Introduction

Calibration and the maintenance of process site instrumentation is vital for a number of reasons, such as to ensure that production output is achieved within set quality parameters and to meet regulatory requirements. It is also a vital requirement if an efficient system of traceability is to be achieved. Calibration and maintenance are often viewed as two separate activities with calibration carried out in isolation from maintenance. But for maximum effect, they should be carried out together to ensure the results of calibration are incorporated into maintenance procedures and that maintenance schedules are planned according to the results of calibration.

Calibration involves the comparison of two devices, one of which is of a known accuracy. For the accuracy to have any real meaning, the standard itself should have traceability to a nationally or internationally recognised reference instrument, which has been shown to offer the smallest deviation from the absolute true value. Historically, instrument calibration has been carried out once a year during plant shut-down. The drawback to this approach is that all instruments drift out of specification to some extent and the onset of this drift could be anytime within the 12 month operating period. Of course, more regular calibrations are possible but has added cost and resource implications.

Today, calibration management software is able to analyse collected calibration data and determine the optimum calibration period for each instrument. Apart from providing better audit-ready status to comply with regulations and legal requirements and ensure plant safety, calibrating critical instruments more often and keeping them within tight operating limits can also have a beneficial effect on quality and efficiency. Today’s software can also indicate where calibration periods could be extended, without the instrument going out of specification.

Collecting the data

Some instrument engineers believe that calibration cannot be properly performed outside of a calibration laboratory where it is not possible to control the effects of temperature, atmospheric pressure or humidity. Today laboratory based pressure calibration equipment has been designed to communicate with software to enable it to support both laboratory and field calibrations. Calibration Management Software often has documenting facilities that prepares reports and provides calibration certificates to print out data collected from the connected calibration equipment or test device. In addition, calibration and maintenance history, along with configuration, is stored within the software. This is updated each time a calibration is carried out.

Portable calibration instruments for on-site applications have advanced to the point where they can now be used in a range of climates that are within well-defined limits. The latest compact calibrators can simultaneously measure and source electrical, temperature and frequency signals and provide loop power. Simple screw-in modules and snap-on generators add pressure calibration capability. The versatility of these instruments has also been increased by incorporating configuring and commissioning capability, which turns the calibrator into a communicator and contains a library of registered HART device descriptions to support more than 1000 sensors.

Calibration software

If calibration data is analysed correctly it can help improve compliance, efficiency, quality and safety. However, managing the calibration of 1000s of plant instruments and then analysing the data to a level required for trend evaluation is not a simple task. It involves scheduling, resource management and cost analysis, as well as the challenge of storing all the data and documentation to the satisfaction of an auditor.
Often managers tend to use manual methods for gathering data, storing and processing the data by means of an in-house locally produced spreadsheet application and then employ various means to plan and schedule maintenance activity. This makes for low calibration productivity, a process that can be difficult to learn for new staff and a system prone to errors and mistakes.

Today calibration Management Software (CMS) is increasingly forming the heart of a total calibration system for customers. Not only is CMS driving up the productivity of the calibration process, it is also eliminating errors and reducing total cost. The best Calibration Management Software solutions today provide a number of functions such as:

- Generating automatic work schedules for calibration engineers
- Recording and storing historic calibration results
- Analysis of sensor calibration trends
- Generation of hands-free automated calibration procedures
- PASS/Fail reports and calibration certificates
- Audit trials for ISO9001 and other quality standards

How customers implement CMS depends on their own unique situation and what’s important to them.
Some customers favour a PC-based software installation where the instrument database and history are held on a PC. Technicians download information relevant to their workload, carry out the required calibrations and then upload the results to enable reports to be produced and records maintained. This type of configuration is simple, easy to integrate into existing work procedures and requires limited software integration into legacy systems. As the software is also often sat on a stand-alone PC, it also provides a high degree of security.

Recent developments in software and general computing power have enabled some customers to distribute more of the software solution into the actual portable calibrators. This allows more of the management of a plant’s instrumentation inventory from a portable device in the field. Field engineers, without reference to a remote PC, could access information such as device details, calibration history, trend analysis and calibration procedures, as well as all the necessary supporting documentation. It also allows new device records and procedures to be created in the field while giving access to historical data. Calibration and documentation is automated. Regulatory compliance is improved by scheduling work procedures and documenting calibrations and actions. Data can be transferred to a PC at a convenient time.

Two types of Software

There are basically two types of calibration software - software from calibrator manufacturers, which can be closely integrated to the manufacturer’s hardware and software from independent software companies, which does not come with hardware solutions. Many organisations want to move forward with fully integrated software-based solutions but find it difficult to justify or obtain the IT infrastructure or support required. Some organisations have adopted high-end, computerised maintenance management systems (CMMS), which will schedule maintenance activities but offer no tools for organising calibration resources, defining calibration procedures, gathering and analysing calibration data.

The best software solution will typically combine calibration and maintenance management and offer a way to streamline maintenance workflow by improving data integrity, scheduling work activity, automating calibration and maintenance and correcting deviations. This software then offers a true paperless system with e-signatures for regulatory compliance. An added benefit is that it could interface with wider plant level systems and provide audit ready data in compliance with the most stringent quality systems.

Resource management and efficiency improvement tools are other features of the best calibration management software. An interval Analysis module allows users to report on device performance by scientifically analysing historical data and drift. This tool helps calibration managers tasked with increasing calibration intervals to come to a researched and informed decision, providing reporting and analysis quickly and accurately. Similarly, Key Performance Indicators update in real time to allow performance of the installed base and resources to be analysed and compared across the whole business or at different levels. Vision deviation management ensures that calibration failure notifications are sent in a timely and controlled way, so that users can record the cause of deviations, investigate the reason and work to a resolution. The audit trail will then demonstrate that a robust solution is in place to manage deviations and that strict procedures are enforced for corrective action/preventative action.

Conclusion

Companies should look to improve the productivity and efficiency of their calibration process just like any other key process in their operation. Integrating calibration and maintenance operations and simplifying scheduling, reporting and storing calibration data yields real benefit. Calibration management software should sit at the heart of a total calibration solution involving close integration between hardware and software parts. No two customer installations of a calibration management suite are identical and so its important customers select a configuration that works for them depending on their local needs. Calibration is both a specialist function and a vital service within companies operating and so selecting the right calibration management suite provider is very important. The integration of hardware, software and existing customer processes should be carefully considered.

About GE’s Software Management Solution

GE’s Calibration Management software solutions simplify the process of instrumentation calibration making it faster, easier and error free. Their software solutions enable a totally paper free calibration process that takes care of the whole cycle from generating work orders to printing and electronically storing calibration certificates. GE’s software systems enable full integration with the Druck Calibrator range covering pressure, temperature and electrical calibrators so that data and calibration reports can be downloaded off the instrument totally error free. GE’s latest Intecal v10 software is ideal for single PC users who want to run a calibration database, schedule planner or automated test routines off a single terminal. Easy to use, simple and cost effective, it delivers the key functions of a calibration management software with ease. For more advanced users who need networking capability and the ability to analyse calibration trends to optimise their calibration periods, then 4Sight is the ideal solution. Either way, GE’s calibration management software forms the heart of a calibration system.

About Measurement & Control

Measurement & Control is a leading innovator in advanced, sensor-based measurement, non-destructive testing and inspection; flow and process control; turbine, generator, and plant controls; and condition monitoring. Providing healthcare for our customers’ most critical assets, we deliver accuracy, productivity and safety to a wide range of industries, including oil & gas, power generation, aerospace, metals and transportation. Headquartered in Boston, USA, Measurement & Control has more than 40 facilities in 25 countries and is part of GE Oil & Gas.

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