Moving a Standards Lab via the Internet

Presenter
David Deaver
425-356-6434
Fluke Corporation
POB 9090 Everett, WA 98206

Author
John Emery
Fluke Corporation

Abstract

Relocating an accredited lab to a different facility usually requires a suspension of the accreditation until an on-site assessment of the new facility can be made. This paper describes how the Internet was used to maintain close contact with NVLAP and DKD during the move which saved the expense of the on-site assessment and reduced downtime to just a few days.

Introduction

Here on the West Coast of the United States we are very sensitive about things moving. Living on a major fault line, we are constantly reminded to be prepared in the event of a large earthquake. The earth was not the only thing the Fluke Primary Standards Lab was concerned about moving in 1999. When we received the directive that the accredited factory annex of the Standards Lab was to move that year, we had mixed emotions. On the positive side, the move would bridge a 3-mile gap between our primary and annex lab facilities. This would tremendously improve efficiency and communication. Not only would the annex be in the same building, it would be located directly adjacent to our primary facility.

The down side of the move was that we would face a temporary lapse of our accreditation status for the annex lab until our accreditors could make an on-site assessment. This would affect much of our calibrator new product that is shipped with accredited certificates of calibration. The products impacted would include the Fluke 5500A, 5520A, 5700A, 5720A and 5725A. Historically, the costs involved in the on-site assessments performed jointly by the National Voluntary Laboratory Accreditation Program (NVLAP) and our German accreditors, Deutscher Kalibrierdienst (DKD), have exceeded $10,000 for us. Another significant factor has been the coordinating of schedules to accommodate all parties involved often resulting in an assessment date at least a couple months away. In the mean time, we would incur the additional cost of

recalibrating product in our accredited European labs for our European customers whom require accredited calibrations [(1)].

Plan Devised

When NVLAP and DKD visited us in January 1999 for our regular on-site assessment, we presented proposals to avoid the anticipated problem. As always our accreditors were quite accommodating and tentatively agreed to a plan that would avoid an on-site assessment in order to evaluate the new annex lab facility. Our plan included the following:

- Evaluation of the new facility
- Take steps to ensure the protection of the test equipment during the move
- Documentation of the move in some type of multimedia format
- Validation of our test systems after the move using check standards

Our goal through the whole process was to gain our accreditors confidence by being proactive in our approach to the problem.

Facility Evaluation

Before the relocation took place, we evaluated the new facility in four areas:

- Temperature control
- Humidity control
- EMI/RFI emissions
- Power line quality

Our purpose in the evaluation was to gain some level of confidence that our test systems would perform at the same level or better than our existing facility. And we wanted to convince our accreditors of the same thing. One item in our favor was that we were moving from an older building to a newer one. The newer building had a superior system for controlling ambient temperature. And unlike the older building, it was constructed out of reinforced steel. With the new lab facility on the bottom floor away from windows, it would be surrounded by reinforced steel serving as a natural shield of EMI/RFI from the outlying vicinity.

Temperature and relative humidity measurement data from both facilities was compared in order to evaluate the new facility relative to the existing facility. Approximately one month of data was used for this purpose. Data was accumulated at the rate of one measurement per hour over this period. Vaisala HMW60Y transmitters were used to measure the parameters. The measurement data was collected using a Fluke Hydra in the existing facility and a Fluke 2645A NetDAQ in the new facility. The results are tabulated as follows:

Facility	Avg Temp (deg C)	Stdev Temp (deg C)	Avg Humidity (% RH)	Stdev Humidity (% RH)
Existing	22.507	0.465	42.048	4.642
New	23.009	0.289	37.441	2.965

The data showed that the average temperature of our new facility was closer to the 23.0 degrees Celsius set point. The variance of both temperature and humidity was nearly 40% smaller in the new facility as well. This was one confirmation of our confidence of the feasibility of the new facility over the existing facility.

In our evaluation of EMI/RFI, we wanted to verify that there were no unexpected noise sources in the area that might interfere with sensitive high-accuracy measurements during the testing of our product. This is especially important for calibrator instruments that can perform in the 10 ppm region on some parameters. The building into which our new facility was moving is located in an industrial area where there is likely to be radio, pager and cell phone transmitters. Also, we are located close to an airport having Boeing as our neighbor. Thus we had to consider the possible influence of high power radar transmission. Inside the building, we wanted to make sure that nearby computers, monitors or other electrical equipment were not going to cause a problem.

We probed for noise up to 2GHz with a Hewlett Packard spectrum analyzer with various hand-made antennae for various bandwidths. Were pleased to find no significant noise sources. In fact, the area into which the annex lab was moving was relatively quiet with nothing above -70dBm showing up on the spectrum analyzer.

Our Facility Department at Fluke evaluated the power line quality using Dranetz 656 Disturbance Analyzer. Though they found some minor disturbances in other parts of the building, our area received a clean bill of health. Quoting from the report of the evaluation: "The analyzer was connected to a circuit in G-Pod where the calibration production line is relocating. There were no significant disturbances recorded during the ten days of monitoring."

Pre-Move Preparation

The countdown to the move began at T minus 3 weeks. At that time photographs were taken of both the existing and the new facilities. Our original intention was to send the digital photos as attachments over e-mail to our accreditors. We were concerned, however, with the large file size of the pictures. Instead we decided to set up a web page displaying the photos. At T minus one week the web page was operational. We sent them e-mail discussing the results of our evaluation of the new facility and the URL to the web page (www.fluke.com/accredit) so that they could "see" what we could.

During this time we also performed a visual evaluation of our test systems to identify any risks of potential problems that could arise during the 3-mile transporting. Our test systems are contained in test consoles with instrument racks. The standards and other support equipment sit on the racks. These consoles are typically about 6 feet tall with an open front and a back door. They have wheels facilitating transportation.

One area of concern we found was that most of the equipment was not bolted to the console. The plan devised was to fill the empty space inside the console then wrap the outside of the console in order to keep the equipment stationary.

The Move

At T minus 3 days, the assembly area and technician stations of the production line were moved separately. We were not immediately involved in this part of the move, as it was not part of the annex lab.

At T minus 2 hours, we began to prepare the test consoles for transportation. The intention was to wait as long as we could in order to minimize the time that the equipment was powered down. The empty space inside of the consoles was stuffed with an anti-static bubble wrap. The outsides of the consoles were wrapped with the same bubble wrap numerous times. When the movers arrived, they wrapped over the bubble wrap with a strong shipping plastic. This provided the strength to secure in equipment inside the consoles. The bubble wrap protected the instruments from any static that might have been built up with the moving plastic.

Photographs were taken of the whole process. Notes were written describing the disassembly process and diagrams drawn where it was felt to be beneficial. In the event that there was some question as to how to hook up cables or where a particular item was to be placed that was removed before the move, we would have the information in order to restore the system to its exact state.

When the movers arrived a couple hours later, we strongly conveyed the extreme caution that needed to be exercised when moving the equipment. The movers were very understanding, especially when they were being followed by someone taking pictures of them as they worked. Each test console was moved with great care one at a time. They were loaded onto the truck with a hydraulic lift and strapped individually to the side of the truck with large, heavy moving blankets placed over them for additional protection. The truck moved all the test consoles in one trip. The smoothest route was taken between the two facilities. The truck traveled well under the speed limit and was followed closely by the annex lab deputy.

Once the test consoles were unloaded and brought into the new facility, they were immediately powered up. It is estimated that the maximum down time was approximately 5 hours.

Post-Move Validation

The moment of truth was at hand. Never having moved the consoles before, we faced the results of transporting them with some trepidation. With systems as complex as ours, the number of possible problems were numerous. How many hours of toil would it take to troubleshoot and get the systems functional? Our fears were put to rest, however, once the systems were fully re-assembled with all cables and accessories reconnected. Only two problems identified, both were fixed within an hour. On one system, one of the cables was not making connection. It turned out the cable had never been soldered as it should have been. It took the move to expose this existing condition possibly avoiding intermittent problems in the future. The other problem on another system involved a cable plugged in backwards. Once these issues were cleared up, all the systems were functional. The great care that was exercised throughout the move paid off!

The second phase of validation dealt not with the functionality of the systems but the accuracy. The main question to be answered by this validation was "did the mean or the variance of the standards in the test systems change significantly as a result of the move?" Normally, this would entail having each standard calibrated individually—quite a timely effort. Fortunately, the annex lab test systems, operating under process metrology, had a long history of comparisons to our primary lab through weekly transfers using dedicated units designated as check standards. This meant that the systems' performances were well-characterized [(2)].

Over the next several days, the systems were evaluated by measuring the check standards multiple times on the annex lab test stations and in the primary lab. The difference data was added to the historical data and evaluated. The results were quite encouraging. There was no test parameter on any system that showed a significant discontinuity in the data. Nor was there any evidence of any degradation in the variance of the new data relative to the old. Consequently, within a few days of transporting the test systems, we were able to verify product confidently.

The Move as a Virtual Event

Throughout the move, digital pictures were taken of the event. Selected photos of before, during and after the move were added to the web page previously created. The photos were arranged in chronological order with explanative text so that our accreditors could "watch" the move step by step. In parallel with the web page, additional information on the status of the move was sent out over e-mail punctually as it unfolded. Since the web page and status over e-mail were updated nearly real-time, our accreditors were thus able to experience a "virtual move" that was "the next best thing to being there."

The Results

So what was the grand finale to all this effort? The last question that we eagerly awaited the answer for was whether or not our accreditors would accept our "virtual move". Once again we were impressed by our accreditors' timely response. On the very day that we finished validating our systems, we got the news over e-mail: "The assessor…checked your documentation and the recorded data from the new site. We revive the accreditation of your site calibration laboratory." This was truly good news. The icing on the cake was an encouraging comment from our DKD assessor:

"Congratulations to your splendid arrangement of the move of the factory annex. This was our first experience in watching such things via the INTERNET and assessing it. Normally we have to check the lab on site. But your documentation is perfect. I am convinced that process metrology is a good tool to even check a move."

As a result, we were able to continue to ship new product out of our factory annex of the Standards Lab with an accredited calibration without any additional delay.

Summary

Through up-front planning and communication, along with the cooperation of our accreditors, we were able to maintain our accreditation status of the factory annex of the Primary Standards Lab as we moved its facility. As a result we saved thousands of dollars. These savings were a result of avoiding an additional on-site assessment to validate the new facility. We also avoided the additional cost of having product recalibrated in our accredited European service centers for customers who desire accredited calibrations over the period of a month or more before the on-site assessment could take place. The Internet proved to be a valuable tool in the process. It allowed our accreditors to watch our move as it happened and gain the confidence they needed to approve our new facility.

Conclusion

Moving an accredited lab is a big endeavor to undertake. Our experience demonstrates that the normal result of a temporary suspension of accreditation status can be one less worry through it all. There are two factors involved in the possibility of maintaining lab accreditation during a move: (1) The evolution of technology, especially the Internet, that allows nearly instantaneous multi-media communication around the world and (2) the cooperative disposition of accreditors such as NVLAP and DKD who are embracing today's technology to make the accreditation experience more efficient and less costly.

We are convinced that the Internet will play an increasing role in the metrology of the future. The Fluke Primary Standards Lab as well as accreditors like NVLAP and DKD are taking such technology seriously as we look for ways to improve our respective services.

References

[1] Kletke, Raymond, D., "Accreditation Experiences of an American Company", 1999 NCSL Workshop & Symposium, pp. 699-710

[2] Kletke, Raymond, D., "Maintaining Traceability at Remote Sites With Process Metrology", 1995 NCSL Workshop & Symposium, pp 531