# MAXIMIZING THE EFFICIENCIES OF YOUR INTERNAL CALIBRATION LAB

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WHITEPAPER

**Tektronix**®

## Introduction

Despite their convenience, internal in-house labs can be a source of pain points, costly expenses, and stress in the form of facility expenses, training new employees, production or R&D line downtime, and a host of other inefficiencies. Below is an in-depth review of the various factors to consider when looking to optimize the use of your in-house calibration lab.

## Understand the Hidden Costs of Internal Calibration Labs

### 1/ SIGNIFICANT INVESTMENTS IN INSTRUMENTS AND PERSONNEL

To run an in-house lab, an organization needs to either already have the space to operate a calibration facility or it needs a sizable budget to make the necessary capital expenditures and invest in building out adequate facility space for the calibration lab. This facility needs to be climate controlled, have enough space for proper separation for sensitive instruments, and requires controlled access. In addition to the facility space, there needs to be an investment in the actual instruments that conduct the calibrations. These can be specialty pieces of equipment that require significant expenditure to purchase and manage to stay up to date on accreditation and certification. The calibration instruments also need to be calibrated regularly which requires additional funding for the standards required to calibrate those instruments or to outsource the calibrations to a competent vendor to maintain calibration traceability.

Along with the high level of capital expenditures, running an in-house calibration lab requires significant spending on human capital. There are two ways to staff an in-house calibration lab. The common approach is to hire specialized calibration technicians with appropriate training. These specialized employees require high salaries and benefits due to their degrees, certifications, and experience. Some companies may choose to re-purpose current workers in the organization. This requires repurposing financial assets for increased training programs while simultaneously reducing productivity in other areas where those employees created vacancies. Training to necessary levels of competence can take several months or even years for non-experienced technicians.

The result of these capital expenditures and operating expenses is higher overhead costs and protracted lead time, which can result in losing important bids for government contracts and other businesses. This is at the top of mind for a Tektronix customer, a quality manager in an aerospace & defense company: *"We are willing to pay for items that reduce their labor costs, which makes us more competitive to*

*government customers. If my overhead rates go up, or I take too long to deploy the resources, I end up losing bids."* For mission critical industries, anyone bidding on contracts should keep their internal overhead costs in mind.

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>
> – Quality Manager, Aerospace & Defense Industry

### 2/ INCREASE IN TURNAROUND TIME (TAT)

Many organizations that have an internal calibration lab have a plethora of different instruments that require various types and levels of calibration. Even though they have a dedicated calibration team of technicians employed in the lab who can handle the quantity and workload of the low frequency calibrations, there are still instruments that require more complex calibrations and procedures that cannot be conducted in-house. For example, RF/Microwave equipment requires rigorous testing and calibration with specialized technical labor. Internal labs may not have capabilities to handle this testing due to lack of expertise or lack of automated procedures, so these instruments need to be sent to a calibration lab for specialty calibration which can incur backlogs for up to several weeks and months. In this case, TaT suffers from inconsistency due to shipping times and extra costs associated with logistics and from the backlog for complex calibrations that cannot be managed by the in-house lab.

### 3/ NEED FOR INTERNAL CAPACITY FOR INFORMATION/ DATA MANAGEMENT

In audits, such as AS9100, one of the top non-conformance findings is around calibration of equipment, training, and processes. In an internal lab, this can be especially problematic where personnel do not focus on these requirements full-time, making it difficult to maintain high levels of competence.

An internal lab needs to have organizational systems for its paperwork, certification, and accreditation schedules as well as systems for its equipment and instruments. Software tools make this information management simple and centralized. However, an internal calibration lab will need to build out these capabilities in-house which requires more investment in R&D and software development. A third-party calibration service will have these software tools included to help manage calibration schedules and certification documents to help the firm run their lab efficiently and effectively. Storage and retrievability of completed data for periods of up to 7 years are a critical component of data management and will also cost as an ongoing follow-up expense should the in-house lab ever cease operations.

> Interestingly calibration, or lack thereof, is one of the highest causes of non–conformances within Aerospace Certification audits.
>
> – Michael Venner,
>   Aerospace and Automotive Director,
>   NQA Global, Global ISO
>   Certification Firm

### 4/ EMPLOYEE KNOWLEDGE GAPS

When training employees or hiring new calibration experts, there can be knowledge gaps that result in incorrect calibration or over-calibration of instruments which causes additional costs and TaT delays. Companies in mission-critical industries cannot afford to calibrate incorrectly or fail an audit. Instruments need to be calibrated correctly, the first time. In-house engineers and technicians may not be knowledgeable of a specific manufacturer's standard calibration performance verification for essential equipment and instruments which is a safety hazard and can be the difference between life and death in an industry such as aerospace & defense. Internal calibration labs also may not have a complete in-depth understanding of the regulatory requirements such as AS9100 for calibrations. Even with a dedicated calibration team in house, it is difficult to consistently stay up to date with latest industry & OEM regulations, therefore the organization can suffer from inconsistent and incorrect calibration which lowers the return on investment of building out internal calibration lab capabilities.

These are some of the places that costs can hide, creating inefficiencies in an organization's calibration process and costing resources in terms of time, money, and personnel investments. Improve your lab's efficiency by considering the following factors.

## Strategies and Factors to Consider for Improving Calibration Lab Efficiency

Companies are increasingly focusing on honing their core competencies while outsourcing other areas of the business to expert service providers to save time and cost while improving capability. As a strategy, consider a full or partial outsourcing for calibration needs. If an organization already has an internal calibration lab, a calibration partner can be a valuable time- and cost-saving augmentation strategy. Additionally, a calibration partner can help with the transition period of an aging workforce in internal lab technicians. Look for companies that can work around your specific business needs with a tailored solution in terms of services offered and how the services are performed, such as a permanent on-site calibration technician, occasional on-site technician, managing calibrations for select brands, or managing calibrations for your entire lab. Below are some factors that should be considered when deciding on an outsourced calibration strategy to enhance your lab's operating efficiency.

### 1/ CONSIDER THE NUMBER OF INSTRUMENTS TO CALIBRATE

If a company requires calibration on more than 50 electronic test & measurement instruments, outsourcing to a professional calibration services provider can improve efficiencies and keep compliance in managing the sheer calibration volume. Complex, high-performance, electronic test & measurement equipment should not be trusted with just any calibration provider. A test & measurement OEM, like Tektronix, understands these complexities and has the reputation to stand behind the calibration.

If a company has less than 50 electronic test & measurement instruments, consider managing that amount in house with the help of a calibration partner, like Tektronix, to avoid the internal costs associated with extra time, lack of expertise, and potential non-conformance to audits. Inviting a calibration vendor to augment in-house current efforts may improve the quality, TaT, and conformance of the calibration for less real cost. If a firm decides to outsource, it's best to select a vendor that brings all the expertise yet is flexible enough to align with the current calibration model—for example a vendor that can come onsite once a month to perform calibrations or provide convenient pickup and delivery of instruments to be calibrated in its local lab.

## 2/ COMPLEXITY OF THE CALIBRATION NEEDED

Is the lab looking to calibrate high-end oscilloscopes, spectrum analyzers, and other electronic test and measurement equipment? Or are they looking just for a few torque wrench calibrations? Where is the current bottleneck in the internal lab processes? Is it with RF/Microwave instruments? More sophisticated equipment requires more investment, and a company can create a "make or buy" analysis to understand how investing in training and equipment balances against employing a calibration expert vendor experienced and equipped for these types of calibrations.

## 3/ CONSIDER AND REVIEW THE TRUE TURNAROUND TIMES

Analyze the internal turnaround times and get estimates from vendors. How do they match up? Are all the hidden time delays that can happen when using internal employees being considered? For example, a large semiconductor customer of Tektronix reduced their TaT time from 15 days to 2.65 days by using Tektronix as their embedded onsite partner to augment their internal lab capabilities, increasing uptime and productivity. When an internal calibration lab is experiencing a backlog and delays in their calibration, it affects their costs since they need to either buy spare instruments or rent equipment, which can cost anywhere from $500 to $2,500 per month or more depending on the instrument. Backlogs also affect revenue by causing the calibration lab to miss deadlines or delay projects, possibly requiring rental equipment for several months.

If internal lab turnaround time is a concern for you, consider a third-party vendor, like Tektronix, with dedicated resources, spare parts, loaner instruments, and technicians to help bring those times down. A good calibration service provider will offer a variety of service options (ship to OEM, ship to local calibration labs, pick-up/drop-off onsite, on-site calibration, or combination) allowing the customer to choose the solution that works best with their business model in reducing TaT.

## 4/ DEFINE THE COSTS THE COMPANY IS WILLING TO ABSORB

Calibration services are a specialty function. How much is an organization willing to invest to build out these capabilities? An organization may need dedicated facilities that are climate controlled and secure, lab resources for upkeep, necessary equipment, and technician time and training. For organizations looking to outsource a portion of their capabilities, 70% cite cost savings as the priority reason for consideration[1]. Additionally, outsourcing can reduce total labor and overhead costs by up to 45% while simultaneously improving calibration accuracy and reliability[2]. Build out the cost model for investing in this lab and compare it to the cost of services provided by a calibration vendor. If there is already an internal calibration lab, perform the calculations to understand if having an expert resource from a calibration vendor to augment the current capabilities makes financial sense.

## 5/ KEEPING UP WITH STANDARDS AND PASSING AUDITS

Audits can be very time consuming for internal labs and is worth considering in a cost-benefit analysis. If personnel are already trained in passing calibration audits, it can be smooth sailing. However, if this capability requires build-out, weigh the cost against using an outsourced calibration service, where the internal quality and lab managers can rely on the vendor expertise and knowledge base to stay up to date on standards and requirements.

## 6/ REGULATION & ACCREDITATION NEEDS

If accredited calibrations are required to pass audit, a third-party vendor can be the most efficient choice.



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[1] Stoler, Mike, and Simon Tarsh. "2020 Global Outsourcing Survey." Deloitte United States, Deloitte, 10 Dec. 2020, www2.deloitte.com/us/en/pages/operations/articles/global–outsourcing–survey.html.

[2] Singh, Bhanu, and Megha Chawla. "Outsourcing Aims Higher on Cost, Performance and Innovation." Bain & Company, 22 Apr. 2020, www.bain.com/insights/outsourcing–aims–higher/.

These certifications require significant financial resources and time to achieve. A calibration vendor requires accreditation from ISO/IEC and other accrediting body organizations to provide quality service and help pass audits. However, accreditation is voluntary for a calibration vendor. Ensure that the vendor partner is consistently up to date on all accreditation and regulation requirements, such as FDA, FAA, NIST regulations. OEMs of test and measurement equipment, including Tektronix, may be the ideal choice here, as they carry all the necessary accreditations and have the unique expertise to understand the complexities of test and measurement equipment to help companies pass audits and maintain compliance. The standard calibration offering from a company like Tektronix includes range of calibrations from ANSI/NCSL Z540.1 to ISO/IEC 17025 accredited calibrations.

## 7/ DOCUMENTATION REQUIREMENTS

The organization should define documentation requirements up front—does the company or team need to pass specific audits? Do they need to be able to store and access calibration documentation from anywhere, any time? For instance, do they need to be able to scan a barcode on an instrument and view the relevant documentation for that instrument on the spot, in the lab?

It is also important to consider the internal software needs. Is a basic spreadsheet with links to documentation sufficient for internal needs? Or is a database or software solution required to manage the large scale of the test and measurement equipment, their calibration cadences, and the relevant certificate documents?

For a few instruments, it's simple and quick to create a spreadsheet and get to work. For labs with many instruments, a company or lab may want to consider the efficiency and convenience of a dedicated asset management software solution, such as those provided by a calibration expert vendor. The software can help improve communication and scheduling around calibration needs and it can be bundled along with the calibration services.

## 8/ ORGANIZATION SECURITY NEEDS

In mission-critical industries, security of data and information is paramount. This is the major reason some companies build calibration services capabilities in-house. If the analysis for building complete in-house capability indicates inefficient overhead costs, it's possible to maintain security protocols with an embedded onsite calibration services option. This eliminates the need to send equipment, with potentially sensitive data, offsite. An embedded onsite option, for example, works very well for aerospace & defense customers, where a Tektronix technician becomes part of the in-house team either full or part-time to augment the capabilities of the internal lab.

## Comparative Worksheet:

### FACTORS FOR CONSIDERING IMPROVING LAB OPERATING EFFICIENCY

Below is an informative worksheet to use when considering your calibration service options.

| Factor | In-House Considerations | Outsource Considerations |
|---|---|---|
| Number of Instruments to be Calibrated | Few Instruments | Many Instruments |
| Personnel – Headcount | On site staff<br>Salary + benefits costs | Can be on site or elsewhere<br>Fee-based |
| Personnel –Training on standards and equipment | Training Costs<br>Testing Costs | Handled and guaranteed by outsource company |
| Facilities and Equipment | Lab Space<br>Calibration Equipment | Outsource company manages facilities and equipment |
| Equipment Expertise | Training on various models | Expertise in your T&M equipment<br>Select Factory-certified services |
| Standards Expertise | Periodic Training Required | Handled and guaranteed by outsource company |
| Documentation requirements | Toolset – database or other automation | Handled and guaranteed by outsource company<br>Easy online access via software or web portal |
| Accreditation | Certification process for internal lab | Handled and guaranteed by outsource company |
| Turnaround Times | Dedicated staff or part-time staff<br>Actual TaT | On-time performance history |
| Data and lab access security | In-house alleviates concerns | Should offer part- or full-time embedded onsite options to satisfy safety requirements |

## Conclusion

Calibration of sensitive test and measurement equipment is required in most mission-critical industries. Managing an in-house lab to perform these duties can be a larger investment than initially thought. Companies looking to maximize their efficiencies in calibrations can consider partnering with a calibration vendor to reduce high overhead costs, shorten turnaround times, streamline accreditation database management, and solve for calibration quality control issues. Labs will need to conduct the analysis and study the models of service to arrive at an optimal solution for their businesses. Whether considering a calibration vendor for either complete outsourcing or internal lab augmentation, rely on experienced calibration service vendors such as Tektronix to act as a single source, strategic calibration services partner, providing program modeling, cost estimates, documentation plans, and toolsets to assist with analyses and determine what works best for the organization's strategic goals.

## ABOUT TEKTRONIX

Tektronix is the leading accredited calibration services provider with 75+ years of experience in serving the world's largest mission-critical manufacturers in aerospace and defense, semiconductor, automotive, medical, communications, and other industries. Tektronix works as a strategic partner, delivering tailored solutions that save time and cost in achieving accredited and/or compliant calibrations on over 140,000 different electronic test & measurement equipment models from more than 9,000 manufacturers. Tektronix employs over 180 ISO/IEC 17025 accredited parameters and offers an extensive global service network that encompasses 100-plus locations with more than 1,100 experienced technical associates.

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