

Beamex

Calibration White Paper

www.beamex.com
info@beamex.com



When to calibrate
in a workshop

When to calibrate in a workshop

In today's process industry, the field instruments are often calibrated out in the field. To do so, portable calibration equipment is used. Field calibration is often the best solution, but there are still various reasons why it is sometimes more convenient and effective to do calibration in a workshop. Selecting between field calibration and workshop calibration is not a black-and-white situation. These two methods are not exclusive alternatives; instead, they complement each other.

Beamex has previously presented the arguments for doing calibration out in the field, but this paper will discuss some of the most common reasons for establishing a workshop and doing the calibrations, or some of them, in the workshop with dedicated workshop calibration equipment.

1. Commissioning

One of the most common reasons to calibrate in a workshop is during the commissioning of a new plant, or some new parts of the plant. During the commissioning, the field equipment is not yet installed as the installation of the process equipment is not completed. The process equipment has typically already been purchased and is in storage in large quantities, waiting for installation. At that point it is very efficient to calibrate all the process equipment in the workshop before it is taken out into the field and installed. It is often faster and easier to calibrate all transmitters in the workshop prior to installation, than to calibrate them in the field after installation. Also, this saves time as the transmitters can already be calibrated before they are installed. After the transmitters are installed, there is no need to reserve any time for calibration, which is a plus because schedules are typically tight.

When installing fieldbus, other aspects also need to be taken into account. If the plan is to calibrate fieldbus transmitters and loops in the field by reading the control system readout, one needs to wait until the fieldbus and the process control system are up and running. If the equipment in the workshop is capable of calibrating fieldbus instruments, the fieldbus process instruments can be calibrated in the workshop before they are installed in the field.

2. Total uncertainty of the calibration

The accuracy of the field instrumentation has been getting better and better during recent years, and this sets more requirements for the calibration equipment and also for all of the calibration processes. When doing the calibration in the field, the most significant aspects of the total uncertainty

The operating procedures in a workshop can be more easily written so that the calibrations are performed in a more consistent way than when done out in the field.

often do not come from the calibration equipment but from the calibration processes and the human factors. These are more critical with some quantities than with others.

The situation changes when the calibrations are done in the workshop with equipment and conditions dedicated for calibration work. In the calibration workshop, the calibration equipment does not have to be portable, but can be workshop equipment, which often has better performance than portable equipment. Also, the environmental conditions in the workshop can be controlled, so calibrations are always performed in similar controlled conditions. And finally, the operating procedures in a workshop can be more easily written so that the calibrations are performed in a more consistent way than when done out in the field.

Therefore, doing the calibration work in the workshop can result in a more accurate calibration with less total uncertainty.

3. Primary standards in a workshop

As mentioned in the beginning, workshop calibration and field calibration complement each other. There may be higher-accuracy, non-portable calibration equipment in the workshop as the primary reference calibration equipment. With these workshop primary standards, the portable field calibrators—which are used out in the field and of which there is often a larger number—can be calibrated. This will save money and time as the calibration equipment doesn't need to be sent out for periodical recalibrations. Most of the recalibration can be done by oneself and only the primary standards will need to be sent out for recalibration.

4. Spare device calibration / rotating spares

In some cases it is more convenient to calibrate a spare device

and then replace that into the process. That is especially the case when the calibration is difficult to do in the field, or the calibration takes a very long time to perform. Of course this is also the case when the device has to be sent out to a third party calibration laboratory for calibration. In case the spare device calibration is performed in-house, it is most effective to perform the calibration in a workshop that has a suitable setup always ready for use. The spare device may also be installed in the process only for the time it takes to calibrate the original instrument.

5. Safety

A professional calibration and service/maintenance bench in a workshop can be equipped with proper safety facilities. This includes items such as: isolation transformer, fault current protection, emergency switch, thermal overload protection, ESD protection, just to mention some. The same kind of safety mechanisms cannot be easily arranged for work performed out in the field.

6. Accreditation and quality system

In some cases it is necessary or beneficial to apply for an accreditation for the in-house calibration service performed. It is easier to get an accreditation for the calibration work performed in a dedicated workshop than it is for field calibration. Also, the uncertainty of the calibration can be lessened when it is done in the workshop. Even if an accreditation is not necessary, it is easier to build a quality system for calibration work done in the workshop.

7. Field conditions vs. workshop conditions

The field conditions may sometimes be challenging to work in.

Often the field is a hazardous area that sets requirements for the calibration equipment to be used, and not all calibration equipment is suitable for hazardous areas. For example, a temperature dry block cannot be used in hazardous areas, but it is still needed for temperature sensor calibration.

Often, instead of carrying several items of calibration equipment out to the field, it is easier to take the small device to be calibrated to the workshop, where all calibration equipment is ready for use.

The environmental conditions out in the field can be challenging. Going into the field may require use of protective

gear and may also require a dedicated training to be completed.

There are typically more mechanical maintenance personnel on the work site who can take the device to be calibrated to the workshop, where the calibration specialists can concentrate on the calibration work.

8. Efficiency, ergonomics, ease of use

When doing the calibration in a workshop, the work can be arranged to be much easier and much more ergonomic than the work performed out in the field. Some of these considerations include:

- All equipment is always in place and ready to be used. All connections can be readily made and ready for use.
- Panel-mounted, mains-operated equipment never has empty batteries that need to be charged before work.
- Equipment never gets lost; it is always where it should be.
- All the equipment is optimally located for an ergonomic work space. The height of the bench tables can be motor controlled so it is easy to adjust ergonomic height for any work.
- Panel-mounted automatic or manual pressure generation modules are ready for use, so there is no need to use manual pressure hand pumps.
- The workshop offers more convenient work environment for the workers. The field conditions may sometimes be very harsh to work in.

In addition to the above-listed arguments for doing the work in a workshop, there is also some calibration and maintenance work that cannot be performed out in the field. A dedicated workshop with adequate equipment in place makes the work easy and effective.

SUMMARY

Workshop calibration versus field calibration, summary comparison

There are also many reasons to perform the calibration out in the field. Some of the main arguments for calibration in the field are listed below, as well as a simple comparison for the arguments for both scenarios: workshop and field calibration.

In practice, workshop calibration and field calibration are not things that one chooses between. In most cases, depending on the case, both are used for effective results.

Below, some of the most common arguments for doing calibration in the field are presented:

- Enables calibration of the whole measurement loop in one go, from the beginning to the end, i.e. from the process sensor to the control system reading.
- The calibration is performed in actual process conditions.
- Eliminates the need for removal and re-installation of the instrument to be calibrated.
- If the easy access for calibration has been taken into account in the installation of the process instrument, the calibration can be done quickly and easily.
- Modern portable documenting calibrators help to make the field calibration very effective.

And to summarize, a condensed list of the arguments for workshop calibration explained in more detail earlier in this paper:

- Performing calibration in the workshop during commissioning phase.
- Pursuit of better accuracy / less uncertainty.
- Use of primary standards in the workshop to calibrate the portable working standards in house.
- Spare device / rotating spares calibration in workshop.
- Safety issues can be more easily taken care of in workshop.
- Accreditation for the calibration workshop.
- Efficiency, ergonomics, ease and many other similar practical reasons.