

# Justifying In-House Calibration

## Introduction

The variety and quantity of electronic instruments in a manufacturing environment can be dizzying. Keeping those instruments calibrated in accordance to quality standards like ISO 9000 is an important task. So is the process of deciding whether you should calibrate the instruments yourself or hire an outside lab. Many factors, including time, labor, and equipment needed for calibration, will influence your decision.

A big advantage of setting up your own calibration facility is that you can control the work flow. You can also set up a documentation procedure to fit your needs. An outside lab, however, might be more efficient. Every company has different circumstances, but there is a simple method for determining the most cost-effective calibration system. To help you in your decision, we at Fluke have developed a free spreadsheet (which requires Excel 4.0 or higher) for analyzing calibration costs. By asking yourself a series of questions and plugging the answers into the spreadsheet, you can decide whether an in-house calibration lab is the better choice and at what point you can expect to break even on your investment.

## Stay at Home?

Developing an in-house lab is a significant undertaking. You need to evaluate several factors before choosing this option:

- *Analyze the workload.* You need to estimate accurately the amount of work involved in calibrating your instruments. Ask yourself these questions: How many items of each type need to be calibrated? How many times must each category of instrument be calibrated? How many hours – labor and machine – does each calibration take? How much time should be estimated for unscheduled calibration and repair?
- *Determine the costs of a lab.* You must determine if setting up your own lab makes good economic sense. Some of your costs will be one-time costs, while others will be recurring.

A significant cost of calibration is payroll expense. When calculating the payroll expense of calibration, you need to include more than just the cost of the technician's time. Be sure to take administrative and documentation costs into account. A rule of thumb is to add 50%-100% to your technician's time to cover these activities. Calibration software can help you reduce these costs by automating the documentation process.

You should also take into account the cost of training lab technicians. This may

include travel, subscriptions, or organization memberships.

- *Calculate laboratory overhead.* Laboratory overhead costs include more than just the purchase price of calibration equipment and depreciation expenses for capital equipment. You will still have to send your calibration equipment out for calibration. Be sure to include maintenance and its associated administrative costs in your calculations. Generally, annual maintenance costs of a calibrator will be about 5% to 10% of the original purchase price.

Don't forget the costs for phone, mail, freight, photocopying, and other office expenses. You'll also need to add in occupancy, security, and grounds-keeping charges. These expenses generally are 20% to 50% of the cost of a technician's time to perform a calibration.

Another consideration is workload. If you have a wide range of equipment to calibrate, then the more equipment you can calibrate with the fewest calibrators the better. A multifunction calibrator might be more useful than a single-function calibrator. Be sure, however, that any calibrator you choose has the accuracy you require.

*Table 1. The spreadsheet can calculate the break-even point for setting up an in-house calibration lab. To obtain a copy of the complete spreadsheet on a PC-compatible 3.5 inch disk, call 1-800-44-FLUKE (U.S.) or contact your local Fluke representative.*

<b>Company</b>	<b>A</b>	<b>B</b>	<b>C</b>
<b>Business</b>	<b>Surgical Equipment Manufacturing</b>	<b>Power Supply Manufacturing</b>	<b>Computer Systems Manufacturing</b>
Employees at site	350	25	650
Instruments requiring calibration	719	44	352
Items covered by multifunction dc/low frequency calibrator	431	33	148
5-year calibration cost: with outside service	\$220k	\$30k	\$99k
in-house	\$105k	\$37k	\$129k

5-year savings (deficit) by performing calibrations in-house	\$115k	(\$7k)	\$30k
Break-even point by performing calibrations in-house	9 months	12 years	3 years

*Note: All calculations in this application note are based on U.S. dollars.*

## ...Or Go Out?

Using an outside calibration lab has its advantages, as some labs can essentially manage the calibration process for you. To understand the pluses and minuses of using an outside lab, you'll need to evaluate both the direct costs and the indirect costs. Consider more than just the recurring cost of service fees; shipping and administrative fees must also be added to the price tag. Also, compute the amount of downtime you will face when your instruments are out for calibration, or the risk of having this vital function performed outside your control.

## Consult the Spreadsheet

Once you've evaluated your situation, you can plug some numbers into the spreadsheet. Using the spreadsheet is an easy way to measure the economic implications of in-house versus third-party calibration. You will need to insert values for

- How much your calibration equipment will depreciate in value every year.
- The number of simple, moderate, and complex instruments that must be calibrated.
- How often the instruments require calibration.
- The amount of time - in both labor and equipment - the instruments require for calibration.
- The hourly wage for calibration technicians.
- The rate of inflation.

To demonstrate the types of results the spreadsheet provides, we inserted data for three imaginary companies. Table 1 shows some results from the spreadsheet. Each case assumes \$1,000 in startup costs for researching outside labs and \$17,500 for setting up a starter in-house lab with a multifunction calibrator. The purchase price of equipment is amortized over 5 years. The spreadsheet can calculate the break-even point, or the point at which the cost of setting up an in-house lab equals the cost of using an outside service.

Company A's short (9-month) break-even period suggests that this company would benefit from an in-house calibration lab. Company B's 12-year payback period might lead to the conclusion that the company should use an outside lab. However, the importance of fast turn-around time, inside control over the process or other factors may override purely economic factors. Company C can go either way. Control over documentation or quality of calibrations may become the deciding factors in company C's decision.

To request a copy of the spreadsheet on a PC-compatible 3.5 inch disk, call 1-800-44-FLUKE in the United States, or contact your local Fluke representative.

Even without this spreadsheet, you can still evaluate your company's calibration workload. The important thing is to be thoughtful and honest in your evaluation.