverage industry has been upgrading to new and larger tanks significantly over the last one to two years.”

Noting one more trend, Sartor continues: “In many cases we’re providing a different type of vaporizer as an alternative, because many beverage producers are withdrawing liquid CO₂ instead of vapor for their processes. We saw this trend take shape in 2003.”

Other technology impacting sales into the CO₂ market, according to TOMCO, is growing use of dual safety setups. Here, the firm offers tanks with dual pressure-relief valves and a switching

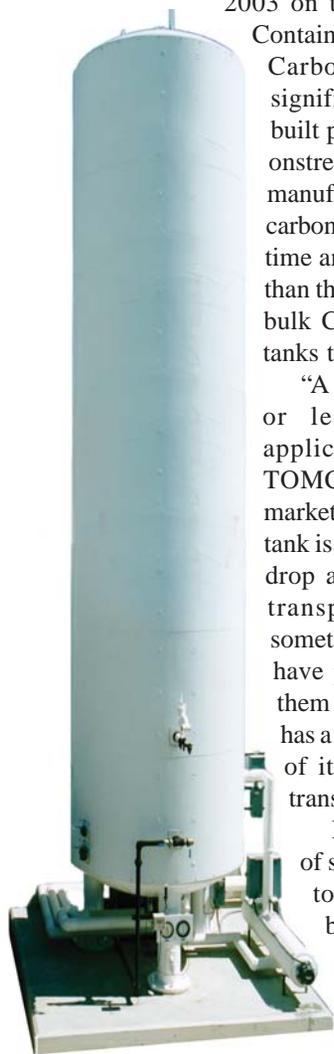


Photo courtesy of TOMCO

The 50-ton single-walled Vertical CO₂ Tank. “A 50-ton tank is ideal since the gas companies can drop an entire 22-ton load from their transports into the larger tank,” said Dan Templeton, TOMCO vice president of sales and marketing for industrial sales.

valve between them. This way, one relief valve can be tested without taking the tank offline. "This has been well accepted in recent years," says Templeton. "In fact, many of the gas companies are requiring that their customers have dual safeties before they'll fill their tanks."

A couple of other markets have grown recently for CO₂, boosting the coffers of TOMCO and other suppliers of CO₂ bulk tanks. "We've seen a noticeable increase in the need for capacity from municipality water plants," says Templeton, where CO₂ is used for pH control. "And, poultry plants have been a growing market for CO₂ in recent years," Templeton adds. There, CO₂ is mixed with water and chlorine to make hypochlorous acid used to attack pathogens in poultry-processing plants and other food-related industries.

"We developed the pathogen-management system in 2001 and received the USDA letter of non-objection last year," adds Sartor. "It's a fast-growing market."

Paul Matlock of TAP Resources, a consulting and services firm focused on the compressed gas industry, offers the following observations based upon his 20+ years of experience in the industry. "The impact of major producers' installation of non-cryo plants seem to have abated and currently new installation almost always



Photo courtesy of TOMCO
The CO₂ storage unit (six tons to 120 tons capacity) with wide flanged rectangular skids for balanced weight distribution in areas where placement is a concern.

include a cryogenic tank as back-up. These tanks are typically smaller than the original tank. But at the same time major producers are still not purchasing a significant number of cryogenic tanks for typical installations and their purchases are for specialty designs and applications. The availability of a large number of used larger vessels will continue to supply much of the organic growth in the market in the future," comments Matlock.

"While much of the impact of ORCA Microbulk supply is a surplus of older style liquid cylinders, they have and will have an impact on smaller tank installation in the future," Matlock adds. "It would seem that distributors and smaller regional suppliers may have an opportunity to pursue the smaller installations using rehabbed excess used vessels as the major producers concentrate on optimizing their supply chain with large tank installations." ■

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