Seeq

5 Questions to Ask When Selecting a Process Manufacturing Analytics Solution

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Introduction

Process manufacturing organizations run on data—from a manufacturing, operations, and business perspective.

The data generation and collection strategies at the center of manufacturing processes have evolved dramatically, especially in recent years. Process manufacturers now collect and store huge volumes of data throughout their operations, both on and off premise, across multiple geographic locations, in an increasing number of separate data silos.

These advances have coincided with the proliferation of connected sensors and increasingly inexpensive storage, leading to an Industrial Internet of Things (IIoT) projected to generate more than 4 trillion gigabytes of data per year by 2020, according to IDC Research.

Data analytics solutions have a huge positive impact on the growing volumes of data in many sectors, from retail to finance. So why aren't these solutions widely leveraged in process manufacturing? With so much data and the promise of so many new technologies, why is it so difficult to apply these technologies to process manufacturing and gain the same benefits as other sectors?

Why do process manufacturing organizations still feel like they have too much data and too little insight?

At Seeq, we believe this gap—between the data process manufacturing organizations have and the insights achieved—exists because some data analytics solutions fail to completely grasp the unique challenges and opportunities presented by process manufacturing. Aggregating data from different sources (e.g. process historians, sensors) is especially challenging for analytics solutions that were not developed specifically for process manufacturing.

When we talk about data analytics solutions, we mean any software enabling process engineers or scientists to:

- Create a cleansed, focused data set for analysis through assembling, aggregating, or wrangling data from various sources, including data historians, offline data, manufacturing systems, and relational databases

- Investigate operations data using "self-service" tools to rapidly analyze alarm, process, or asset data for ad hoc or regular reporting

- Publish or share insights and reports across the organization to enable data-driven action, or enable predictive analytics on incoming data

Many data analytics solutions claim to offer some or all of these things—with the goal of finally closing the gap between data and insight. But are they successful, and what are the criteria that determine success?

In this paper, we propose five questions we believe every process manufacturing buyer should ask when evaluating a data analytics solution.

Questions #1

Is the data analytics solution designed specifically for process manufacturing, and can it handle time-series data and solve intricate process manufacturing problems?
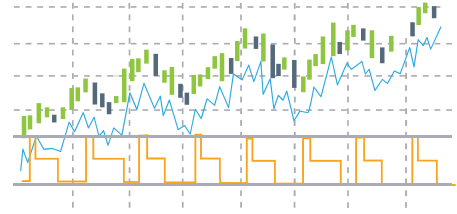
Why it matters

Anyone who works with process manufacturing data knows it isn't like other data. No matter the industry—from pharmaceutical to mining to oil and gas—the data produced and the assets involved present a tangle of convoluted relationships and contextual challenges.

Whether you're looking at a refinery, a production line, or a wind turbine farm, there are historians collecting data across many different protocols used by multiple vendors across a disparate array of equipment, all of varying ages and implementations.

These systems are typically producing data at speeds and volumes that other industries would find dizzying, and at uneven intervals that can confound conventional analytics solutions. All this data also needs to be cleansed to be useful.

To make matters worse, all these events and signals lack the associated context to make them meaningful on their own—a problem that is further compounded when assembling data from multiple sources which requires the addition of these key relationships.

An analytics solution should do the heavy lifting of synchronizing, cleansing, and contextualizing time-series data from different sources so your specialists have a complete, accurate data set to work with.

Finally, process manufacturing data is hard to navigate. Sensors have timestamps that need to be aligned and aggregated across specific ranges in time. It is difficult to get answers to even the simplest of questions and overcome hurdles that transaction data doesn't have.

What is needed

Many analytics, reporting, and industrial control systems can present data, but process manufacturers have far fewer options for solutions that can coordinate and aggregate data in helpful ways. In your evaluation, you should consider how easily the analytics solution makes it for users to select an appropriate time series for analysis and synchronize input from various control systems, sensors and other sources (which may report at different intervals) to present an accurate view of activity within the specified time window.

An analytics solution should do the heavy lifting of synchronizing time-series data from different sources so your specialists have a clear, accurate data set to work from. The solution should not require them to download data from different systems (control systems, databases, sensors, spreadsheets etc.) and coordinate it by hand in spreadsheets before any meaningful analysis can begin. It should also support the most useful analysis and output formats for time series data, such as pattern search, value search, and scatterplot charts.

Questions #2

Does the analytics solution rely on your experts or its experts?
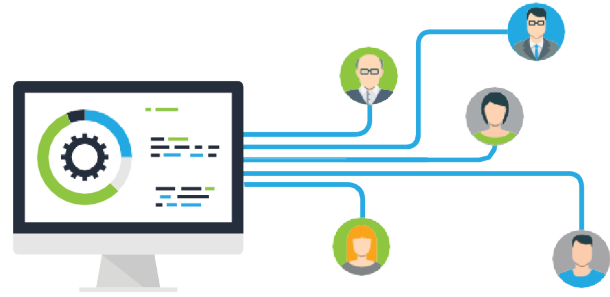
Why it matters

Beware of experts bearing correlations. Many data analytics vendors know their own technology extremely well, but don't know much about process manufacturing. For example, an analytics solution might tell an oilfield operator that production is diminishing at a specific well, but would not point the operator to check a specific asset, which an industry-focused solution could do. Lack of process or vertical expertise can lead to a focus on the analytics themselves rather than the implications of any findings—and, in turn, an emphasis on correlations over outcomes.

The key to positive business outcomes for process manufacturers is empowering subject-matter expert employees. A typical process manufacturing organization has a great deal of expertise at its disposal, spread out across different roles including skilled process engineers, analysts, architects, team leads, and other technical specialists.

These experienced front-line users often have decades of experience, detailed knowledge of the company's processes and history, situational awareness of its operations, and fluency in plant assets, sensors, and tags. They have the advanced technical education and experience to ask smart, productive questions.

Unfortunately, these employees are often limited by an aging suite of software tools, most of which were originally created in the mid to late 1990s. They know the right questions to ask—but using existing data analytics tools to answer those question can be difficult and time-consuming, approaching impossible in many cases.

> Analytics solutions for process manufacturing should put power into the hands of the people who can most efficiently create the most positive outcomes.

What is needed

Packaged analytics solutions won't know more than the process engineers and quality specialists that focus on your operations every day, and they shouldn't pretend to. Instead, data analytics solutions should make it easy for your specialists to access and work with the data they need so they can apply their particular expertise.

Process engineers excel at solving problems and driving incremental improvements by studying how slight changes impact performance. Solutions that save time by helping engineers isolate variables will return tremendous value because users can focus on making changes and modeling results, instead of collecting, coordinating, and preparing data.

Analytics solutions for process manufacturing should put power into the hands of the people who can most efficiently create the most positive outcomes by providing productivity tools and features to help them assemble, cleanse, search, visualize, contextualize, investigate, and share insights from process data—all without involving IT experts.

If you give the right tools to the right people, you can immediately see positive results.

Questions #3

Is the analytics vendor more focused on the problems being solved or the technologies involved?
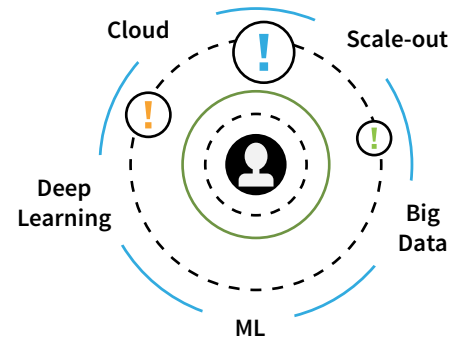
Why it matters

We're in the midst of an overwhelming wave of innovation that includes software innovation with big data, hardware innovation highlighted by highly scalable, on-demand computing architectures, and cognitive computing innovation marked by ongoing advances in machine learning and deep learning. These rapid advancements have led to two big problems for anyone trying to compare analytics solutions for process manufacturing organizations.

First, emerging technologies—big data, predictive analytics, machine learning, cloud computing, and others—have eclipsed the narrative of benefit and impact. The capabilities of these technologies have surpassed our understanding of the best way to get value from them. Rather than discussing why we should adopt a particular innovation, the conversation focuses too often on what technology to use, often with more enthusiasm for the technology than the actual benefits.

Second, the sheer pace of recent innovation means there has been too little focus on fitting new offerings into existing environments. Technology generations used to last decades, now it feels like months. Many companies get lost in the fog of technology discussions instead of focusing on end results and engineers don't necessarily want technologies, they want insight and solutions. Technology is just one resource (an important one) that gives engineers the insight they need to make improvements.

> Analytics solutions for process manufacturers should fit into existing information system infrastructures and enhance them rather than force the enterprise to continually catch up to adapt the latest technology.

What is needed

The world of big data, predictive analytics, machine learning, and cloud computing needs to be turned inside out—from a technology-centric revolutionary approach to a user-focused, problem-solving evolutionary approach.

Engineers can't just start by "grabbing a bunch of sensor data" – it isn't a trivial task. It's also often the start of a longer process that involves cleansing, adding context, and performing calculations—a process that needs to leverage the hard-won insights and institutional knowledge of engineers.

Analytics solutions for process manufacturers should fit into existing information system infrastructures and enhance them rather than forcing the enterprise to continually catch up to adapt the latest technology. Process control systems, historical production records, ERP systems, and specialized applications and processes are at the heart of your business. Process manufacturers need analytics solutions that can easily fit into these environments through interfaces to, for example, Emerson, Honeywell, OSIsoft, Siemens and other leading systems and enhance their value by extending their functionality and allowing the data they collect and produce to be easily used and shared in new ways. It is better to leverage existing investments than to continuously make new ones.

Does the analytics solution require you to move, duplicate, or transform your data?

Why it matters

Contextualization has always been difficult with process data, often requiring manual effort and painstaking work in Microsoft Excel® to define relationships between relevant data. Historians have come a long way in terms of trend viewing and investigation, but "Export to Excel" is still every historian's most important feature for doing the "real work" of data aggregation, context, and modeling.

For example, a pharmaceutical engineer might have several hypotheses to explain a bad batch outcome, ranging from an error by a particular operator to a bioreactor maintenance event to a specific raw material variation. The data exists to validate these hypotheses, but it requires bringing together disparate databases, often across multiple data silos, and then creating context to evaluate the data.

This contextualization process goes by many names—including data wrangling, data harmonization, and data blending—but for many analytics solutions, these tasks still require manual data transformation and duplication. Duplication adds hidden cost to the environment by increasing storage requirements and bandwidth consumption.

> Analytics solutions for process manufacturers should easily aggregate data from disparate sources and perform the complex calculations needed to synchronize data points that were collected at different intervals.

What is needed

Users achieve meaningful results when they can focus on data analysis instead of data collection and processing. Analytics solutions for process manufacturers should easily aggregate data from disparate sources and perform the complex calculations needed to synchronize data points that were collected at different intervals. It should also allow engineers to contextualize data without getting IT or other experts involved, without duplicating or transforming the data, and without creating additional data lakes.

Can the solution help your engineers work as fast as they can think?

Why it matters

Engineers typically look at data for a specific reason. For example, because an alarm went off in a system, or someone has asked a question, or they need to generate a report. Traditional analysis tools often require specialized skills or syntax, so these tasks can be difficult and time-consuming—and the tools are typically only mastered by a few people within an organization.

Beyond the struggles of individual users, few tools are built around collaboration and organizational knowledge capture. When one user cleanses data for a project or creates context and relationships among data sources, that analysis and information is often lost, with no way for other users to discover or leverage it.

Analytics solutions should make it easy for engineers to distribute their work and provide a central place where employees can work together to leverage each other's expertise and information.

What is needed

Data analytics solutions should be flexible enough to support both real-time collaboration and existing workflows. Engineers should be able to interact with tools spontaneously, as quickly as they can create tasks or devise hypotheses. The user interface should allow Google-like searches instead of requiring users to learn a new environment.

Insight gains value when it is shared. For example, one person might know a certain set of process data really well, and they know how to clean and transform that data, while another person might know the ERP system really well, and another might be an expert with your maintenance system. Analytics solutions should make it easy for engineers to distribute their work and provide central place where employees can work together to leverage each other's expertise and information.

Conclusion

Presumably, the goal of any analytics solution is to improve outcomes in yields, margins, quality, and safety. So, any data analytics solution should be drawing from all of these recent technology advancements to accomplish those outcomes—without your organization having to enlist expert assistance or know exactly how these underlying technologies work.

The large and growing gap between data and insight in process manufacturing organizations will only start closing when data analytics vendors start putting the process engineer and analyst, by whatever title, at the center of the picture. These engineers have the expertise, ability, and incentive to ask the right questions and take advantage of insights generated by the answers. Analytics solutions need to unlock process engineering knowledge in a way that is convenient for users.

The Seeq Approach

The Seeq application is designed for use by front-line employees—specifically engineers with the experience, expertise, and education to investigate alarms, generate reports, and optimize production outcomes. With Seeq, they can work together, easily and confidently, simultaneously or asynchronously, across teams and geographic locations.

Our engineers have decades of experience at companies like Honeywell, OSIsoft, Emerson, and Siemens. Process manufacturing knowledge is in our DNA and it's built into our solution. We give you capabilities that go far beyond spreadsheets or general-purpose data analytics software designed for relational or IT-based applications. This approach produces production and business results: better yields, margins, quality, and safety.

Seeq doesn't ask you to do a lot of work to adopt specific innovations. Instead, we harness innovation on your behalf, in a manner leveraging many technological advancements to deliver concrete benefits specific to process manufacturing via a modern, cloud-enabled, browser-friendly application.

Seeq creates an index on top of your data sources so front-line users can look at the data in a structured way, while leaving the data itself in place. Engineers can search the data like they would with Google, and quickly and dynamically add context within historian data and across data sets.

Seeq connects to your live data—as it is and where it is, of any size and any type—and lets the user interact with it. Users are free to traverse the system, ask questions on the fly, and layer multiple data sources on top of each other in a single view, even when many historians are involved. All work is captured for future use and reference, so users don't have to start all over again if their original question doesn't prove out. All work is captured and saved automatically, and this leads to a powerful, multiplicative effect on productivity and user empowerment as more expertise, knowledge, and context are injected into the data analytics system over time.

Seeq also helps organizations get the most out of a quickly retiring cohort of engineers before they leave the workforce. We help capture knowledge, and then preserve and present it in a modern, browser-based application that appeals to the incoming wave of new engineers.

Through these and other features, Seeq dramatically upgrades the working interface for front-line engineers, giving them a fluid, visual user experience—similar to other modern web-based applications. Searching, saving, and sharing are easy and intuitive—even from browsers and mobile devices—and reports can be generated in minutes or hours, not days.

Seeq is working to enable the right person—the process engineer— with the right application to bridge the gap between data and insight. We want to make difficult problems easy, and impossible problems solvable. The result is faster insights leading to better yields, margins, quality, and safety outcomes.

About Seeq

Founded in 2012, Seeq is a privately held software company headquartered in Seattle, Washington, with employees across the U.S. and sales representation in Canada, Europe, and South America. Seeq has a successful and accomplished executive team that brings over 100 years of experience and ex- pertise in process manufacturing, mission-critical systems, and software development from companies that include OSIsoft, Microsoft, Boeing, and Honeywell.

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