

The Value of an Integrated Cryogenic Metering Solution

By Kenneth Nugent

The cryogenics industry has changed drastically in the past ten years. Although the general population may know very little about the business, those of us in the industry realize its significance as it impacts medicine, construction, transportation, electronics, and numerous other markets. And as technology expands, so too does the opportunity to expand into other industries. This means there's a greater demand for cryogenic and liquefied gases, but this also means that there will be an increased demand for effective measurement.

This creates some challenges and it's important to focus on offering technology that produces the critical link to the revenue stream and not only offer measurement, but a complete reporting system. The system must be easily integrated, easy to understand, and must

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Moving Past the Meter

At cryogenic conditions, liquids provide little lubrication for moving parts and the thermal shock of fluids at these low temperatures can pose problems for transport. Keeping elements cold, below boiling points—and also ensuring that these materials are in their purest forms can be difficult but not impossible.

The cryogenic turbine meter has been around since the 1940s but improvement upon mechanics such as re-engineered ball bearings and alternate meter materials—Monel for some applications, and stainless steel for others—are now available. Choosing the correct meter is an important investment, one that needs to be backed by knowledgeable industry professionals.

This is especially important when transporting cryogenic materials. The transportation vehicles traveling down a highway can encounter potholes and other usual hazards.



Even during the most tenuous routes, liquefied gas must remain stable and transport drivers must have access to the status of their cargo at all times. In addition, the quality of the liquid must be maintained. An intuitive system needs to be put in place that monitors activity but also recognizes warning signs and takes the appropriate measures to prevent damage, especially from cavitation. If temperatures are in the wrong zones, or there's an indication of pressure changes, the pump system needs to react accordingly, and automatically. It's important to note that accuracy has a direct correlation to revenue. For example, it's possible that a one percent error in accuracy could translate to upwards of \$15,000 of revenue loss annually per bulk transport. This means that a typical major fleet that has 300 trailers of cryogenic transport has a potential annual loss of \$4.5 million.

Focusing instead on integrated solutions with technical advances, such as μ processor utilization, assists companies effectively in transporting as well as monitoring all activities from the comfort of their truck (or home office). This creates not only a safe environment for transportation professionals, but it also protects the quality of the cryogenic materials, reduces the needs for maintenance, and protects the investment.

Keeping It Simple

The other element that's a must in terms of successful implementation is simplicity. Anything that is hard to read or humbles people won't work. Simplicity and efficiency are imperative to the success in the cryogenic industry. Incorporating an integrated system needs to be a cost-effective investment but it also should be easy to implement, operate, and understand. Installing a meter with convoluted or extensive programming instructions not only takes time away from more pressing matters, but it can also be more difficult to maintain or understand. This also poses safety issues. A properly integrated metering system should notify users of issues, and should indicate clearly what the problem could be

whether it's a malfunction, pressure change, or perhaps something more serious.

Clearly presented diagnostics and warning signs help even the newest team member or technician to troubleshoot issues. This not only saves time for training, but also protects your investments by quickly discovering issues and solving them before they grow to become dangerous or unmanageable—which again can significantly impact your bottom line.

When choosing an overall metering solution, there are several things that should be considered:

Quality: It's important that a company designs and calibrates its meters and monitors to the highest standards using independent verification, and that they meet all prerequisite certifications. Especially in the case of cryogenic applications, meters must be precision crafted from the best available materials by skilled machinists so that they are able to withstand harsh conditions. Cryogenic meters must be able to handle a large temperature range, with -450°F as a minimum. The meter's engineers must be knowledgeable of processes where the flow meters will be implemented, and can determine the best metering option for any installation.

Reliability: Turbine meters depend on the quality of their design, workmanship, and materials, as well as proper installation. A key element that is necessary, especially when dealing with rugged materials and drastic temperatures, is that the meters can be replaced relatively quickly so that valuable production time is never sacrificed for performance and accuracy.

Precision: Turbine meters should be equipped with a specially-designed turbine rotor that spins freely. As the rotor spins, it affects the magnetic field provided by the magnetic pick-up, which is interpreted by the flow monitor and expressed as flow-rate read-out. In addition to the need for a high-quality meter, it is also important to have a monitor that displays in real-time.

Accuracy: Turbines can be designed and calibrated to deliver from $\pm 0.50\%$ to $\pm 0.25\%$ respectively. Only skilled, experi-

enced providers can harness the full potential of these technologies to such high standards, outcompeting other meters. Independent calibration provides a greater level of insurance against low performance; suppliers who calibrate both in-house and independently offer a more conservative and reliable option.

Providing Ever More Complex Solutions

As the cryogenic industry evolves so does the industry's expectations of vendors and the equipment provided. Gone forever are the days when a simple delivery totalizer is sufficient. Vendors today are expected to partner and provide solutions to challenges the client is experiencing, even those not related to the vendors' immediate accountability.

Integration of wireless communications with a cab's onboard computer and with handheld billing systems, data records of delivery information, preservation of delivery system components, and maintenance scheduling is the key to creating an effective forward-thinking solution.

As technology infiltrates every aspect of our daily existence, dependence on that technology increases proportionately. As with all products, the advent of the μ processor has transformed product expectations. Today manufacturers can meet those elevated expectations in an economically feasible way. Continued exploitation of technological advances has converted impractical products and concepts into mainstream products and services. Turbines Incorporated utilizes the latest technological advances and resources in our designs, yet our greatest resource is as old as business itself—price, delivery, quality, and customer service. ■

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