

Industry insights

Solid Edge speeds product development for electronic devices

Siemens Digital Industries Software

In the 21st century, mobile phones and the internet have become mainstays of society, allowing humanity to become connected in ways few people could have imagined. New technological innovations are expanding opportunities to deliver higher value, differentiated and connected products, but the increasing pace of change and the demand for the next big thing have significantly shortened windows of opportunity for market-place success.

Consumers now demand almost everything they own to be connected, which is driving market growth for integrated electronics because electronics are the backbone to all this connectivity. However, even though products are increasingly differentiated by their electronic content, designing electronic devices is not a simple task.

Electronic devices have common characteristics: printed circuit boards (PCBs), standard electrical components, electrical wiring, a mechanical housing/enclosure

and components that enable human machine interfaces (HMI). These devices typically must maintain a particular size regardless of the electronic functionality being forced into them. Adding wiring and PCBs into small enclosures is a complex struggle that must be addressed.

Manufacturers of electronic devices face other challenges in addition to the demand for connected, customizable devices. Increasing competition is another. Thanks to global competition between mature and developing countries, products are being produced faster than ever before. However, increased complexity can slow a product development process and result in delayed time-to-market, project budget overruns and poor quality. Manufacturers need to bring differentiated products to market faster while ensuring performance and reliability; therefore, they must address issues that slow down development processes.

A possible solution for these manufacturers is to create and manage a comprehensive digital twin of electromechanical

The Solid Edge advantage

- Manage projects and engineering change requests
- Control communication of design intent using cloud-based collaboration
- Manage requirements throughout the product development cycle
- Produce accurate 3D models and 2D drawings
- Works easily with PADS Professional software from Siemens and other PCB Design software
- Synchronize electromechanical design efforts
- Efficiently package PCBs in mechanical housings
- Analyze heat dissipation from electronic power sources
- Optimize designs for manufacturing and prepare components for 3D printing

Solution focus

The Solid Edge advantage continued

- Create photorealistic product images and animations for sales and marketing purposes

products throughout the design process and into manufacturing. A digital twin, a detailed 3D digital model, adds data to a design as it progresses, then leverages this data throughout the product development lifecycle. It can be used as the basis for all areas of product development, including managing customer requirements, concept and detailed design, prototyping, simulation, manufacturing, installation and service.

A comprehensive digital twin is especially useful in the design of electronics. Gone are the days when walls existed between product groups. Today's engineers need to understand both electronic and mechanical design, and more importantly, how to integrate these two disciplines. Thankfully, colleges are in front of this trend and routinely expose mechanical engineers to electromechanical design practices. Some even offer multidisciplinary engineering degrees that cover both mechanical and electrical engineering and oftentimes train students to use integrated electromechanical design software that can actively enable collaboration between domains. Software tools that can interactively exchange data can make it easy to see and react to design changes in either discipline.

Solid Edge® software, which is a part of the Xcelerator™ portfolio, the comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software, enables small and medium-sized manufacturing firms to rapidly digitalize their product designs and development processes. This fundamental step in moving to a digital enterprise increases their flexibility to react quickly to changes in consumer demand. Using Solid Edge speeds the product development process, enabling manufacturers to bring best-in-class products to market quickly and cost-effectively. Siemens provides programs for startup manufacturers and academic institutions that give them easy access to integrated electromechanical design solutions.

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

Manage projects and engineering change

Access and track design, analysis and manufacturing data and processes using built-in data management capabilities in Solid Edge that allow you to review and edit the properties of multiple files and perform revision and release operations on Solid Edge parts, assemblies and drawings. Teamcenter® integration for Solid Edge software provides access to a full range of product lifecycle management (PLM) capabilities.

Collaborate with customers and suppliers

Improve communication of design intent both internally and externally to reduce errors and speed the product development process. Siemens offers easy-to-use, cloud-based collaboration tools that enable you to share design data created in many different computer-aided design (CAD) formats with customers and suppliers in a way that protects the intellectual property (IP) of your designs.

Manage customer requirements and regulations

React faster and more accurately to changing customer demands by ensuring their requirements are visible and managed through the product development process, even when requirements come from different sources or are supplied in different formats. Solid Edge Requirements Management links requirements to 3D CAD models, which can reduce business risk by ensuring requirements are visible to everyone, tracking how and when they are met.



Speed mechanical 3D design

Speed up design, make changes faster and increase the re-use of existing components using next-generation design technologies available in Solid Edge. Solid Edge enables you to streamline sheet metal design and manufacturing, reducing cost and speeding product delivery. It enables quick and accurate design of plastic components and speeds aesthetic surface design with unique subdivision modeling capabilities that don't require expert knowledge. Using Solid Edge also streamlines and simplifies the process of finding 3D models with integrated, cloud-based catalog options available inside the software.

Create schematics for PCBs

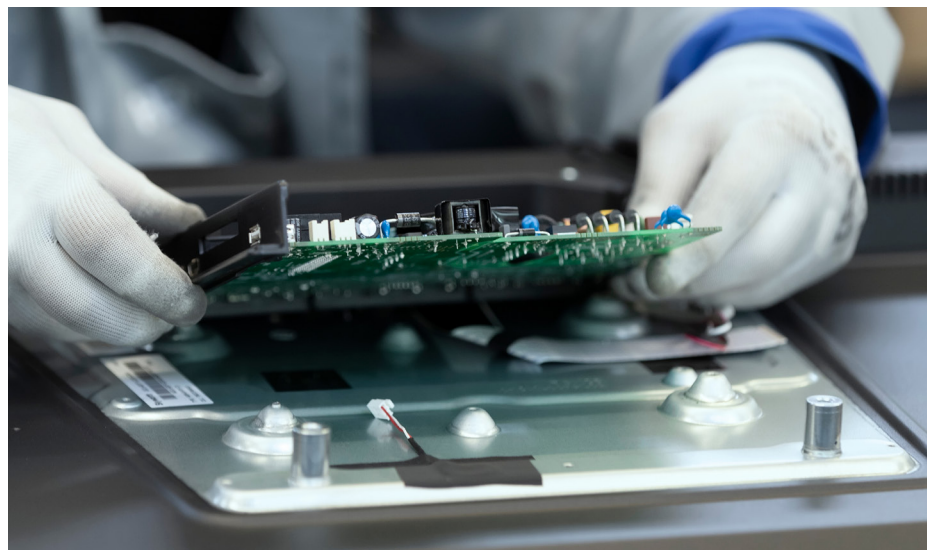
Enable fast and flexible PCB design using integrated schematic capture software or imported designs created using third-party PCB software. Tightly integrated with Solid Edge, Siemens' PADS™ Professional software provides a complete schematic design solution, making the capture and definition of a schematic simple and fast.

Validate PCB layout

Produce high-quality results and reduce costly, iterative cleanup of constraint violations with a powerful and easy-to-use constraint management system that validates the layout against the design intent. Using PADS Professional provides fully integrated, 3D layout, including placement, constraints, design rule checking (DRC) checking and photorealistic visualization; it includes a unique sketch routing capability that reduces complex routing times by orders of magnitude.

Simulate PCB performance

Simulate the performance of PCBs to explore various scenarios that help determine which parameters or conditions most affect circuit performance. Based on Siemens' Xpedition™ software PCB technology, PADS Professional offers more analysis and simulation capabilities than many other PCB tools on the market. It includes advanced circuit simulation with comprehensive analysis for analog, mixed-signal and mixed-technology PCB circuits.



Integrate electronic components into a mechanical assembly

Synchronize electromechanical design effort using integrated solutions to create 3D models of PCBs and help with packaging them in electromechanical assemblies in the most effective manner. Using the IDX format to exchange data, Solid Edge PCB Collaboration supports the mapping of 3D models to and from Siemens and third-party PCB design solutions. It also provides a photorealistic view of components in a mechanical assembly, which enables efficient integration of PCBs into traditional mechanical design.

Analyze cooling of power sources and components

Ensure heat is dissipated correctly and hot spots are kept within allowable limits using integration simulation of electronic power sources and heat dissipation. Electronic components and power supplies act as heat sources that can interfere with electrical signals. Simcenter™ FLOEFD™ for Solid Edge software includes a full suite of capabilities for electronics cooling. A BCI ROM add-on module can reduce central processing unit (CPU) time from weeks to minutes.

Manufacture accurately and efficiently

Define accurate and efficient machining processes to reduce errors and rework plus optimize designs. A unified computer-aided manufacturing (CAM) solution allows you to get the most from your tools. Solid Edge CAM Pro, a powerful

computer numerical control (CNC) programming software, can be used to create tool paths that are associative to Solid Edge digital CAD models. These models can also be used directly with third-party software. Solid Edge also supports additive manufacturing (AM) processes such as 3D printing.

Publish technical documentation

Create interactive 3D technical publications to communicate processes and provide information for user guides and online catalogs. Interactive technical publications can leverage design models and data to clearly and accurately communicate the correct manufacturing processes and help end users install, operate and maintain products correctly. Solid Edge technical publications solutions can be used to automatically create graphical user guides, maintenance instructions and online spare parts catalogs from your design.

Visualize new products for sales and marketing

Create images and animations of proposed devices and use these to communicate the unique value of innovative solutions to potential customers. Solid Edge enables the creation of 3D digital models, photorealistic images and animations that may be used to create attractive and customized marketing materials and catalogs quickly and easily. Augmented reality (AR) capabilities showcase products in real-world environments.

Key solution components

- Solid Edge Mechanical Design: 3D part and assembly design using synchronous technology – accelerates design of enclosures for electrical components, speeds revisions and facilitates the use of catalog components in new designs
- Solid Edge Electrical Design: Design wiring, cables, bundles and printed circuit boards – enables electromechanical co-design collaboration
- Solid Edge Simulation: Digital validation of critical components – reduces the need to create physical prototypes, lowers material/testing costs and improves reliability and durability
- Solid Edge Manufacturing: Define accurate machining, fabrication and assembly processes – improves overall efficiency with additive and subtractive manufacturing
- Solid Edge technical publications: Create illustrations and technical documents – communicates manufacturing, installation and maintenance procedures globally
- Solid Edge Data Management: Search, manage and share product data – improves collaboration within the design team and with other departments, suppliers and customers
- Solid Edge Cloud Collaboration: Online multi-CAD management, viewing and collaboration

Realizing significant benefits

Manufacturers in the electronics manufacturing sectors that use Solid Edge consistently achieve significant benefits from designing their products in 3D and using integrated Solid Edge solutions. Some examples from published case studies include:

- Redesigned products 75 percent faster
- Reduced time needed for drawing revisions and prototyping activities by 50 percent
- Cut product costs and increased performance
- Reduced product weight
- Increased length of warranties
- Achieved easy development of integrated components
- Reviewed design options before committing to one
- Implemented individual customer requirements with greater flexibility
- Simplified processes, from design and prototyping to production



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

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