



Getting Ready for the 2020s

OPTIMIZING EDM AND DRAWING MANAGEMENT FOR UTILITIES

accruent

We stand on the brink of a fascinating future, where new technologies can give us the means to perform at levels of excellence and service undreamt of in previous decades. It is also a riskier future, where the potential for large-scale disasters, whether natural or man-made, perpetually loom on the horizon. For utilities, the next decade will bring an increasing need for improvements in Engineering Document Management (EDM) and Drawings Management, both for the sake of improving efficiencies and for improving Critical Infrastructure Protection (CIP) processes.

Being able to comply with regulations such as the CIP Reliability Standards for the security of critical assets is an easier task with the right systems in place. Having an efficient platform for managing engineering documents and drawings is a cornerstone of a safer, more efficient future for utilities.

We believe that those who take the time to watch, to plan, and to build the right frameworks for the future of their engineering documents and drawings and related data will be the ones who manage risk and operate the most safely, successfully, and profitably. The time to plan for what's coming in the 2020s is right now.

In this e-book we'll take a look at today's pain points and show how some of our utilities customers have implemented an Accruent Meridian Engineering Document Management (EDM) and Drawing Management system for enhanced management of engineering documents and drawings, providing improved safety, compliance, and controlled file access, among other benefits.



WELCOME TO THE 2020s: MORE DOCUMENTS, MORE DRAWINGS ... AND MORE DATA

It's not just documents and drawings that will need an effective management platform in the 2020s. The detailed, minute-by-minute data about usage demand and other data that is available from modern connected systems can help power companies manage their grids better, but the volume of this data can overwhelm antiquated systems. "Artificial intelligence will be essential in analyzing the vast amounts of data generated around the power grid and taking real-time control decisions," says Valentin Robu, a lecturer in smart grids at Heriot-Watt University in Edinburgh, Scotland.¹ A smart, format-agnostic platform such as Accruent Meridian goes beyond just document and drawing management, making it possible to manage any type of incoming data, document, or drawing together in one place—a "single point of truth"—with a common overlay of rules, processes, and controls for all documents and data. In this way Meridian provides many additional benefits beyond just EDM and drawings management, making it a forward-looking investment in a power company's future.

Water companies, too, will have an ever-increasing amount of engineering documents, drawings, and related data to monitor as they implement new connected technologies that will provide data that can help them provide clean water at a reasonable price, amid the fallout of environmental issues such as plastic soup, fracking, and spills. Water treatment plants, tasked with goals to reduce CO2 emissions and do a better job of extracting heavy substances from wastewater and transforming waste into energy, will also benefit from the new monitoring technologies and the data they provide. An effective EDM and Drawings Management platform that can also simultaneously embrace incoming data from a utility's other systems is a one-stop solution.

Furthermore, tackling the challenges of managing an ever-increasing load of engineering documents and drawings while remaining regulatory-compliant is a major challenge. Preparing for inspections means that drawings and documents must be up-to-date, complete, and easily accessed in a controlled manner according to each stakeholder's need and level of authorization. The more documents and drawings in an archive, the more challenging the task, and the greater the need for a specialized platform to manage them.

"A reduction in the time spent searching for documents is really something valuable, since engineers typically spend about 30 percent of their time looking for the current and correct documents."

It has been our experience that today many utilities are “making do” with disconnected, antiquated systems, leaving an inadequate foundation for future growth. Outdated systems can make it extremely difficult and time-consuming for users to access documents and drawings, or to determine which is the latest version. This often creates obstacles to the smooth completion of deliverables and optimized plant performance. Ideally users should all have access to the same version of a document or drawing, and there should be no need to waste time ascertaining which item, among multiple versions of an engineering document or drawing, is the correct one to use. But this is often not the case today. A significant reduction in the time spent searching for engineering documents is highly achievable, since engineers typically spend about 30 percent of their time looking for the current and correct documents.ⁱⁱ The search for the right documents and drawings becomes especially critical in times of unplanned downtime or emergency situations.

Lastly, we should consider how these problems limit a utility's ability to set effective KPIs for project completion on-time, within budget, and within specifications. If the underlying engineering document and drawings management system is inadequate or subject to errors or data faults, subsequent rework will be required, the project can be delayed, and costs can rise unexpectedly. Having the right platform to manage engineering documents and drawings helps prevent these unanticipated losses and maintain profitability.



ENHANCING ENGINEERING DOCUMENT AND DRAWINGS MANAGEMENT

With antiquated legacy systems, it's common for utilities to find documents and drawings with missing and out-of-date information. This requires the error-prone manual re-entry of information, more laborious information collection processes, and the potential reliance upon inaccurate reports. Non-digitized legacy assets (paper drawings, manuals, etc.) are especially problematic. Aside from the need to remedy the incomplete information, the limitations of trying to use these processes at a departmental or application level are obvious and fraught with inherent problems when viewed from an organization-wide perspective.

By contrast, a powerful EDM and Drawings Management solution will fix the metadata-collection issue up front at the point of data entry through automatic validation, treating the tasks uniformly organization-wide. Some organizations attempt to force one of their dominant applications to serve as a central EDM or drawings management platform, but since the application was not built for the task, this approach typically fails. So much extensive customization is required (often for features that are not meant to be customizable) that it ultimately becomes cost-prohibitive or results in a limited and inflexible solution.

Extensively used by leading utilities, Meridian is a sophisticated yet economical solution that has its roots as an EDM solution focused on CAD-related content, giving it a powerful engineering-oriented core. Over time, Meridian has fully expanded to complement computerized asset/maintenance management systems as well. Meridian provides a best practices implementation and integrates with leading line of business applications, such as CAD, plant- and equipment-design software, and Enterprise Asset Management (EAM) solutions.

We will look at this in more detail further below, where we will share the highlights from several case studies to document how utilities have benefited from adopting this EDM and Drawing Management solution in different ways. Toward the end, we will offer a quick self-assessment as a tool to evaluate your organization's readiness for the 2020s.

THREE COMMON SHORTFALLS AND PAIN POINTS

A quick look at where most plants are today versus where they need to be reveals the shortcomings that need to be addressed to create a more solid platform for efficient growth in the 2020s. Three very common shortfalls are:

1. Inaccessible documents & drawings.

Reliable access to documents is not available to those who need it, when and where they need it. Structuring access to documents for external parties without compromising security, compiling reports that involve pulling data from disconnected, antiquated sources, and being able to quickly access critical information during an unplanned shutdown are all ways in which inefficient document and drawings management can frustrate or even cripple the responsiveness of a utilities plant.

2. Inconsistent handovers.

Unfortunately, today some plants still maintain outdated processes that make managing the flood of engineering documents unreliable and make working with external vendors difficult. Unless there is a product on board that can, through automation, assist with checking that the documents submitted by the supply chain are compliant to agreed-upon standards, organizations face the difficult task of never knowing, without significant manual checking, where they are with their documents until it is too late. Having an efficient EDM & Drawings Management solution such as Meridian gives utilities a central platform that all vendors can access under controlled, configurable permissions as designed by the utility, and there is no need to risk granting access to a utility's master documents, which remain protected.

3. Need to reduce costs.

Organizations often waste money on human labor to make up for deficiencies in EDM and drawings management. The financial consequences of ineffective management practices can be daunting and affect the organization in variety of ways. The need to reduce costs happen on a variety of fronts. As a 2018 ARC Advisory Group report by Ralph Rio outlines, using outdated documents often leads to rework, project delays, cost overruns, and safety incidents—all of which negatively impact the P&L statement and balance sheet.ⁱⁱⁱ



Fig. 3. Top 3 Data-related Organizational Pain Points

Operations & maintenance divisions offer many examples of these pain points in real life. For instance, engineering document management presents numerous challenges for operations teams, mainly revolving around the need to access engineering documents to make key assessments, track compliance, and optimize plant performance. Shortcomings include the fact that documents are simply not available when and where they are needed, and the time it takes to gather document data, often manually, from multiple disparate systems. The sheer volume of human labor and brainpower needed to patch together document data in the right ways, at the right time, so that operations can run smoothly creates a variety of workflow issues, not the least of which is employee frustration due to overly complex and laborious information review and approvals process. O&M departments also experience long-term pain points and costs post-handover when they find they must spend time fixing poor quality document metadata in the weeks/months following a project closure—problems that should have been caught and corrected earlier.

The inefficiency of being unable to share information across teams instantly and to automate review and approvals takes a heavy toll on project team members emotionally. It also comes at higher hard cost in terms of expenses for increased labor to do a task that should be more efficiently done through automation and an effective management system. For example, team members can waste an inordinate amount of time looking for information that isn't where it should be, or duplicating efforts to re-create information that already exists elsewhere. Even something as simple as basic document management functionality can become unwieldy for a large utility.



Additionally, with demands for streamlined budgets, success is contingent on narrow margins, and so efficiency becomes king. The need to do more with less is a chronic issue but often challenging to resolve when documents are housed in separate, disconnected silos.

As the utilities sector has faced a decline in power demand over the past several years, with customers taking greater control of their energy use through smart thermostats and household solar arrays, utilities are seeing fundamental shifts in their business and operating models. “Easing overburdened balance sheets by way of cost reduction measures is a priority for most companies in this space,” a Frost & Sullivan report^{iv} states, “Compliance with environmental and regulatory policies is another key focus area. The importance of information integrity through this process has been driving the spend on solutions including EIM (Engineering Information Management).” The same report cites PwC’s perception that utility companies globally believe that there is room for performance and efficiency improvements in capital projects, asset operations, and asset risk management, and that as utilities pursue these improvements over the forecast period through 2023, they will turn to EIM solutions.^v

Lastly, utilities plants face numerous challenges in document compliance when their supply chains deliver contracted-for documents, which should comply with the standards defined by the operator (correct format, proper naming convention, etc.). The operator must manually perform these document compliance checks when receiving the documents from the supply chain. However, there is an industry-wide problem with this manual checking process because most utilities do not have the resources to continually perform these manual checks on every document received from their supply chain, and so incorrect or missing document metadata is commonplace. Additionally, utilities will need certain documents in place in order to be compliant to operating and safety regulations, a subset of which are critical to the safe operation of the facility.^{vi} Ensuring compliance on all fronts is actually the key driver for EDM and drawing management solution implementations.

Engineering departments face many of the pain points outlined above for Operations, but there are some additional concerns. Ensuring optimal performance is critical, as are accident reduction and the reduction of plant maintenance costs. Avoiding unplanned downtime is critical to meet budgets; with average downtime cost at \$50-200k/day (depending on what part of the plant is down), it's easy to see how these crises can affect the bottom line.

As capabilities for preventive and predictive maintenance grow, and as data from root-cause analyses continue to shed light on problems and indicate potential solutions, utilities plants will become better able minimize unplanned downtime. Flexible and agile planning can help a plant leverage unplanned downtime to perform scheduled maintenance and with that, reduce planned downtime. But it's very difficult to optimize downtime without an effective, comprehensive engineering document management and drawings management solution.

For individual engineers, the biggest issue is being able to quickly find the right documents and drawings they need to perform their work, both at their desk and via mobile in the field. Better coordination with external partners is also of concern to engineers as well as to their vendors and service providers (e.g., inspection contractors).



Project managers face the need to manage shared resources with external parties. Because project management teams are expected to be able to frequently report on the status of any project deliverable, being able to rely on a system that provides accurate status updates on project components is critical for them. In utilities projects, project managers deal with vast amounts of documents and data, and if the systems are inadequate, they can be faced with incomplete resources to effectively manage contractors and vendors, and lack much-needed insight into external parties.

Just one of the problems faced is in manpower planning. A platform that offers the ability to analyze a project in terms of manpower (for example, the workflow analysis capabilities of Meridian Analytics, a cloud service extension for the Meridian platform) can help utilities plants optimize projects to ensure that suitable labor is available at the right time.

Another challenge faced is making sure the documents and drawings that are coming into the system from all sides have complete integrity and are therefore reliable. Getting robust analytical capabilities from a solution such as Meridian Analytics can offer enhanced visibility into document metadata; the ability to navigate large datasets by time, location, contractor, asset and more; and the ability to diagnose areas for improvement. In this way it helps project managers project managers—and organizations—quickly and effectively analyze data integrity and plan for improvement wherever needed.

CIOs and IT managers have a different angle on the same problems. Highly aware of the need for system users to be able to extract/gather documents and drawings from legacy systems that often are not 'open', but aware of the heavy cost of software development (whether the solutions are outsourced or built in-house), they must strive to make legacy systems manageable and get them integrated in an affordable way. Often, these legacy systems and unconnected departmental point solutions are vital to continuing core process, but the chore of making them work in the modern and futuristic ecospheres seems daunting, and the result is creating cumbersome workarounds. Investing in the transition to a specialized platform removes these headaches and shows its ROI early on.

AVOIDING “INFORMATION INCIDENTS”

Having inaccurate, incomplete, or inaccessible asset information leads to what are known as “information incidents”—crises where faulty information is a major identifiable cause of the problem. According to the industry analyst ARC Advisory Group, losses caused by information incidents typically amount to 1.5%. In a plant that generates of \$250 million, that means \$3.75 million lost every year. An effective engineering document management and drawings management solution helps plug that leaking bucket of expenditures by creating a “single point of truth” while also improving access by stakeholders to critical information.

RWE AG, a leading European power generation company, offers a good example of an organization that was able to improve access to data for its stakeholders. With almost 60,000 employees supplying energy to over 16 million electricity customers and 7 million gas customers, RWE sought to improve its collaboration with external planning agencies and needed easier and faster access to all key engineering information—all within a user-friendly interface that offered integration with AutoCAD and Microsoft Office. RWE turned to Meridian for these needs, also gaining the ability for batch-type processing of metadata for multiple documents and the mass import of data as well as the ability to save documents for further integration in SAP with just a simple mouse click.

In RWE's regenerative power division, which concentrates on regenerative energy, especially hydro power, there were other needs. There had been no central system for managing documents relative to the various separate regenerative energy stations, so it was often necessary to go to the location in question to obtain a relevant document. The implementation of Meridian solved this problem by ensuring that current documentation relative to the various power plants is accessible at different locations and at all times. Furthermore, document access is controlled based on stakeholder type: all technicians and central engineering team members working in the field of regenerative energy have full access to all the documents they manage. In contrast, there are other users who have read-only rights.

The new Meridian-optimized business processes helped ensure operational excellence, economic efficiency, and plant health and safety. A dramatic demonstration occurred when a fire caused RWE's brown coal station in Frimmersdorf to burn down, impacting both the power supply and the computers and making required documents unavailable. However, because the documents and data in Meridian were stored on two different servers outside the power station, it was still possible to access them from a neighboring station. Thanks to the rapid availability of the required documents, it was possible to quickly restore basic electricity supply.

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– An ARC Advisory Group statistic

Similarly, the **New York Power Authority (NYPA)**, the largest state-operated power provider in the United States, proactively sought to streamline its CAD and maintenance processes across the organization's different sites. The NYPA infrastructure is designed and maintained by hundreds of engineers, with approximately 60,000 engineering drawings distributed over five independent sites. Major new projects required the management and exchange of engineering information with various sites and vendors. At that time, access to and transfer of engineering information between sites was difficult and time-consuming. NYPA needed to implement an integrated Engineering Information Management (EIM) solution with emphasis on easy document and data exchange.

To help meet the company's needs, NYPA decided to upgrade its existing drawing management program to Meridian, a robust, highly-scalable EIM solution that provides utility companies with simple access to complex information.

"The growing complexity of our projects and increasing federal and state legislation required us to streamline our work processes," says Robert Sickles, IT Project Manager at NYPA. "Meridian has proven to be a valuable boost to productivity."

The design engineers across the state now have a common user interface, standardized workflow, and full searching and reporting capabilities. In this way, the implementation of Meridian has simplified the management of engineering information for NYPA.

*"Meridian has proven
to be a valuable boost
to productivity"*

– Robert Sickles,
IT Project Manager
at New York Power Authority
(NYPA)



MAKING COMPLIANCE EASIER

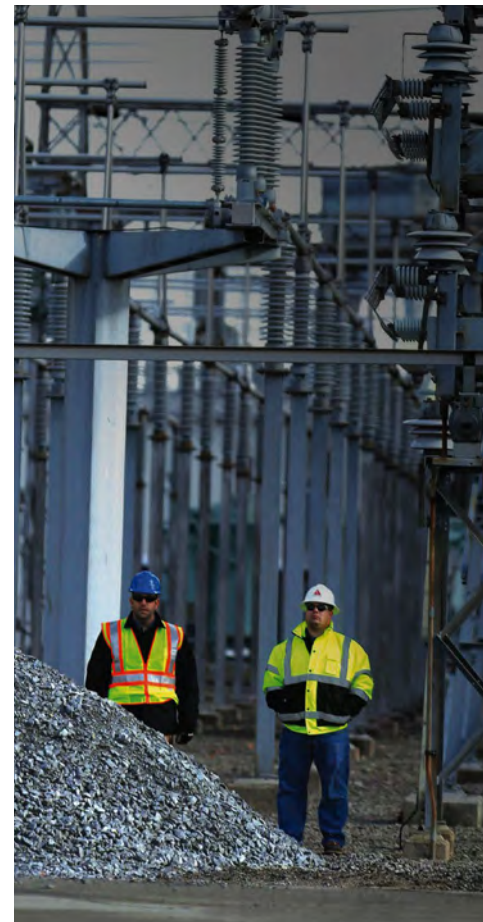
FERC AND NERC RELIABILITY STANDARDS

Compliance becomes increasingly difficult when systems are disconnected from each other and not optimally engaged to deliver everything that is needed. In the very near future, as the increasing volume of engineering documents and drawings pours in, utilities plants will face more critical challenges than they do today to fully master increasing workload in order to reduce unscheduled downtime and increase the uptime at their facilities.

Using an effective EDM and drawing management solution such as Accruent Meridian provides a strong and reliable foundation for compliance. For example, **Idaho Power** experienced a number of advantages upon implementation of Meridian.

Idaho Power is a progressive regulated utility dedicated to providing quality electric service to around 547,000 residential and business customers in two American states; they own and operate 17 hydro-electric plants, as well as two natural gas and three coal fired power plants. Secure access to maintenance information is a critical priority and they desired to be able to more easily meet the specific requirements outlined by the Federal Energy Regulatory Commission (FERC), as well as other federal and state regulations.

The Meridian implementation at Idaho Power solved other operational issues, too. Their CAD Services Group of 300+ CAD engineers had been using a system that managed a large volume of facility documents and suffered from unnecessary duplications network overload and increasing needs for server space for these duplications. It had become easy for performance degradation errors to creep in, which had subsequently increased the potential for errors due to manual intervention and raised concerns about managing security for the growing system of users and engineering information. Through its implementation of highly-scalable Meridian, Idaho Power was able to meet the challenge of providing fast and simple access to up-to-date engineering information from the office and in the field. They achieved greater operational efficiencies and a lower error rate, benefiting also from a secure audit trail and enhanced document security.



In Washington state, the **Grant County Public Utility District** (Grant PUD) recently launched Accruent's Meridian solution to manage its growth in the inventory of documents, including tens of thousands of engineering drawings. Grant PUD serves approximately 40,000 customers and has the capacity to generate more than 2,100 megawatts of clean, renewable energy. Grant PUD's Vision 2021 plan emphasizes data-based decision making – an approach to sustain the affordable rates and economic opportunity that locally-owned and controlled hydropower has brought to Grant County.

In particular Grant PUD sought more security and control for their Critical Infrastructure Protection (CIP) documents. As a power company, they must follow the Critical Infrastructure Protection (CIP) Reliability Standards, which are federal regulations related to the security of critical assets.

"Implementing Accruent's solution helps our teams to work collaboratively, complete assignments efficiently, and manage compliance with federal regulations," said Susy Anderson, ECM Project Manager, Grant PUD.

In addition, Accruent's solution helps Grant PUD by supporting concurrent engineering, integrating with IBM® Maximo® for maintenance management, and offering role-based security, workflows, structured approvals, version and revision control, data backup, multiple search capabilities, and the ability to view engineering drawings without AutoCAD. Using Accruent's solution, Grant PUD can increase management visibility, reduce project timelines, improve project performance, and provide better security and control of their CIP documents.

With extensive expertise in the utilities industry, Accruent's Meridian has powerful capabilities as an EDM and drawings management solution focused on CAD-related content. Meridian has expanded to cover a comprehensive footprint in other data areas for owner operators with brownfield assets. Meridian provides a best practices implementation and integrates with leading line of business applications in the typical utilities landscape, such as CAD, plant- and equipment-design software, and Enterprise Asset Management (EAM) solutions such as SAP/PM and IBM Maximo.

MERIDIAN: THE RIGHT PLATFORM FOR 2020S EDM AND DRAWINGS MANAGEMENT

To lay the optimal foundation for engineering document management (EDM) and drawing management in the 2020s, take advantage of Accruent's Meridian software suite. Meridian provides engineering document and drawing management with version control, revision management and document workflows in a safe, secure environment using a vault concept. The software provides role-based secure access through single sign-on. Meridian is available in multiple languages and offers integration with AutoCAD, MicroStation, Inventor, SolidWorks, Revit and DWG-based CAD applications, as well as Microsoft Office and email applications.

With Meridian, you get a comprehensive solution to manage engineering drawings that can save you time and will increase your data quality and accessibility.

Choose either a cloud-based or on-premise server platform for the foundation, upon which can be added the related Meridian modules such as Meridian Analytics, Meridian Portal, and Meridian Mobile.

MERIDIAN CLOUD

Meridian Cloud is powered by Microsoft Azure, the world's most robust and trusted cloud supporting 90% of Fortune 500 businesses today. Meridian Cloud ensures that users are informed, aligned, compliant and in control throughout document lifecycles. Using this cloud version of Meridian makes it easy to implement best practices and get up-to-speed very quickly so you can start seeing the return on investment almost immediately. Offered through a subscription-based model, Meridian Cloud reduces startup costs, simplifies procurement and operational budgeting, and enables costs to stay in line with changing requirements and actual software usage.



MERIDIAN



MERIDIAN CLOUD

MERIDIAN SERVER

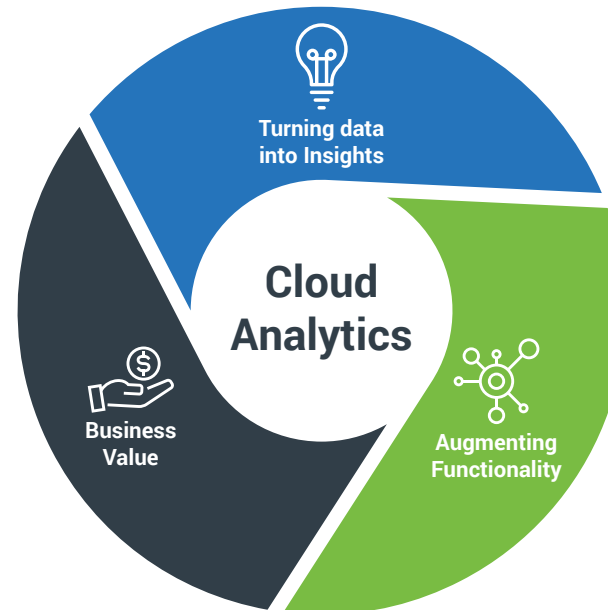
Meridian Server provides a way to enrich your EDM and drawing management with advanced capabilities and integrations through an on-premise server. Integrations with other critical business systems increase interoperability and enhance efficiency. Support for advanced information types such as 3D CAD and BIM integration, as well as auditable workflows with e-signatures, are available to meet the requirements of a wide range of highly regulated industries. Valuable features include local access and control while remaining 'off the grid'; comprehensive e-signatures; and a high degree of configuration and integrations to EAM, ERP, Enterprise CMS, Microsoft Office, and CAD authoring applications including AutoCAD family, MicroStation, Inventor, SolidWorks, Revit, and DWG-based CAD applications.



MERIDIAN SERVER

MERIDIAN ANALYTICS

Meridian Analytics is a cloud service extension providing analytical capabilities that enhance the value of Meridian with powerful insights. These cloud services provide unprecedented visibility into the metadata on the engineering documents and drawings managed within Meridian. With Meridian Analytics, it's easy to interrogate large datasets by time, location, contractor, asset and more, in order to find and diagnose areas for improvement.



MERIDIAN ANALYTICS

MERIDIAN PORTAL

Meridian Portal facilitates the management of engineering projects with extended project teams and external stakeholders without relinquishing direct access to internal master data and workflows through secure cloud-based collaboration.



MERIDIAN
Portal

MERIDIAN MOBILE

Meridian Mobile is the “ALIM in the Field” solution, providing anywhere-access to search, view, and add comments to documents and drawings through any user’s mobile phone or tablet. Meridian Mobile helps users find information quickly by scanning barcodes or QR codes on assets.



MERIDIAN
Mobile



Are You Ready for the 2020s? A Self-Assessment

Take this quick self-assessment to score your readiness for the needs of 2020s document and drawing management.

10 Readiness Indicators	Self-Rating Scale of 1 to 10 (1=low, 10=high)	Notes
1. SOLUTION IN PLACE. An effective and comprehensive Engineering Document Management (EDM) or Drawing Management solution is in place to manage and provide reporting via user-friendly dashboards.		
2. DOCUMENT VALIDATION & ACCURACY. Each internal user type has appropriate-level, easy access to current versions of the documents they need; a "single point of truth" guarantees that the document or drawing they have is the latest version. Validation systems are in place to foster reliable, accurate documents and drawings.		

3. EASY, CONTROLLED ACCESS & WORKFLOWS. External parties (such as vendors and contractors) who need access to documents and drawings can obtain structured access to specific ones they need, with appropriate permissions for each user and without the organization having to relinquish control of master files. Workflows are streamlined and appropriate for each level of worker.		
4. OPEN FORMAT. The document and drawing management system is open and format-agnostic (i.e., it does not require proprietary data formats to be used).		
5. CLOUD-BASED & SECURE. The engineering document and drawing management platform leverages an industry-leading, trusted cloud service that fully supports both mobile and desktop access. Security level is high.		
6. FACILITATES MAINTENANCE. The system facilitates predictive and preventative maintenance to help avoid unplanned downtime.		
7. SUPPORTS PROJECT SUCCESS. Projects are delivered on-time and on-budget, without-hiccups due to document- or drawing-related issues.		

8. SUPPORTS SAFETY, FACILITATES RCAs. Safety is assured through effective and secure document workflows and automated analysis. The document and drawings management system facilitates the thorough reporting required to support a root cause analysis (RCA) of accidents, providing the necessary insights to improve safety.		
9. MINIMIZES DOWNTIME. The current document and drawings management system minimizes unplanned downtime due to document chasing and emergency maintenance outages. Maximum uptime contributes to higher ROI.		
10. EASE OF COMPLIANCE. Compliance for NERC, FERC, and other regulatory audits is generally easier to do and well automated. Contracted-for documents submitted by supply chains are automatically screened for compliance to organizational standards, so that an operator does not have to manually perform the document compliance checks.		
Total Score (out of a possible 100)		
Average Readiness Score		

How to Score. Take your Total Score (above) and divide by 10. This is your Average Readiness Score across all items on a scale of 1 to 10. Your score provides an approximate indicator of how ready your plant is to face the coming data challenges of the 2020s.

FOR MORE INFORMATION

- Accruent's Engineering Document & Drawing Management:
<https://www.accruent.com/solutions/engineering-information-management>
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- ⁱ BBC Future Now, "The Biggest Energy Challenges Facing Humanity."
<http://www.bbc.com/future/story/20170313-the-biggest-energy-challenges-facing-humanity>
- ⁱⁱ Ralph Rio, "Trinseo Establishes "One Version of the Truth" for Asset Lifecycle Information Management with Meridian," Blog, March 2018,
<https://www.arcweb.com/blog/trinseo-establishes-one-version-truth-asset-lifecycle-information-management-meridian>
- ⁱⁱⁱ Rio, "Trinseo Establishes "One Version of the Truth."
- ^{iv} Frost & Sullivan Global Digital Transformation Research Team, "Global Engineering Information Management Solutions, Forecast to 2023," April 2018.
<https://store.frost.com/global-engineering-information-management-solutions-forecast-to-2023.html>
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- ^{vi} "Stay in Control of Your Hazardous Area Classification, Accruent blog, May 2018,
<https://www.accruent.com/resources/blog-posts/stay-control-your-hazardous-area-classification>.
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About Accruent

Accruent is a global software company that helps organizations achieve superior performance by transforming how they manage their physical resources. Its innovative, industry-leading cloud-based software and services enable organizations to optimize all stages of asset management from capital planning through to IoT-based monitoring and control. With a proven track record across two decades, Accruent has created the only integrated SaaS-based framework and reporting platform for full lifecycle physical resource management. Over 7,000 global customers depend on Accruent solutions to drive out hidden costs, extend asset lifecycles, protect their brands, ensure compliance and deliver on the missions of their organization. Headquartered in Austin, Texas, Accruent operates in 149 countries serving customers in government, healthcare, education, retail, telecommunications and manufacturing.