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Consolidation with Aptio Automation Drives Cost-efficient, Patient-centric Care at NHS Tayside



“We consolidated four lab disciplines onto a single track. Aptio Automation has enabled us to streamline processes, speed turnaround time, and free lab staff to increase our focus on the quality of patient care.”

Dr. Bill Bartlett
Joint Clinical Director of Diagnostics, NHS Tayside



Consolidation with Aptio Automation drives cost-efficient, patient-centric care at NHS Tayside

Pursuing its holistic vision of clinical effectiveness combined with cost utility, National Health Service (NHS) Tayside, based in Dundee, Scotland, in 2012 became the first laboratory in northern Europe to deploy Aptio™ Automation from Siemens Healthcare Diagnostics. NHS Tayside leveraged this innovative and powerful automation solution to consolidate formerly siloed biochemistry, immunology, hematology, and hemostasis testing onto a single automation track. Today the results are in. Aptio Automation has helped Tayside to accommodate increasing volume, speed up turnaround time (TAT), streamline workflows, redeploy staff to higher-value activities, and add new tests to improve patient care.

“Underpinning all of our actions is the commitment to reduce waste and variation—and most of all, to prevent harm to patients,” says Dr. Bill Bartlett, Tayside’s joint clinical director of diagnostics. “Aptio Automation is helping us enable our vision of cost-effective, patient-focused care.”

Using Aptio Automation, Tayside now processes 7000 tubes per day which represents a 20% increase in workload in its main laboratory and a 65% increase in staff productivity. Decreased TAT across the board drove a 61% improvement in the TAT for add-on tests—all with the high-quality results derived from the consistency and standardization enabled by automation. Increased capacity has even enabled Tayside to introduce new testing protocols that improve the quality of care and can save the hospital money.

- Deliver patient-focused services
- Leverage technology to improve outcomes
- Optimize use of staff time

“Aptio Automation enables the convergence of technologies, bringing everything together so we’ve got better flows of information, better flows of samples, and better flows of data back out to the patient, properly supported. By crossing traditional disciplinary boundaries to streamline and standardize workflows, we’re transforming lab services—typically considered a cost center—into a value investment.”

Dr. Bill Bartlett
Joint Clinical Director of Diagnostics, NHS Tayside

Automation integrates three laboratories into one and optimizes workflows

NHS Tayside serves a population of 480,000 through a network of 22 hospitals/infirmaries and 69 general-practice sites that rely on two laboratories. The Blood Sciences Laboratory is located at the 900-bed Ninewells Hospital in Dundee, one of the United Kingdom’s major teaching hospitals. Here, Aptio Automation merges the three former individual labs onto a single track, providing a full complement of pre- and post-analytical sample-processing modules along with comprehensive analytics. The efficiencies gained have empowered the Ninewells Hospital laboratory to take on 73% of the testing that historically had been conducted at the 260-bed Perth Royal Infirmary (PRI), enabling the smaller PRI laboratory to focus exclusively on acute admissions and inpatient testing. Ninewells now handles 100% of the general-practice testing in the entire region.

Getting there, and beyond, with data-driven decision making

While Tayside staff had ideas about what they needed and wanted to do, Siemens gave them data-driven information to guide their decision making. “Siemens’ expertise and consultative approach was paramount to the success of this project, from beginning to end,” says Dr. Bartlett. “We relied on them to evaluate workloads from a variety of locations and to recommend the optimal mix of instruments to support peak loads. They devised the final track layout for the new space and helped optimize the use of automation to best manage the workflow.”



Aptio Automation with:

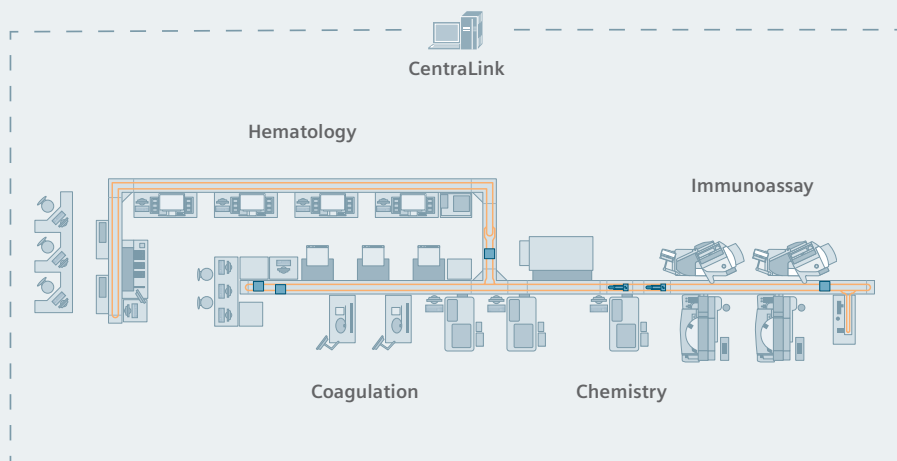
- ADVIA Centaur® XP Immunoassay System (2)
- ADVIA® 2120i Hematology System (3) with Autoslide (1)
- ADVIA® 2400 Clinical Chemistry System (3)
- Dimension Vista® 1500 Intelligent Lab System (2)
- Coagulation analyzers (2)
- Centralink™ Data Management System (1)

The Siemens team, Dr. Bartlett says, combined its willingness to learn Tayside's processes and goals with understanding of the Aptio solution's capabilities and global best practices. "They not only saw what happens in this lab, they have a lot of experience in labs elsewhere, and they understand the environment. They chaired meetings between our biologists and biochemists to broker change. Siemens consultants helped people who formerly worked in silos to understand how their actions affect downstream workflows for others, and vice versa." "And the team was instrumental during the interim period as we transitioned to the new track," added Shirley McKay, associate services manager at the Ninewells Hospital laboratory. "On occasion, they even helped with sample processing!"

Two years after the initial implementation, consultants from Siemens continue to support Tayside with services and strategic consulting for process engineering.

Now staff can focus on quality rather than throughput

The 75-foot track employs a variety of modules to reduce manual handling of samples, ease test reruns and add-on testing, and speed TAT across the board. Aptio Automation has contributed to a 65% increase in staff productivity and has enabled Tayside to up-level staff responsibilities so that biomedical and clinical scientists have the opportunities to become less involved with daily throughput and more focused upon quality.



The laboratory at Ninewells combines chemistry, immunology, hematology, and hemostasis testing on a single track that features multiple input routes and centrifuges; automates decapping/recapping, aliquoting, and sealing/unsealing functions; and allows for refrigerated storage of 15,000 tubes—all centrally managed by the CentraLink Data Management System.

Results: Speed, quality, efficiency

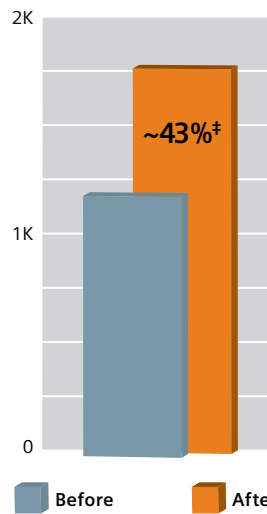
The Ninewells Blood Sciences Laboratory processes as many as 7000 tubes a day on the Aptio Automation track, 1700 tubes an hour at peak times. Despite volume increases of approximately 5% per year since 2012, samples no longer back up. Median TAT is 41 minutes, with 95% of the work completed in 67 minutes. "Our input potential has increased 246%*, and that's without additional capacity of the Input Output Module, which is reserved for STAT samples and is used heavily for sorting," Dr. Bartlett says.

A 2015 in-house evaluation of staff productivity compared the number of tubes processed in a 24-hour period against the number of technical, non-technical, and reception staff used to process those tubes and/or perform calibration, QC, validation, troubleshooting, basic maintenance, and non-core lab activities (i.e. EQAS and operating procedures). Productivity was expressed as a ratio. When data from 2011 and 2015 were compared, a 65% mean improvement and 158% median improvement in total staff productivity was reported.

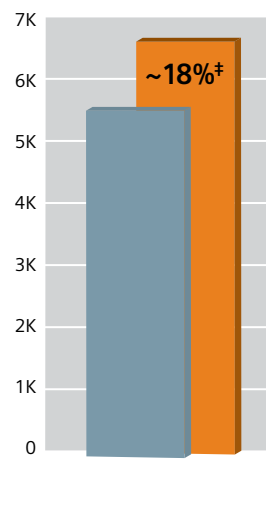
TAT Achievements

	Median TAT (minutes)			95th Percentile* (minutes)		
	Old System	Aptio Automation	Percent Improvement	Old System	Aptio Automation	Percent Improvement
Serum creatinine	74	56	24%	146	124	15%
STAT serum creatinine	~60	37	38%	NA	68	NA
Troponin I	49	33.6	31%	119	73.4	38%
Add-on tests	85	33	61%	146	80	45%

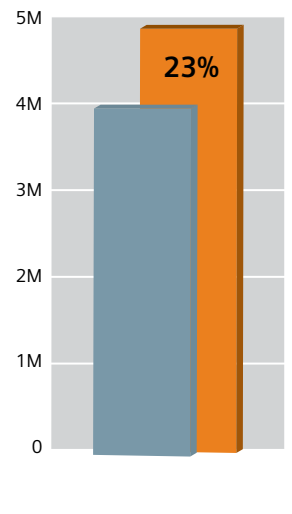
Peak load—tubes per hour



Tubes per day

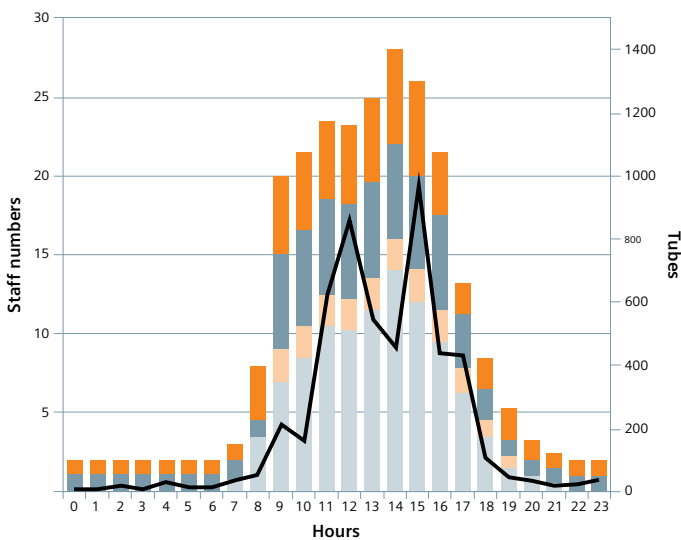


Tests per year

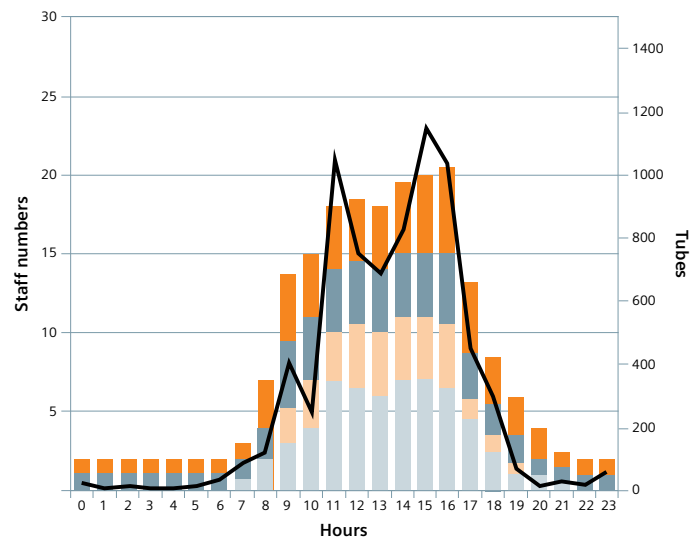


*Estimate based on separate chemistry and hematology lines in pre-automation period.
 †95th percentile is an accepted measure of test-time predictability that reflects TAT for 95% of samples received.
 ‡Calculated using average.

Hourly staffing versus workload 2011



Hourly staffing versus workload 2015



■ Average Chemistry Staff
 ■ Average Hematology Staff
 ■ Average Core Staff
 ■ Average Reception Staff
 — Total Tubes



“The new system can track and manage 3600 specimens an hour just in circulation. At the touch of a CentraLink system screen, we can also retrieve and drive testing on up to 15,000 more samples stored in the Aptio refrigeration module.”

Dr. Bill Bartlett
Joint Clinical Director of Diagnostics, NHS Tayside

CentraLink Data Management System customizes and provides comprehensive workflow management

The CentraLink Data Management System drives Aptio Automation. With end-to-end touchpoints, the CentraLink system consolidates information from the LIS, track, and instruments to intelligently automate workflows in support of a lean, multidisciplinary laboratory that can handle routine and emergency testing on one track.

The CentraLink system customizes and standardizes the various workflows across automation, analyzers, and IT and has especially revolutionized add-on testing at Ninewells. Laboratory staff no longer need to physically locate tubes when add-on orders come in. The CentraLink system finds the tube wherever it is on the track or in refrigerated storage, coordinates decapping and/or aliquoting as required, sends it to the proper analyzer, and uploads results. “It’s a simple click of a button, the test is added, and the automation takes care of everything until we see the result,” says Shirley McKay. “We can drill down and look at each individual sample, at the route it takes, and we can reroute as needed.”

The CentraLink system has also enabled the laboratory to use autoverification for approximately 90% of its workload, McKay says; if the laboratory had to validate everything manually, it could not process

such high volumes. She notes that logic rules in the CentraLink system can be both test- and site-dependent, so that the rules for the renal ward, for example, need not be the same as those for a pediatric ward.

Dr. Bartlett recalls a time the laboratory had a fire drill. The staff returned an hour-and-a-half later and found the Aptio Automation Rack Input Module and track empty, the specimens processed and in their storage units, and the CentraLink system validating the data. “The system was effectively running itself whilst the firemen were responding to a false alarm.”

A bright future: new testing to improve care and cut costs

Aptio Automation is helping Tayside to add new tests that reduce costs and improve the quality of care. “We received the first new immunoassay funding in five years by demonstrating how to generate 38 antibiotic-free days per month in the ICU by introducing procalcitonin testing at the starting or stopping of antibiotics,” explains Bartlett. “The impact on drug spending is minimal, but a single night’s occupancy in the ICU is very expensive. The new protocol can shorten patient stays, saving up to £1200 per night. It also helps reduce selection pressures on microbes associated with hospital-acquired infections that are antibiotic-resistant in the longer term. These were key elements that were of interest to the organization.”

New opportunities afforded by this advanced automation are now beginning to be understood by clinical users outside of the laboratory. For example, the ability of the CentraLink system to take data from systems on the multidisciplinary Aptio Automation track can enable secondary, cascade testing. Clinical and laboratory teams at Tayside are collaborating along these lines to develop simple user interfaces—powered by complex algorithms—to enable the investigation of liver disease.

“It’s a common perception that laboratory automation is intended to reduce staff,” Dr. Bartlett says. “Tayside’s approach is different. We’re redirecting knowledge and skills away from routine tasks and toward the value-added side of the business, toward quality and collaborative support of caregivers. We’re delivering efficiencies in order to focus on effectiveness—on continuously improving the quality of patient care.”

The outcomes obtained by the Siemens customer described here were realized in the customer’s unique setting. Since there is no typical laboratory, and many variables exist, there can be no guarantee that others will achieve the same results.

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