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How Element Unify Helps Evonik Reduce Corrective Maintenance Costs and Alleviate Data Science Burden

EVONIK
Leading Beyond Chemistry

At-a-Glance[1]

- Specialty chemical company
- €13.1 billion annual revenue
- 32,000 employees
- 100 countries
- Headquartered in Essen, Germany

Executive Summary

Evonik is one of the world's leading specialty chemical companies. When plant managers from two production sites in Mobile, AL, discovered that emergency maintenance for pumps and compressors represented nearly 75% of corrective maintenance costs, they decided to take action.

To avoid equipment failure and increase uptime, the team wanted to leverage condition-based monitoring, predictive maintenance, and root cause analytics. While the plants had a variety of data available from systems like GoPlant and Emerson EMS, the production data was messy. Data scientists spent 50–70% of their time on data cleanup — leading to slower realization of analytics benefits.

Arpan Seth, Senior Data Scientist and Process Engineer, turned to Element Unify to produce clean, contextualized asset data models that integrate metadata from source systems and ultimately enable dashboards in Microsoft Power BI–providing a 360-degree view of the plant's pumps and compressors.

In just eight weeks, Evonik was able to deploy two asset data models for 464 pieces of rotating equipment at both plants. The results? The plant operations team is now able to predict equipment failure and make informed maintenance decisions using Power BI dashboards. Plant managers estimate a potential savings of $2M over five years, based on the ability to prevent four pump failures per year from just one analytic at one plant.

Going forward, the team will be able to rapidly scale these analytics to other plants, as well as test and validate new AI and machine learning technologies at speed thanks to Element Unify.

Challenges
- Connecting and integrating disparate sources of asset data
- Time and expertise needed for data cleanup and preparation

Solution
- Connect to Aspen InfoPlus.21, SAP and Emerson EMS using Element Unify, to automate data extraction and cleanup
- Purpose-built IT/OT data management solution for data scientists; 360-degree view of equipment for plant operations teams

Results
- 80% less time to build asset models
- 40% less analytics deployment work
- Potential savings of $550K over 5 years, from one analytic at one plant
- Improved data accessibility, enabling future analytics and AI/ML initiatives

The Company

Evonik is no stranger to innovation. Over the last century, the company has evolved to become one of the world's largest producers of specialty chemicals, generating over 13 billion EUR in sales in 2019[1].

Evonik supplies a diverse range of chemicals and proprietary materials to its customers. More than 80% of the company's chemical sales today come from leading market positions[1].

Evonik currently holds approximately 24,000 patents and pending patents and has either registered or applied for 6,900 trademarks.

The Germany-based company has also strengthened its competitive position in global markets and is active in over 100 countries.

Evonik has undergone several transformations leading to its current organizational structure. This structure, in addition to the nature of the specialty chemicals industry, generates a massive amount of data from different source systems.

BACKGROUND

Predictive Maintenance is An Industry-wide Struggle

Chemical manufacturers and other process industries have an immediate opportunity to optimize plant performance and reduce costs through continuously improved condition monitoring and predictive maintenance. In fact, industrial manufacturers could save an estimated $50 billion simply by avoiding unplanned downtime[2].

Many process-based organizations are launching pilot programs to test how analytics like condition-based monitoring and root cause analysis can benefit their operations. Nevertheless, creating and maintaining asset data models to enable these use cases at scale remains an industry-wide issue.

Historically, manufacturers tend to approach managing data in a fragmented way. Data is stored in disparate systems like SAP and GoPlant, each with their own standards. Consequently, information is available to the immediate system where it has a direct application, but the ability to combine and leverage this data to solve critical plant issues remains out of reach.

Forward-looking OT and IT leaders recognize that, in order to transition into this new era of automation intelligence and machine learning, they must move toward more centralized, consistent, and contextualized data systems. Organizations should approach this issue with a sense of urgency, given that 42% of chemical industry CEOs say they plan to prioritize digital operations and related technologies such as sensors, digital twin, and drones in the next 12 months.[3]

THE CHALLENGE

Leveraging Data to Improve Asset Reliability & Reduce Maintenance Costs

Evonik's Mobile, AL, facility is its largest site in North America. Its Crosslinkers and Active Oxygens plants manufacture crosslinkers used in paints and coatings, as well as hydrogen peroxide and other chemicals.

As a major supplier for many industries, ensuring asset reliability and preventing unplanned downtime are critical challenges.

When plant managers at these two production sites discovered

that emergency maintenance for rotating equipment (ex. pumps and compressors) accounted for 75% of corrective maintenance costs, they saw an opportunity. The ability to predict when assets fail or require maintenance is a game-changer.

According to the managers, consistent downstream abnormality in plant or equipment KPIs — e.g. pump current or pump running time approaching mean time between failures — are symptoms of equipment failure or plant downtime. Several factors can lead to this failure, such as a pump seal leak. Although both plants held vast amounts of operational data in various systems, this data was difficult to sort through.

In order to find the information needed, engineers burned a large amount of time pulling data from these systems

and plugging it into Excel. On occasion, they are forced to rely on experience and intuition to make on-the-spot decisions. Evonik was ready to move toward more data-driven decision making adding a layer of insight to expert observation.

Furthermore, production data is "messy". Data scientists spent a disproportionate amount of time — as much as 50-70% — on data cleanup, impeding the testing and innovative pace of the team. Creating integrated views of time-series and transactional data was very painful and not scalable for additional plants. The end result was limited predictive maintenance capability, slower realization of data analytics benefits, and the inability to efficiently test and implement new technologies to solve operations issues.

THE SOLUTION

A Purpose-built IT/OT Data Management Solution

Element Unify's technology is the perfect solution for process-based operations looking to scale digital transformation. The software snaps into existing IaaS Cloud environments — with no "rip and replace" — complementing existing and next gen Industrial IoT services. For Evonik's data scientists, the days of painstakingly cleaning and combining data are over.

What's more, Element Unify allows data scientists to easily build, deploy, and maintain asset data models for the

plant's pumps and other asset classes they decide to model. Rather than wrangling new data for each analytics use case, the team can build the models once and use them over and over again.

After ranking potential use cases by the value they would return to the business, the Evonik team decided to focus on building these key analytics:

1. Condition-based monitoring
2. Predictive maintenance
3. Root cause analysis

IMPLEMENTATION

464 Pieces of Equipment Modeled in 8 Weeks

Building the asset models was remarkably simple. Implementation started with importing tag metadata from Aspen InfoPlus.21, a master equipment list from SAP, electronic operator logs,
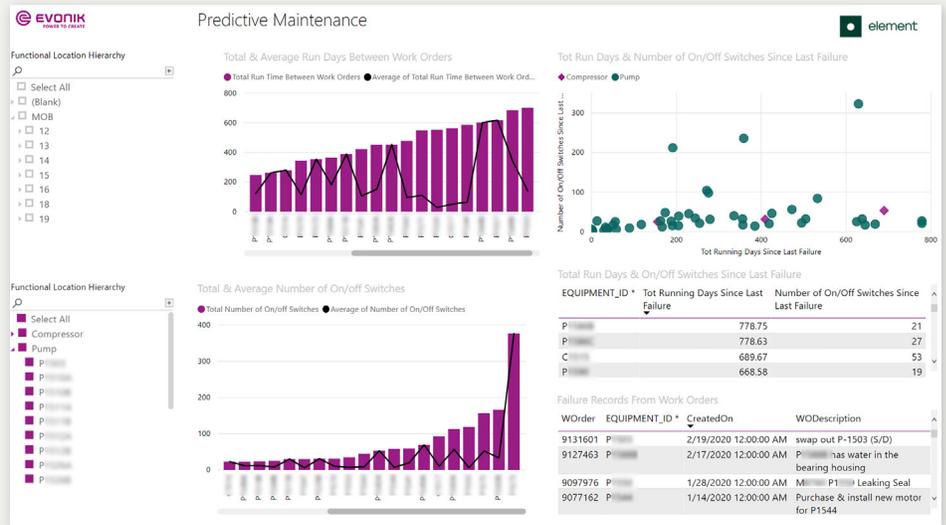
work orders, and vibration metadata, into Element Unify. Critical information, such as equipment references, was extracted from these data sources and integrated. The tags from IP.21 were also mapped to

Element Unify's starter templates, which are pre-configured to save time. The asset data model created in Element Unify was then used to provide the context and relationship between the time-series and transactional data, all residing in Microsoft SQL Server.

With Element Unify at the heart of this system, users were able to connect Power BI and create five dashboards for condition-based monitoring, predictive maintenance, and root cause analysis.

Examples of these dashboards are shown below:

Predictive Maintenance Dashboard

Root Cause Analysis

Evonik originally envisioned a timeline of eight weeks to build and deploy models for 20 assets — a goal they quickly surpassed. Due to the reduced effort needed to build models in Element Unify,

Evonik was able to deploy two asset data models for 464 pumps and compressors at the Crosslinkers and Active Oxygens plants in that period.

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> *"There's a new startup every day trying to apply data science and machine learning to the manufacturing space. Having our data ready and in place speeds up how quickly we can test out these new technologies — and that speeds up innovation. We see Element as an important partner in that aspect."*
>
> *Arpan Seth | Evonik*

Without Element Unify, the team estimated that building the first analytic at the first plant would have taken 90 days. Instead, data modeling took 60 days including validation cycles with plant engineers and subject matter experts (SMEs).

Replicating each analytic at the second plant and each subsequent plant thereafter would have normally taken 60 days. However, it only took 20 days to build the model and apply the same analytics with Element Unify — slashing the cost and burden for data scientists.

THE RESULTS

40% Less Deployment Work and $550K in Maintenance Cost Savings

Element Unify has helped Evonik's data scientists develop data models 80% faster and deploy analytics with 40% less work. Since implementing Element Unify, the plant operations team is now able to predict equipment failure and pinpoint root causes for plant downtime using Power BI dashboards. For example, plant engineers can view a dashboard showing recent asset performance. They can see the amperage of a pump or compressor and if it's running.

On the same dashboard, the engineer can see operator logs and work orders, in addition to vibration history. With all this information at their fingertips, they can make informed decisions about equipment maintenance during the shift. And because the information from Element Unify is always clean and up-to-date, they trust the data.

Plant engineers can now anticipate when a pump is approaching failure based on its history. This means they can proactively schedule maintenance and avoid pump failures before they happen. A data analyst estimated that one analytic at one plant can save the company $110,000 by preventing four pump failures per year, representing a potential savings of $550,000 over 5 years. Scaling the analytic to additional plants has a potential for significant savings for the company.

Evonik also uncovered several hidden issues, including faulty sensors and misclassified work orders, thanks to Element Unify's integrated reporting. The ability to detect issues with the data saves a tremendous amount of time.

Harnessing the Future

The applications for data science in the chemical industry are endless — from forecasting KPIs to improving operational control. In the past, Evonik's ability to take advantage of new technologies was limited by the time it took to combine and clean data from various sources and systems.

Now that Element Unify is in place, Evonik's team sees potential to realize long-term value — not only from analytics

but also AI, machine learning, and other future technologies. Siloed, inconsistent, and incompatible data is no longer a major barrier to innovation. With a purpose-built IT/OT data management solution for asset-related data, testing and validation of new data science applications can occur in weeks instead of months.

About Element

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Element powers digitally-enabled operations for the Industrial Enterprise. Tackling one of the most critical gaps in Industrial IoT — the fact that 95% of data across the Industrial Enterprise is unusable because it's fragmented and disconnected — Element Unify breaks through the data silos by bringing IT and OT data together for the first time on a single solution. With Element Unify, IT and OT teams can collaboratively make data-driven operational and business decisions around rich, contextualized metadata, while ensuring scale, reliability and security.

See How Element Unify Can Drive Innovation and Value for Your Operations

Evonik's transformation is just one example of how Element is helping large industrial enterprises realize the benefits of analytics in a rapid, cost-effective manner. To learn more about how Element unify can benefit your organization, contact our team or request a demo.

Endnotes

1. The Evonik Group. "FINANCIAL REPORT 2019" *Accessed 10 September 2020.*

2. Industry Week & Emerson. "How Manufacturers Achieve Top Quartile Performance" *Accessed 4 October 2020.*

3. Price Waterhouse Cooper. "Chemical Trends 2020: Winning Strategies for an Era of Sustainable Value Chains" *Accessed 12 October 2020.*