

## LEAN LABORATORY CHOOSES POWER EXPRESS: DRIVING PEAK PERFORMANCE

### Laboratory profile

- › Community Regional Medical Center, Fresno, California
- › 700-bed, not-for-profit hospital serving Central California communities
- › Home to the only Level 1 trauma center and comprehensive burn center between Los Angeles and Sacramento
- › Operates 24/7
- › More than 3 million billable chemistry and immunoassay tests per year
- › 215 FTEs
- › Previous solution: two ADVIA 1800 clinical chemistry systems, two Centaur XP immunoassay systems
- › Integrated automation system: Power Express automation system (with dynamic inlet, two centrifuges and aliquotter) connected to two UniCel Dxl 600 Access immunoassay systems, two AU5812 with dual ISE chemistry analyzers, a Centaur XP, recapper, outlet and 5,000-tube stockyard
- › Clinical Information Management Tools: REMISOL Advance with Command Central



### Community regional medical center transforms pre-analytical processes with next-generation automation system.

Based in Fresno, California, Community Medical Centers is a not-for-profit, public-benefit organization representing the region's largest healthcare provider and private employer. Recently, one of its three hospitals—Community Regional Medical Center—took its core laboratory's efficiency to new heights with the powerful performance of Beckman Coulter's newest automated sample handling system, Power Express. Read their story.

### Time for change

Manual processes and inconsistent delivery of results are the enemies of every clinical laboratory. And in 2013, the core laboratory at Community Regional Medical Center (CRMC) was definitely feeling the effects. It was riddled with redundant, time-consuming pre-analytical processes—even with a competitive automation system already in place. It was overdue for a change.

"Our pre-analytical process required a lot of steps, and no matter what we did Lean-wise, we couldn't seem to improve the turnaround times (TAT) enough to meet our customers' expectations," said Carol Kelley, core lab supervisor. "We decided we needed to automate our pre-analytical processes, and that became our goal."

The laboratory, however, had high expectations—and serious requirements—for its new system.

"Some of the biggest challenges we faced during our selection process was making sure that the speed of the centrifuges met our expectations," explained Kelley. "In addition, we have probably 120 add-ons per day, so we needed a process that was seamless for adding on testing to samples that were already in the lab."

Of course, the laboratory also wanted to decrease overall TAT, decrease variability and increase standardization in the sample handling process—all while maintaining excellent results quality. It needed a Lean solution to take its efficiency to the next level.



Move healthcare forward.



**“Because of our entire solution—REMISOL Advance, the track system [Power Express], and the AU5812 systems—the quality and consistency of our results is much better.”**

**Chris Hopfer, CLS, Core Lab Lead CLS**

### **The right system: Power Express automation, AU chemistry and REMISOL Advance informatics**

After a lengthy evaluation process and many site visits, CRMC found the right solution for its laboratory—the Power Express—and became the third laboratory in the country to install Beckman Coulter’s newest high-speed automation solution.

As a high-throughput automated sample handling system, Power Express performs multiple processes on a variety of sample types, including chemistry, immunochemistry, hematology and coagulation. It automates sample login, centrifugation, decapping, aliquoting, presentation of samples to connected instruments, recapping, storing in ambient or refrigerated storage modules and sorting to outlets. The system also automatically retrieves and performs rerun or reflex testing as directed by LIS information and instrument status. It’s all driven by a line controller computer in conjunction with process control software, Cenexxus, which translates test codes from an LIS into routing information.

To keep up with demand, the laboratory chose to integrate two centrifuges on its Power Express system, which would allow it to process 600 sample tubes per hour. It also acquired two AU5812 chemistry analyzers (with dual ISE modules) and two UniCel Dxl 600 Access immunoassay systems for more analytical efficiency. Completing the picture was the addition of new middleware—REMISOL Advance with Command Central—which would enable the laboratory to experience the time-saving benefits of auto-validation and hands-free add-on processes.

“We were looking to automate pre-analytical processes and Beckman Coulter met our needs for streamlining those processes based on Lean principles,” said Kelley.

### **Timely implementation and support**

Since the laboratory didn’t want to go live with all its new equipment at once, it decided to install the solution in phases. First, it implemented the two AU5812 chemistry analyzers, plus auto-validation through REMISOL Advance. Even without the automation track, Beckman Coulter’s new solution was already outperforming the laboratory’s previous fully connected automation solution.

A few weeks later, the laboratory installed the two Dxl 600 immunochemistry systems, and a few weeks later, the automation track system. By May 2014, the entire solution was up and running.

“Because implementation was done in stages, it was an easier learning curve for the staff and made the process simpler,” said Kelley. “Beckman Coulter was very helpful in our installation and we had a lot of support. Any questions that we had, they were on top of it—and we had many questions.”

## Workflow without the work

Once the full solution was in place, the core laboratory started witnessing results immediately. One of the most noticeable results was a dramatic change in the entire end-to-end specimen handling process.

Today, when samples arrive from the hospital's pneumatic tube system, technologists load them either into a routine or STAT rack, which will be loaded and prioritized first by Power Express. Once on the track, sample tubes are automatically loaded into the centrifuge, spun, loaded back onto the track, diverted to the decapper, decapped and routed to the appropriate analyzers for testing. Once testing is complete, tubes are diverted to the refrigerated storage area. All of these steps are completely automated, requiring no intervention from technologists.

The results are then either verified manually by a technologist via Command Central or auto-validated and automatically released without any intervention.

"Our key workflow and turnaround improvements are a direct result of having fewer manual steps," said Kelley. "Centrifugation happens automatically, normal test results are released automatically and having samples stored in the connected refrigerated stockyard saves us many steps."

**"This has helped us reallocate some FTEs to do other tasks that we were unable to do before. It used to take five people to run chemistry, but now it only takes three."**

**"Prior to having the Power Express, our quarterly dialysis days, specifically, were horrible and the staff dreaded them. We would have as many as 5,000 samples per day, but now it's no big deal."**

**Carol Kelley, Core Lab Supervisor**

Of course, having faster chemistry analyzers was another huge step in the right direction. Thanks to the two new high-speed AU5812 analyzers, each of which can process up to 1,200 tubes per hour, the core laboratory witnessed increased testing speeds, which further boost efficiency and reduce TAT. Furthermore, the AU systems could be front-loaded without stopping the instrument—another improvement for the laboratory.

Paired with the high-volume AU system, the Power Express is a perfect choice for laboratories like CRMC's, which demands very high throughput. The whole system was designed to match the analytical speed of the AU5800, eliminating any potential bottlenecks on the line. It's a Lean system that enables profound productivity.

The laboratory's newfound speed and efficiency have become particularly helpful when processing dialysis samples.

"Prior to having the Power Express, our quarterly dialysis days, specifically, were horrible and the staff dreaded them," said Kelley. "We would have as many as 5,000 samples per day, but now it's no big deal."



## A few “add-on” benefits

Another dramatic change was evident in the test add-on process.

Before automation, the laboratory’s manual process for adding a test to an existing sample was cumbersome and time-consuming. After the laboratory received an add-on request from a physician, a staff member had to go to the refrigerator to determine whether the sample was there or not. If it was there, they had to see if it had enough sample volume. If so, they had to pull it out, take it to the computer to “receive it” and then put it on the correct instrument.

“Now when we get a request for an add-on, all we have to do is look into the computer, see that we have a sample, add the test on and the Power Express pulls the sample right out and puts it on the correct instrument for that testing,” said Kelley.

Power Express automatically locates the tube in the stockyard, places it back on the track, sends it to the decapper, forwards the tube to the appropriate analyzer for the add-on test, sends it back to the recapper and finally places it back in the refrigerated stockyard. It’s simpler, faster and much more streamlined.

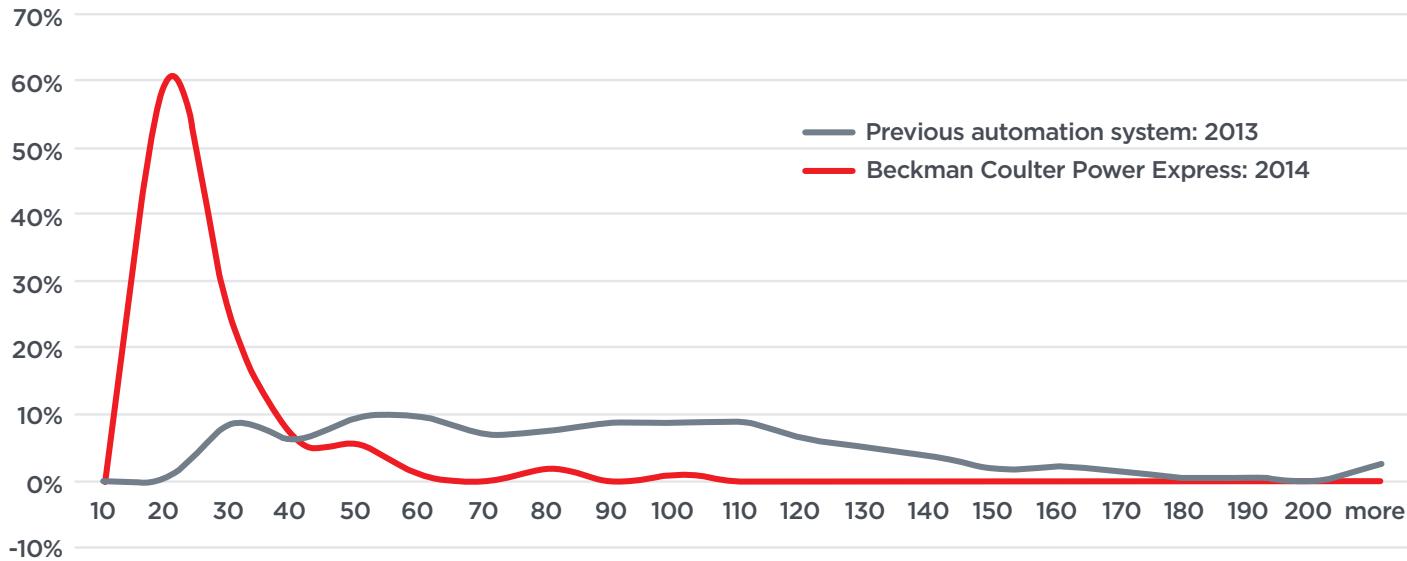
## Fewer errors

Testing standardization also does wonders for error reduction. Traditionally, many errors are directly related to pre-analytical specimen handling—specifically in the areas of aliquoting, labeling and relabeling specimens needing further analysis.

“We’ve definitely seen a dramatic reduction in aliquoting errors and most of the residual misidentification errors we have relate to processes that are still quite manual, such as doing differential counts on slides from body counts, which still require somebody to look at the slide and look at the computer screen and make sure you’re entering results on the correct patient,” said Dr. Slater, pathologist and medical director of the laboratory. “Those types of human foibles just don’t exist in many of the places that they used to exist for us.”

“By automating and taking manual steps out of the process—steps by which members of a busy laboratory are subject to distractions, forgetfulness and different priorities—those types of human slips just don’t exist when you remove as many steps from the process as we’ve been able to do,” he said.

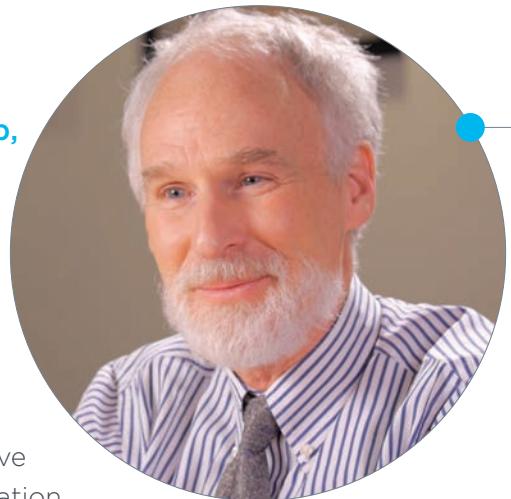
**TAT BMP comparison: drastic variability reduction**



**Figure 1**

**"I've seen a large improvement in the work culture in our lab, as a result of the front-end automation [Power Express]. People can simply work more efficiently now."**

Dr. David Slater, M.D., FCAP, Medical Director



## TAT improvements

Not surprisingly, Power Express has also helped the laboratory achieve serious improvements in TAT. Figure 1 shows that prior to implementation, basic metabolic panels (BMPs) took, on average, about 89 minutes; after implementing the track, BMPs now take only 24 minutes—a dramatic 74% reduction.

Consistency for critical test results, such as troponin, is particularly important for a Level 1 trauma center like CRMC. And thanks to the realization of faster analytical time, the core laboratory now demonstrates a faster TAT for critical tests than even the hospital's STAT laboratory can deliver.

According to Kelley, adding autoverification played another huge role in decreasing TAT. About 75% of the laboratory's results are now autoverified by the LIS and automatically released, which gets them into doctors' hands sooner.

"Autoverification has really expanded our efficiency dramatically," said Dr. Slater. "Like most labs that have it, we've seen our TAT improve quite a bit—especially with better release of critical values, which are the ones everybody wants and remembers."

"Today, our CLSs need to focus only on samples that are problematic—not the normal ones," added Kelley. "This has helped us reallocate some FTEs to do other tasks that we were unable to do before. It used to take five people to run chemistry, but now it only takes three."

## More peace of mind

Unlike its predecessor, Power Express also offers some built-in redundancies to increase the laboratory's confidence and peace of mind.

For example, it offers RFID routing for fast movement as well as redundant barcode scanning stations throughout the track system, which serve to verify and reverify the sample identification, tube position and required test list before loading onto analyzers. It's one of several quality checkpoints to ensure the right tests are run on the right sample tubes.

The system also offers dual decapper modules and dual recapper modules so that if any one module goes down, the laboratory can continue running its automation system without reverting to a manual process.

Unlike those of other automation solutions, the refrigerated storage compartments on the Power Express have doors that make accessing samples easy. Even if the system goes down, laboratory staff can still retrieve all the samples. Plus, all automation modules are off-chutes from the main track, so any issues that may arise can be isolated from the backbone.



## Less stress

Not only do these features drive overall productivity, they also make the laboratory environment a happier place to work. In fact, one laboratory technologist says the new system has made her job ten times easier.

"Before getting our new track system, we had so many manual processes—and on a busy day, it was very stressful," said Kelley. "Once the track was put into place, however, our stress level decreased considerably. I feel like most of the staff are very, very happy with the choice that our team made."

"There are a lot of stresses in a work culture that can be reduced by decreasing the number of manual steps and adding reliable automation," said Dr. Slater. "These improvements can give you more peace of mind, provide some elasticity and better support to help you do your job. That's certainly true in the processing area, an extremely busy job where workers need to receive specimens, centrifuge specimens, identify problem specimens, occasionally bring specimens back to the microbiology laboratory and handle phone calls—all at the same time."

"I've seen a large improvement in the work culture in our lab as a result of the front-end automation," he said. "People can simply work more efficiently now."

## Excellent quality of results

"Because of our entire solution—REMISOL Advance, the track system and the AU5812 systems—the quality and consistency of our results are much better," said Chris Hoffer, lead clinical lab scientist. "The AU5812 systems are very reliable and the type of results that we get on them are very consistent and precise. We can repeat something over and over and we get very precise results and the accuracy is much better than our previous equipment."

"The relationship between physicians, the nursing staff and care providers in general has been very good, not only because of the consistency of the TATs, but also the accuracy and precision of the results," added Hoffer. "We don't get as many questions about quality of the results anymore."

Having a faster, more automated sample handling and testing process also enables laboratory technicians to focus on more important matters—supporting quality patient care.

"I believe that automation has allowed us to focus more on patient care issues that arise," said Dr. Slater. "By not having to focus on tasks that don't add intellectual value to the process, technologists have more time to work up the critical values, look at delta checks and try to understand if there's something in the patient's clinical course that might explain the delta check failure, and request a redraw if necessary."

## Lean laboratories choose Beckman Coulter

Since automating its core laboratory's sample processing with the Power Express, Community Regional Medical Center has joined the hundreds of Lean-focused labs around the globe that have chosen Beckman Coulter to transform their testing processes and prepare for future growth.

"Our health system is in one of the most rapidly growing areas in California, so we do need to prepare for an increased demand for laboratory testing," said Dr. Slater. "By having automation, it positions us to better handle that work without adding staff."

Laboratory goals	Laboratory results
Achieve TAT goal of 30 minutes	<ul style="list-style-type: none"><li>› Achieved BMP TAT of 24 minutes with a standard deviation of 3.6 minutes</li><li>› 90th percentile TAT in 27 minutes</li></ul>
Improve overall laboratory efficiency	Auto-validation automatically released 75% of results without any human intervention
Streamline the cumbersome test add-on process	Gained a seamless, automated (and hands-free) way to accommodate 120 add-on tests per day

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