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Total Refining & Chemicals Rolls Out Self-service Analytics Software Globally

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Keywords

Self-service Analytics, Industrial Analytics, Predictive Analytics, Predictive Maintenance, Production Efficiency, Safety, Energy Management, Refining and Chemicals, Total, TrendMiner, OSIsoft

Overview

Many industrial companies today are evaluating and testing advanced analytics solutions to gain insights into their real-time process data. These analytics solutions allow organizations to quickly discover and diagnose potential issues and help plant workers improve performance.

Total wanted technologies that made it easy for subject matter experts, such as process engineers and plant operations and maintenance personnel to gain actionable insights from their data to quickly diagnose abnormal conditions or potential problems. The company launched an advanced analytics pilot project last year at its Antwerp site. The benefits demonstrated during that pilot were sufficient to justify a global roll-out of the TrendMiner software to Total's refining and chemical plants.

At the OSIsoft User Conference, Fabrice Leclercq, Mechanical Engineer for the Refining and Chemicals segment of the Total Group, described how the company had piloted new technologies at its refining and chemical sites to increase plant availability, efficiencies, and overall equipment effectiveness (OEE).

Total wanted a solution that made it easy for process engineers, field operators and maintenance personnel to gain actionable insights from their data to quickly diagnose abnormal conditions or potential problems, as well as monitor good behavior and make better decisions. The company launched an advanced analytics pilot project last year at its Antwerp site to assess whether TrendMiner could fulfill these key requirements in practice. Within the pilot, real-time process data from the OSIsoft infrastructure was combined with TrendMiner's self-service process and asset analytics software. The benefits demonstrated during the pilot were sufficient to justify a global roll-out of the solution to Total's Refining and Chemicals plants.

A Responsible Energy Major

Total, a global integrated energy producer and provider and leading international oil and gas company, is also a major player in solar energy with SunPower and Total Solar. The company prides itself on being "the responsible energy major," which it interprets as meaning maintaining high HSE standards, meeting IEA's ambitious target for minimizing global warming, promoting responsible energy use by customers, and being recognized for its local services. According to the company, its 98,000 employees are committed to better energy that is safer, cleaner, more efficient, more innovative, and accessible to as many people as possible. As a responsible corporate citizen, the company focuses on ensuring that its operations in more than 130 countries worldwide consistently deliver economic, social, and environmental benefits.

To contribute to achieving these goals, the Group's Refining and Chemicals segment has developed a digital roadmap towards becoming an even more efficient, data-driven organization. The priorities for this roadmap are: safety, availability, cost control, and energy efficiency.

Refining and Chemicals industrial plants have thousands of assets and millions of sensors, generating huge volumes of data for analysis. Mr. Leclercq emphasized the critical need to analyze this data in real time and said that the technology used must empower plant personnel to interpret the data themselves.

Pilot Project Objectives

Total decided to pilot an analytics software tool to help get intelligence from its data so that employees could quickly determine the cause of process behavior or events. Whenever a problem or abnormal situation occurs in the plant, the operators and process engineers are often asked questions such as: "Has this happened before?" and "Which conditions caused the event?" While common, these types of questions can be difficult to answer, often requiring extensive and time-consuming data investigations.

Requirements for Analytics

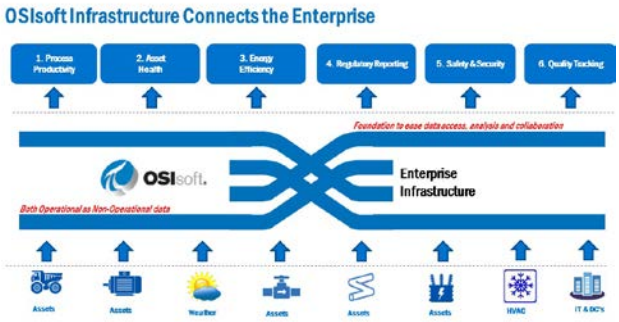
Total wanted to reduce spreadsheets and improve its ability to make sense of day-to-day situations using the analytics software. The following capabilities were required:

- Pattern-based search and discovery
- Ability to diagnose process behavior and anomalies quickly
- Monitoring live process and asset performance
- Prediction based on historical information
- Ability to analyze data in real time to enable faster decisions

The technology's search capabilities were important, particularly the ability to access sensor and asset information quickly.

Selection Process

To select its analytics software, Total looked at various types of analytics tools. The company categorized the tools into two categories: generic and operations-specific. Since generic tools require both IT development and data scientists or experts, they are not ready for end users "out of the box." Operations-specific tools, in contrast, are designed to work right out of the box with operations-specific data. Operations-specific tools require only configuration by IT, rather than IT development.



OSIsoft and TrendMiner Technologies Help Improve Efficiencies at Total

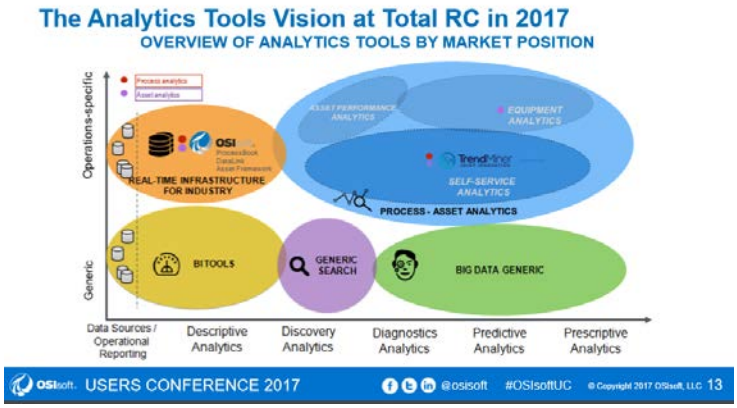
The company also classified the tools by their analytics capabilities: descriptive, discovery, diagnostics, predictive, and prescriptive. In this context:

- *Descri*be illustrates what happened based on historical data
- Discover enables the ability to search historical data to determine what happened in the past
- *Predict* tells what will happen in the future based on historical data
- *Prescribe* gives the user a recommendation on actions they could take in the future.

The company also desired software tools could combine historical and current data to determine the what, why, and how of any issues or events; and that subject matter experts with no special analytics background could use directly on operations-specific data without requiring IT development.

Discovery and Knowledge Sharing in Hazardous Production

By combining data and operational reporting from OSIsoft PI with the self-service industrial analytics and data visualization capabilities of TrendMiner, Total was able to meet its requirements. Using TrendMiner, process engineers and other operations and maintenance personnel can select process tags and search for specific behavior. Data is represented graphically, so users can match patterns, compare with similar events in the past, and find correlations quickly. They can compare transitions in batch activities and share the information with everyone who needs it.

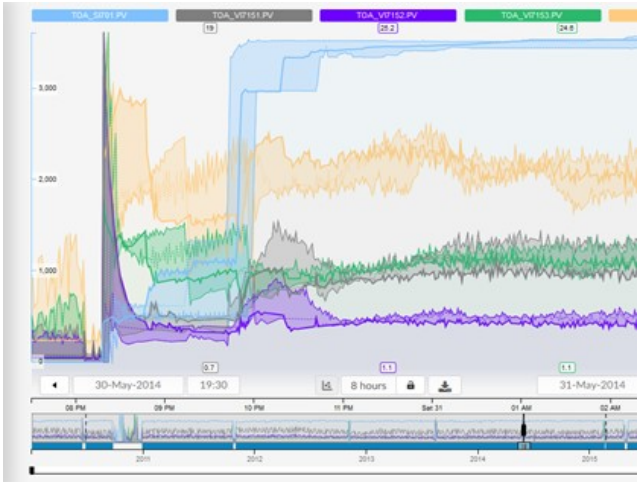


Total's Analytics Assessment for OSIsoft and TrendMiner

Users within the Refining and Chemicals activities pilot found that with TrendMiner they could easily discover correlations in the data, share their findings within the organization, and capture it for future use by adding annotations.

Operating within Constraints

"It is important to realize that we are not playing with water – we are working with hazardous chemicals," Mr. Leclercq commented. Machinery and other asset limits must be integrated into the data because the limits or constraints cannot be exceeded. Normal operations were based on historical data, rather than the information in their specifications. TrendMiner's pattern-based fingerprinting enables users to select one or more process tags and search the data for similar performance to determine normal or optimal operating conditions. They can then compare the fingerprinted patterns to live data and benchmark performance within the operating window.



Data Analysis of Historical Data Shows Operating Windows

In the steam cracker example, five curves for different attributes are included to monitor optimal operating conditions. The live data is then compared to determine if the unit is operating within the set limits.

Self-service Industrial Analytics

Total's technology evaluation included a functional assessment and survey of pilot users. The Refining and Chemicals team determined that the OSIsoft and TrendMiner technologies are complementary, with little functional overlap. With approximately 45 users involved in the pilot, it was important that everyone could use the technology; giving the power of the data to the people who must interpret it - the operators, plant engineers and other plant workers – not just data scientists.

Total's assessment gave high scores to the pilot's self-service capabilities, user friendliness and the solution's value potential.

According to Mr. Leclercq, TrendMiner can be managed centrally, and as a "plug and play" technology, it is compatible with the IT security and landscape. The TrendMiner solution enables easy accessibility of the data and intelligence, comes fully programmed, and can be configured with agility. It enables users to look at their equipment, troubleshoot, and account for each asset separately. Mr. Leclercq believes that they can do more with their data and improve productivity. Next steps include looking at assets as fleets with standard calculations and KPIs and using PI Asset Framework to manage them.

The Total pilot users described the key benefits of TrendMiner as:

- Time gain - By obtaining intelligence directly from the system they would not have to view multiple time-consuming spreadsheets to diagnose problems
- Testing hypotheses – The tool allows them to test potential outcomes of different scenarios
- Diagnose problems better – Users identified their ability to determine the cause of problems faster, send an alert or alarm to the user, and impact potential problems to avoid abnormal behavior

Next Steps

Based on the success of the pilot, the technology will be rolled out to Total's Refining and Chemicals plants around the world over the next nine months to empower all Total subject matter experts to interpret their own data and make faster decisions, contributing to the company's continued success. Because of the benefits gained from the pilot, Total has added TrendMiner to the company's digital solutions catalog for Data-Driven Asset Performance.

Benefits

The pilot showed significant benefits in all four of Total's industrial priorities: reducing safety risks, improving asset availability, reducing operational costs, and increasing energy efficiency. Additionally, the plug-and-play diagnostics, monitoring and predictive capabilities are expected to bring benefits in areas not yet explored.

Not only did the technology reduce the time users needed to solve and diagnose problems, it improved their ability to share and capture knowledge.

Recommendations

Many different analytics solutions are available today and ARC believes that it is important for operating companies to carefully assess business and user needs and requirements when evaluating the available solutions.

ARC recommends piloting the technology to gain a better understanding of the capabilities and the potential benefits before making an enterprise-wide commitment. The Total pilot helped the company estimate ROI and enable a smoother roll-out because they now know what to expect.

ARC recommends the following actions for owner-operators and other technology users when selecting an industrial analytics solution:

- Select technology from suppliers that have experience and the competency to integrate existing data that works with your applications and existing IT requirements
- Look for technologies that empower subject matter experts such as process engineers, field operators, control room personnel and maintenance teams to discover and solve their own process problems (without help from data scientists)

- Proceed with a pilot to test the technology and determine key success factors and benefits
- Look for the ability to annotate process behavior and share the knowledge
- Find suppliers with knowledge and experience of the problem your organization needs to solve
- Carefully review requirements against capabilities to ensure the proof points are in place and the technology is appropriate for your company.

The ARC Advanced Analytics Supplier Evaluation and Selection Service can help owner-operators make a more informed and objective purchasing decision for this critical technology.

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