Solutions for Chemical Labs Facing Unique Challenges with Tracking and Inventory

The desire for maintaining accurate chemical inventory levels in labs throughout the world has grown, primarily influenced by cost control, time management and government regulations. Each of these drivers have those managing chemical labs struggling to find solutions with the least financial, technical and time commitments as possible. The desire to maintain accurate levels have shifted to requirements as a result. Labs, whether corporate, governmental or educational institutions, have had to undertake research seeking solutions that fit their unique needs and circumstances, and doing so with data security in mind, especially with recent high-profile ransomware attacks and takeovers.

Efforts in tracking chemicals in labs has evolved in recent years. Leading up to this evolution, staff had to manually inventory their chemicals, and some still are. This method is highly inefficient by today's standards and leads to accuracy, cost and, especially in the chemical space, safety issues. Many evolved to barcode scanning, a practice which, while more efficient than a fully manual process, is still time consuming and dangerous when it comes to handling chemicals. Now, the most effective way to inventory chemicals is through the use of Radio-Frequency Identification, or RFID technology.

Of the software solutions available today, the "off the shelf" options do not satisfy the needs for flexibility, customization, and licensing, and, in many cases, security.

When viewed through a global lens, TracerPlus, from Portable Technology Solutions (PTS), partnered with scanning hardware provider, Zebra Technologies, is the most efficient way of addressing all facets of this complicated landscape.

In this paper, you will learn about the flexibility, affordability and security that comes with a TracerPlus subscription, and you will hear this directly from clients who have already implemented solutions and are enjoying the benefits of doing so.

What's Good Enough for Most Industries, isn't Good Enough for Chemical Labs

The advent of barcode scanning changed everything for those needing to track materials or parts. It took much of the manual process that was subject to human error out of the equation. Specifically, it removed many of the data entry errors as the scanning of the barcode populated the inventory tracking software with the correct information.

Barcode scanning has many benefits, but when it comes to tracking chemicals, there remained the danger of having to handle each container, risking contamination, cross contamination or outright damage from dropping or bumping containers. In chemical labs, storage requirements can range from metal shelving, to self-contained units, to freezing temperatures. Handling containers in these different environments is a major contributing factor to the level of danger.

Another significant danger is misplacing more volatile chemicals that have more stringent storage requirements and may require isolation from certain other chemicals or materials. These situations could lead to catastrophic events. The only way to minimize danger in labs is through a solution that reduces the amount of physical contact with containers while also enhancing the ability to locate specific, more volatile chemicals.

The Software Meets Hardware Solution

When it comes to chemical tracking in labs or processing plants, RFID scanners combined with TracerPlus software brings many benefits and increases safety. Bottles no longer need to be physically handled during inventory, which all but eliminates the danger of breakage or contamination. Another RFID feature that reduces danger in labs is the ability to find misplaced chemicals. TracerPlus, combined with the proper hardware, provides a "Geiger" feature allowing someone to quickly find the exact location and relocate it to it's proper, safe location. This works by selecting the specific item in the chemical inventory that you need to locate and scanning the storage areas with the handheld device. The device will signal as you get closer to your target, guiding you to the exact location.

Courtesy: Lawrence Berkeley National Lab

Andrew Peterson, Environment, Health and Safety Manager, at Lawrence Berkeley National Lab was looking for a more efficient way to track chemicals with their large inventory of over 60,000 containers. They currently use barcodes, but he had a hunch that RFID would be a safer and more convenient way to manage their inventory.

"A few years ago we did a major inventory and found significant discrepancies, specifically with lost or expiring chemicals," Peterson said. "We were looking for a better way to track chemicals and looked into RIFID. We reached out to Zebra to learn more about their systems," said Peterson.

That's when the partnership between Zebra and TracerPlus came to light for Peterson. "They referred us to Portable Technology Solutions (PTS) where we learned about TracerPlus." Peterson agreed to do a pilot using TracerPlus and two Zebra RFID scanners with 100 containers in their lab. "I saw the potential immediately in the speed you can do reconciliations. I showed others how you can read 40 chemicals in a matter of seconds." This led to "ah ha" moments according to Peterson and others at Lawrence Berkeley. With the pilot complete and the benefits obvious, Peterson and the lab are now on the verge of a broader RFID deployment, which will begin with tagging containers.

It was a similar situation for Matthew Allen, Director of Chemical Stores, Handling and Safety at Brigham Young University's Department of Chemistry and Biochemistry.

"We were looking for options to speed up the process from handling and scanning every bottle," said Allen. "We were influenced by a local library that used RFID to track their books." With their TracerPlus – Zebra implementation, Allen and his staff went from having two people spend nearly two days to inventory their chemicals in one of their labs, to spending about 15 minutes using RFID.

Courtesy: Bringham Young University

Another added benefit of the customization options of TracerPlus is that they can be done without the use of IT staff.

When Robert Petricek was the head of Chemical Management at Brookhaven National Laboratory, he also did a careful analysis on the return on investment with RFID tagging and scanning. His

research and testing showed that with optical barcode scanning, a cabinet with 20 containers would take 5 minutes or more. Brookhaven has more than 45 thousand containers throughout their labs, meaning inventorying chemicals was nearly an endless task. Inventorying that same cabinet with RFID tagged containers and RFID scanners took seconds. When multiplied out over the vastness of Brookhaven's chemical stores, the value in tagging all existing containers as well as new shipments was never in doubt.

Another benefit for anyone using TracerPlus for their chemical tracking is the ease in generating inventory reports to more accurately meet regulations and reporting requirements.

Lessons Learned in RFID Tagging

While the advent of RFID has revolutionized the previously helpless task of tracking and maintaining chemical inventories manually, it isn't without it's own learning curve. RFID is a technology that doesn't work perfectly in every scenario. This was something Petricek learned during an extensive evaluation of RFID technology prior to the decision and Brookhaven to rollout RFID tags to their entire inventory. The variables included in his research included tagging various locations on a container, including above and below the liquid line. It also involved testing the accuracy depending on how the containers were stored.

What Petricek initially learned, was that an RFID tag that was placed flat onto a container introduced a risk of that tag not being read by the scanning device. This was especially true when placed below the liquid line, or flat on a metal container. In both cases, the liquid and the metal containers had a negative impact on accuracy by "reflecting" the RFID signal. This was a significant problem and a risk of RFID technology not being the solution they had hoped for.

Petricek and his team at Brookhaven sought solutions to these issues and eventually came up with the concept they called the "Flag Tag," which is an RFID tag that protrudes from the container at roughly a 90 degree angle. This method

of tagging dramatically increases the level of accuracy by all but removing the liquid and metal interference in the radio signal.

Even with the innovative "Flag Tag," it's still important to properly store containers to avoid problems, such as not having a tag in contact with the metal walls of a cabinet, placing the container directly behind a larger container of fluid or metal container, or having the item laying flat on a metal shelf.

Examples of the RFID "Flag Tag" promoted by the Brookhaven National Laboratory. Photo courtesy of Brookhaven National Laboratory

Another important learning from Petricek and his team's work are the potential issues when separate labs share a common wall. For example, if labs are separated by standard drywall, it is possible for an RFID reader to detect an item through the wall. This is something Petericek calls "Cross Talk." Cross Talk is still possible, although less common when labs share a concrete wall.

Software Security

Software security is a valid concern in the chemical lab space, as with other, equally sensitive industries. High profile takeovers of software and systems have peppered the news recently, including takeovers of government systems, oil refineries and the world's largest meat processing company to name a few.

Seeking quality software solutions that put a strong emphasis on security is important for any industry, but it certainly needs to be emphasized when it comes to hazardous, or potentially hazardous chemicals. TracerPlus stands out among many of the off the shelf options in that all of the coding or security work is completed by PTS employees domestically. This eliminates the risk of foreign interference in the software development process.

In addition, through the TracerPlus subscription model, clients are kept up to date with the latest upgrades and patches, ensuring the greatest possible security from an attack.

PTS *Portable Technology Solutions*

Courtesy: Bringham Young University

How to Get Started

You can begin a free evaluation of TracerPlus by visiting **https://www.tracerplus.com/software/downloads** to download a 30 day trial.

To learn more about extensive evaluations, call **1.877.640.4152** today, or email **sales@tracerplus.com**.