

Hazen and Sawyer

Customer Success Story

AutoCAD®

AutoCAD® MEP

AutoCAD® Civil 3D®

Autodesk® Buzzsaw®

Autodesk® Design Review

Autodesk® Navisworks®

From conception to as-built record drawings, AutoCAD-based products are at the core of what we design, and our clients benefit from our 25 years of AutoCAD expertise. By relying on AutoCAD MEP and AutoCAD Civil 3D as the basis for our design process, we have improved the efficiency and quality of all our project designs and documentation.

—Harold Litzenberger
Corporate CAD Manager and the
Senior Principal Designer
Hazen and Sawyer, P.C.

Engineering better solutions.

Hazen and Sawyer uses Autodesk engineering solutions to improve the quality and efficiency of water and wastewater design projects.



Image courtesy of Hazen and Sawyer, P.C.

The Firm

For more than half a century, environmental engineering and science firm Hazen and Sawyer, P.C. has focused on providing safe drinking water and controlling water pollution. Founded in 1951, the firm provides environmental engineering services to public and private clients in the fields of water supply, treatment, and distribution; wastewater collection and treatment; and stormwater management. The company has a staff of more than 750 people located in over 20 offices throughout the United States and South America.

Hazen and Sawyer was an early adopter of CAD and has used AutoCAD® software for its designs since 1985. “Our design process is the heart and soul of our business,” says Harold Litzenberger, corporate CAD manager and senior principal designer at Hazen and Sawyer. “We are exceptionally strong at detailed design and have a history of providing innovative engineering solutions for our clients—backed up with the detailed drawings and specifications to actually build their facilities.” All of Hazen and Sawyer’s design tools are coordinated to meet those ends.

The Challenge

Over the years, the firm maximized the efficiency and productivity of its design process with a highly customized AutoCAD environment. “We have always had an aggressive approach toward alternative methods to produce our deliverables and are at the forefront of using technology to meet and exceed our clients’ expectations,” says Litzenberger. As discipline-specific AutoCAD-based products matured, the firm embarked on a long-range strategic initiative to move from project production in 2D AutoCAD to multidiscipline design using the advantages of 2D, 3D, and model-based design with products such as AutoCAD® MEP software and AutoCAD® Civil 3D® software.

Because the transition had to be in the context of a familiar production environment, the firm chose AutoCAD-based design solutions—implementing both AutoCAD MEP and AutoCAD Civil 3D for their core design needs.

Using AutoCAD MEP and AutoCAD Civil 3D enables project engineers to work in an integrated design environment and produce countless numbers of drawings.

Multidiscipline Design Process

"We need a broad base of multidiscipline design tools to get our projects out the door," says Litzenberger. Hazen and Sawyer's projects typically include civil, structural, architectural, process mechanical, electrical, instrumentation, HVAC, and plumbing design disciplines. The combination of AutoCAD MEP and AutoCAD Civil 3D is a perfect fit for the firm's multidisciplinary needs—enabling it to work in an integrated design environment and still produce AutoCAD-based documentation sets with as many as 1,400 drawings. The firm currently has more than 120 AutoCAD MEP users and over 45 AutoCAD Civil 3D users.

Hazen and Sawyer also uses Autodesk® Navisworks® software for cross-discipline visualization, coordination, and clash detection; Autodesk® Buzzsaw® software for collaborative project management; and Autodesk® Design Review software for sharing and reviewing designs.

Design in a Proven Environment

The discipline-specific design tools within AutoCAD MEP and its familiar AutoCAD environment enables Hazen and Sawyer engineers to develop quality designs and documentation. With AutoCAD MEP, Hazen and Sawyer develops drawings directly from the design—automating the production of contract documents by using

AutoCAD-based drafting tools designed specifically for mechanical, electrical, and plumbing systems design. "There is no question that AutoCAD MEP produces a higher-quality project," says Litzenberger. "Not only is the design more coordinated, the documentation set is more accurate."

Improved Coordination

"When you are working and designing using traditional drafting tools, it is possible for the mechanical, HVAC, and electrical designers to overlook each other's design elements," says Litzenberger. With AutoCAD MEP, users take advantage of the intuitive design environment to help coordinate their mechanical, electrical, and plumbing designs and see where problems may occur. In the past, they did this by manually comparing 2D CAD drawings. "But with AutoCAD MEP, we are working 'inside the space' so we can more quickly visualize where the pipe or the ductwork should go, and perform interference checking to minimize clashes from the start," says Litzenberger.

Multidiscipline Clash Detection

Hazen and Sawyer also uses Autodesk Navisworks to bring all of the discipline-specific data into one common project model and instantly detect any clashes of ducts, pipes, structures, and so on. In addition, a clash detection log allows the firm to monitor conflicts and resolutions throughout the

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design process. "Using Autodesk Navisworks, we have a much more efficient and detailed way to find and correct conflicts," says Litzenberger. "It's transforming the way we work."

Custom Content

In addition to the large amount of mechanical, electrical, and plumbing-specific content included in AutoCAD MEP, Hazen and Sawyer used the software's content creation functionality and the MvPart conversion tools to create custom and specialized water and wastewater content. With these prebuilt libraries of custom content, Hazen and Sawyer's engineers and designers do not lose time at the beginning of a project creating equipment and can quickly utilize mechanical, electrical, and plumbing objects for early conceptualization and spatial coordination.



Image courtesy of Hazen and Sawyer, P.C.

Model-Centric Civil Engineering

Hazen and Sawyer's civil engineering group has also transitioned from drawing-based production to model-based design, migrating from AutoCAD® Land Desktop software to AutoCAD Civil 3D software: Autodesk's building information modeling software for civil engineering. The software's model-based approach links design and production drafting—reducing the time it takes to implement design changes. “Using AutoCAD Civil 3D, we can create many of our design tasks such as transportation and utility drawings with improved quality, efficiency, and flexibility. Some infrastructure projects have seen CAD time savings of as much as 50 percent faster than we could with AutoCAD Land Desktop,” reports Joshua Farmer, PE, Civil 3D coordinator and principal engineer at Hazen and Sawyer.

The civil engineering group realized that AutoCAD software's style templates could be used to bring consistency and standardization to their deliverables. “AutoCAD Civil 3D offered us the opportunity to define the variety of civil engineering groups through our adoption of a common software platform, standardize the design and documentation processes, and expand information sharing throughout the company.” Two years later, a sub-

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Hazen and Sawyer, P.C. uses Autodesk tools to incorporate environmentally conscious, cost-effective 3D design.

stantial increase in the firm's site and civil work is performed within the company by this group of 45+ AutoCAD Civil 3D users.

Situation on (and Under) the Ground

Many of Hazen and Sawyer's projects involve a site with existing yard piping, and in these situations, the firm uses the software's link between design and documentation to its advantage. Yard piping can have a dense network of existing, underground piping that does not always match the as-built drawings for the facility. “We need a design tool that allows us to quickly adjust to the situation on the ground—even underground,” says Farmer. “As more data regarding existing conditions becomes available, we can update the model, locate pipe interferences, and more quickly modify the location of new design components. This ability to make changes on the fly is an invaluable benefit of AutoCAD Civil 3D.”

Throughout the design process, Hazen and Sawyer's civil and mechanical, electrical, and plumbing engineering groups are able to reference each others' DWG files to share centerline data for yard piping and process piping—so they all can coordinate up-to-date information on where the pipes are going in and out of the buildings.

Site Alternatives

The ability to generate designs and design alternatives faster is another aspect of AutoCAD Civil 3D the firm appreciates. “On one job, we did a feasibility study that compared four different sites for a large pump station,” recalls Farmer. “By using the geospatial analysis functionality within the software, we could import elevation information as well as GIS data—information regarding soils, wetland and floodplain boundaries, and buffers—to more quickly determine the real impact of this pump station on each site.” The software allowed Hazen and Sawyer to get more accurate cost estimates that included true costs for each site analyzed including additional costs associated with pumping, grading, and land area. “If our client had purchased the initial site they chose, they would have spent between \$500,000 to \$1,000,000 more for a site that would not have fit their needs as well as the one we selected using AutoCAD Civil 3D,” says Farmer.

Civil Engineers used AutoCAD Civil 3D for site selection resulting in time and money savings.

Integrated Storm Sewer Analysis

Hazen and Sawyer also uses the Hydraflow Storm Sewers Extension included with AutoCAD Civil 3D to help design and analyze stormwater and sewer systems in real time. Once the pipe network for the stormwater system is modeled in Civil 3D and elevations for the structures, inverts, and so forth are defined, the model is exported via LandXML and used directly in the Hydraflow Storm Sewers Extension to analyze the network.

Project Visualization and Collaboration

Hazen and Sawyer uses Autodesk Navisworks to aggregate the firm's AutoCAD MEP and AutoCAD Civil 3D designs—as well as their partner's designs—for clash detection, multidiscipline project visualization, and collaboration. “I was recently at a design review meeting with a roomful of people—the client team, our joint venture partners, the construction manager—and instead of looking at the drawings spread all over the table, they were all focused on the Autodesk Navisworks model we were displaying,” says Farmer. “The whole room was able to stay on task throughout the day-long meeting. Presenting the project via a 3D model makes it easier for everyone to understand. And it is a much better way to get early feedback on a project—which can save us money by limiting major design changes late in the process.”

Collaboration Made Easy

The firm uses Autodesk Buzzsaw for its collaborative project needs, and it uses Autodesk Design Review to digitally review and mark up drawings. “We work with a variety of constituents on our projects: municipalities, consultants, joint venture partners, not to mention our own staff located throughout multiple offices,” says Litzenberger.

The Solution

“The primary motivation for upgrading our 2D-based production environment to discipline-specific solutions was to produce a higher-quality project and to meet our client demands more effectively and more efficiently,” says Litzenberger. “Autodesk products have enabled us to do that. It is not just about productivity—it is the quality of the design that we are able to produce and the ability to use that design data right on through to the final stages of design, for clash detection, for schedules and cost estimating, for construction sequencing, even facilities management functions like matching shop drawings to installed equipment.”

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For additional information about these and other Autodesk products, visit www.autodesk.com/water.

To learn more about Hazen and Sawyer, visit www.hazenandsawyer.com.



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