ACCRUENT
Unifying The Built Environment

milestone

THE COMPLETE BUYER'S GUIDE TO ENGINEERING DOCUMENT MANAGEMENT SOLUTIONS

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INTRODUCTION

In the built environment, man-made structures appear relatively fixed — but underneath their facade, they are constantly being worked on and repaired. Consider large production facilities like oil and gas refineries, pharmaceutical factories, and manufacturing plants. Designing and building such a facility, while a massive undertaking, is just the first step in its lifecycle. Over time, fixtures need to be replaced, broken items must be repaired, and old assets require updates. And this all takes place in a high-stakes environment fraught with the potential for hazardous situations and inordinate costs.

That's why it's crucial for maintenance teams to have streamlined access to comprehensive engineering documentation. By having a complete picture of the exact rendering of a building and property, including any revisions made during the construction process, maintenance can ensure that it performs its work safely and efficiently. And the need for comprehensive documentation occurs long before maintenance gets involved. The engineering team also requires a single source of information to shorten project turnaround time with concurrent engineering, preserve control of engineering data changes, and generally manage the exchange of information with internal and external stakeholders.

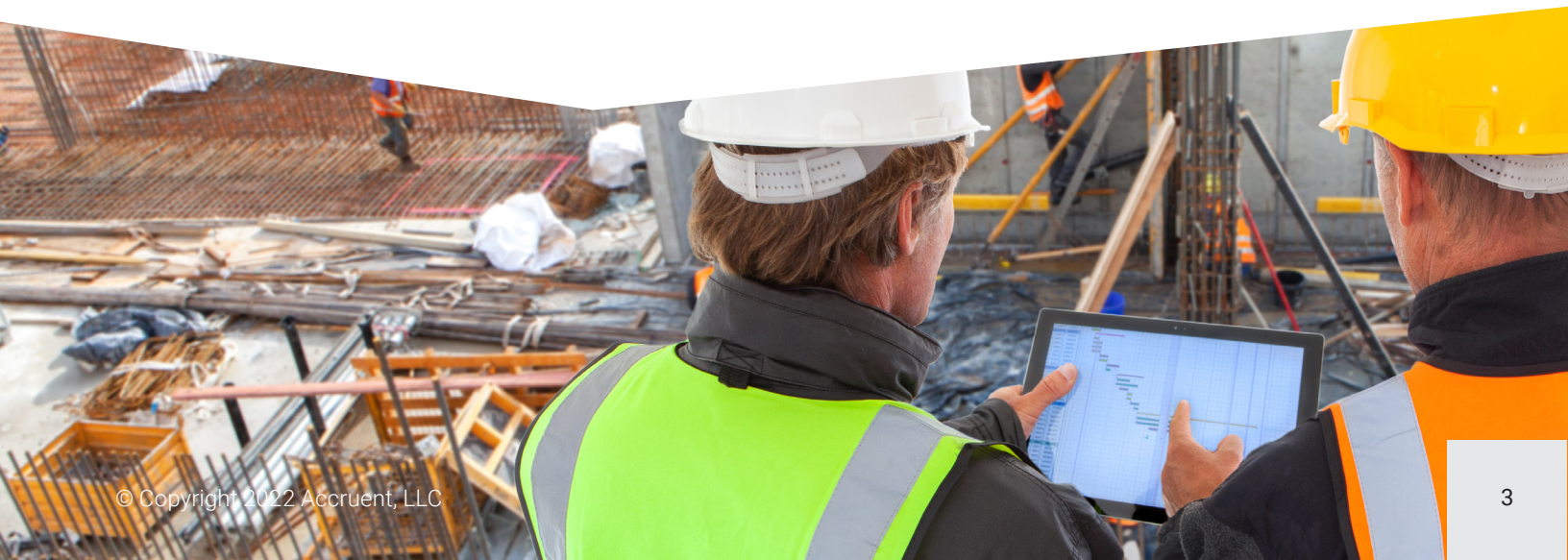
But far too often, engineering documentation is incomplete, inaccessible, or out-of-date. And when that happens, confusion and inefficiencies ensue.

"More than 50% of office professionals spend more time searching for files than on work.[1]"

TOP THREE INEFFICIENCIES IN POOR ENGINEERING DOCUMENT MANAGEMENT

LOCATING INFORMATION QUICKLY	SHARING AND APPROVAL REQUESTS	TRACKING AND VERIFYING DOCUMENT VERSIONS

[1]https://www.techrepublic.com/article/more-than-50-of-office-pros-spend-more-time-searching-for-files-than-on-work/



Clearly, facilities need an engineering document management system (EDMS) with a centralized, secure, scalable, and highly accessible repository for all engineering documentation. Such a system helps you gain efficiency in engineering projects, consolidate mission-critical engineering information, break down information silos to ensure plant safety, adhere to regulatory compliance mandates, and take control of hazardous areas.

THE VALUE OF ENGINEERING INFORMATION MANAGEMENT[2]

£180bn	p.a. costs in unplanned shutdown and equipment downtime
£70bn	of 3.5% efficiency increase in engineering information handover to operations
16%	reduction in engineering and maintenance costs over the next five years
20%	cut in energy and waste cost to achieve emission reduction levels

But when looking for an engineering document management system, where do you start? With so many solutions on the market, making the right choice can feel overwhelming. Before you narrow down your search to particular vendors, it's beneficial to understand what an EDM system is, its capabilities, and how it differs from other document management systems.

In this guide, you'll deepen your understanding of engineering document management and know what to look for when evaluating a system. You'll also learn how to avoid pitfalls during the process to ensure that you end up with the right solution for your unique environment.

[2]https://www.pentagonsolutions.com/about/the-value-of-an-efficient-engineering-document-management-system/

AN OVERVIEW OF ENGINEERING DOCUMENT MANAGEMENT (EDM)

WHAT EDM IS NOT

Before we dig into what EDM is, let's talk about what it is not. Engineering document management is not the same as enterprise document management. While they may share an acronym and some similarities, EDM is an entirely different animal for three key reasons:

1. **Document longevity.** In many other fields, users create documents for one-time use only. For example, you might create a PowerPoint presentation for a specific meeting. But in an engineering environment, documents may live for decades or even longer. This creates a unique problem because not only do you have to store the information for an extended time, the documents are continuously in need of updates.
2. **Change management needs.** Facility change is ongoing, so users need to be able to find engineering documents easily and have confidence that they are working with the most recent, up-to-date versions.
3. **Safety requirements.** Complying with governmental and industry regulations is vital for facilities in an environment with a heavy emphasis on safety and protection protocols. EDM's focus on compliance sets it apart from other document management systems.

These three points illustrate why generic document solutions are insufficient for the engineering environment. EDM, on the other hand, is tailored for asset-intensive settings and is able to handle its use cases.

WHAT EDM IS

In a nutshell, EDM is a digital way to organize engineering documents that allow for easy file retrieval, the smooth exchange of information, and control of engineering data changes. Large facilities can have tens of thousands or even up to a million of these files — written documentation, 2D and 3D CAD models, photos and photo renderings, animations, and more — and the overwhelming volume can make it challenging to find, categorize and organize business-critical information. EDM establishes a centralized, secure, scalable, and highly accessible repository for all of a plant's engineering files while preserving historical information in a neutral format.

Also, because of the importance and complexity of engineering projects, engineering documents are often related to one another. For example, an electrical system may start on one side of the building but then continue in another area. The related diagrams may be in different documents, and this complexity is difficult to manage. Engineering teams use EDM systems to keep all this information in a centralized location for frictionless access.

THE IMPORTANCE OF EDM TO YOUR BUSINESS

A comprehensive document management system where users can easily store, manage, render and visualize engineering information conveys several business benefits. With EDM, you can:

1. **Break down information silos among teams and departments.** One unique aspect of engineering information is that the people who create documents aren't, in large part, the people who actually use them. Engineering creates, maintains, and defines the documentation, but the primary users are those who perform facility maintenance operations. A centralized system, where files are stored in a single digital repository rather than on individuals' hard drives or department servers, means everyone who needs the information to execute their work has 24/7 access.
2. **Ensure information is up-to-date.** Inaccurate information can lead to accidents caused by incorrect maintenance procedures, delays due to wrong parts being ordered, confidentiality and security breaches resulting from improper external party access, and other unwelcome outcomes. Engineering documents are living files that are modified frequently — in some cases, dozens of times per year — so it's critical that teams have access to the most updated information possible. A single source of truth, rather than a collection of multiple, outdated versions of files, means employees and others can have confidence they are working with accurate data.
3. **Verify compliance and demonstrate traceability.** It is mission-critical for organizations to maintain a complete audit trail for engineering documents throughout the document lifecycle. Is a proposed change accurate, complete, environmentally, chemically, and structurally safe? With EDM, plants can easily track who changed what, when they changed it and why, along with the reasons for the change, the decisions involved, and the approvers of that change. System audit logs help organizations show regulatory compliance and decrease corporate risk while facilitating traceability in case of accidents.
4. **Control access for external parties and contractors.** Since no one is an expert in everything, one of the key characteristics of engineering processes is that they often involve third parties. The common outsourcing of engineering data makes the information flow even more complex. The process is relatively straightforward for minor changes, and only a few documents may need to be modified. But major changes can involve thousands of documents and dozens of external parties. EDM helps a facility exchange engineering documentation with external contractors and identify and fix data inconsistencies before they become an issue.
5. **Shorten project turnaround times.** No engineering project is an island, and overlapping changes and projects are routine. Concurrent engineering projects can be the most difficult and complex document management challenge for owner-operators. EDM simplifies concurrent engineering, allowing organizations to keep their master data updated while organizing their change processes in separate project areas and ensuring that each stakeholder has the correct information at the most optimal time.
6. **Minimize plant stoppages.** We all know how unexpected stoppages are both dangerous and expensive. Plant shutdowns or turnarounds can be extremely challenging for an organization — and manual processes are part of the problem. It can be a substantial manual effort for an owner-operator to document the history of changing a piece of equipment, and consequently, the process becomes error-prone. But a direct connection between the change management piece, the engineering project, and the planning of the plant stoppage improves the identification of risks involved in the change. EDM can make this process more visible, thereby aiding you in achieving proper lifecycle management, reducing risks, and lowering costs.

SOLUTION CAPABILITIES CHECKLIST

When investigating EDM systems, it's crucial to take the following considerations into account.

TYPES OF DOCUMENTS HANDLED

One of the primary reasons that general enterprise document management systems often fall short when it comes to engineering data lies in the types of documents that need to be stored, rendered, and visualized. Many enterprise systems are focused on managing written information, such as reports, letters, memos, and spreadsheets, versus the copious amount of visual data comprising engineering documents. EDM must accommodate the need to visualize data such as 2D and 3D CAD drawings, images, and the like, along with associated information such as comments, markup, metadata, and more.

EASE OF LOCATING RELEVANT INFORMATION

How do you find the information you need when it's located in someone else's documents? In large production and other facilities, those who need access to engineering documentation — typically maintenance and operations teams — often are not the same people who created it. With one team creating and organizing the data and another team searching and using it, the challenging nature of this situation can create regular friction. An EDM system must contain key data organizational features such as the ability to handle large quantities of data, tools for linking relevant documents together, automatic naming conventions for streamlined searching and browsing, and more.

VERSION CONTROL

The ability to keep track of revisions is supercritical because of the volume of people who may need to edit a document. For example, during a motor assembly project, different engineers may need to review the integrity of the motor designs and update wiring information while someone from the fabrication shop ensures the project is feasible with the available machinery. Look for a solution's ability to secure the review process with features such as merging online and offline changes, actions within the system that can be traced and logged with a timestamp, and indicators and safeguards that ensure the user knows they are using the most up-to-date documentation. Version control is also critical in ensuring proper change management, as you can only confidently approve changes if you know exactly what was changed and by whom.

CONCURRENT ENGINEERING CAPABILITIES

Revisions don't just need to be tracked but often must be made simultaneously. Concurrent engineering enables this to happen. Consider a scenario where a plant room — with its many electrical features, structural components, possible water pipes, etc. — requires updating. Here multiple teams may be working on the documentation. With concurrent engineering, a given document can be worked on under separate projects at the same time, facilitating agility and ensuring accurate, seamless changes to critical capital assets. It allows for status visibility, review states, and version comparisons, managing a smooth relationship between checkouts and ensuring as-builts are as accurate as possible.

WORKFLOW TOOLS

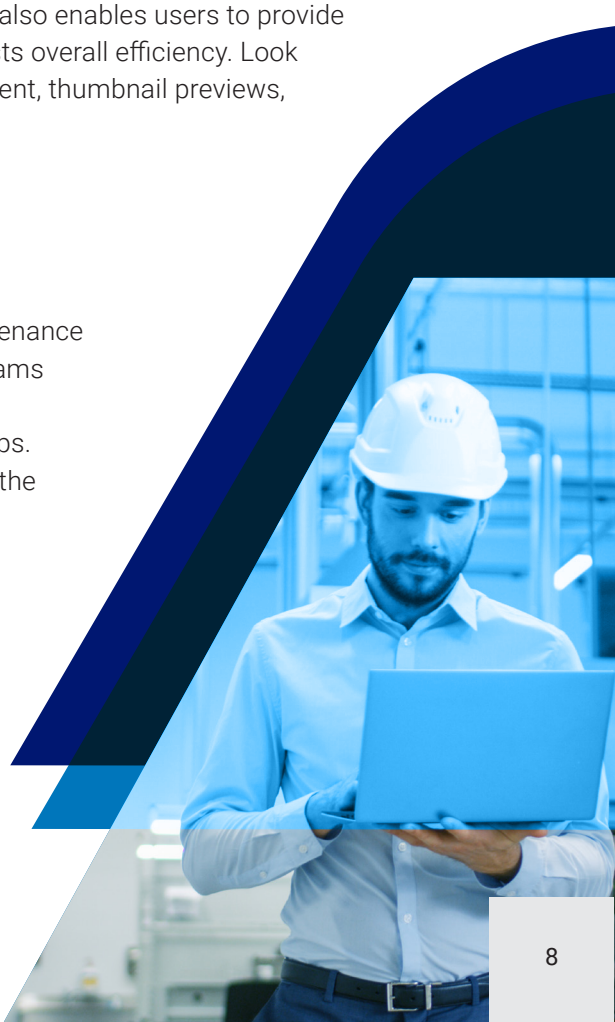
Internal teams need as much flexibility and automation as possible to shorten project turnaround times. Workflows help structure the change process by ensuring data validation and providing a complete audit trail for regulatory compliance so that facilities can confidently keep their master data up to date. When evaluating EDM solutions, look for workflows that can automate tasks, such as adding an electronic signature, applying a watermark to let users know the status of a document, or creating a PDF for each file and adding a print stamp that automatically displays when the document is printed. The ability to configure rules is also critical. For instance, a rule to send documents for approval to designated backups if the primary approver is on vacation or one that allows or blocks the transition from one project stage to the next if certain documents within the project are not yet approved.

MOBILE FEATURES

In our mobile environment, users increasingly rely on the ability to access documents from virtually anywhere, at any time. Engineers in the field, who may be executing work far from where the data is stored, need access to up-to-date, accurate documentation. A mobile-friendly EDM solution precludes the need to predict which documents and drawings will be required on-site and printed beforehand. It also enables users to provide real-time feedback, which speeds up the change approval process and boosts overall efficiency. Look for mobile features such as secure and user-authenticated rights management, thumbnail previews, document properties content, commenting capabilities, and user to-do lists.

INTEGRATION WITH COMPUTERIZED MAINTENANCE MANAGEMENT SYSTEMS

Ensuring engineering teams have effective information handoffs with maintenance departments and external contractors can be difficult. With maintenance teams working out of separate systems, commenting or submitting changes to engineering is often delayed by manual, time-consuming processes and steps. And that's assuming they can even figure out what documents they need in the first place. For instance, a maintenance staff member who typically thinks in terms of building, location, or equipment numbers may want all the engineering data related to a particular room, but they don't know where the documents are or what they're called. EDM systems that integrate with systems for maintenance, operations, capital planning, facilities management, and other departments, such as CMMS solutions, streamline information access. APIs that allow the EDM solution to integrate with other software programs help break down silos and provide a single source of truth for engineering documentation.



COLLABORATION WITH EXTERNAL CONTRACTORS

Internal teams aren't the only stakeholders requiring access to engineering documentation. Nowadays, a significant amount of work is outsourced, and contractors need secure, efficient access to complete and up-to-date documentation. Internal and external teams must communicate well to ensure that field changes are accurately conveyed to and from the design team. And if several projects are being planned simultaneously, the need to communicate well and share accurate information increases. Consider how easy (or difficult!) it is within an EDM system to send documents to external contractors or vendors to view, update or add information, and look for tools such as automatic validation of CAD software file references and a full audit log of all actions.

REGULATORY COMPLIANCE FEATURES

We've mentioned audit logs in several different contexts – and for good reason. It's mission-critical that organizations maintain a complete audit trail for engineering documents throughout their lifecycles. EDM systems help production facilities keep track of constantly changing regulations and shifts in technology and innovation while lowering the risk of audits, cost overruns, and production delays from inaccurate document versions. Look for features such as a controlled platform with a tested "configuration change management" procedure that ensure all aspects of a proposed change have been documented and agreed upon. Role-based security that allows for the provisioning of access rights and proof of control that introduces checks and balances to guarantee user modifications are not lost is also recommended.

HOW TO CHOOSE THE RIGHT EDM VENDOR

START WITH A NEEDS ASSESSMENT

An EDM system can address a variety of challenges, so your first step in choosing a solution must be to start by considering which problems your organization is trying to solve. Do you lack visibility into critical asset information for plant locations across a widespread — perhaps global — area? Is the absence of automated version control and standardized workflows leading to inefficiencies and costly wastes of time? Are you looking to streamline the handover of information from engineering to maintenance and external contractors?

EDM requirements can be difficult to articulate, but the deeper the understanding of your challenges, the better you can tailor the search for a solution. Also, remember that EDM software needs to be tied to your your company's vision, objectives, and day-to-day operations. When conducting a needs assessment, be sure to involve all major stakeholders in each process area because your aim should be to end up with a solution that everyone agrees is a need and not an extravagance.

DEFINE YOUR TECH REQUIREMENTS

No facility exists in a vacuum, and you likely have systems in place that may dictate in part what you will need in a new EDM solution. What other current or planned applications will need to be integrated with your document management system? Do you anticipate using the EDM system throughout multiple locations, and do the various sites have differing tech requirements? How much mobility do you need (the answer is probably a lot!), and do you have the technology, such as tablets or smartphones, to support it? Also, consider how sophisticated and knowledgeable your end users are and what support they will need to get started.

MAP OUT A BUDGET PLAN

Outlining a budget is tricky, and we hesitate to delve too much into the topic here. Still, it deserves mention, even if it is just a starting point for guiding future discussions. When considering a budget for an EDM system, you'll want to think not only about the initial outlay but also support and maintenance costs, training costs, and any potential scaling costs should the system be rolled out to other departments or users.

TWO PITFALLS TO AVOID

Thinking a generic system will solve an engineering problem. It is tempting to say, "We already have a document management system. Why do we need another one?" But engineering information is more complex to manage than generic documentation, as frequently these files are large and have existing relations with other files with specific requirements for managing them. A primary pitfall companies fall into is that the engineering team is forced to use a one-size-fits-all document management strategy. In contrast, a purpose-built engineering document management system provides benefits for ensuring compliance, controlling engineering project costs, improving safety, protecting brand reputation, and extending the lifespan of decades-old assets.costs.

Doing nothing. Large businesses like manufacturing facilities often don't fully grasp how a system drains an organization. They may need to be explicitly shown the cost of the status quo (such as obvious costs like wasted time) and a comparison of how a proposed solution would lead to a better ROI. But even where demonstrating the value of a better EDM system isn't possible, it's important to consider what will happen when problems aren't addressed. For instance, issues that lead to plant stoppages or non-compliance with governmental or other regulations. In these cases, the costs of doing nothing far outweigh the investment in a tailored engineering document management solution.

TIPS FOR IDENTIFYING VENDORS AND CREATING A SHORTLIST

If you're just beginning your search for an engineering document management solution, you might want to consider outsourcing the vendor shopping process. It isn't uncommon for large plants to hire professional services companies to create a vendor shortlist since these firms have experience and skills across a wide range of technologies and industries. They also likely have comparison charts that allow you to easily pinpoint differences among competitors.

On the other hand, if you prefer to do much of the legwork yourself, you'll find an abundance of content available from each vendor — webinars, presentations, datasheets, case studies, white papers, solution guides, etc. — that can point you in the right direction. These resources can provide you with enough initial information to narrow your search so that when you're ready to contact a company's sales team, you can have confidence that they are in the ballpark of meeting your EDM needs.

Lastly, talk to others with no personal stake in your decision. Seek out peers at conferences or look to outside groups like industry organizations or analysts.

VENDOR EVALUATION CHECKLIST

Vendors are happy to try to persuade you that their EDM software is the best for your particular needs, but there's more to a partnership than a solution's features. Be sure to also consider the following:

1. **Industry experience.** Look at the performance history of any potential vendor to predict how well the vendor will fit your company's requirements. Consider their background and stability and whether they have a track record in innovating solutions. This is a major decision, and you won't want to be stuck with an outdated or insufficient solution.
2. **Support and training.** What support is offered before, during, and after implementation? What will end users need to be able to use the system? What trainings are offered and how much do they cost? Does the vendor provide comprehensive documentation? Can you buy professional services to jump-start your project?
3. **The partner network.** Large plants tend to be spread out across the globe, often with facilities in multiple countries and continents. Many businesses desire local partners to provide support after implementation. If this is your situation, find out what partnerships the vendor has, their local knowledge and expertise, and whether they are supported with training and other resources.
4. **References.** In today's connected world, be wary of a vendor that can't supply you with customer references. Be sure to ask how long the customer has used the system, why they chose a particular vendor, what challenges the solution solved, how the implementation fared, what ongoing support is needed, and anything else they have learned from working with the vendor.
5. **Trials and demos.** First-hand knowledge can be invaluable, so look for options to try a solution. Start with a demonstration, where you can ask questions of a salesperson, and then move to a trial (if possible) where you can get a feel for how the system works, including insights into its strengths and weaknesses.

THE ACCRUENT MERIDIAN ENGINEERING DOCUMENT MANAGEMENT SYSTEM

Meridian, Accruent's EDM solution, gives your teams secure access to accurate asset information they can trust anywhere, anytime. By establishing a single source of truth for all asset information, Meridian helps facilities ensure plant safety and compliance, enables disparate teams to share engineering information securely and reliably, and demonstrates effective change control procedures for all engineering documentation.

$1.5T	500M	300K+	50%
IN ASSETS MANAGED	DOCUMENTS TRACKED	USERS	OF TOP TEN CHEMICAL COMPANIES

With Meridian, you:

- **Preserve engineering data integrity.** Identify and fix data inconsistencies before they can become an issue. Meridian helps you maintain the quality, accuracy, and completeness of data and metadata by working in a unified system. Manual data entry and redundant data are eliminated, while version control prevents users from working on an incorrect version.
- **Ensure effective control and change management.** Entire teams will stay on track with access to up-to-date project data. Meridian makes it easy to keep master data up to date while you organize change processes in dedicated project areas. It allows you to create highly configurable workflows based on your organizational needs.
- **Utilize a CAD platform-independent solution.** Generic content management systems can't handle complex and constantly changing engineering information. Meridian's purpose-built engineering document management software supports bi-directional attribute linking with most major CAD systems to ensure accurate information. This allows users to easily store, manage, render, and visualize 2-D and 3-D content.
- **Reduce the cost of handover.** Shorten project turnaround through concurrent engineering, facilitate smooth information handover processes among engineering, operations, and maintenance teams, and efficiently manage the exchange of engineering documentation with external contractors.

> ***"Through the time and resources saved in search and retrieval and document processing, we are enjoying a new operational efficiency and very low mitigation costs. Meridian reduced our information expenditure by 5%."***
>
> – Bill Eager, Drawing Management Senior Officer, AbbVie

ABOUT ACCRUENT

At Accruent, we know the built environment better than anyone. We're setting new expectations for how data can fundamentally change how you run your built environment and empower your people and systems to work together for greater ROI.

The built environment is all around you. Today, it's saddled with more systems to manage, more regulations to follow, and higher expectations from your workforce than ever before. But within this mosaic of connected infrastructures and integrated workflows is endless opportunity.

Accruent helps you look below the surface to unlock the value hidden in your complex systems and endless data points to gain deeper insight into your organization. We offer intuitive and intelligent solutions that seamlessly integrate with your existing systems and workflows. Our solutions not only deliver the promised results but also illuminate possibilities you couldn't see before — so you can achieve results you never knew were possible.

10K	150	8.5B+	500M+
CUSTOMERS	COUNTRIES SERVED	SQUARE FEET MANAGED	WORK ORDERS MANAGED

Accruent is the world's leading provider of software for unifying the built environment, with solutions spanning workplace management, asset management, and physical and digital applications. Accruent continues to set new expectations for how organizations use data to transform the way they manage their facilities and assets. With headquarters in Austin, TX, and Hoofddorp, Netherlands, Accruent serves over 10,000 customers in a wide range of industries in more than 150 countries worldwide.

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