

How the AP3900 Automated System helped an Industrial Customer Improve Efficiency

Problem

The laboratory was challenged with decreasing total analysis and results reporting time while ensuring critical process adjustments made are compliant with the environmental limits. The analysis needed to be accurate, free from human error while ensuring data integrity. The laboratory also has to comply with the increasingly stringent health and safety regulations.

Solution

With half of the required analyses being regular water tests the obvious solution was to introduce automation. The Hach® AP3900 is an automated system capable of handling multiple samples and multiple analyses offering accurate and repeatable results, sample preparation, optimised processing and data management; driven by easy to use software.

Benefits

The investment in a Hach AP3900 Automated System for water analyses enabled the site to increase throughput whilst reducing associated technician resources by 30%, these resources being transferred to important research work. In addition to increased analysis capacity, results integrity and reliability were also improved.

Background

A centralised laboratory analysing water samples from their industrial processes

The customer is a private laboratory in Qatar and has been a Hach customer for many years. The laboratory has several lab technicians and 50% of the work in the laboratory consists of water analysis.

The laboratory operates 24 hours a day, with three different shifts which have to run different types of tests on multiple sample types such as wastewater, raw water, process water, boiler water and cooling tower water. The analyses were carried out using three different Hach spectrophotometers, and on average the laboratory would carry out approximately 100 water analyses per day.

Since the lab was set up and testing began in 2006, demand has steadily increased from other departments such as Environmental, Production and Process Engineering for more testing, quicker turnaround and proof of result accuracy and reliability.

The Laboratory Manager was very interested in the Hach solution due to the company wanting to automate as many laboratory tests as possible. Automation would take less of the technicians' time, enabling them to multi-task, whilst also meeting capacity, turnaround, accuracy and reliability goals.



AP3900 Laboratory Robot as all in one solution for the customer



Be Right™

Solution and Improvements

An automation solution to meet growing demand

Due to the increasing testing demands, the laboratory decided to invest in the Hach AP3900 Automated System to handle their water analysis. The laboratory undertakes COD, Total Nitrogen, Ammonia, Sulphide, Phosphate, Nitrate and Nitrite analysis with this system. The initial suite of automated tests has been extended after commissioning to include free chlorine analysis.

The Hach AP3900 Automated System was installed by trained service engineers and an application specialist. Following the installation all laboratory staff were trained on the set-up, routine operation, and troubleshooting of the instrumentation and software. To ensure performance and maximum up-time the AP3900 is supported with a service contract providing regular inspections and replacement of wear parts according to the recommended schedule.

Increasing sample quantity while increasing results quality with limited staff

The benefits from using the Hach AP3900 were immediately obvious to the customer:

- **Overall productivity increased:** Increasing sample throughput demand was met with a reduction in staff from three laboratory technicians to two. The resource that was no longer required for water analysis was allocated to productive research and development work.
- **Accuracy and reliability improved:** Automation provided faster results with better accuracy and precision and less opportunity for human error in testing or data management.
- **Safety improved:** Staff previously had to handle many different reagents and this has been drastically reduced with automation, therefore reducing health and safety risks.

The time for staff to become familiar with the Hach AP3900 was very short. Feedback from the customer was that the PC software is very simple to use and that all laboratory personnel were able to quickly grasp the basics of operation. Within days the automation system was routinely used by the staff and implemented into their daily work routine.

After one full year of using the Hach AP3900 the Laboratory Manager commented:

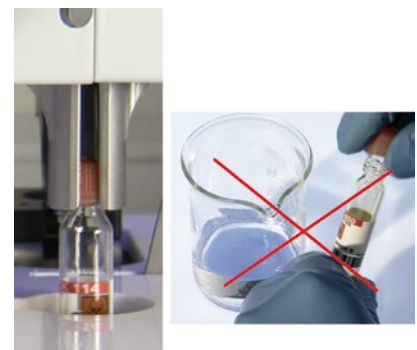
"Before we started using the AP3900, the water analysis in the laboratory was quite heavy; about 73,445 analyses are carried out in a year, requiring a second laboratory technician to assist in order to complete all the analysis within a shift. After we started using the AP3900 the second person was no longer required and thus we were able to remove one person from the three man shift in the Night and utilise the extra person to get Research & Development activities done in the laboratory. The analysis requirements have also increased slightly with an additional 500 analysis being included to be done per year but it is expected to increase by another 1000 analysis before the end of the year for which the laboratory is well prepared."

Conclusion

The laboratory was facing many issues in meeting increasing demand while being under pressure to deliver accurate, reliable results quickly. With 50% of the work being analysis of water samples, the Hach AP3900 Automated System proved the perfect answer.

The system helped optimise analyses whilst providing a high level of reliability and accuracy. The laboratory could also decrease the number of technicians dedicated to water analysis and reallocate this resource to other work. The team also appreciated how the ease of use of the Hach AP3900 allowed rapid integration into their daily work routine, and the safety improvement due to less reagent handling.

Sample No.	Identification	Sample Tray	Photo	Method	Test	PreDilution	FinalResult	Unit	Chem Form	PrioritySample	SystemError	ResultError	PriorityLevel	Unused	CountMethod	CountPosition
1	LCA700	1		1 Ammonium	APC204	1	1.15 mg/L	NH4-N		0	0	0	4	1		
2	LCA700	1		1 Ammonium	APC204	1	1.15 mg/L	NH4-N		0	0	0	4	2		
3	LCA703	1		2 Chloride	LOX3111	1	45.1 mg/L	Cl ⁻		0	0	0	8	5		
4	LCA703	1		2 Chloride	LOX3111	1	47.7 mg/L	Cl ⁻		0	0	0	8	6		
5	LCA703	1		2 COD High	APC114	1	304 mg/L	COD		10	0	0	2	1		
6	LCA703	1		2 COD High	APC114	1	499 mg/L	COD		10	0	0	2	2		
7	LCA704	1		3 LOC Ammonium	LOX035	1	5.45 mg/L	NH4-N		0	0	0	12	1		
8	LCA704	1		3 LOC Ammonium	LOX035	1	5.63 mg/L	NH4-N		0	0	0	12	2		
9	LCA704	1		3 Nitrate	APC340	1	24.3 mg/L	NO3-N		0	0	0	3	1		
10	LCA704	1		3 Nitrate	APC340	1	25.3 mg/L	NO3-N		0	0	0	3	2		
11	LCA704	1		3 COD	APC314	1	56 mg/L	COD		10	0	0	10	1		
12	LCA704	1		3 COD	APC314	1	58.5 mg/L	COD		10	0	0	10	2		
13	LCA705	1		4 COD High	LOX014	1	4881 mg/L	COD		10	0	0	9	1		
14	LCA705	1		4 LOC Ammonium	LOX032	1	69.2 mg/L	NH4-N		0	0	0	5	1		
15	LCA705	1		4 LOC Ammonium	LOX032	1	68.5 mg/L	NH4-N		0	0	0	5	2		
16	LCA705	1		4 COD High	LOX014	1	4913 mg/L	COD		10	0	0	9	2		
17	LCA707	1		5 Nitrite	APC341	1	0.308 mg/L	NO2-N		0	0	0	7	1		
18	LCA707	1		5 Nitrite	APC341	1	0.307 mg/L	NO2-N		0	0	0	7	2		
19	Alpha	1		6 Nitrate	APC340	1	2.17 mg/L	NO3-N		0	0	0	7	3		
20	Alpha	1		6 COD	APC314	1	6.24 mg/L	COD		0	0	0	10	3		
21	Alpha	1		6 Ammonium	APC204	1	0.003 mg/L	NH4-N		0	0	0	4	3		
24	Est Alpha	1		7 LOC Ammonium	LOX035	1	0.723 mg/L	NH4-N		0	0	0	12	3		
25	Est Alpha	1		7 Nitrate	APC340	1	5.81 mg/L	NO3-N		0	0	0	3	4		
23	Est Alpha	1		7 COD	APC314	1	17.6 mg/L	COD		0	0	0	10	4		
22	Est Alpha	1		7 Ammonium	APC204	1	0.805 mg/L	NH4-N		0	0	0	4	4		
28	Theta	1		8 Nitrate	APC340	1	4.7 mg/L	NO3-N		0	0	0	3	5		
27	Theta	1		8 COD	APC314	1	14.2 mg/L	COD		0	0	0	10	5		
26	Theta	1		8 Ammonium	APC204	1	0.002 mg/L	NH4-N		0	0	0	4	5		
31	Est Theta	1		9 LOC Ammonium	LOX035	1	9999 mg/L	NH4-N		0	0	0	12	4		



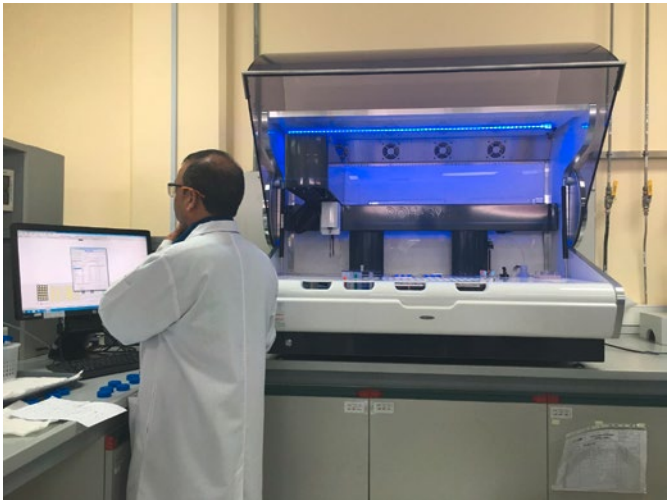
Automation means: No manual handling, no exposure to the reagents

The AP3900 software makes results easy to evaluate.

Summary

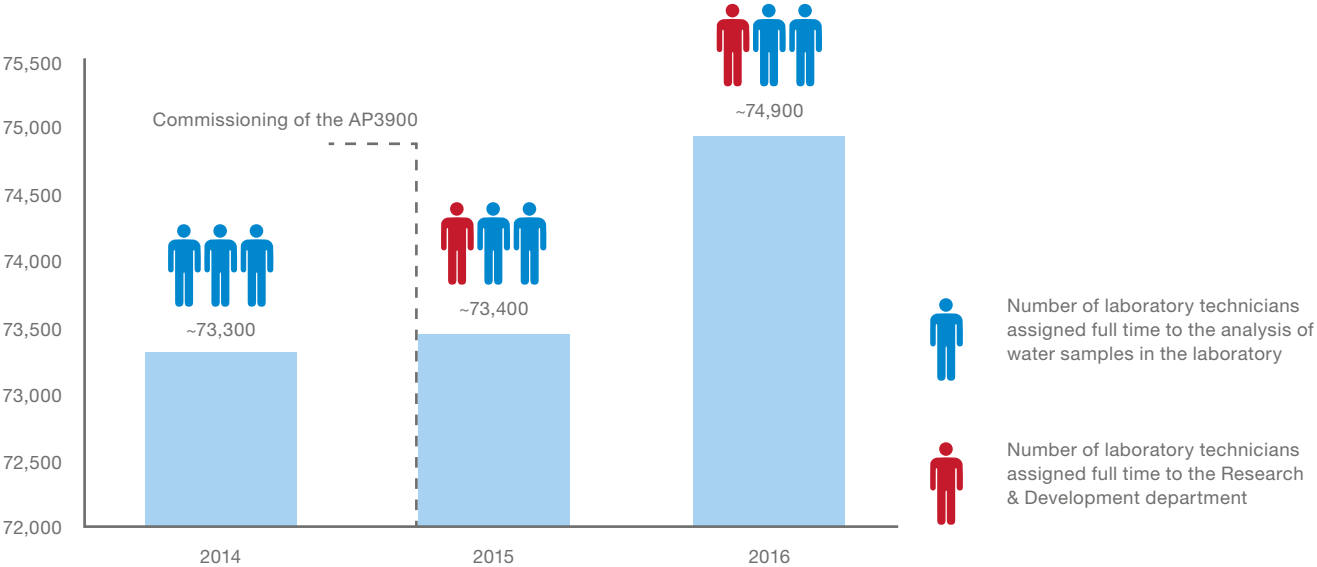
"This is without doubt one of the best and the most satisfying installations that has been done in the laboratory till date. I am very happy with the support provided by the Hach Team. The training done was very detailed and being a relatively simple software all laboratory personnel were able to grasp the basics of the operation of the equipment very quickly and within a few days the robot was already being used routinely in the laboratory."

Head of Laboratory, Industrial Laboratory Qatar



A laboratory analyst preparing the AP3900 for testing samples.

Approximate number of water analyses conducted per year



Impact of the Hach AP3900 on the number of water analyses conducted by the laboratory between 2014 and 2016, and on the utilisation of the laboratory manpower

Photometer range for all routines



SL1000 Portable Parallel Analyser using Chemkey technology



DR900 Multi-Parameter Colorimeter



DR1900 Portable VIS Spectrophotometer



DR3900 VIS Spectrophotometer



AP3900 Laboratory Robot for fully automated water analysis

The AP3900 is offered with complete chemistry as a modular concept. Basic version contains COD, total P, total N, Ammonium, Nitrate and Nitrite.

- Saves time and costs
- Increases productivity and flexibility
- Highest precision and accuracy due to automated procedures
- Parallel execution of different samples and methods
- Reliable, with complete traceability of results



DR6000 UV-VIS Spectrophotometer



For more information on the complete Hach laboratory portfolio please visit www.hach.com.