ARUP'S AUTOMATION TIMELINE

CHARLES HAWKER

ARUP Laboratories is the most automated laboratory in North America. This automation has contributed significantly to ARUP's quality, turnaround time, efficiency, and profitability. Lost specimens have been reduced by 80 percent to near Six Sigma levels; turnaround times have been reduced by 30 percent; and productivity in laboratory sections served by the automation has more than doubled.

APRIL 1995—ARUP executives realize that rapid growth is coming and that automation may be the only way to handle this growth. An automation committee is formed to evaluate and consider options.

JANUARY 1997—ARUP introduces a standard transport tube that is supplied to all clients. By the time ARUP's automation initiative is implemented, 83 percent of all arriving specimens are in these tubes.

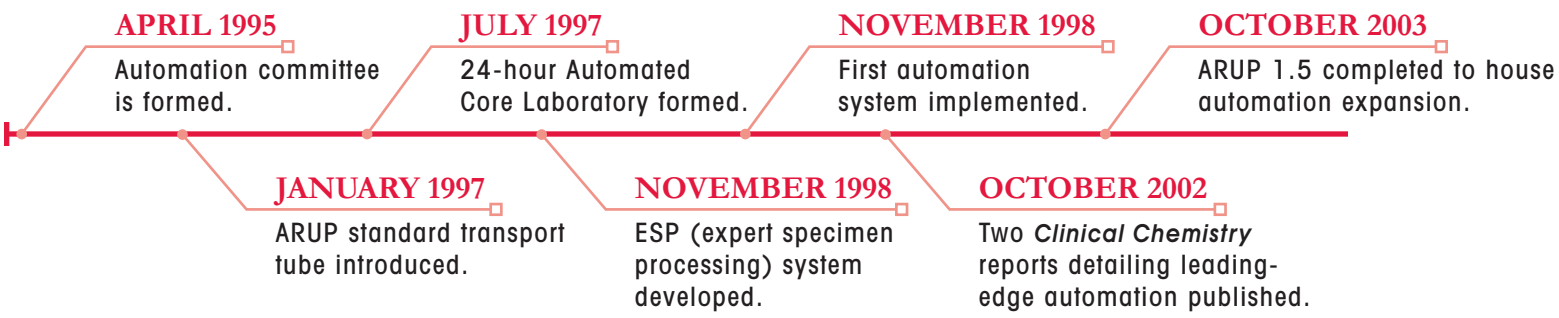
JULY 1997—ARUP consolidates its former general chemistry section with special chemistry and endocrinology sections to form a new Automated Core Laboratory to operate on a 24/7 basis and perform ARUP's most automated high-volume tests.

NOVEMBER 1998—ARUP completes a version of ESP (expert specimen processing) that is sufficiently developed and validated to support automation. This internally developed system represents a new era of specimen-processing software in clinical laboratories, employing rules and logic to guide specimen processors instead of requiring them to memorize details of thousands of different tests and test combinations. Training time to bring a new specimen processor to a minimum level of competency is reduced from six months to six weeks.

NOVEMBER 1998—ARUP implements its first automation system built by MDS AutoLab. This automated transport and sorting system has 18 specimen-processing workstations adjacent to three input conveyor systems and four high-speed sorters on a circular loop conveyor; three sorters sort processed specimens for testing, and one sorter sorts specimens that have completed testing and are ready for storage. ARUP's daily volume at this time is approximately 8,000 specimens; the system has the capacity to handle up to 2,000 specimens per hour. This early system is later expanded to 30 specimen-processing workstations.

OCTOBER 2002—ARUP publishes two Clinical Chemistry reports detailing its leading-edge automation.

OCTOBER 2003—ARUP completes ARUP 1.5, which is constructed primarily to house major expansions of ARUP's automation to keep up with ARUP's growth.



DECEMBER 2003—ARUP implements a two-story freezer automated storage and retrieval system (AS/RS) built by Daifuku America. The system, which is the largest clinical laboratory storage system in North America, holds more than 2.3 million specimens, and individual specimens can be retrieved in as little as 2.5 minutes. The new freezer replaces several walk-in freezers that required employees to wear parkas and gloves to search for specimens in storage trays.

JANUARY 2004—ARUP implements a major expansion of the MDS AutoLab automated transport and sorting system. The expanded system has 72 specimen-processing workstations (with a 96-workstation capacity) adjacent to four input conveyors, a unique switching and routing system, four automated sorters, and two automated specimen loaders. In 2006, four more automated sorters are added to the system (bringing the total to eight sorters) to keep up with ARUP's growth. The total speed of the system is at least 10 times greater than the speed of any other automated laboratory system in North America. ARUP's daily volume at this time is 16,000–20,000 specimens.

MAY 2004—ARUP implements a Motoman robotic system in the refrigerated anteroom next to the AS/RS system for the automated retrieval of specimens requested by employees. Up to 38 employees can concurrently request specimens for check-out, and requests for one or two specimens are generally filled in 2.5 minutes.

JULY 2004—ARUP implements a Motoman AutoSorter for robotically placing specimens that have completed testing in storage trays. The system can store approximately 1,100 specimens per hour. A second Motoman AutoSorter is implemented a year later.

FEBRUARY 2007—ARUP implements the world's first robotic thawing and mixing workcell, a collaborative effort involving Motoman and the University of Utah's College of Engineering. There are two such systems connected to ARUP's automation, and each can thaw and mix up to 1,000 specimens per hour, replacing a time-consuming manual process that was not uniform. *Clinical Chemistry* publishes a report on this system in December 2007.

MARCH 2010—A U.S. patent is issued for technology, jointly developed by the University of Utah's College of Engineering and ARUP, that enables the detection of specimens, specimen volume, and interfering substances through the side of a transport tube covered by as many as three labels.

OCTOBER 2010—ARUP implements a new Storage AutoSorter built by ATS. This custom system, the first of its kind in the world, is capable of storing 4,000 specimens per hour and ensures that ARUP can keep up with current volumes and expected new growth. ARUP's current daily volume is 36,000–44,000 specimens.