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Industry insights

Accelerating energy and utilities equipment design using Solid Edge

Siemens Digital Industries Software

Energy and utilities equipment manufacturers are under considerable pressure as they react to trends like increasing global competition, higher product complexity and fluctuating energy prices. They need to improve the speed of their product development process and ensure the equipment they deliver is reliable and operates with best-in-class efficiency. Digitalizing their engineering processes is an excellent way to help them react to these trends while increasing their market share and profitability.

3D digital models, or “digital twins,” can streamline engineering processes, helping energy and utilities equipment manufacturers of all sizes accelerate the development of optimized, reliable products. Intelligence can be added to the digital twin throughout the product development lifecycle, as it moves from concept design to detailed design, and through to simulation, manufacturing and service.

Digital twins include data that can help optimize and validate products and help ensure that customer and regulatory requirements are met.

Digitalization also reduces the need to create and test physical prototypes, speeding the product development process while ensuring the final product’s reliability and durability. With faster completion of design projects, energy and utilities equipment manufacturers can deliver new products faster and increase revenues.

Siemens Digital Industries Software’s Solid Edge® software creates 3D digital models that can be used to accelerate all aspects of product creation, including 3D mechanical design, electrical design, simulation, visualization, manufacturing, technical publications and data management. With Solid Edge you can perform virtual testing of your designs to minimize manufacturing issues, reduce costs and ensure the durability and superior performance of your equipment in harsh operating environments.

The Solid Edge advantage

- Make digital representations of existing designs with reverse engineering
- Use assembly modeling to manage large assemblies, up to 100,000 parts
- Optimize products with generative design
- Seamlessly integrate electrical and mechanical domains for effective electromechanical design
- Improve design of fabrications, weldments and sheet metal components
- Use integrated analysis capabilities to ensure high performance, safety and durability
- Use powerful and flexible NC programming tools, including feature-based machining
- Access and showcase designs remotely through cloud collaboration

Solution focus

The Solid Edge advantage *continued*

- Reduce time on engineering documentation using 3D annotated models
- Take advantage of integrated routing capabilities for piping and tubing, and specific add-on applications for modular plant design
- Manage customer, regulatory and industry requirements

Using Solid Edge improves product development performance in these key areas:

Communicate new designs

Convey innovative features and the value of your equipment designs to potential customers prior to manufacturing. By enabling the creation of rich 3D product information, you can clearly demonstrate design innovations using the latest visualization technologies. Integrated photorealistic rendering included with Solid Edge creates amazing product images and animations, which lets you stand out from the crowd with superior marketing materials that clearly communicate your equipment designs.

Speed product development

Integrate proven standard components in new equipment designs to speed product development and improve quality in the final product. Using standard parts can minimize costs, improve reliability and maintain profit margins. Solid Edge enables designers to easily access libraries of standard and catalog components and insert them into assemblies, where rapid feasibility assessments can be made.

Effortlessly create sheet metal models

Streamline the entire sheet metal product development process, from computer-aided design (CAD) through flat pattern and drawing development, to meet unique sheet metal design challenges like manufacturability. Solid Edge includes sheet metal-specific features, such as enhanced lofted flanges and bend bulge relief, to build complex models. And with integrated applications for analysis, nesting, numerical control (NC) programming and related tasks, Solid Edge helps you speed design time, improve quality, and reduce costs.

Automate modular plant design

Accelerate your design process for mechanical routed systems. A comprehensive set of industry-specific design tools helps developers quickly route and model piping and tubing in Solid Edge assemblies; integrated applications rapidly create piping and instrumentation diagrams (P&ID) and automate the design of complete 3D pipe systems which are crucial for meeting company and international quality standards.

Validate and optimize fabricated structures

Solid Edge provides excellent tools for the fast and accurate design of weldments and structural steel fabrications. Designers can select standard sections and Solid Edge automatically calculates the appropriate intersections and end treatments. Designers can simulate and test structures using embedded simulation capabilities to optimize structures and minimize material and manufacturing costs while ensuring performance and reliability.

Integrate electromechanical design

Create fully functional and manufacturable designs using industry-proven electrical design tools. By automating design processes, you can enable seamless electromechanical design and achieve first-pass design success. From simple wire routing to full harness design and printed circuit board (PCB) layout, Solid Edge lets you model in 3D and collaborate on the electrical details. Electrical designs can be validated for optimized wire gauges and fuse ratings, and cross-probing is available between electrical and mechanical domains.

Deliver machine tool value for manufacturing

Manufacture parts accurately and efficiently using both traditional machining and new additive manufacturing technologies. Using a single unified computer-aided manufacturing (CAM) system allows you to get the most from your tools. Solid Edge CAM Pro, a powerful NC programming software, can be used to create tool paths that are associative to the Solid Edge CAD model. These tool paths can be automatically updated when the design is changed.

Prepare designs for 3D printing

Create world-class products using the latest 3D printing techniques, with support for an end-to-end workflow. Generative design techniques combine design tools with topology optimization allowing you to quickly create light, highly complex shapes uniquely suited for 3D printing. Solid Edge supports 3D printing needs from creating an initial prototype to printing the final product.

Validate and test using virtual prototypes

Validate and improve product performance with scalable simulation tools that use virtual prototyping and integrated motion and vibration simulation. Digital models allow you to validate and test a design prior to physical prototyping; virtual prototypes can even eliminate the need to build costly physical prototypes. Solid Edge Simulation enables you to digitally validate part and assembly designs within the Solid Edge environment, improving performance and durability.

Analyze fluid flow and heat transfer

Facilitate rapid and accurate fluid flow and heat transfer analysis. Moving simulation up in the design process allows you to identify and fix issues before they can impact downstream development. Simcenter FLOEFD™ for Solid Edge® supports flow simulation with an embedded computational fluid dynamics (CFD) simulation tool that enables design engineers to enhance productivity by up to 40 percent.

Publish interactive technical documentation

Embed 3D CAD models into documents to author complete printed or interactive documentation in minutes. The ability to clearly communicate correct manufacturing, installation and maintenance procedures is essential to the performance of your products and the success of your business. Solid Edge Technical Publications allows you to quickly create technical documents directly from Solid Edge parts and assemblies, eliminating the need to convert CAD files and produce top-quality documents in-house.

Manage design projects and engineering change

Retrieve data quickly, optimize resources and manage engineering changes efficiently. Integrated design management tools that include preconfigured workflow capabilities enable your team to access and track design projects and engineering change information. Siemens' design management capabilities range from integrated data management that is included with Solid Edge, to the comprehensive multi-CAD data management and product lifecycle management (PLM) capabilities of Teamcenter®.

Manage customer requirements and compliance with industry regulations

Prove compliance with audit trails and secure released documents. Customer and regulatory requirements drive

complexity into product development, manufacturing and field operations. Solid Edge Requirements Management enables you to work efficiently in this area by managing customer and regulatory requirements as an integral part of the design process.

Enable paperless 3D documentation

Communicate more effectively and reduce manufacturing costs using model-based definition (MBD). MBD produces annotated 3D models, which are far easier to understand than complex 2D drawings. Improving comprehension drives downstream validation and manufacturing efforts. Solid Edge Model Based Definition enables the production of a complete digital definition of parts and/or assemblies using a 3D model.

Access design projects from anywhere

Access accurate design and installation information while working on the shop floor and at remote locations. Mobile viewing of 2D drawings and 3D CAD models using free mobile apps enables you to access design information anywhere, anytime. Cloud capabilities in Solid Edge provide easy access to professional 3D CAD across different devices and the ability to quickly share data. Augmented reality capabilities showcase designs, allowing customers to view products in real-world settings.



Key solution components

- Solid Edge Mechanical Design for 3D part and assembly design using synchronous technology – accelerates machinery design, speeds revisions and improves the reuse of proven components in new designs
- Solid Edge Electrical Design for the design of wiring, cables, bundles and printed circuit boards – enables true electromechanical co-design collaboration
- Solid Edge Simulation for digital validation of critical components – reduces the need to create physical prototypes, lowers material/testing costs and improves reliability and durability
- Solid Edge Manufacturing for definition of accurate machining, fabrication and assembly processes – improves overall efficiency with additive and subtractive manufacturing
- Solid Edge Technical Publications for creating illustrations and technical documents – communicates manufacturing, installation and maintenance procedures globally
- Solid Edge Data Management for searching, managing and sharing of product data – improves collaboration within the design team and with other departments, suppliers and customers
- Solid Edge Cloud Collaboration for online CAD management, viewing and collaboration

Commission and service

Support customers by installing, commissioning and maintaining the equipment that you design. Mobile access to design data and the ability to create specific service instructions that incorporate 3D graphics ensure that in-service problems can be identified and resolved quickly and efficiently.

Realizing significant benefits

Designers and engineers in the energy and utilities equipment manufacturing industry report significant benefits using Solid Edge. Some examples from published case studies include:

- Improved design productivity and product quality
- Reliable, automated design process with fewer errors
- Decreased number of mistakes using standard pipe specifications

- Decreased number of connection problems through integrity checks in P&ID
- Reduced time needed to perform a complex design task from two days to 30 minutes
- Reduced manual data transfer by 75 percent
- Complied with rigorous International Organization for Standardization (ISO) certifications while building a unique product
- Improved marketing with attractive images and animations

For more information on this offering and to read customer case studies, please visit <https://solidedge.siemens.com/en/industries/oil-gas-equipment/>

