

Enhancing Process and Operations Through Digitalization: A Blueprint for Utilizing Advanced Data Analytics, Model Predictive Control and Remote Monitoring



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Abstract:

If we lack high performing data acquisition, visualization and analytics across our production plant or enterprise in the upcoming years, achieving data based, Informed & faster decision making over the expected KPI in your manufacturing facility is relatively tougher. When you start to employ the right resources and have a plan that allows for gradual changes that add up to significant results. Small changes such as combining existing historian systems, effective software tools and a mindset of proactive digital awareness for your team can significantly impact the overall success of your operations. Newfound ease in your daily tasks and reporting are results of effective IT/OT convergence and will be experienced by everyone. From the operator to the engineer all the way to corporate management, small changes become major impacts when completed strategically and as part of an effective plan for positive digital progress.

Keywords:

IT/OT Convergence:

Data Historians.

PIMS

Introduction

In the realm of process and manufacturing industries, comprehensive digital and data management solutions play a pivotal role. These solutions, often referred to as Process Information Management Systems (PIMS), empower engineers, operators, and plant managers by providing real-time access to critical data. The goal? Faster troubleshooting and informed decision-making capabilities. This journey began decades ago, with visionaries developing in-house data acquisition and analysis systems. Over time, these solutions evolved into mission-critical systems deployed across plants worldwide. One such robust software, dataPARC, emerged from the front lines—engineered by those who worked in paper plants and understood the power of data for problem-solving and efficiency optimization. Today, the promise remains unchanged: dataPARC continues to be the most intuitive and easy-to-use decision support platform. Amid the buzzwords of IT/OT convergence, organizations seek answers: How can they enable data-driven decision-making across their enterprise? The answer lies in connecting all production data seamlessly.

Leveraging existing tools while strategically adding new ones drives change without disrupting operations. PIMS, data historians, and analytics platforms—all part of this ecosystem—ensure that accurate, actionable data reaches the right people at the right time. So, whether it's a pulp and paper mill, an oil refinery, or a chemical plant, the quest for efficiency and problem-solving persists, guided by the principles of gradual, strategic IT/OT convergence

Material and Methods - IT/OT Convergence Is Easier Than You Think

How to Enable Data-Driven Decision-Making on the Plant Floor and Across your Enterprise by Connecting all your Production Data are the most common questions to be answered. IT/OT Convergence and corresponding buzz words are all over the place. No matter what the source is, important data needs to get to the right people at the right time, so where does one start. In a plant, chances are you have many sources of IT and OT data that contribute to seamless operations. Whether it is a Pulp and Paper, oil & gas, food, chemical or mineral process, on the ideal days, your operation runs like a well-oiled machine. How easily

and consistently can the entire plant or enterprise operate efficiently, solve problems and reduce bottlenecks? Accurate and fast data access, intuitive data visualization and analytics are needed to make decisions that affect production on a 24/7 basis. Resources are also at risk when changes are made, even if they are for the better. Ripping and replacing data systems and equipment is expensive and involves a lot of risk. No matter what the source is, important data needs to get to the right people at the right time, so where does one start to make small, gradual IT/OT changes?

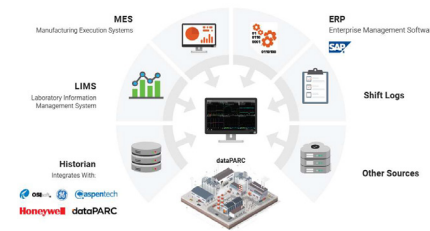
Utilize Tools you Already Have While Adding New Tools That Drive Change

Firstly, you can leverage the data assets you already have. Risk is reduced considerably when you can add on products that enhance data sources you already use. For example, if you utilize a data historian that works well for your needs, you can add a data visualization and analytics solution on top, as well as connect other sources that were previously siloed. Not replacing the existing historian (if any) saves you a headache and allows your important production to

continue without interruption. Using what you already have means saving valuable financial resources that can be allocated to other needs, faster ROI and reduced risk.

All Your Plant's Data in A Single View.

Combine data from multiple sites and multiple data sources in a single view without double configuration of tags or double storing of data. "Data Series" connections include drivers to real-time historians built on vendor provided API/SDK's and industry standard templates (SQL, Web Services, etc.) to connect other key sources of data".



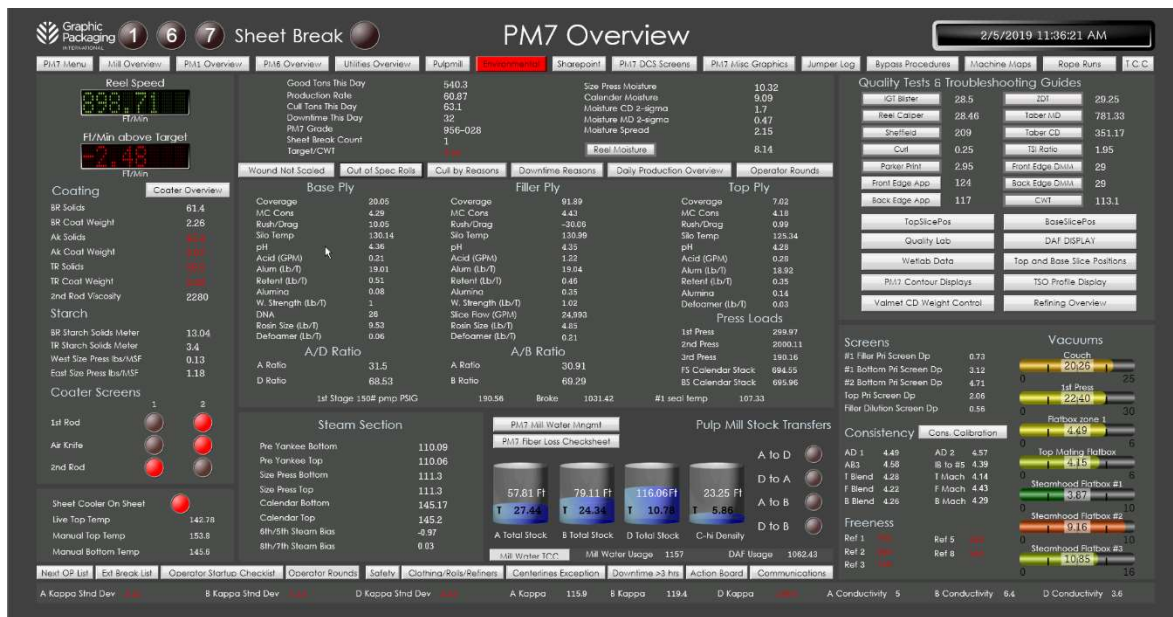
What Next after storing Data?

We have established that having the collective data readily available in a

common, accessible location is important for effective usage, but just the ability to see the data is not enough. You need a strong visualization and analysis tool to make good decisions with all the newfound data. This functionality is also an integral piece of the dataPARC software.

The ability of dataPARC to provide process reports and graphics to enable managers and supervisors to stay current on process conditions and reports. Other management benefits are realized by operations use of the data. Having fast & easy advanced analysis of data from multiple data systems enables reductions in process and product variability, the ability to proactively make changes, and improved transfer of information between shifts and to management.

This solution should also aggregate operational data based on the above monitored conditions and time periods, as well as predefined time periods. Daily, hourly, and minutely aggregations make data retrieval speeds for large time periods among the best in the industry, even when using a slower third-party historian.



Industry-Leading Trending Tools

dataPARC solutions is widely considered the best trending application available, PARCview provides a combination of powerful features and ease of use. Features such as drag & drop, right-click menu, dragging time-axis, multi-trend templates, time syncing of multi-trends, and unlimited traces on each trend provide a potent tool for troubleshooting and analysis. This Realtime, high data resolution visualization helps the users to monitor and actions on Realtime basis rather than performing a postmortem analysis.

Faster Is Better

Plants often face a performance vs. resolution dilemma with data. Infrastructure improvements have allowed plants to more easily capture and store high resolution data (1 second or lower sample rate). From a troubleshooting standpoint this is great, but there is a penalty paid when trying to access the data. Running reports or long-term trends of high-resolution data is slow, hindering the problem-solving process.

dataPARC solves this by the features like Aggregate Archive & Rollup Archive:

Aggregate Archive: PARCpde solves this problem by creating two Archives alongside your real-time archive. The Aggregate Archive

works seamlessly with the PARCview trend, providing unmatched performance and accessibility to real-time data. Two-year trends can be recalled in seconds not hours and users can easily switch between real-time data and hourly/daily averages.

Rollup Archive: The Rollup Archive makes reporting on production-based time periods easy. It creates statistics (Min, Max, Avg & Std Dev) for any user defined period, like Product Runs, Batches, Shifts and more.

Anytime Access to Live Plant Data

Get critical plant data into the hands of important decision-makers, no matter where they may be. We bring PARCview's powerful data visualization tools to mobile phones and tablets, making it easy for key personnel to respond to downtime events or simply monitor plant conditions, regardless of if they're in meetings, travelling, or at home.

Robust Reporting Tools

PARCview's highly configurable scripting and scheduling application can schedule and deliver recurring reports or other key data to management and other decision-makers.

Dashboards Via Email: Automatically capture screenshots of trends or process displays and attach to reports for engineers & managers to have delivered while on-call or during key plant trial

Event-Triggered Reports: Reports can be configured to run in response to any number of triggers, including process-based events such as process values that are too high or too low

Scheduled Reports: Build workflows that populate and send preconfigured reports. For instance, report hourly production averages and average quality parameters for the last 24 hours.

The Foundation for Your Plant Information Management System (PIMS)

dataPARC's PARC server offers everything you expect from a mission-critical plant data historian product, including essential accessibility performance and security. Scalable and flexible, it enables users from every level of the plant to rely on the data by ensuring the highest levels of system uptime and data integrity.

Performance: Maintain a small disk footprint with optimized storage based on exception with option for dead banding. Capstone's OPCHDA data portal optimizes data sent from the server to the client, minimizing network load -- a bottleneck in many scenarios.

3rd Party Connectivity: dataPARC takes advantage of open protocols (ODBC and OPC, et al.) to provide easy access to a broad range of data sources such as DCS, PLC, SCADA, MES, Advanced Metering, PLC, Batch, database, IT assets and others.

Reliability: PARCserver's data collectors utilize "store and forward" technology to buffer data, ensuring maximum integrity by preventing data loss during network failures. Options for historian redundancy and failover tolerance provide consistent access to data.

Scalability: Suitable for systems with 100 tags or 1,000,000 tags, PARCserver's architecture can accommodate small operations as well as multi-location corporations. Additional data sources and storage capacity can be incorporated seamlessly.

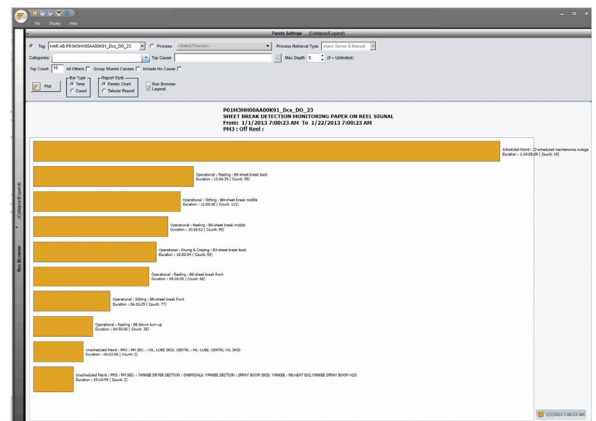
How a Paper company Empowered Their Operations

An example of a company that utilized current tools and enhanced their operations with new ones was a company headquartered in Houston, Texas. They had an enormous amount of data at their 5 sites and 8 Paper Machine and 4 Pulp mills. The company has acquired assets over the years, resulting in multiple vendor data

systems across the Enterprise, and did not have a good way to share it. Engineers and management both needed data from all sites but couldn't make operational decisions before the window of opportunity had passed. They also knew future acquisitions with different data systems might come, so a flexible future was critical. They purchased a reliable data visualization and analytics software solution (dataPARC) and was then able to combine data from all sites with just one program.

Not only was the data easily available, but the tools enabled the data to be customized to the way that everyone- from operator to engineer to management- wanted to see it. Sites could customize and access data they specifically needed, while corporate headquarters could access data they wanted and customize it to their specific needs. By joining their OT and IT worlds in a future-proof manner, they not only improved efficiency but they saved time and money while doing it to the tune of \$10M in annualized savings.

Downtime Pareto



Importance and Challenges with Process Information Management System

The key to efficient manufacturing decisions, as well as the core of Industry 4.0 lies in manufacturing data. Collecting it at higher frequencies, keeping it for longer, from more sources, and more points in each process area is most critical in this effort. However, to add value to all this data, you need a robust way to make it available to personnel at all levels to support process optimization and Realtime decision making. Sustainable business growth opportunities lies in these historical data through its wise utilization.

Most data visualization, lab, or analysis software comes with its respective storage system, but cannot connect to other systems, and are often localized to limited points of use. This is referred to as a data silo, and is a big problem in all industries, especially pulp and paper. With multiple distributed control systems, programmable logic controllers, quality control systems, and laboratory systems (to name a few) present in many mills, all of which use different programs and terminals that are often accessible by a select few people, how does one correlate all this invaluable data?

Conclusion

In summary, the quest for efficiency, informed decisions, and gradual digital progress continues—a testament to industry resilience and adaptability. In this ever-evolving landscape, the convergence of technology and human expertise continues to shape our industries. Embracing technological advancements from the outset can significantly accelerate progress. Rather than reinventing the wheel, leveraging existing tools and innovations allows us to build upon a solid foundation. The synergy between tried-and-true principles and cutting-edge solutions often yields remarkable results.