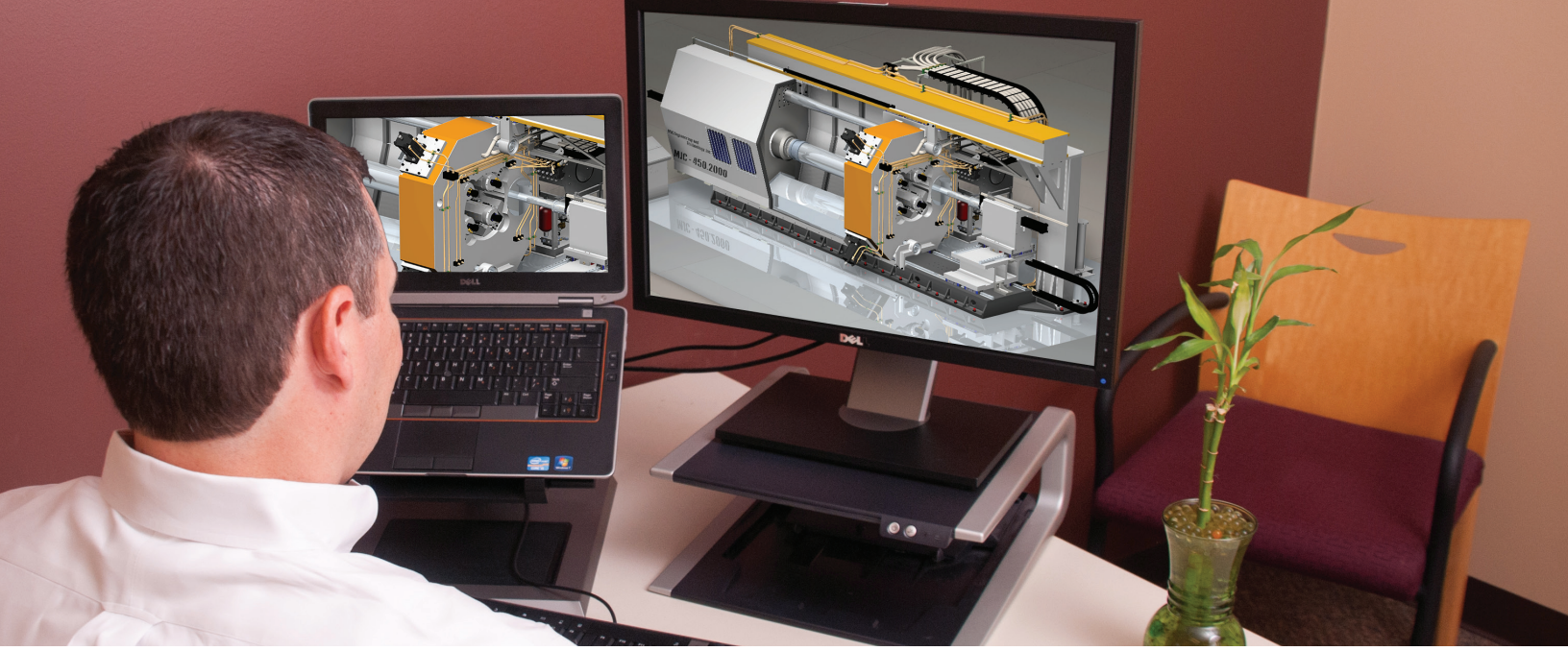

DIGITAL INDUSTRIES SOFTWARE

Achieve faster and more efficient machine design with Solid Edge

Solution brief

Manufacturers of industrial machinery and equipment are under great pressure to deliver quality products faster and cheaper. Compounding matters further is an increase in product complexity caused by product diversification and personalization to meet customer requirements. Together they are flattening existing revenue streams and eroding profit margins.

Using 3D digital product models (also known as a digital twin) throughout the product development lifecycle can streamline engineering processes and result in higher quality, optimized products. By challenging conventional manufacturing with a digital transformation, manufacturers can eliminate physical prototypes, disconnected systems, paper-based work instructions and silos of information. They can achieve efficient smart manufacturing with better integration of planning and production, and by applying new manufacturing technologies.

The Solid Edge® software portfolio from Siemens Digital Industries Software enables small and medium-sized manufacturing firms to rapidly digitalize their product designs and development processes. This is a fundamental step in moving to a digital enterprise.

- For small and medium business (SMB) machinery manufacturers that often engineer-to-order, accelerated product development means faster time-to-cash. Strong cash flow is critical for these smaller organizations and Solid Edge helps them improve their design processes and deliver machines faster while maintaining and improving profit margins

The Solid Edge advantage:

- Create photorealistic images and animations of proposed products, using them to communicate the value of new products to potential customers
- Design complex parts and assemblies quickly and flexibly using synchronous technology
- Validate and improve performance of machinery and equipment using Solid Edge Simulation and Simcenter FLOEFD for Solid Edge
- Manufacture parts accurately and efficiently using both traditional machining and new additive manufacturing technology
- Manage customer and regulatory requirements using Solid Edge Requirements Management. Make customer and regulatory requirements easily visible to design engineers and track fulfillment of these requirements

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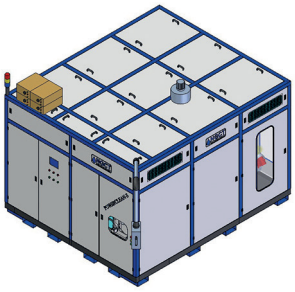
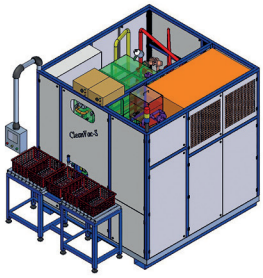
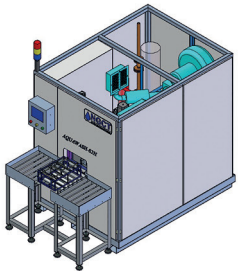
Solution focus

The Solid Edge advantage: *Continued*

- Manage everyday processes, including release-to-manufacturing and engineering changes efficiently and accurately using built-in data management capabilities
- Easily upgrade to Teamcenter to meet more comprehensive data and process management requirements







- For larger manufacturers who develop new machines and may have more complex processes in place, Solid Edge helps improve the efficiency of these processes and reduces the business risk associated with new product development

Solid Edge provides easy access to today's hottest design technologies for any size business. Enabled by unique Siemens convergent modeling technology capabilities such as generative modeling, reverse engineering and additive manufacturing, Solid Edge design tools boost productivity.

Industrial machinery manufacturers using Solid Edge improve product development performance in these key areas:

Speed mechanical 3D design and 2D drawings

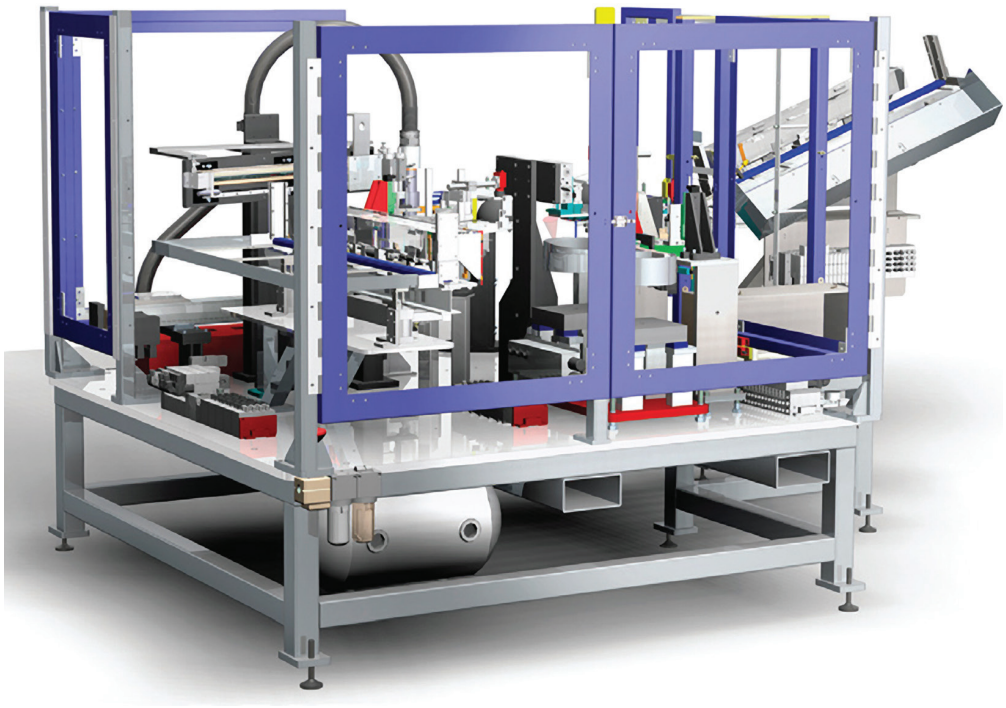
Design complex parts and assemblies quickly and flexibly using synchronous technology, which combines the speed and simplicity of direct modeling with the flexibility and control of parametric design. Solid Edge supports innovative machine design with powerful yet flexible 3D tools that make design faster and more efficient and eliminate errors before manufacturing.

Visualize new products

Create photorealistic images and animations of proposed products to bring them to life. Build-to-order manufacturers can communicate the unique characteristics and value of their products to potential customers before manufacturing. Integrated photorealistic rendering included with Solid Edge creates amazing product images and animations, which let you stand out from the crowd with superior marketing materials. Augmented reality (AR) capabilities enable you to display your products in customer environments and resolve issues before installation.

Meet demands for customized products

Meet increasing demand for custom machinery while reducing product development times. Consumer demand is driving the need for customized machines; however, customization is expensive. By managing machine configuration throughout the sales cycle and selecting preferred configurations based on experience and standards, industrial machinery manufacturers can reduce business risk. Solid Edge delivers easy access to online standard part catalogs for off-the-shelf supplier component selection and provides tools for automated machine configuration that facilitate re-use of proven subassemblies.



Produce fabricated structures

Reduce material costs and manufacturing complexity for fabricated structures while maintaining performance and reliability. Industrial machinery manufacturers who develop fabricated structures must consider structural integrity and welding standards while minimizing material costs. Solid Edge tools for structural steel design and detailing allow you to simulate and test structures using embedded capabilities and structured workflows. Frames and weldments are fully associative with Solid Edge assembly, part modeling and drafting capabilities.

Manufacture accurately and efficiently

Improve manufacturing productivity for both traditional machining and additive manufacturing technologies. Minimizing manufacturing costs and understanding suitable tolerances and when to use machining or weldments is critical for manufacturers. Using a single unified computer-aided manufacturing (CAM) system allows you to get the most from your machine tools. Solid Edge CAM Pro can be used to create tool paths that are associative to the Solid Edge computer-aided design (CAD) model and can be automatically updated when the design is changed. Solid Edge also supports output of your part models to in-house 3D printers and external additive manufacturing services. Solid Edge Model Based Definition enables manufacturing information to be communicated accurately and effectively, reducing errors in manufacturing.

Design sheet metal parts

Meet unique sheet metal design challenges, including rapid placement of sheet metal features and manufacturability. Industry-leading sheet metal design and detailing solutions in Solid Edge let you produce accurate flat patterns from a 3D model and send the geometry directly to manufacturing. Built-in intelligence saves time by automatically calculating material treatments and validating parts for manufacturability. Creating manufacturing-ready sheet metal flat patterns and nesting complex shapes efficiently using Solid Edge 2D Nesting helps reduce scrap and improve manufacturing productivity.

Integrate mechanical and electrical design

Overcome the electromechanical design challenges that result from increasing electrical content in your designs. Solid Edge Electrical Design software can be used to seamlessly communicate changes between mechanical and electrical environments. Electrical design tools create intelligent wiring, harness and printed circuit board (PCB) designs while mechanical design software routes wires, cables and harnesses through a 3D physical space. This type of collaboration, which includes validation of electrical circuits, cross-probing and cross-visualization, enables faster and more accurate design.

Streamline piping design and manufacturing

Accelerate your design process for mechanical routed systems. A comprehensive set of industry-specific design tools helps developers quickly design complex piping based on international standards, and then route the piping in Solid Edge 3D assemblies. Integrated applications enable you to rapidly create piping and instrumentation diagrams (P&ID) and automate the design of complete 3D pipe systems. Parts lists can be created from the P&ID so long lead-time items can be ordered early in the product development process.

Simulate and validate prior to build

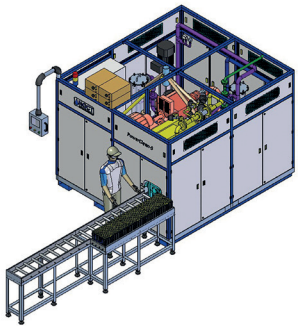
Control material costs and optimize machine design using embedded, easy-to-use simulation tools. Digital models allow you to validate and test a design prior to physical prototyping; virtual prototypes can even eliminate the need to build costly physical prototypes. Solid Edge Simulation enables you to digitally validate part and assembly designs within the Solid Edge environment, improving performance and durability.

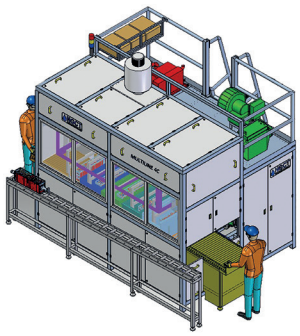
Analyze fluid flow and heat transfer

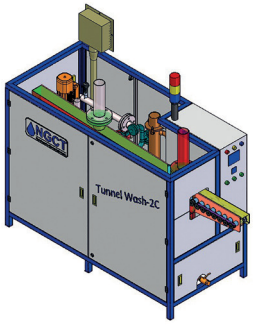
Facilitate rapid and accurate fluid flow and heat transfer analysis. Moving simulation up in the design process allows you to identify and fix issues before they can impact downstream development. Simcenter™ FLOEFD™ for Solid Edge software supports flow simulation with an embedded computational fluid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

Manage customer requirements

Increasingly complex customer requirements can come from different sources and be supplied in different formats. Manufacturers must ensure requirements are visible and managed throughout the







Key solution components

- Solid Edge Mechanical Design solutions for 3D part and assembly design using synchronous technology – Accelerates machinery design, speeds revisions and improves the re-use of proven components in new designs
- Solid Edge Electrical Design solutions for the design of wiring circuits, wire harnesses and printed circuit boards – Enables true electro-mechanical co-design collaboration
- Solid Edge Simulation solutions for digital validation of critical components and systems – Reduces the need for physical prototypes, lowers material/testing costs and improves reliability and durability
- Solid Edge Manufacturing solutions for definition of accurate machining, fabrication and assembly processes – Improves overall efficiency for both additive and subtractive manufacturing processes
- Solid Edge Technical Publications solutions for creating illustrations and technical documents – Communicates manufacturing, installation and maintenance procedures globally
- Solid Edge Data Management solutions for searching, managing and sharing product data – Improves collaboration within the design team and with other departments, suppliers and customers
- Solid Edge and Xcelerator Share – Helps you collaborate on design and engineering projects in the cloud

product development process. Solid Edge allows requirements to be documented, linked to product designs and tracked throughout the product development process, ensuring the final product meets customer requirements and reduces your business risk.

Comply with industry regulations

Demonstrate compliance with government and industry regulations with secure document control and electronic workflow management and signoffs that provide full traceability of the product development process. Solid Edge enables standards compliance with consistent document control based on electronic workflows and signoffs for controlled, consistent process completion, providing reliable audit results and a reduced risk of litigation.

Manage projects and engineering change

Optimize resources, identify critical path activities and manage 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 provides a full range of design management capabilities that range from integrated data management, that is included with Solid Edge to comprehensive multi-CAD data management and product lifecycle management (PLM) capabilities of Teamcenter® software.

Install commission and service

Access accurate design and installation information while working on the shop floor and improve customer service by providing remote access to design data for field engineers. Solid Edge provides mobile viewing of 3D CAD models and remote access to design data, enabling you to communicate the correct installation and service procedures using 3D interactive product information.

As a result, commissioning is completed on-time and on-budget, and the manufacturer has accurate knowledge of equipment configuration at delivery and in service.

Realizing significant benefits

Designers and engineers report they have achieved some important benefits by using Solid Edge. Some examples from published case studies include:

- Reducing development time for new machines by 70 percent
- Moving from concept to manufacturing drawings in 1/6 of the time in the previous system
- Decreasing time-to-market by 33 percent
- Reducing manufacturing costs by 20 percent
- Cutting rework rate from 20 percent to 2 percent
- Replacing physical prototypes with virtual prototypes
- Achieving more accurate cost estimates
- Improving product performance as well as product aesthetics
- Lowering prices for new machines

For more information on this offering, see: solidedge.siemens.com/en/industries/industrial-machinery/.

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