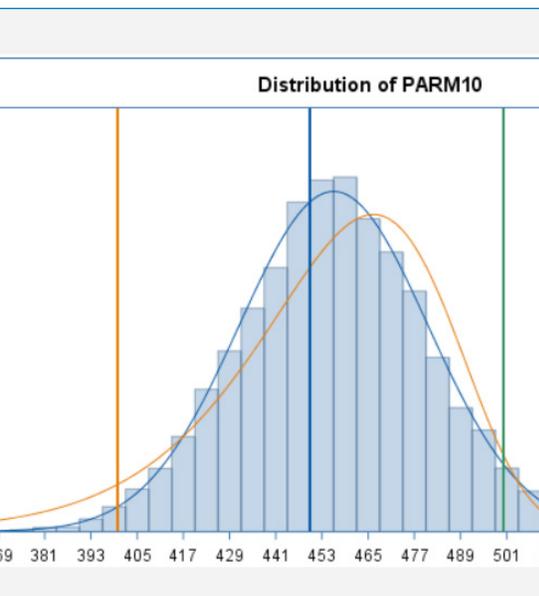


# SAS® Production Quality Analytics

Powerful predictive analytic and reporting technologies provide a holistic view of quality across the enterprise and throughout the entire product life cycle



## What does SAS® Production Quality Analytics do?

It provides manufacturers with a holistic view of quality and operational performance across the enterprise through advanced analytic and reporting technologies. These include quality-centric modeling, automatic monitoring and alerts as well as an advanced custom analysis framework, best-practice workflows, a case-management feature and web-based dashboards and reports.

## Why is SAS® Production Quality Analytics important?

It combines the power of data integration, automation and analytics to help companies improve quality and operational performance while lowering the cost of poor quality.

## For whom is SAS® Production Quality Analytics designed?

It's for engineers (quality, product engineering, process engineering, etc.) and senior-level managers who are all responsible for achieving and exceeding quality, productivity, utilization and cost targets throughout the supply chain.

Manufacturers today face a myriad of issues surrounding product quality and production in general, including the integration of data from disparate systems and isolated sources; obtaining visibility into and understanding of multiple operational processes; the cost of poor quality goods, rework and scrap; and the improvement of downstream product quality and overall manufacturing yields.

Disparate and isolated data sources limit a manufacturer's ability to see quality issues across the entire operation. With a limited understanding of these processes, companies are often unable to solve underlying quality problems or implement effective improvement actions. A lack of visibility into operational processes hampers a manufacturer's ability to react to changes in product quality and operational performance. Without this information, it is difficult to make fact-based business decisions, leaving manufacturers to rely on employee intuition and guesswork. This can be very expensive if the decisions made are wrong or based on incomplete information.

In addition, poor-quality goods that result in high rework and scrap costs can devastate a company's bottom line. Without a clear understanding of quality effects on manufacturing and service costs, organizations can be left with a broken business model, unexpected expenses and reduced yields.

Downstream quality issues also can lead to significantly reduced customer satisfaction rates. This is especially true when problems appear after the product has been manufactured and sold. Without the ability to integrate both manufacturing and post-sale quality data, companies are left in the dark as to where problems are occurring and how to fix them.

SAS Production Quality Analytics provides an analytics-based solution for integrating data relevant to quality, productivity and utilization. It also assists in monitoring the health of processes and helps drive sustainable quality and yield improvements while containing costs. Part of the integrated SAS Quality

Analytic Suite which provides a common code base and data model for key quality areas including asset performance and field quality, this solution comes ready-made to take advantage of the large volumes of data generated by the industrial internet of things (IoT). It supports multiple data domains, including material movement tracking, genealogy data, process data and asset condition data. Featuring an advanced analysis workspace, SAS Production Quality Analytics provides users with a rich set of interactive root-cause analysis and quality improvement tools that can identify quality issues and operational performance degradations before they become serious problems. The solution's integrated data mining capabilities allow organizations to gain true process understanding across their entire manufacturing operations. Best-practice workflows and a case-management feature document findings and problem-resolution measures, while promoting collaboration and knowledge sharing.

## Key Benefits

- **Industrial internet of things support.** With a data model specifically designed to handle “dirty” and missing sensor data throughout the enterprise, whether from equipment on the plant floor or sensors on products in the field, patterns can be quickly identified and models deployed while a process is still ongoing, enabling stakeholders to act in as timely a manner as possible.
- **Gain a holistic view of the enterprise.** The SAS enterprise data model captures large volumes of data regardless of format or source - from legacy to modern MES, ERP and other systems - then transforms, standardizes and cleanses the data to prepare it for analysis. While the SAS data model can handle practically any type of data, it can also be extended to incorporate any additional data types that an organization may require. In addition, state-of-the-art analytics and reporting technologies let manufacturers align strategies to reduce the gap between target and actual performance.
- **Understand changes quickly.** World-class quality control delivers up-to-the-minute insights into the performance and quality of manufacturing operations, enabling tighter process control at every level. SAS software’s early-warning analytics enables users to proactively address and act to fix potential quality and performance issues before they become a customer problem.
- **Lower the cost of quality.** SAS software’s state-of-the-art analytics and predictive data mining capabilities drive continuous quality increases, improved reliability and higher yields. With tighter controls and more efficient processes, rework rates and scrap rates will decrease. This helps improve the overall manufacturing cost structure.
- **Increase profitability.** Predictive modeling allows optimal process setup, leading to improved asset utilization, optimized material consumption, reduced rework rates and reduced scrap expenses. And SAS software’s state-of-the-art analytics allows improvement of equipment performance and cycle times. The result is an improvement in the overall profitability of manufacturing operations.

## Solution Overview

### Enterprise quality-centric data model

The SAS enterprise quality-centric data model captures large volumes of data regardless of format or source - from legacy to modern MES, ERP and other systems. This provides a manufacturer with both logical and physical storage capabilities to capture all aspects of the manufacturing process, beginning with the suppliers and carrying through manufacturing. It also encompasses field performance and post-sale quality variables.

Because it is integrated throughout the manufacturing life cycle, the data model allows companies to overcome the barriers created by silos within operational systems. This enables true visibility into operations on the shop floor and allows comparisons between suppliers, plants and production lines.

### Automated monitoring and alerting

SAS software’s large-scale, automatic monitoring engine continuously monitors the health of all processes to help ensure quality throughout manufacturing and operations. The automated monitoring and alerting can be applied real-time as the data is generated or on landed data after an update to the solution’s data model. It can test new data against the Western Electric statistical process control rules or against unique proprietary rules that are custom defined. This level of customization lets users refine and integrate business rules, enabling continual process improvements.

Once tests have been flagged, indicating a variance, supporting control charts and other reports can be supplied that identify the source of the problem. This allows alerts to be published through a variety of different media (portal, email, pager, etc.).

### Predictive modeling

SAS is a world leader in delivering unparalleled predictive modeling capabilities and techniques to organizations around the world. For manufacturers, SAS provides tools to help optimize process and equipment setups that result in improved quality, yield, productivity and performance. This includes a complete spectrum of analytical tools - from explorative analysis to design of experiments with optimizers to cause-and-effect tools such as Ishikawa diagrams.

Predictive models can be used to achieve advanced process control (APC). This allows manufacturers to set up downstream processes to compensate for quality issues that may not have been identified earlier in the operation or that were identified

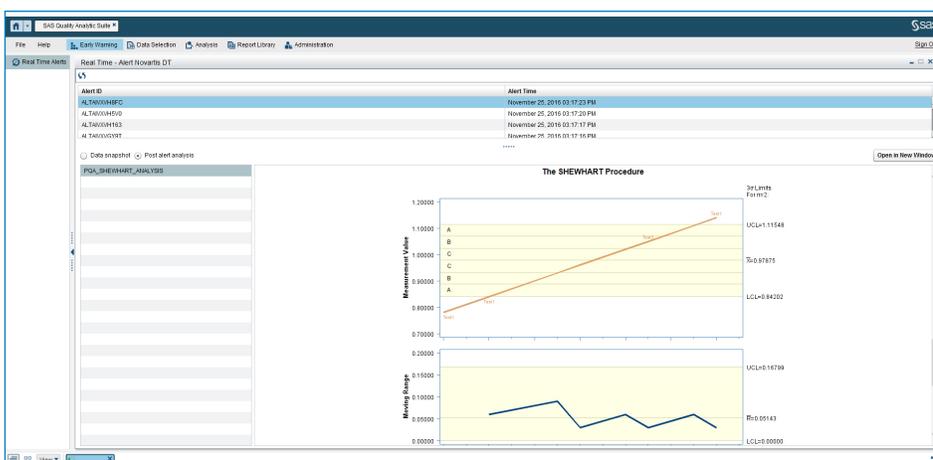


Figure 1: Predictive models applied in real-time alert users of potential issues along with supporting post-alert analyses.

because of upstream analysis. The techniques for achieving this include neural networking, regression analysis and clustering.

### Advanced analysis workspace

The advanced analysis workspace lets users analyze quality issues and explore areas of improvement in a highly interactive and visual environment. It serves a broad variety of users ranging from the casual user to the high-end statistician. Designed with this range of users in mind, the advanced analysis workspace gives users an interactive graphical interface that provides a level of operational visibility never before experienced.

Contents of detail tables can be seamlessly launched in other SAS products such as SAS Visual Analytics, SAS® Enterprise Guide® or SAS® Enterprise Miner™.

### Workflow and case management

Corrective action and preventative action (CAPA) workflows enforce operating procedures and make problem resolutions sustainable, repeatable and auditable. The case management feature documents investigative findings, makes them easily reusable for others and fosters collaboration and knowledge sharing.

### Reporting and KPI dashboards with drillable alerts

SAS Production Quality Analytics delivers customizable reports and graphs enabling information sharing among those who need it at all levels of the organization. This includes standard and ad hoc reports, KPI scorecards, drillable views, snapshots and trend analysis from across the manufacturing operation.

Critical for many companies, the integrated executive dashboard enables reporting on current quality performance at all levels and across geographies. Reports, dashboards and other analysis can be delivered through web-based clients that allow users and executives to access them anywhere and at any time.

## Key Features

### Integration of all relevant data in an enterprise quality-centric data model

- Parts-movement data.
- Measurement data.
  - Continuous measures.
  - Categorical measures.
- Equipment data.
- Supplier-quality data.
- Environmental data.
- Cost attributes.
- Organizational data.

### Supports multiple data storage options

- SAS® Scalable Performance Data Server.
- SAP HANA.
- Apache Hadoop.

### Automated monitoring and alerting

- Parts-movement data.
- Measurement data.
- Genealogy data.
- Process data.
- Asset condition data.

### Predictive modeling

- Decision trees.
- Neural networks.
- Regression analysis.
- Clustering.

### Advanced analysis workspace

- Pareto charts.
- Control charts.
- Histograms.
- Distribution analysis.
- Design of experiments.
- Regression and curve fitting.
- Path analysis.

### Workflow and case management

- Corrective action and preventative action (CAPA) workflows.
- Case-management documentation.

### Reporting and KPI dashboards with drillable alerts

- KPI dashboard.
- Web-based reports.
- Web-based graphs.

## Deploy models into SAS Event Stream Processing

Streaming data can be processed in the SAS Event Stream Processing engine. Results are then sent to the application to perform further analyses. (Additional optional software purchase required).

### TO LEARN MORE »

To learn more about SAS Production Quality Analytics system requirements, download white papers, view screenshots and see other related material, please visit [sas.com/production-quality-analytics](http://sas.com/production-quality-analytics).

## Key Features (continued)

### Custom Analysis Framework

- Flexible framework to support any stored processes in the SAS Quality Analytic Suite UI.
  - Handles user interactions.
  - Surfaces and manages outputs.
  - Persists status between sessions.
  - Supports independent as well as dependent stored processes.
  - Capability analysis as a “blueprint”.

### Seamless integration with the full SAS Quality Analytic Suite 6.2, including SAS Field Quality Analytics and SAS Production Quality Analytics.

- Common code base and data model simplify enterprisewide operational improvements and allow a modular approach to adding analytic capability as the organization matures.

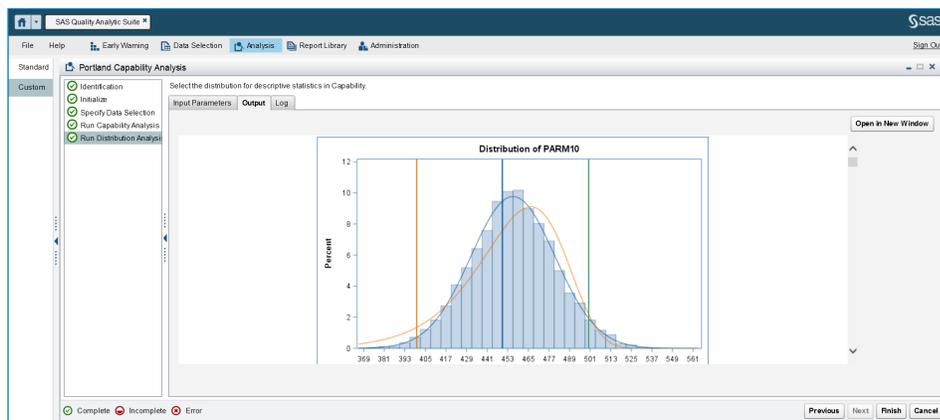


Figure 2: The advanced custom analysis enables interactive visual data exploration for in-depth root-cause analysis.

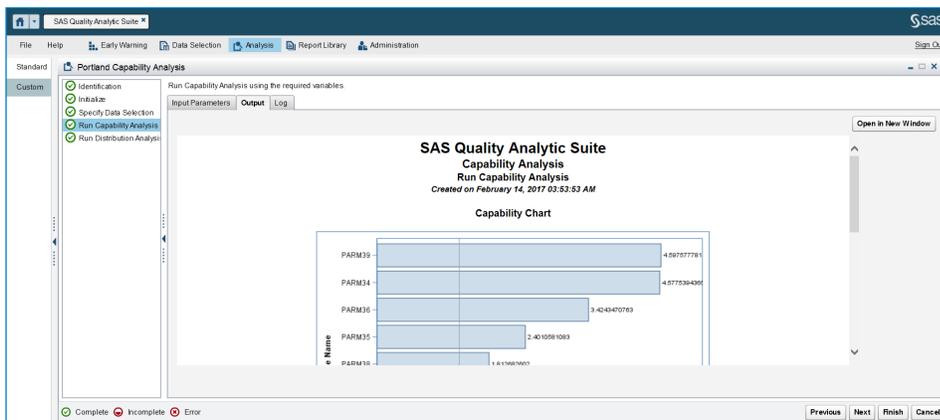


Figure 3: Capability analysis provides insight into how capably a process is performing.

To contact your local SAS office, please visit: [sas.com/offices](http://sas.com/offices)

