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Gauging dial performance levels Sonic sensors may see boom as research continues on externally mounted gauges

Two views of the ADEPT sonic gauge test model, the technology for which was developed for the military to measure fuel levels in warhead-bearing missiles.

The traditional float gauge has buoyed the industry for years, of course, but customer service problems can arise if that device has become damaged, worn or simply just out-of-date.

"If a gauge is older than 1980, we recommend replacing it," says Rick LaDue, vice president at Rochester Gauge in Dallas.

A nuance in past industry production processes can bring false readings under certain conditions, LaDue cautions. A key component of a float gauge's functioning relates to the behavior of magnets in the gauge that dictate the accuracy of the dial's movement and measurement of the propane contained in the tank.



Prior to 1980, manufacturers would store and handle their stock of magnets en masse throughout the production process. Having these magnets co-mingled that way resulted in subtle changes in polarity and other properties of the magnetic field, however, negatively impacting the gauge's measuring abilities. Post-1980 gauges don't have that problem.

* This is to clarify the quoted article's references to "ADEPT." Adept Science & Technologies, LLC (ASCENT) was hired by its sister company, The ADEPT Group, Inc. (ADEPT) to develop the continuous level sensor with funding assistance from the Propane Education and Research Council grant. **ASCENT is the sole owner of the level sensor technology.** The level sensor development was based on principles of patents that ASCENT licensed from the Los Alamos National Lab, but the **technology is "new art"** and has been submitted for a provisional patent.

"Magnet technology has evolved to where we've improved our handling and purchasing," says LaDue, who is quick to point out that a pre-1980 gauge is a good candidate for replacement based on its age alone. "If a gauge is more than 20 years old you've gotten a good life from that gauge. You're getting a huge lifespan from that product."

The current crop of gauges serves the propane industry well, reports Roger Blackburn, warehouse manager at Gaseco in Mount Vernon, Wash. He is particularly pleased that the gauges on the marketplace are readily adaptable to the remote monitoring systems now finding increased popularity among propane dealers and their customers. (See story on page 17.)

"The newer ones now come with a remote-ready clip in them, so when it comes across the country they'll be ready for it," Blackburn says.

"All of our float gauges can accommodate remote monitoring systems," says Andy Ryan, project manager at Sherwood in Niagara Falls, N.Y. "We have made sure that the magnet has enough magnetic strength to be compatible."

Rochester gauges are equally adaptable for remote monitoring, LaDue notes. "It's our standard dial now, all you have to do is take out a little black tab. We've been getting a lot of good response to it."

When a dealer wishes to install remote monitoring capability, "all they have to do is snap it into our dial. This is a potential upgrade for a marketer at no extra cost," he says.

Other improvements have been ongoing at Rochester, such as a switch in materials to aluminum and DuPont Lexan plastic products. In the area of readability, a lithographic printing process has replaced the older method of silk screening.

Sherwood also is dialing up success with its own product line innovations designed to defeat the harsh weather.

"You can read our dials with more clarity," Ryan reports, noting that marketers rate readability high in importance. "They like it because it doesn't cloud up on them and it's easy to read and understand. These revisions have been gradually phased in over the past two years."

Remote ready In context of the larger picture, float gauge technology has remained consistent with very little design changes for the past 50 years. That may be changing as the industry looks into newer measurement characteristics.

"We have invested in looking at some much more progressive technologies," Ryan reveals. "We find that there are opportunities to take big steps in liquid level measurement."

Much of this forward-looking research remains proprietary, but certainly the arrival of remote monitoring bodes well for the industry and its dramatically improved customer service ramifications.

"It's going to grow in market share steadily and for a long time," Ryan predicts. "We have been working closely with a number of remote monitoring companies" to perfect design changes.

From a dealer's perspective, it is the majors that have taken the lead in getting remote ready, and Ryan urges the smaller companies to explore this avenue. "These larger companies will probably be the leaders in implementing these remote monitoring systems and will reap the financial benefits of remote monitoring. These larger companies are finding better and more sophisticated ways to do business."

Rocket science Sonic sensors are an emerging technology undergoing research and field testing. A special sensor is attached to the outside of a propane tank via epoxy or a magnet. The sensor uses sound waves to penetrate the tank's wall to ascertain the level of the contents within.

"You can just go out there and snap this on the tank," according to Larry Osgood, a consultant with the Propane Education & Research Council.

One such project features the sensor work being done by the ADEPT Group Inc., an Los Angeles-based engineering consulting firm that obtained a \$156,000 PERC grant.

ADEPT is seeking a manufacturer to purchase the rights and begin mass production of a device that military rocket scientists at the Los Alamos Laboratories had initially developed to measure fuel levels in warhead-bearing missiles. Transferred to civilian life, the technology is expected to produce an externally mounted propane gauge with a bulk wholesale cost between \$20 and \$50. These sensors are expected to be readily adaptable for remote monitoring.

"So far we've just made a couple dozen" of the devices for testing purposes, says Alex Spataru, the company's president. "We wanted to make sure the technology we developed works, and that objective has been achieved. All of them have been tested in the lab and now we are putting them in the field."

Along with other propane-related innovations, ADEPT has also been working on remote monitoring equipment. Its research indicates that 20 percent of the existing gauges had unreadable dials or were otherwise ripe for replacement.

"We found that a lot of gauges stick," Spataru recalls. "All mechanical gauges have that problem."

He warns that many of these gauges "over-read," meaning a customer thinks there is more propane in the tank than there actually is, potentially causing it to run dry and catching the customer – and the dealer – by surprise.

Sonic sensors are self-calibrating to ensure accurate readings. The external mounting capability also relieves any potential trouble with internal float mechanisms.

Spataru extols the following merits offered with sonic units:

- Directly linkable to remote monitoring devices
- Field replaceable
- Field upgradeable
- Low cost
- No moving parts
- Non-intrusive to the tank
- Variety of onsite readout options

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