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Syngenta Uses Seeq Advanced Analytics to Drive Sustainability and Performance Goals

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Keywords

Carbon Emissions, Carbon Intensity, Seeq, Data Contextualization, Advanced Analytics, Collaborative Engineering Teams, Engineers, Data Scientists, Sustainability

Summary

Syngenta is focusing on improving its manufacturing processes, including design and energy-saving programs, increasing the share of renewable sources of energy, and partnering with crop protection and seed suppliers to

Syngenta is a global science-based agricultural technology company with headquarters in Switzerland that helps farms grow safe and nutritious food globally. With operations that span many different functions and working environments, the company is committed to excellence and sustainability across operations and the supply chain. The company's goals are to reduce water and operational waste intensity by 20 percent by 2030.

help reduce their carbon footprint. The company is committed to the goals of reducing water and operational waste intensity by 20 percent by 2030, in addition to other performance and sustainability goals.

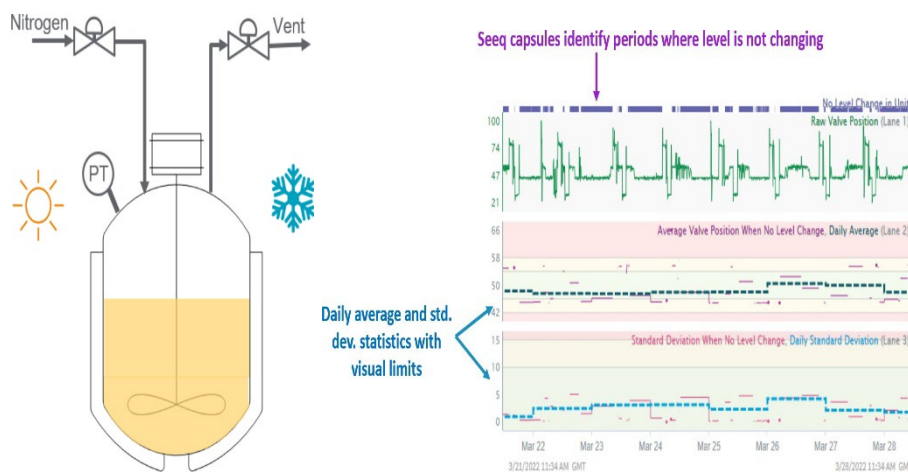
Dr. Stephen Pearson, Principal Data Scientist, described how Syngenta is using Seeq to drive its sustainability goals to ARC Advisory Group. According to Dr. Pearson, "it is important that data is available and visible so that users can get information that allows them to

take timely actions." Syngenta had developed several homegrown analytic solutions using experimental design (DoE) and analysis in the past and had gained a very good understanding of how to analyze industrial real-time data but was looking for a commercial solution that would make the statistical process easier and simpler. Seeq was selected as Syngenta's analytics solution because of its ease of use, data contextualization, scalability and data analysis capabilities. According to Dr. Pearson, "the users found that Seeq enabled them to get started quickly."

Syngenta replaced its custom in-house analytics tool with Seeq and deployed it in an AWS private cloud that is connected to its manufacturing sites across three continents. Having one global system allowed them to collaborate across sites and across functions using a common global language/analytics solution. Dr. Pearson shared several use cases on how Syngenta is using Seeq's Organizer, Workbench, and Data Lab software to help them meet their sustainability commitment.

Nitrogen Blanket Balancing Using Seeq

Dr. Pearson shared how Syngenta is using Seeq for Nitrogen blanket balancing. Because Syngenta works with flammable solvents, the company uses nitrogen balancing to increase safety and avoid fire explosion by ensuring that there is no oxygen present in their vessels.



Nitrogen Balancing Blanket Using Seeq Organizer Showing Time Periods Where the Level Is Not Changing

Nitrogen balancing is done by using two valves – one to add nitrogen when the pressure decreases and the other valve to vent nitrogen when the vessel is over pressurized. Syngenta used Seeq to identify when the vessel is in steady state mode and to find which valves operate abnormally. Heating and cooling caused by outside atmospheric conditions requires that Syngenta balance the venting and adding of nitrogen during and between operational steps.

Problems can occur due to faulty control valves, leaks, etc. It is important that balancing is done correctly because improper balancing can cause emissions issues, solvent losses, and nitrogen losses. A faulty control valve that

leaks can cause issues especially if it is blocked or partially blocked. Because all the vessels are interconnected and vented to the same header, a faulty control valve can cause a lot of problems. When trying to vent the vessel, the valves from one vessel can negatively affect another vessel. The valves open and close when material is transferred to and from the vessel.

Seeq is used to analyze the data and find time periods when the vessel is not changing (e.g., not filling or emptying). Capsules can be used to identify these time periods. Syngenta defines “normal” valve position as 50 percent with a standard deviation of less than 10 percent. Seeq’s scorecard metric is used to determine the average and standard deviation of the valve position. This information is then reported to the users in Seeq Organizer.

By viewing the 30-day Seeq visualization, users can quickly see that some vessels’ valves are doing well, and others have problems, and others have been edited with short-term fixes because of a control issue that was altered.

Last 30 days				
	Dec 26, 2023 12:00 AM - Dec 27, 2023 12:00 AM	Dec 27, 2023 12:00 AM - Dec 28, 2023 12:00 AM	Dec 28, 2023 12:00 AM - Dec 29, 2023 12:00 AM	Dec 29, 2023 12:00 AM - Dec 30, 2023 12:00 AM
weekly valve position	66.34%	46.91%	47.02%	45.12%
weekly standard deviation	1.120%	2.285%	2.791%	2.484%
weekly valve position	61.62%	51.06%	49.42%	48.32%
weekly standard deviation	10.023%	5.226%	6.875%	4.823%
weekly valve position	57.228%			
weekly standard deviation	8.079%			
weekly valve position	11.876%	4.213%	35.80%	41.884%
weekly standard deviation	10.808%	2.232%	1.208%	6.3927%
weekly valve position	44.188%	44.118%	43.437%	44.277%
weekly standard deviation	12.144%	10.475%	11.827%	7.703%

30-Day Snapshot of Control Valves, Built to Identify Faulty Blanket Control Valves (Venting Nitrogen Unnecessarily) On Seeq Organizer

Other issues that take longer to resolve, like those due to interconnections, are also identified in Organizer.

Syngenta’s engineering teams have been reviewing the results weekly and saving the company money. The savings from fixing each faulty valve to the company can be as much as 120,000 EUR (~\$130K) per year in lost nitrogen costs. Additionally, the company is reducing its fugitive emissions from solvents which reduces the company’s carbon footprint and increases their raw material usage efficiency. Previously, the company tried to make carbon intensity

calculations in Excel once a quarter, but it required a lot of work and time to gather the data and analyze it. With Seeq, the company views the live data as needed and distributes it weekly.

Reducing Syngenta’s Carbon Footprint Using Seeq

Prior to using Seeq, Syngenta calculated carbon intensity once a year because it was too much work to gather all the data and build analysis tools to continuously track carbon intensity. Syngenta used Seeq to calculate a baseline value for all carbon contributions in their process, then used that knowledge

to make targeted optimizations that reduce carbon intensity of its chemical operations. Using the software, the company makes better decisions about how to operate the plant using less steam and natural gas for heating, less air and less electricity for pumps, agitation, etc. to produce the same amount of product as before having the software.

The solution can identify at which operational times more resources are being used, allowing workers the ability to analyze and lower carbon intensity during those periods.

Seeq Workbench formula was used to apply Syngenta's accepted calculation methodologies to convert all instrument readings into carbon CO2 equivalents. Syngenta used a dashboard to determine where they produced excess carbon versus theoretical targets for products produced. The tabular view was used to aggregate results in dashboards. With the information from Workbench the company was better able to target areas for carbon reduction initiatives.

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Using Workbench's point-and-click data contextualization and visualization tools, Syngenta created a carbon tracking system to determine where the larger users of different carbon resources occurred. This way engineers rather than data scientists can identify and target the CO2 footprint by product type and operating mode and look for new ways to reduce carbon emissions. Using the near real-time carbon intensity data, the company was able to target improvements and operate at lower carbon intensity resulting in a smaller carbon footprint.

Carbon Intensity = CO2 (water) + CO2 (air) + CO2 (steam) + CO2 (natural gas) + CO2 (electricity)/kg material produced

The engineers used a dashboard in Seeq to determine when the plant was operating in different states and to measure Syngenta's carbon intensity. By changing how the plant operates during different states of operation and during different production runs they were able to reduce their carbon footprint.

Using Data Lab for Proactive Monitoring

Syngenta also used Seeq Data Lab for multivariate and machine learning analysis, which allows engineers and Data Scientists to integrate the information with Workbench and solve specific problems, and then view the data on a dashboard in Organizer. The software was also used to create heat models using real-time historian data to predict what would happen at different power modes.

Data Lab add-ons can be used, for example, to rapidly scale analytics and reports across assets to help replicate carbon intensity calculations from one process unit to many units and to create nitrogen blanket monitoring reports across hundreds of valves. Using Seeq, Syngenta can monitor many nitrogen blankets and hundreds of valves, a task that would take hundreds of hours in the past, in about an hour, enabling Syngenta to go from reactive to proactive monitoring.

Conclusion

Customers should consider advanced analytics like Seeq to help them identify, share and predict areas that need improvements easily and quickly. The software should bring value to the organization, save time and money.

Syngenta is driving sustainability goals and improving process performance through carbon tracking, dashboard creation, and asset-enabled scalability by using Seeq advanced analytics software. The benefits that Syngenta gained using Seeq included “significant person-hour savings in analyst’s time (4-8 hours) and report generation that resulted in proactive carbon monitoring in lieu of previous reactive monitoring,” according to Mr. Pearson. Seeq uses a common analytics language and platform in AWS cloud that enables global collaboration between disparate teams. The Seeq solution “gave Syngenta good business value with improved process visibility and improved workflow, environmental yield, quality and processes. It gave Syngenta the visibility to be more proactive and take action for the future.”

Mr. Pearson concluded, “now we can prevent a problem before it becomes a real problem. Having a global platform gives us a common language so that we can share knowledge and improve how we work – with disparate teams working on different functions at different sites using a common language to describe what they are doing.” Seeq has helped Syngenta fulfill their global sustainability commitments.

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