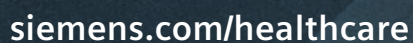


The Siemens logo is displayed in a white rectangular box in the top left corner of the image. The word "SIEMENS" is written in a bold, teal, sans-serif font.

SIEMENS

An orange rectangular label with the words "Case Study" in white, sans-serif font, positioned in the lower right area of the image.

Case
Study

A dark grey horizontal bar containing the URL "siemens.com/healthcare" in white, sans-serif font.

[siemens.com/healthcare](https://www.siemens.com/healthcare)

A large, light blue rectangular area at the bottom of the page containing the main title in white, serif font.

Hospital Clinic de Barcelona Advances Its Hemostasis and Hematology Workflow with Aptio Automation



“We’ve undergone two revolutions: initially in 2001, when we were among the first labs in the world to automate, and now we’ve streamlined even more with Aptio Automation, ADVIA 2120i Hematology System, and Sysmex CS-5100 System.”

Dr. Jose Luis Bedini
Hospital Clinic de Barcelona

Hospital Clinic de Barcelona Advances Its Hemostasis and Hematology Workflow with Aptio Automation

Automation pioneer improves its workflow excellence

Growing workloads, shrinking budgets: In 2001, the Hospital Clinic de Barcelona in Spain was among the first healthcare providers in the world to create an automated core laboratory to help address these challenges. With Siemens Healthcare as its longtime partner in the pursuit of continuous improvement, today the laboratory is gaining even greater efficiencies with Aptio™ Automation connecting analytical systems across all four core laboratory disciplines: clinical chemistry, immunoassay, hematology, and hemostasis.

Over the course of its 13-year journey with Siemens, the laboratory has been able to consolidate instruments, integrate and automate STAT testing, reallocate staff to higher-value responsibilities, and save upwards of €600,000 in tube costs—all while increasing clinicians' trust in the laboratory to support excellence in patient care.

This pioneering hospital's automated core laboratory represents just one part of an equally successful organizational approach to clinical diagnostics. In 2000, Hospital Clinic de Barcelona established the Biomedical Diagnostic Center (CDB) to provide high-quality, comprehensive service in all areas of laboratory medicine and to be a reference for excellence in the related specialties. The CDB uses a client-focused model to optimize the use of resources while ensuring advanced technological development in healthcare and research.

The CDB is divided into five specialty departments and an operative core laboratory where high-volume automated testing is performed. In total, the CDB is composed of 100 staff specialists from the various laboratory areas along with 300 professionals representing pathology, biochemistry, molecular genetics, hemotherapy and hemostasis, immunology, and microbiology specialties. It also includes cross-support units to manage processes common to all laboratories: client management, quality, economics management, and information systems coordination.

In the CDB model, each department is focused on innovation—developing the maximum level of knowledge in its specialty through intensive research and collaboration with the hospital's clinical departments. All CDB departments continuously interact with the core laboratory to achieve the high-quality analytical and scientific results needed to deliver the required clinical support.

The CDB recently began a project to create a Molecular Biology Core Laboratory, which will integrate the most frequently tested molecular technologies.

"Economic pressure is an ongoing fact of life," says Dr. Aurea Mira, director of the CDB. "Lab automation allows us to improve workflows, optimize human and technology resources, and save money. It also raises hospital awareness of the lab as a provider of fast, accurate testing that supports good clinical outcomes."

The Biomedical Diagnostic Center* (CDB) at a glance:

- Serves a local population of **550,000** people
- Processes **500,000** orders from hospital patients annually
- Processes **135,000** orders from other hospital centers and private laboratories
- Makes **6 million** determinations per year
- Runs **2900** different assays

*The CDB comprises all laboratories of the Hospital Clinic de Barcelona.

Laboratory pursues automation vision in 2001

When CDB created its core laboratory in 2001, the hospital automated multidisciplinary testing on a single track. It also employed a central software platform that effectively integrated IT, automation, and the analyzers to further streamline workflows by leveraging time-saving features such as autoverification, quality review, and instrument flagging. Shortly after implementation, the new laboratory was able to reallocate six technicians (three more were reallocated later), eliminate sendouts, and reduce TAT for routine testing from 3 hours to 1.5 hours or less.

Over the next 12 years, the Siemens ADVIA® LabCell® Automation Solution, powered by the CentraLink™ Data Management System, enabled the laboratory to support 5% annual growth while its budget for reagents stayed flat. By moving to one serum tube per patient, the laboratory has saved €600,000 in tube costs alone. In addition to putting the health system in an especially strong position during the global economic crisis of 2008, CDB's record of success set the stage for continued advances in laboratory automation.

Evolution to Aptio Automation and automated STAT testing

The CDB core laboratory runs a million STAT tests annually—more than 500 patients a day. Driving for further efficiency gains—including STAT-test automation—CDB upgraded to Aptio Automation in 2013.



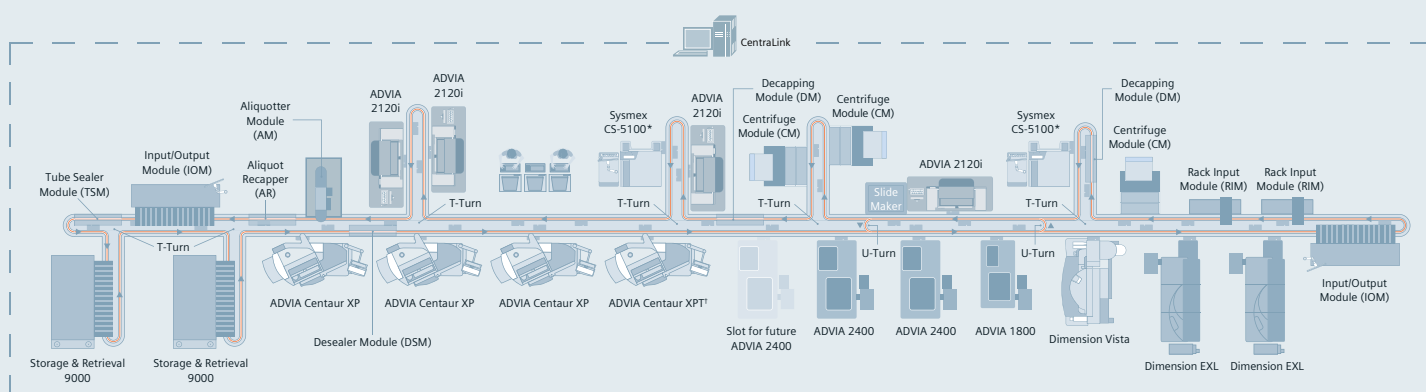
This next-generation solution enables individual sample routing and STAT prioritization using RFID-tracked pucks and supports point-in-space sample aspiration by connected analyzers to speed multi-instrument processing. Aptio Automation also enabled the end-to-end integration of CDB's analytical processes. The laboratory had already automated its pre-analytical centrifuging and decapping, and it added a sophisticated Input/Output Module (IOM) that enables customized and prioritized sample loading. "The I/O Module lets us define many ways to load the samples to the system with different priorities," says Dr. Jose Luis Bedini, head of the CDB core laboratory. "It gives us a lot of flexibility."

For the first time, the laboratory also automated post-analytical processes, with modules for sealing, aliquoting, and refrigerated storage. "This is one of the most

important changes for us," Dr. Bedini says. "Now all the analytical processes, from the loading to the discarding of samples, have been connected to the track. Our technicians only need to load samples to Aptio Automation. It saves time and reduces biological risk and the probability of errors."

Previously, the core laboratory had four technicians each spending 20 minutes every day manually discarding 4000 samples. "For those types of tasks—moving samples to centrifuge, decapping, recapping, discarding—a machine is more efficient," Dr. Bedini says. "I want to free my technicians for work that adds value."

With Aptio Automation the core laboratory was able to reassign another technician and also eliminated the 16-instrument limitation of their previous track, offering new room to grow.



Systems connected to Aptio Automation

- Sysmex® CS-5100 Hemostasis System (2)
- ADVIA 2120i Hematology System (3)
- ADVIA 2120i Hematology System with Autoslide (1)
- ADVIA 2400 Clinical Chemistry System (2)
- ADVIA 1800 Clinical Chemistry System (1)
- ADVIA Centaur® XP Immunoassay System (3)
- ADVIA Centaur XPT Immunoassay System (1)
- Dimension Vista® 500 Intelligent Lab System (1)
- Dimension® EXL™ with LM Integrated Chemistry System (2)
- CentraLink Data Management System (1)

Pre- and post-analytical modules connected to Aptio Automation

- Rack Input Module designated for loading (2)
- Input/Output Module designated for loading, unloading, sorting (2)
- Centrifuge Module (3)
- Decapper Module (2)
- Tube Sealer Module (1)
- Tube Desealer Module (1)
- Refrigerated Storage and Retrieval Module: 9000 tubes (2)
- Aliquoter (1)
- Aliquot Recapper (1)
- Track U-Turn (2)
- Track T-Turn (6)



Due to precise WBC and RBC/PLT technology and high specificity, the ADVIA 2120i Hematology System reduces repeat testing by 20%.

ADVIA 2120i Hematology System minimizes repeat testing, improves workflow

The laboratory also uses the ADVIA® 2120i Hematology System, bringing the full complement of hematology screening and hemostasis testing onto the automation track. The ADVIA 2120i system streamlines workflow and maximizes productivity by eliminating most commonly performed manual steps. It delivers the gold standard in testing methodology while offering simplicity and flexibility for easy integration into the laboratory.

Prior to Aptio Automation, the core laboratory had five hematology systems: three systems for routine testing and two for STAT samples. Not only has connecting

hematology to Aptio Automation enabled the laboratory to eliminate one system and perform testing from just one tube, but CDB now employs identical technologies for all testing. Previously, STAT testing was performed on a different hematology system. Having standardized on the ADVIA 2120i system, the laboratory now has more flexibility to rotate technicians between routine and STAT testing. Further, Dr. Bedini notes that the ADVIA 2120i system is more reliable, provides more precise results for hematology populations, and requires fewer repeat tests than its predecessor. STAT hematology tests are now delivered in 25 minutes.

"Twelve years ago I didn't see the benefit of connecting hematology to the automation track. Now I say it's one

of the areas that gains the most benefits: cost savings, reliable turnaround time, and staffing efficiency. Aptio Automation also routes and tracks hematology tubes for additional testing as required—whether that's an ESR, a glycohemoglobin, or review via CellaVision® digital morphology. We use just one tube for all these tests now," Dr. Bedini says.



Note: Siemens recommends utilizing proper protective equipment when running samples.

Sysmex CS-5100 Hemostasis System enables consolidation

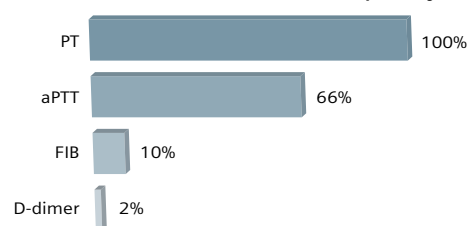
With Aptio Automation in place, Siemens supported CDB to consolidate instruments, improve workflows, and further reallocate staff by automating both STAT and routine hemostasis. In 2014, the laboratory implemented the Sysmex CS-5100 System, a random-access, high-volume coagulation analyzer in which multi-wavelength Preanalytical Sample Integrity (PSI™)† technology identifies unsuitable test samples prior to analysis. The system's automated sample-volume checks and qualitative detection of hemolysis, icterus, and lipemia minimize the need for manual sample inspection.‡

Previously, the laboratory had two Stago STA-R instruments connected to the automation track for routine testing and two stand-alone Sysmex CS-2100i instruments for STAT tests. Now two Sysmex CS-5100 systems on the Aptio Automation track handle both workloads. That allowed the



laboratory to reassign another technician, while also saving on reagent maintenance, service contracts, and physical footprint in a laboratory where space is precious. "The CS-5100 system is very fast, easy to learn, and reliable, and now we can manage coagulation with a single technician," Dr. Bedini says.

Hemostasis test volume: 900 tubes per day



"Choosing Siemens as a partner for us is like a warranty for success, because we have worked together for many years—from the very first workflow analysis for bringing disciplines together in 2001 to ongoing opportunities to improve efficiency. It's a relationship of trust—and that's as important to us as technology."

Dr. Jose Luis Bedini, Hospital Clinic de Barcelona

Before

ADVIA LabCell Automation connected
10 analyzers and integrated **200 assays**.

After

Aptio Automation connects
16 analyzers and integrates
more than **350 assays**.

Turnaround time with Aptio Automation

Routine testing: 2 hours
Hematology STAT: 30 minutes
Chemistry STAT: 40 minutes

Siemens relationship

"like a warranty for success"

Since beginning its automation journey, Hospital Clinic de Barcelona has reduced core-laboratory staffing by 40%, enabling reassignment of 10 technicians. Turnaround time is faster and more predictable, because tests can be routed to any appropriate analyzer on the track if another is undergoing maintenance. Automation has so transformed operations that, when the laboratory returned to stand-alone systems while the new track was under construction, veteran technicians were struck by how much improvement they now took for granted, and newer hires could hardly believe the laboratory had operated the old way. "The young people especially were surprised at how people used to work—and many laboratories out there still work that way," Dr. Bedini says.

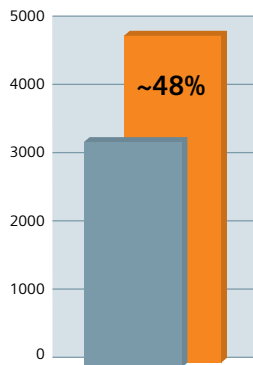
Upgrading automation or establishing it for the first time is a formidable project for any laboratory. With 16 years of laboratory-automation experience and the largest installed base worldwide, Siemens is an invaluable ally in doing things right the first time, Dr. Bedini says. The laboratory's long-term partnership with Siemens delivers single-vendor simplicity as well as ongoing consulting, education, and service and support. "Choosing Siemens as a partner for us is like a warranty for success, because we have worked together for many years—from the very first workflow analysis for bringing disciplines together in 2001 to ongoing opportunities to improve efficiency," Dr. Bedini says. "It's a relationship of trust—and that's as important to us as technology."

Automation gains have made clinicians throughout the health system better appreciate the laboratory, Dr. Bedini adds. "Before, nobody knew us, working down in the hospital basement. With the automation, they realize we have something special—with more quality, better turnaround time, and fewer problems. They recognize the value we bring to high-quality patient care."

†In the U.S., PSI technology helps ensure proper sample fill volume. Outside the U.S., PSI technology helps ensure proper sample fill volume and automates management of hemolytic, icteric, and lipemic samples based on user-defined system settings.

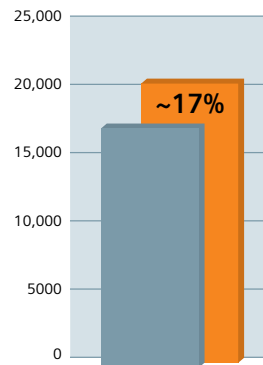
‡Functionality not available in the U.S.

Increasing volume



Tubes per day

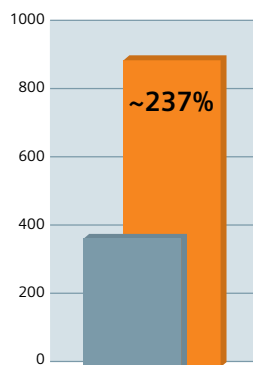
Average increased from 3250 to 4800.



Tests per day

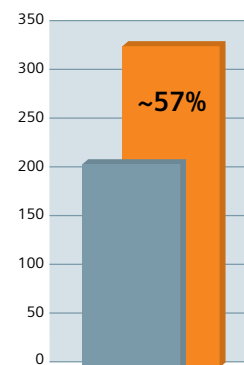
Average increased from 17,300 to 20,300.

Increasing productivity



Tubes loaded per hour

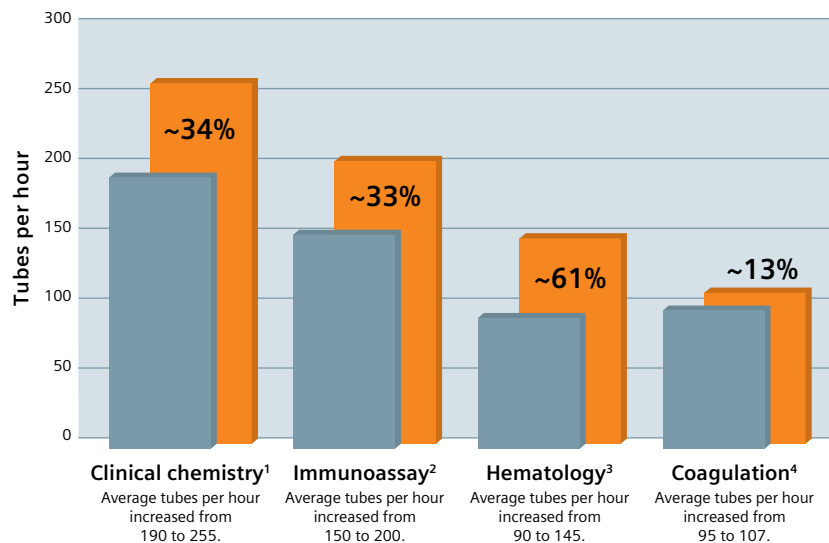
Average increased from 380 to 900.



Tubes centrifuged per hour

Average increased from 210 to 330.

Multidisciplinary performance per hour



1. ADVIA 2400 system only; STAT tubes on Dimension EXL system not included.
2. ADVIA Centaur XP system.
3. ADVIA 2120i system.
4. Sysmex CS-5100 system.

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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Product availability may vary from country to country and is subject to varying regulatory requirements. Please contact your local representative for availability.

Note: Siemens recommends utilizing proper protective equipment when running samples.

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