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*Ingenuity for life*

# Improving product engineering and manufacturing for plastic components

Solution brief

Siemens Digital Industries Software

Designers and manufacturers of plastic components are facing an increasing number of challenges, including uncertainty over global trade agreements and the resulting impact on their supply chains, increasing pressure to control component costs while maintaining or improving component performance, and an increasing focus on environmental issues. Implementing the latest technologies that increase the flexibility and speed of product development can help address these concerns.

Investing in digital transformation across design, development and manufacturing is key in helping manufacturers of plastic components be more competitive. 3D digital models, or “digital twins,” can be used to analyze product performance and aid design optimization that can reduce product and tooling costs. A recent survey from the IDC global market intelligence firm, affirms that many companies are already thinking along these lines. “Small and midsize manufacturing firms are embracing digital transformation to engage with the emerging digital economy.” (“Digital Transformation in Product Design

& Development: The opportunity for SMB manufacturers,” July 2018)

Digitalization can also help plastic component manufacturers understand the impact of material and manufacturing process selection on product costs and performance. Product and tool costing software can help you determine the best size, shape or material for a part and analyze product performance based on the digital model. And, digital models can easily be shared with tooling suppliers through cloud-based collaboration.

Even environmental concerns can be addressed with digital efforts. Manufacturers are under pressure from consumers to use less plastic packaging material and move to bioplastics and biodegradable materials to reduce long-term impact. Extended producer responsibility, which transfers recycling and disposal costs to the producer, is being enforced in many countries. A fast and flexible digitalized product development process can adapt quickly to using new or different materials and efficient manufacturing techniques.

## The Solid Edge advantage:

- Bring your ideas to life with photorealistic, digital design representations
- Shorten RFQ response time by re-using data from previous proposals
- Manage requirements throughout the product development cycle
- Use intuitive wizards that make the placement of plastic features easy
- Speed aesthetic surface design using surface creation and analysis techniques
- Easily model plastic parts using Solid Edge subdivision and surface modeling design capabilities
- Simulate and validate component performance using digital models
- Optimize components for weight and material usage, and prepare components for additive manufacturing
- Share design data with suppliers and customers using mobile and cloud-based applications
- Define accurate and efficient machining processes

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# Solution focus

## The Solid Edge advantage: *Continued*

- Manage engineering change requests using robust data management tools
- Streamline documentation by quickly creating interactive technical publications



However, many plastics component manufacturers, typically small- and medium-sized organizations, don't have access to large information technology resources to implement and maintain high-end software solutions. They need a portfolio of solutions for product development and manufacturing that is affordable, flexible and easy to implement and maintain.

Siemens Digital Industries Software's Solid Edge® software provides next-generation technologies that solve today's toughest product development challenges. An industry-leading 3D computer-aided design (CAD) software platform, the Solid Edge portfolio provides a high-value, flexible and powerful solution for product development and manufacturing that enables manufacturers of plastic components to accelerate their time to market for new products and deliver high-quality products on time and on budget. Solid Edge includes specific capabilities for plastic components design including complex surface design, draft face placement and analysis, and rapid placement of plastic features including lips, ribs, vents, thin walls and bosses.

Solid Edge includes unique convergent modeling capabilities that combine design information stored in mesh-based models, for example, data created during reverse engineering and data used for additive manufacturing, with that stored in the traditional boundary representation format for 3D CAD models. Convergent modeling speeds up the overall design process by allowing you to use mesh-based data in your b-rep workflows with no data conversion and all the benefits of both technologies. Additional solutions from the Solid Edge portfolio enable improvements in both traditional and additive manufacturing, stress analysis, fluid flow and heat transfer analysis, creation of interactive technical documentation, data and process management and collaboration with suppliers and customers.

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

### Visualize new products

Stand out from the competition using superior marketing and technical materials that communicate the unique value of your innovative solutions. By enabling the creation of rich 3D product information, you can clearly demonstrate your product using the latest visualization technologies. Integrated photorealistic rendering included with Solid Edge creates product images and animations for your marketing needs. The Solid Edge augmented reality experience allows users to experience true-scale digital prototypes in real-world environments. And, Solid Edge offers mobile viewing applications that allow full access to CAD data. Wherever you are, Solid Edge enables you to bring your ideas to life.

### Respond quickly and accurately to RFQs

Win business and increase market share by responding quickly and accurately to requests for quotes (RFQs). Improving the RFQ response process benefits everyone involved. However, preparing a bid can be a time-consuming process. Software solutions that manage data and estimate product costs can address challenges in responding to RFQs. Data management solutions can shorten preparation time by re-using data from previous proposals, and product costing software can rapidly assess product and tool costing. Solid Edge's data management tools are scalable solutions that preserve data integrity, irrespective of the size of your organization.

### Manage customer requirements

Reduce business risk by fulfilling customer requirements. Linking requirements to 3D CAD models can aid visibility and management throughout the product development process. Seamlessly integrated with Solid Edge, Solid Edge Requirements Management enables you to work directly with 3D parts and assemblies while simultaneously managing project requirements, resulting in improved workflow and enhanced productivity. Complete traceability benefits project managers and allows sound decision-making.



### Prepare designs for 3D printing

Create world-class products using the latest 3D printing and additive manufacturing techniques. Generative design techniques combine design tools with topology optimization allowing you to quickly create lightweight, highly complex shapes. Solid Edge generative design software allows you to start with your design goals; algorithms automatically generate optimized design options for achieving them. The process speeds the creation of lighter components, perfectly suited for immediate manufacture via today's additive processes. Solid Edge supports 3D printing needs from creating an initial prototype to printing the final product.

### Accelerate plastic component design

Quickly produce accurate 3D part and assembly models and 2D drawings. Comprehensive, proven 3D CAD solutions make design faster and more efficient. With industry-unique synchronous technology, Solid Edge provides you with the freedom to design naturally and iteratively with ease, whether you are working on a new design or editing existing ones. Solid Edge 3D CAD allows you to begin concept designs immediately, without tedious preplanning, quickly creating drawings that meet international drawing standards. Solid Edge also includes wizards that make the creation of specific plastics features easy and more consistent.

### Use subdivision modeling to achieve stylized shapes

Create aesthetically pleasing shapes and develop product forms in a fraction of the time required with traditional products. Solid Edge 3D CAD includes subdivision modeling capabilities that allow for rapid conceptualization of ideas without the need for expert knowledge. Unlike regular surface modeling, subdivision modeling uses stylized design to model complex shapes quickly and accurately, all without having to leave the Solid Edge environment.

### Speed aesthetic surface design

Design smooth, attractive surfaces. Complex curved surfaces are often the most difficult form to design. Solid Edge 3D CAD provides commands that enable the design of smooth surfaces with curvature continuity. The platform includes surface visualization using zebra stripes and draft face analysis with gradient color display. Creating parting lines for molded parts enables the part to be ejected from the mold without marking the surface. Automation reduces design time and eliminates errors prior to manufacturing.

### Simulate and validate component performance

Validate and improve products while reducing the need for costly physical prototypes with scalable simulation tools. Digital models enable testing and validation using virtual prototyping and integrated analysis, offering optimization opportunities. With a full range of capabilities, including static load, buckling and vibration analysis, Solid Edge Simulation digitally validates part and assembly designs. Simcenter® FLOEFD® for Solid Edge virtually simulates the effects of fluid flow and heat transfer without the need to translate data or prepare a separate fluid body CAD model. Starting simulation early in the design process reduces risk in the product development process.

### Improve manufacturability of plastic components

Design mold tools for reliable manufacturing processes. Plastic injection molding produces precision parts at low cost. Therefore, the tooling must be developed to maximize the efficiency of the molding process. Solid Edge incorporates parting lines and draft face analysis into the design process. Working with plastic components designed in Solid Edge, Siemens' mold tool design and analysis software helps companies reduce the time required to produce tooling while meeting quality and cost objectives.

### Access design projects from anywhere

Access design information while working out of the office 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. Solid Edge Portal provides free and easy cloud-based access to designs created in multiple CAD formats, allowing you to collaborate easily with tooling suppliers and customers. Augmented reality capabilities showcase designs and enable customers to view products in real-world settings.

## Key solution components

- Solid Edge Mechanical Design solutions for 3D part and assembly design using synchronous technology – accelerates plastic component design, speeds revisions and improves the re-use of proven components in new designs
- Solid Edge Simulation solutions for digital validation of plastic components – reduces the need to create physical prototypes, lowers material/testing costs and improves reliability and durability
- Solid Edge Manufacturing solutions for definition of accurate machining and assembly processes – extends manufacturing techniques to include additive manufacturing
- Solid Edge Technical Publications solutions for creating interactive 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 Cloud Collaboration solutions – online multi-CAD management, viewing and collaboration

## Manufacture accurately and efficiently

Build components accurately and efficiently using traditional and additive manufacturing technologies. Solid Edge manufacturing solutions allow you to work directly on your Solid Edge part models, with tools for creating NC toolpaths and for preparing CAD models for additive manufacturing. Solid Edge supports the direct output of design information to CNC machines and 3D printers together with the creation of interactive work instructions developed through model-based definition efforts.

## Manage design projects and engineering change

Retrieve data quickly, optimize resources and manage engineering changes efficiently for faster completion of design projects. Solid Edge includes design management capabilities that provide a visual approach to managing complex design



data. 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 capabilities of Teamcenter®.

## Publish interactive technical documentation

Create parts lists, raster and vector graphics and multi-page digital documents for training and work instruction packages. Storyboard wizards included in robust technical publication software can be used to automatically create step-by-step processes to quickly insert information into a document template. By working directly with Solid Edge parts and assemblies, Solid Edge technical publication solutions streamline your documentation process by eliminating the need to convert CAD files. You can edit existing documentation or create instructions or product catalogues that include 3D graphics and help reduce costly mistakes.

## Realizing significant benefits

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

- 60 percent reduction in time for modifications
- 50 percent faster design changes
- 50 percent reduction in product development time
- 40 percent increase in number of new products brought to market
- Design time for complex products cut from 12 months to four months

- Intellectual property fully protected when sharing files
- Rapid development of samples
- Last-minute changes before manufacturing enabled by parts families
- Easy path to productivity for new employees
- Increased collaboration between departments
- Complete definition of products prior to manufacturing
- Increased reliability for product development
- More consistent processes across different divisions
- Seamless transfer of design intent to shop floor
- Sustained international competitive advantage

For more information on this offering and to read customer case studies, please visit:

<https://solidedge.siemens.com/en/industries/plastics-component-manufacturing>

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