Instrumentation Calibration as a Service

Process plant personnel constantly or temporarily struggling to keep up with instrument calibrations can engage a third-party provider to meet their needs.

By Robert Jennings, Endress+Hauser

One reality cutting across the entire range of processing plants and industries is the need for timely and proper instrument calibration. Operations require this for efficient and safe operation; additionally, many industries must abide by regulations and standards. However, keeping current on calibrations can be a tall order for many sites.

Maintenance staff are already familiar with many other aspects of industrial automation, but to operate in a metrology role they must also have specific training and specialized equipment to perform and document calibrations. Depending on the facility, the instruments may consist of a variety of makes, models, sizes, and technologies—making it difficult for personnel to address every situation (Figure 1).

For these and other reasons, many end users are exploring options for assistance. Instrument vendors with the right technical experience, established laboratories, and local, nationwide, or even worldwide reach can make the difference for this crucial task.

Figure 1: A wide variety of instrument technologies, standards, installation conditions, and operating needs can make it tough for industrial facilities to keep up on calibration needs.

Calibration Challenges

Like many other technical undertakings, instrument calibration is subject to the constraint triangle of fast–good–inexpensive, with only two viable choices. Often, the tradeoff is simply between speed and cost because the "good" element is heavily specified by regulations and standards.

For clarity, the term *standards* can mean two different things with regards to instrumentation. One type of standard is a document published by a recognized authority, describing in detail the practices and procedures which must be followed. A second kind of standard particular to calibration efforts would be any carefully measured weight, process calibrator, or other similar reference which will be used to calibrate other instruments. These physical calibration working standards or references must be carefully and periodically maintained with traceability back to National/International Standards.

Each instrument manufacturer may call for certain minimum requirements, and end user production plants can demand even more restrictive means and methods. It is important to use service providers that are accredited and adhere to ISO/IEC17025 standards. This should be considered for calibrations as the best way to ensure they are performed by properly trained competent personnel. Associated documentation must be meticulously created and maintained along with a Quality Management System in place.

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People for Process Automation

The nature of regulations is becoming more rather than less stringent, so end users must keep abreast of all requirements. This includes keeping calibration technicians up to date on training, as well as finding a way to train replacements as the workforce changes and expertise gaps are created due to retirements of experienced personnel.

When and Where

Time schedules for calibrations can vary widely based on instrument types, applications, and end user requirements. Some pharmaceutical companies will proactively calibrate instruments before every product run because losing a batch due to improper instrument operation could be a far greater expense. Other companies won't calibrate devices until they seem to drift or fail and some base calibration on the calendar. Many modern instrumentation and automation systems can alert if an instrument is drifting out of calibration, which could be an alternative than running to failure or calibrating too frequently. However, it is a challenge to replace a calibration without confidence in the measurement as proven by statistical data.

Continuous processing industries like petrochemical, and food and beverage, typically have few opportunities for downtime where calibrations can be performed. This may add complication in the form of multiple redundant instruments so one can be calibrated at a time, demanding extra attention since the instruments must be handled while the process remains **active**.

Many of these industries schedule infrequent maintenance outages or turnarounds during which calibration work can be performed since the process is stopped for other major maintenance activities. Careful coordination is necessary to ensure the right materials and personnel are available to calibrate during this brief window of opportunity. Occasionally, some equipment failure will open an unexpected window of time when work can be performed on associated out-of-service systems.

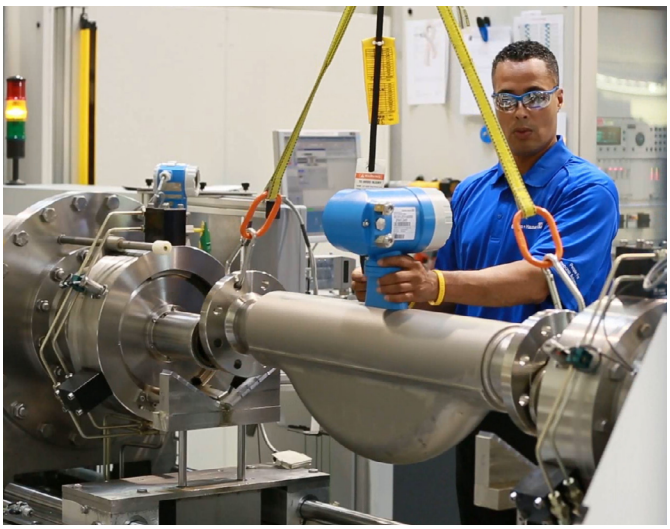

Figure 2: Fully-equipped instrument labs, such as those operated by Endress+Hauser, are the ideal environment for calibrating instruments when transporting them is possible.

The **where** component can be just as involved as the **when**. A shop or laboratory, either on-site or off-site, is usually an ideal and controlled environment stocked with everything needed for calibrating instruments (Figure 2). However, shop or lab calibrations require instrument removal, transport, and handling that introduces time delays, increases costs, and adds the risk of inadvertent damage. These downsides can be offset by efficiencies gained when multiple field teams remove and reinstall instruments, enabling a small calibration team in a shop or lab to perform work quickly in bulk.

Instruments may also need to be calibrated in-place because removal is impractical. For very quick turnarounds, the removal, transport, and replacement cycle may be unacceptably long. In those cases, an individual or calibration team must be ready for deployment to the field.

Calibration Services Secure Scalability

Because calibration needs often come in waves with relatively long periods of inactivity between them, it is very difficult for process plants to maintain the necessary staff, knowledge base, and standards for a timely response. For this reason, plant personnel often find they can supplement or completely rely on instrument vendors to provide specialized calibration services for some or all their metrology needs as these service providers can deliver the required flexibility and scalability. Depending on need, calibration support can be arranged to vary from a half a day of service up to a more long-term solution of having an embedded calibration technician full time.

Some calibration service providers are strictly local or regional, but a provider with multiple regional facilities can provide distinct advantages. End users will always appreciate the availability of calibration technicians within a few hours travel time of their sites. This proximity is crucial for quick response. Additionally, a geographically diverse presence means there are more technicians available to travel to sites during surge times, and it creates options for shipping instruments to a full-fledged lab for timely calibrations of large quantities of instruments.

Calibration service providers with multiple facilities have the resources to offer the highest level of assistance. While they may specialize in certain makes and technologies of instruments, their broad experience means they are likely able to calibrate devices of most any type (Figure 3).

Due to their scale, these larger service providers are also familiar with administrating large calibration management programs, and they can often collaborate with end users to tailor their services to exactly what is needed. Some calibration service providers may even be able to assist with process issues like optimization and loop tuning, which relate to instrumentation but are outside the exact domain of calibration.

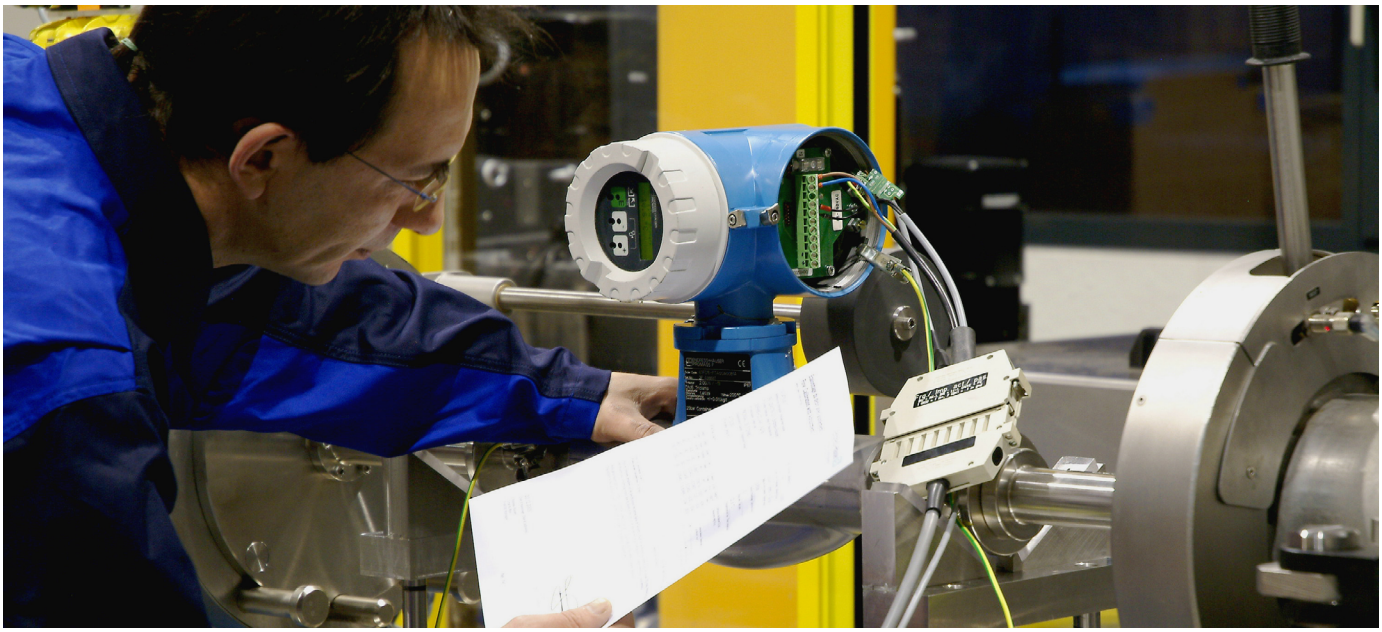

Figure 3: Endress+Hauser's capable calibration labs and highly trained technicians can support many instrumentation makes, models, and technologies, providing end users an efficient option for staying in calibration.

Following are a few examples of how one large calibration services provider helped process industry companies meet their needs.

Quick On-Site/Lab Turnaround

One end user was scheduled for a quick turnaround in order to tie-in a new processing area to upgrade existing operations. The process equipment and instrumentation had been completely installed except for the final cut-ins. During the pre-commissioning steps, it was discovered that about a third of the 32 vortex flowmeters were not operational. Additional investigation showed that improper installation had led to water damage and caused the failures.

Delaying the tie-in would cost millions of dollars per day. Recognizing the risk and the enormity of the task, the end user engaged Endress+Hauser's local calibration services. Field service technicians were quickly deployed to perform reconnaissance on the situation. They were able to identify the problems and expedite parts orders from overseas, including some surplus components so they would be ready to remedy other potential issues. The technicians made the repairs and calibrations both on-site and in the local laboratory in close coordination with the commissioning team to keep the schedule on track.

Calibration Rotation

Another end user operates bottle and can fillers, which use dozens of flowmeters per production line. These high-speed pulse meters can be very accurate but do not feature a user interface, so each can require additional effort to calibrate. Inconsistent fills can result from any combination of poor calibration, mechanical issues like sticking valves, or even unsynchronized controls systems logic.

Endress+Hauser's calibration service group developed a creative calibration solution to keep the end user in production without disruption. The end user already had six spare flowmeters in stock, so Endress+Hauser utilized a dedicated hard case for shipping up to six flowmeters at a time. By shipping multiple flowmeters this way to a central calibration center where they were calibrated and turned around same day, it was possible for the end user to rotate each flowmeter back into service and complete all calibrations within a few weeks. The result was properly calibrated and documented devices, with negligible downtime.

Custom Calibration

Keeping a ready supply of properly calibrated temperature probe and transmitter pairs represented a challenge for another process plant operating in a regulated industry, with many different sites across the U.S. These specialized high-class redundant devices incorporate specific geometry and cabling to match the process and automation needs. Each probe and transmitter pair normally follows a six-month calibration cycle unless issues are identified. It is possible to keep pre-calibrated spares on the shelf, but there was a concern a spare might sit long enough for the calibration due date to lapse.

To address this end user's needs, Endress+Hauser agreed to maintain a special stock of the proprietary probes and associated transmitters in a secured manner at their facility. The team stands ready to ship newly calibrated devices when requested by the end-user. Depending on the urgency, this can be done in an expedited (same day), half turn (two to three day), or standard (five day) time frame. This customized approach helped the end user stay in calibration and compliance so they could focus on their primary business.

Efficient Staffing

Every process plant has some level of operational time-sensitivity to ensure maximum productivity. These operations need properly calibrated instruments not only for efficiency, but often to meet regulatory requirements. Instrument calibration is a specialty activity, in some cases needed intermittently and unexpectedly, and often requiring a large number of specialized staff.

These and other issues can be addressed by engaging a calibration service provider to meet all or some of a plant's calibration needs. This can allow a plant to maintain correct staffing levels for day-to-day operations, with the ability to quickly respond to any calibration challenges.

About the Author

Robert Jennings is the Calibration and Repair Team Manager for Endress+Hauser, supporting the Gulf Coast Calibration & Service Center for the past five years. He has previous Field Services experience for instrumentation, control valves, and steam products. Robert has grown the business by developing innovative turn-key approaches for delivering timely and high-quality calibrations on projects of all sizes, freeing end users to focus on their core businesses.