Machinery Design

SOLID EDGE
Solutions for Machinery Design

UGS powering collaborative commerce
Solid Edge solutions for machinery design

Machinery makers face some of the most extreme design challenges in the manufacturing industries:

- How to engineer and build complex machines in a very limited window to meet demanding delivery schedules
- How to provide machinery solutions that best fulfill functional specifications but also fit within engineering and budget constraints
- How to innovate beyond competitors while maintaining quality and serviceability
- How to get it right the first time

Solid Edge, the leading mid-range CAD software from UGS, gives machinery makers comprehensive computer-aided tools tailored for machinery design problems. With industrial-strength 3D modeling, assembly design, engineering aids, and 2D drafting, Solid Edge has everything you need to get down to the business of machinery design. These uniquely productive tools are remarkably affordable and easy to use, to help you realize the business benefits of advanced 3D machine design technology:

**Faster bid response, quote preparation, and proposal.** With Solid Edge's innovative CAD tools, you can quickly develop new designs and alternative machine configurations in response to customer specifications. Solid models clearly communicate your proposed machinery solutions, and correct Bills of Material from CAD models help improve the accuracy of quotes.

**Greater design productivity and throughput.** With Solid Edge, your design team can get more work done with less effort. Your designers will readily master advanced 3D CAD solid modeling techniques without a long and expensive learning curve. Streamlined design operations with an intuitive user interface make Solid Edge the most productive CAD system available, requiring fewer commands and mouse clicks to get the job done. The added productivity results in significant direct labor and time savings.

**Shorter design, manufacturing, and delivery cycles.** Solid Edge's productivity edge automates and streamlines all design functions, from concept layout through detail design and drafting, to significantly reduce machinery development time. With integrated applications for CAE, CAM, PDM and related functions, Solid Edge supports full-cycle efficiencies that get your machines delivered on time.

**Reduced product development costs.** With the lowest cost of ownership of any 3D CAD system, Solid Edge gives you an up-front advantage in your outlay for design technology. In addition to direct engineering labor and time savings, Solid Edge also helps reduce costs associated with prototyping, errors and revisions, and engineering change orders.

**Fewer errors and design revisions.** With Solid Edge, you build accurate virtual machinery models that help you avoid costly errors, scrap, and rework. You can detect and eliminate fit and function problems long before they reach the shop floor, and reduce errors and changes from customers and suppliers with 3D design communication.

**Improved machine quality, function, and reliability.** The engineering aids in Solid Edge help you evaluate more design alternatives in less time, so you can optimize machine performance and reliability. Solid Edge includes mass properties calculations, design sensors, motion analysis, interference detection, and other built-in tools, as well as integrated CAE software applications for detailed finite element, kinematics, and dynamics analysis.
“Solid Edge gives us everything we need for machinery design, at a fraction of the cost of high-end systems.”

Paul Choate, engineering manager, Alcoa Packaging Machinery
Englewood, Colorado

“By building the machine digitally using the software’s assembly modeling capability, we knew everything would fit. That was much more efficient than tearing apart a prototype to make it work.”

Steve Cook, vice-president, Dayton Systems Group
Dayton, Ohio

“We’re not only designing machines faster, we’re making them better.”

Alan D. Flores II, mechanical design engineer, Casa Herrera, Pomona, California

“With Solid Edge, we can give potential customers an accurate picture of a machine that does not exist yet, and we can far more easily take account of their specific requirements in the end product.”

Rob Stikkelorum, deputy manager
APS Engineering, The Netherlands

“IT was clear to us that Solid Edge would provide a higher level of productivity and return on investment than the other systems we evaluated. We were also very impressed with Solid Edge’s ease-of-use.”

J.Y. Yoo, automation R&D manager, Sun Yang Tech, Inchon, Korea

“By increasing engineering capacity, improving quality, and reducing lead times and costs, Solid Edge is helping machinery makers achieve strategic business objectives of greater market share, revenue, and profitability.”
Assembly design for machinery

Solid Edge was developed specifically to tackle the large assemblies that are fundamental to machinery design. Supporting both top-down and bottom-up techniques, Solid Edge assembly design tools enable your engineering team to develop 3D models that capture the relationships among machine components. You can ensure accurate fit of parts by designing and modifying them within the assembly model, directly using geometry from adjacent parts or from machine layouts.

Solid Edge minimizes the time you spend searching for and organizing machinery data with built-in assembly management tools. Integrated parts libraries and revision aids help you quickly find, replace, and revise assembly components. To minimize modeling time, designers can "teach" parts to automatically snap into their positions with proper mating and alignment relationships.

With Solid Edge, customers can design even the most complex assemblies. Lightweight and simplified part representations make it easy and practical to work with machine models comprising thousands of parts.

Machinery engineering aids

Solid Edge's exclusive Cognitive Assembly Design technology delivers design assistance innovations that aid in making machinery engineering decisions.

**Design rule sensors.** DesignAssistant sensors, analogous to physical sensing devices, provide continuing feedback on engineering rules and variables as the design develops. With sensors your designers can automatically monitor distances between components, surface area, physical properties, and other key design criteria.

**Motion analysis.** Solid Edge includes a built-in motion analysis package, Simply Motion, developed by Mechanical Dynamics Inc. Simply Motion automatically builds detailed motion analysis models from Solid Edge assemblies. Designers can quickly and accurately simulate complex movement, detect interferences and create animations of the full range of assembly motion. This analytical feedback helps identify and correct problems and improves the quality and performance of moving machinery parts.
**On-line machinery reference.** The Engineering Handbook is an integrated add-on package for Solid Edge that provides on-line reference and automatic parts creation for machinery designers. Developed by MechSoft.com, Inc., the Engineering Handbook includes calculations representing standard mathematical formulas and physical theories for a broad range of machinery components. A calculation-driven parts generator automatically creates correct-by-construction part models from the engineering calculations, based on desired load and service criteria. Also included is a complete on-line machinery reference that documents algorithms, formulas and theories.

**Third-party engineering software.** Solid Edge works with the leading software applications for detailed engineering analysis, simulation, and optimization. Finite element analysis, kinematic and dynamic simulation, and other engineering software aids integrate with Solid Edge to accelerate analysis cycles.

**Greater design productivity for machinery components**

Solid Edge helps machinery engineers design more rapidly with parametric, feature-based modeling tools that efficiently build machine parts. Beginning with base parts created from a revolved or extruded sketch, designers can easily add typical mechanical features including holes, cutouts, protrusions, rounds, and thin-wall features, as well as more complex geometric features like draft angles, sweeps, lofts, helical features and feature patterns. Part geometry, relationships, and dimensions can be changed quickly to investigate design alternatives.

Solid Edge boosts design productivity with specialized, process-specific environments for machine components including sheet metal, weldments, and tubing. These environments provide tailored commands and structured workflows that help you design these components much more quickly than with general-purpose CAD modeling tools.

**Sheet metal.** Solid Edge's sheet metal environment uses standard sheet metal and fabrication terminology, with streamlined modeling commands for tabs, flanges, louvers, dimples, cutouts, mitred corners, corner breaks, and other sheet metal-specific part features. With automated placement of bend relief, bend allowance calculations, and flat pattern development, Solid Edge delivers the most advanced sheet metal CAD package available.

**Weldments.** A customized command set in Solid Edge accelerates design of machinery weldments. The weldment environment assists in defining the constituent parts of weldments, as well as weld beads, pre-weld surface treatments, and machining operations after the welds are applied. Solid Edge drafting documents the entire weldment manufacturing process, with component drawings as well as pre-weld and post-machining views. Weldment designs can be placed and manipulated as single components in machinery models.

**Tubing.** Solid Edge XpresRoute is an integrated add-on package that rapidly routes and models tubing for hydraulic or pneumatic systems. The XpresRoute module helps you quickly define the 3D tube properties and paths between other assembly components. After defining these parameters, XpresRoute automatically creates a 3D solid model of the tube part, complete with end treatments. Tubing parts are dynamically associative to the components they connect, so that they automatically adjust when changes are made in related parts.
Streamlined drafting

Solid Edge improves the quality and accuracy of engineering documentation with a powerful system for creating 2D drawings. Whether you are working from a solid part, an assembly model, or a blank drawing sheet, Solid Edge drafting and detailing tools complete your drawings more rapidly and easily than any other CAD system.

Developed specifically for mechanical drawing production, Solid Edge provides excellent drawing layout, detailing, annotation, and dimensioning controls that automatically comply with the mechanical drafting standard you select.

Solid Edge’s associative drafting system automatically creates and updates drawings from 3D models. Designers simply select the model and then select and arrange views on the sheet to create the drawing graphics. Solid Edge quickly creates standard and auxiliary views, including section, detail, and isometric views. As changes are made to machinery models, associated drawings update automatically to reflect the changes. The drafting system in Solid Edge dramatically accelerates assembly drawing by automatically creating exploded views, balloons, parts lists, and Bills of Material.

Practical design collaboration

With Solid Edge, machinery manufacturers can improve design data sharing and collaboration with practical, inexpensive tools. SmartView is a free viewer for Solid Edge design files that works independently of the CAD software, enabling anyone in the enterprise or supply chain to view drawings or part and assembly models. To leverage company intranets, extranets or the Internet for design communication, Solid Edge Web Publisher provides a fast and easy method for publishing web pages with Solid Edge 3D models, Bills of Material, and related data. This integrated module works directly from the Solid Edge design session using a simple wizard interface that requires no web publishing expertise. Published models can be viewed on the web with the Microsoft Internet Explorer browser, and users can manipulate the display of the model and even manually create exploded assembly views. Web Publisher is an inexpensive solution for creating web-ready spare parts catalogs or engineer-to-order applications for customers.

For real-time collaborative design, Solid Edge uses industry-standard visualization and collaboration technologies developed by Engineering Animation Inc. These products and services include Solid Edge Exchange, a hosted site where design teams, customers, and suppliers can establish collaborative projects, organize, share, and manage data, and concurrently access, review, and mark up design models.
Easing the move to 3D

The majority of machinery makers are still using design processes based on 2D engineering drawings, even if they acknowledge the business and productivity benefits of 3D design. Solid Edge removes the roadblocks on the path to 3D by making the migration significantly less expensive and less difficult.

Solid Edge delivers advanced 3D CAD in the industry's most intuitive Windows-based interface, so it is remarkably easy to learn and use. Patented STREAM technology employs inference logic and decision management techniques to streamline operation and shorten the learning curve.

Dozens of built-in tutorials provide self-paced, step-by-step instruction and guidance as designers use the software. The on-line help system includes information for users moving from 2D CAD systems. With these tools, thousands of former 2D designers have become productive with Solid Edge within hours of installing the software.

With Solid Edge, machinery designers who are moving from 2D need not abandon their legacy data or CAD knowledge. Solid Edge builds upon 2D design practices, and directly uses 2D CAD data in 3D modeling operations. Built-in translators provide simple, wizard-driven import and export of 2D designs in AutoCAD format.

Data exchange

Machinery design teams can readily exchange CAD data with other systems using Solid Edge's built in data translation tools. These support two-way conversion of widely used CAD formats, including AutoCAD (DXF/DWG) and Pro/ENGINEER, the IGES and STEP neutral formats, and the Parasolid format used by a host of CAD, CAM, and CAE software programs. An additional Feature Recognizer module is available to add parametric design intelligence to imported models.

Design-through-manufacturing automation

Solid Edge is the cornerstone of a full-cycle solution that helps transform machinery designs into deliverable products faster and at lower cost. Working directly with leading computer-aided manufacturing applications, Solid Edge provides all the design data needed to automate numerical control programming, sheet metal fabrication, rapid prototyping, and related manufacturing and assembly operations. High-performance CAM solutions are integrated with Solid Edge to eliminate redundant data creation and minimize delays between design and production.
Solid Edge: the proven solution for machinery design

Solid Edge is uniquely positioned to deliver exceptional value to machinery designers. Developed from its outset to address productivity issues in machinery development, Solid Edge directly addresses the practical aspects of machinery design engineering with powerful CAD functions that are exceptionally easy to learn and use. Leading machinery manufacturers worldwide recognize that Solid Edge delivers more productive tools with a lower cost of ownership, which yields a superior return on their CAD investment. Our customers in the machinery industry rely on Solid Edge as a strategic tool to help them realize the benefits of better quality, lower costs, and shorter delivery cycles.

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