

HUMAN INTERACTION: THE KEY TO AUTOMATION

Ron Byrd and Kevin Solomon, Athlon, USA, explain why effective specialty chemical automation starts with people and service.

When developing and implementing a specialty chemical automation system at a refinery or any other operation requiring water and process treatment, people and service need to be the cornerstones of the solution. The benefits of human interaction are far-reaching.

The challenges

In refineries and petrochemical plants, the specialty chemical spend on water and process treatments makes up a portion of an operating budget. However, without chemicals and supporting services, there is a long list of potential risks that can result in downtime and loss of revenue.

Desalters, heat exchangers, boilers, cooling towers, furnaces, and waste water systems are just the start of a lengthy list of equipment, units and processes that can be impacted by corrosion, fouling, coking and other challenges.

The ever-changing crude slate and feedstocks that enter a site can wreak havoc on assets and throw water and process systems into disorder if not prepared for and managed properly. When it happens, the downtime alone for large refineries can mean revenue losses in the millions of dollars each day, not to mention the capital expense for repairs that will also be needed.

Specialty chemical programmes

Plants can achieve higher performance by partnering with a specialty chemical vendor to develop, implement, maintain and optimise treatment programmes that can include not just a specialty chemical but also a novel application and/or an engineering enhancements, including automation.

Automation has become an emerging and critical part of treatment programmes. It is an important weapon in the constant fight to maintain a healthy operation. The problem with automation, however, is that it is not often implemented, managed and used properly. Automation needs to be steered by people who understand what data is being collected and how it can help refiners meet their business goals, such as improved reliability, increased throughput, and enhanced efficiency and flexibility of operating units.

A holistic and experienced view is needed. Automation can provide it, but only if you have a knowledgeable service team looking at the collected data and interpreting it to make operational corrections and optimisations. The chemical service team to a refinery's operations is like a doctor to a patient.

A doctor uses his medical knowledge, skills, methods and experience in making the best medical assessment based on information he collects with tools and tests. This is exactly what a specialty chemical service team provides to a refinery. Automation enhances that service by providing the chemical team with a continuous collection of important data from which they can make informed and important decisions.

What is automation?

When one hears the term automation, it is typical to think of technology performed without human assistance. While that is true, this should not be the only goal of an automation system.

The goal should be to implement a continuous, real-time data collection and measurement system so

operations can monitor and use the feedback to help predict and mitigate risk and improve performance, while also permitting some automatic control.

There are many misconceptions about what automation is. Rather than acting as a 'silver bullet', the Athlon Solutions Assurance System (ASAS) is more about an organised system of standard water and process automation solutions from approved equipment suppliers and integrators. It is a collection of equipment implemented, monitored and used by a team of experts who know what to do with the data, like a doctor would with a patient's data.

The philosophy of an effective automation system

When developing an automation system for a customer, the final solution should be unique to their operations. No refinery or petrochemical plant is the same. This underscores the point that a qualified team of people is needed to implement and deploy what really is a standard set of equipment in a unique environment. It is how the equipment is used and how the data that it provides is interpreted.

As a result, a chemical automation team needs to be knowledgeable and customer-centric. They must understand the customer's goals and the operating envelope to implement and monitor a full-automation solution. When starting its automation engagements, Athlon keeps six principles in mind as part of its automation philosophy (Figure 1):

- Automation is a tool used to support a customer's operations.
- A competent technical service representative will never be replaced with automation.

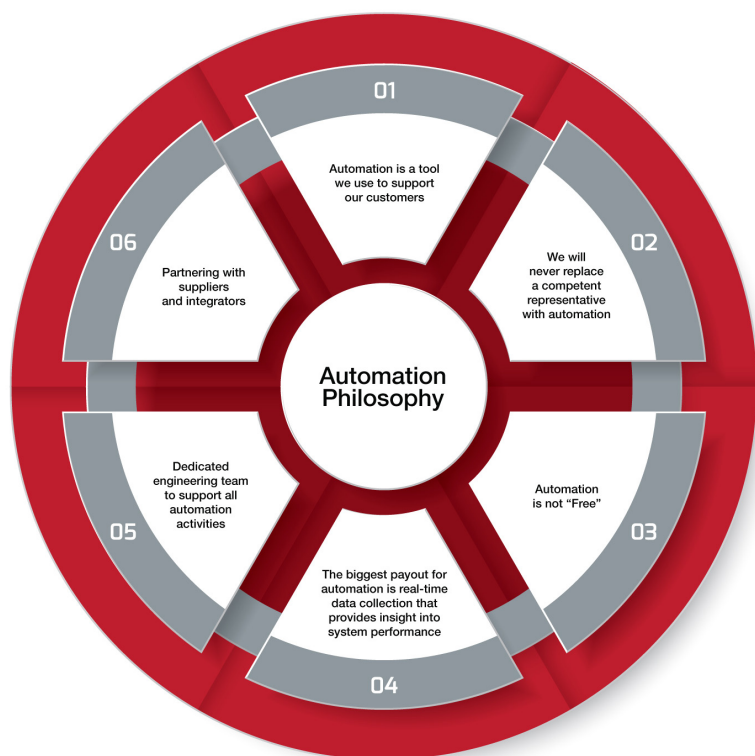


Figure 1. The six key principles of Athlon's automation philosophy.

- Automation is not 'free'.
- The biggest payout for automation is real-time data collection that provides insight into system performance.
- A dedicated engineering team is needed to support all automation activities.
- It is essential to partner with suppliers and integrators.

These six points are worth expanding upon.

One, automation is a tool and human interaction is needed. This is emphasised in the philosophy's first two principles. As mentioned earlier, the team needs to know how to use it and to interpret the data in conjunction with operational history for it to be effective.

Second, automation is an investment into equipment and services. To continue the doctor metaphor, think of the Benjamin Franklin quote: "An ounce of prevention is worth a pound of cure." This absolutely applies to automation. Refiners have to be prepared to invest in equipment, 'see' the onset of upsets and mitigate significant damage that could require a costly fix.

Third, the real value of automation is the data you collect. It provides the signs to make a health assessment of an operation. You can 'slice and dice' the data to learn negative and positive trends and patterns, enabling corrective actions if needed.

The data should be regularly reviewed by the chemical team and operations staff for it to be maximised for the benefit of the refinery. This data is largely collected through telemetry, which is the process of recording and transmitting the readings to a database for the chemical treatment team to monitor.

Not only does the team on the ground need to be experienced and knowledgeable, a dedicated engineering team is also necessary to backstop them. Such a team can work with field personnel to design new applications that promote reliability and improved throughput. They can also provide equipment support such as calibration, troubleshooting and maintenance.

The collected data can also provide the engineering team with information that leads to the identification and delivery of value-add projects, which can stack up favourably to a customer's annual chemical spend.

It is also important to partner with equipment suppliers and integrators. Leverage the lessons they have learned in the market.

Make automation a part of the service model

It is essential to understand a customer's goals and issues to help them. Once needs and expectations are understood, it is possible to develop a detailed service and communication plan that includes automation.

When framing up automation expectations with a customer, it is best to take an approach that shows how automation can optimise and improve their operations. Demonstrate how

chemicals and technology, when closely monitored with automation, can provide a step-change in performance, remove constraints that limit operations and move the refinery beyond the norm of current operating strategies.

Employing an automation solution as part of a service model will also provide a large body of analytics, predictability proof, newfound knowledge and experienced engineering support from which to draw.

Finally, all good service models require documentation and reporting. It is important to regularly document, report and review automation activities and results with the refinery's operations team.

How does automation work?

As noted earlier, an automation system is a collection of water and process automation solutions from approved equipment suppliers and integrators. They operate independent of each other, but together they provide the big picture of a refinery, which is a complex, interconnected system of process and water units.

There are many automation solutions that can be implemented into a refinery's operations, including: mass flow meters able to detect changes in fluids and control secondary injections to monitor trycock profiles and overhead accumulators; online analysers for overhead systems to adjust chemical feed rates; online probes to control NaOH and pH; patented Critical Electrical Field (CEF) technology to detect emulsion stability; and sensing, instrumentation and communications technologies for water treatment applications.

Figure 2 is a good overview of the different inputs that can be managed through automation and the treatment solutions that can be put in place as part of an effective specialty chemical programme.

Each automation solution is part of the Athlon Assurance Process Control. Through telemetry, each piece

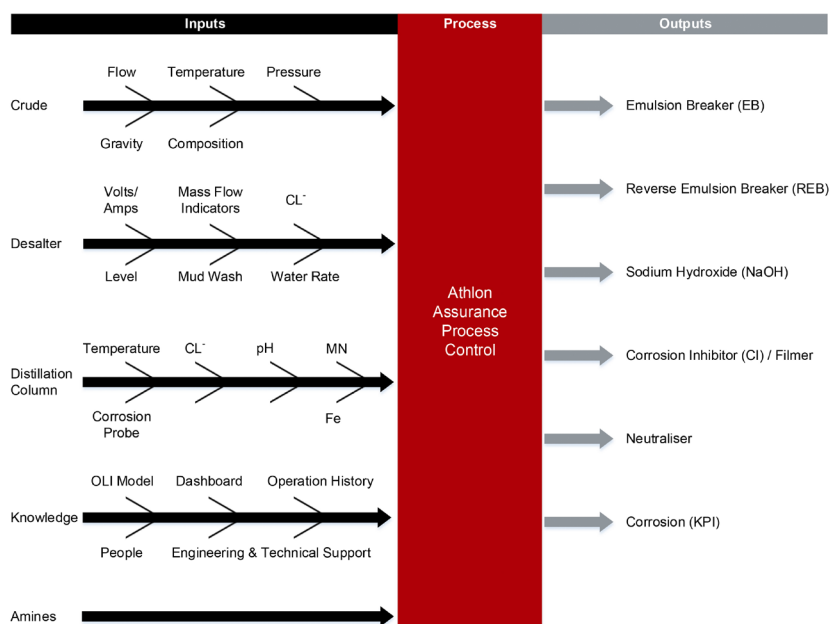


Figure 2. Overview of the inputs that can be managed through automation and treatment solutions that can be put in place.

of automation equipment collects and sends data to the treatment team to review, control and track key performance and operational indicators.

The information that is collected becomes the health check on the refinery's process and water equipment. The team looks at established process control parameters to monitor and to correct negative trends and to also identify value projects and other proactive activities to support the refinery's goals.

In the case of ASAS, all of these solutions are brought together through a performance dashboard, which is a comprehensive communication system that is often the anchor point for tracking results driven by automation. Key capabilities of the dashboard include the following:

- Access to all unit systems from the main screen.
- Service reports.
- Project updates.
- Historical data archiving.
- Monitoring that provides a single source of easily accessed data, recommendations and training, as well as the framework for all weekly and monthly reporting.
- Manual logging of all important operating data is performed on a routine basis in conjunction with the compiled data available.
- Visual observations on key variables are captured, archived and reported on a routine basis.
- Any variable can be viewed in a historic graph as well as the raw data.
- Control charting.
- Chemical inventory, usage, safety information and project status are accessible.
- Valuable training tool.
- Format is designed to provide value to all stakeholders across a refinery's operations.

Conclusion

Refineries and petrochemical plants are complex operations. There is a lot at stake, including revenue goals that hinge on asset protection, maximum throughput and steady-state operations. Specialty chemical programmes are implemented to help refineries reach their goals.

To meet these goals, automation can be implemented to boost a specialty chemical programme. It is an excellent way to continuously collect data from all parts of an operation. However, it will result in little if it is not steered and interpreted by experienced people who are committed to helping the refinery meet its goals.

A really good chemical team uses automation at a refinery to collect and interpret data like a doctor uses medical knowledge, skills, methods and experience to make the best medical assessment for a patient. Without human interaction, automation is just a tool. 