

Gas Market Dynamics, Influx Of New Employees Put Emphasis On Training

By Russel W. Treat

HOUSTON—Oil and gas technology is constantly evolving, particularly in the fields of gas measurement and control. With gas prices at new levels over the past several years, it is crucial for field measurement technicians to create accurate measurements. Otherwise thousands of dollars could be at risk.

These technicians must be properly trained, and must understand the basics and theory of both the mechanical and physical processes behind gas measurement. Until recently, many companies relied on on-the-job and on-the-fly training. The value of natural gas has gone up, and for the first time in a long time new people are entering the industry. So a renewed emphasis is being placed on all aspects of skill development, and gas measurement is no exception.

During the energy boom of the 1970s and '80s, many companies were aggressively hiring new employees, with training conducted in-house, using their own training centers and their specific equipment and operations. Utilizing these formal programs, employees received regular training and became "certified" by their companies.

Once certified in the theory, technicians learned to operate and maintain every type of equipment found in their companies' operations. Companies often would standardize based on a specific set of vendors, and develop training programs to certify their technicians in standard practice for those vendors' specific types of equipment.

After pipeline deregulation in the '90s, the industry went through significant changes. Major U.S. gas pipelines became deregulated market price-based transporters, which drove consolidation, debt restructuring and budget cuts. As companies radically downsized or eliminated hiring activities, many trimmed their training programs. At the same time, natural gas prices fell and gas measurement became less of a priority. Training became an on-the-job function.

Since the 1990s, the gas industry has had a mature, well-trained force of gas measurement professionals, many of whom have changed employers because of industry downsizing. How-

ever, companies are quickly realizing that their experienced gas measurement technicians are on the verge of retirement. The average field technician is 45-50 years old. Within the next decade and a half, almost the entire gas measurement workforce will disappear into retirement, creating an immediate need for new, qualified measurement and automation professionals.

Training Needs

Obviously, the needs of this new workforce will be markedly different than that of its predecessor. The current workforce learned measurement when devices were largely mechanical or pneumatic, and often came from backgrounds of formal training or experience in the mechanical aspects of the equipment. In the '90s, companies focused on teaching this highly skilled workforce the electronic and computer skills necessary to work with modern measurement equipment.

In contrast, today's entry-level measurement technician often has a two-year college degree in electronics or instrumentation, and has grown up using computers. This segment of the workforce is typically very comfortable with technology, but has had little exposure to the theory, math and the hands-on, "gas under pressure" aspect of measurement.

This means when new measurement engineers and technicians come on board, they need both on-the-job training and dedicated theory and hands-on application training.

While most companies are quick to see the value in training, its implementation still can be a challenge. For example, because of the consolidation and downsizing in the gas business, companies are more thinly staffed and as such, employees have more duties—more measurement points and other responsibilities besides measurement. This makes it very difficult to release employees for off-site training.

To minimize time away from the field, many companies are opting for on-site training at a location or facility that is easily accessible by truck to their field personnel. Some of the advantages to conducting training on site include:

- Saving travel costs;
- Customizing the class to meet the needs of a specific group;

- Providing training customized to a company's pipeline or gas plant facility; and
- Being close enough to return to the facility in case an emergency should occur.

Even considering the many challenges of effectively delivering training, companies are always better served by investing the time and expense on the front end to properly train their people.

Formalized Training

Constant equipment upgrades, because of technology and regulatory changes, leave technicians with the responsibility to operate and maintain equipment according to those changing standards. Formalized programs offer complete control over curriculum, and ensure consistency for each employee. In informal training sessions, senior technicians often pass on the "tricks of the trade," which are not necessarily company policy or best practices.

The main benefits of formalized gas measurement certification training include:

- Each technician can contribute to maximizing measurement accuracy, directly affecting the revenue generated through the sales, purchase or transportation of natural gas.
- Hands-on training in a "live gas" environment is superior to pure classroom training. Technicians can train in virtually the same environment they might face in the field.
- Training on current measurement devices, electronics and software provides even senior technicians with the skill to properly and efficiently implement new techniques into their daily roles and responsibilities.
- Formal training programs integrated into the career development and performance reviews enable companies to meet the intent of operator qualification requirements.

As senior personnel retire and leave the workplace, new employees will need to be trained in all aspects of natural gas operations and measurement. A formal training program designed to meet these needs can improve operations and safety.

Hands-On Training

Training done under actual operating conditions has a greater impact because all equipment is under line pressure and contains natural gas. When a technician is wearing safety equipment and working on flow or pressure controllers in a live gas environment, the schooling procedures of hands-on training create a realistic atmosphere as technicians learn to perform their tasks.

In "live gas" situations, technicians learn through experience and develop the problem-solving expertise necessary to develop and enhance troubleshooting techniques. They also learn proper safety procedures. New skills are put into play immediately, and technicians can resolve complex operational and maintenance problems as they arise.

To increase productivity, each technician should receive training on the different types of measurement equipment available in the gas industry. Ideally, successful field measurement technicians master a variety of necessary gas measurement skills. To truly do their job well, each employee should understand the relationship between these activities and the company's profitability.

Fundamentals of gas measurement are best learned through both classroom presentation and on-the-job study. Fundamentals training covers both principles and details, including hands-on training and skills in basic mathematics. A fundamentals course gives the student the ability to understand and use the simple equations encountered through the course of further

training. Mathematics, fundamental gas laws, and volume calculations are a critical portion of a basic knowledge of gas measurement.

The basics of chart recorders and flow computers are subjects rarely covered during informal training. Understanding electronic flow measurement, chart recorders, witnessing meter test inspections, inspecting orifice meters, and the importance of meter tube inspection sheets are all skills best taught during formal training.

Mastering control equipment requires a thorough knowledge of fundamental gas pressure regulation, as well as the regulator's operation. Technicians should know the basics of "self-operated" and "pilot-loaded" regulators, as well as globe valve and ball valve regulators. Training handled in a hands-on setting, where students disassemble and reassemble regulation equipment, will help them gain complete understanding of their operation.

Measurement technology is rapidly changing. Once process variables are measured, calculations are made instantaneously. The variable measurements (differential, temperature, etc.) are made by a variety of transmitters or transducers. Electronics comprise many different components, circuits, and systems. Field measurement technicians should be familiar with:

- Diodes, transistors and integrated circuits;
- Amplifiers;
- Oscillators;
- Power supplies;
- Number system;
- Logic circuits;
- Counters;
- Registers;
- Memories;
- Analog-to-digital (A/D) and digital-to-analog (D/A) conversion; and
- Electronic test equipment.

Sampling And Odorization

Natural gas samples are taken routinely to determine quality and composition of natural gas. The techniques used, such as sampling points, sample size, sample pressure and sample timing, often are critical to effective and accurate measurement.

Technicians must know why a sample is being taken before



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gathering the sample. They need to be familiar with accepted industry methods for transferring a sample from the source to a transporting device, to the lab, and from the transporting device into a chromatograph device, all without compromising the sample.

Today's field of gas measurement has created an environment where change is constant. Training has evolved into a continuous learning process that continues throughout the life of

each career.

Implementing a formal gas measurement training program for employees will ensure their training reflects standard operating procedures, and ensures compliance with any Sarbanes-Oxley requirements.

In today's market, with the cost of natural gas rising, each inaccurate measurement means real dollars, and an inexperienced technician can have a real impact on the bottom line. □