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Six reasons to switch to Solid Edge

How changing your design tool can save time and reduce development costs

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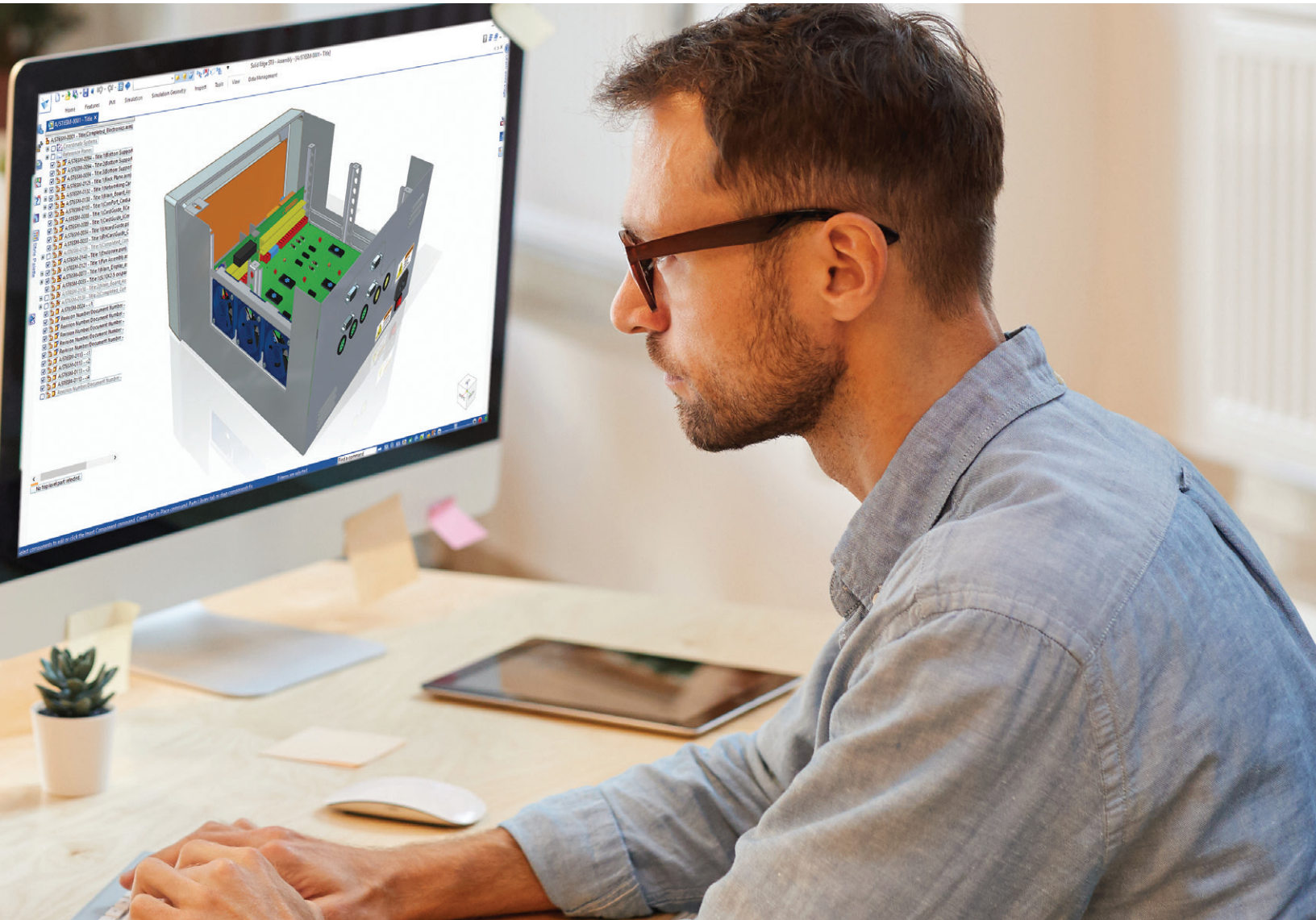

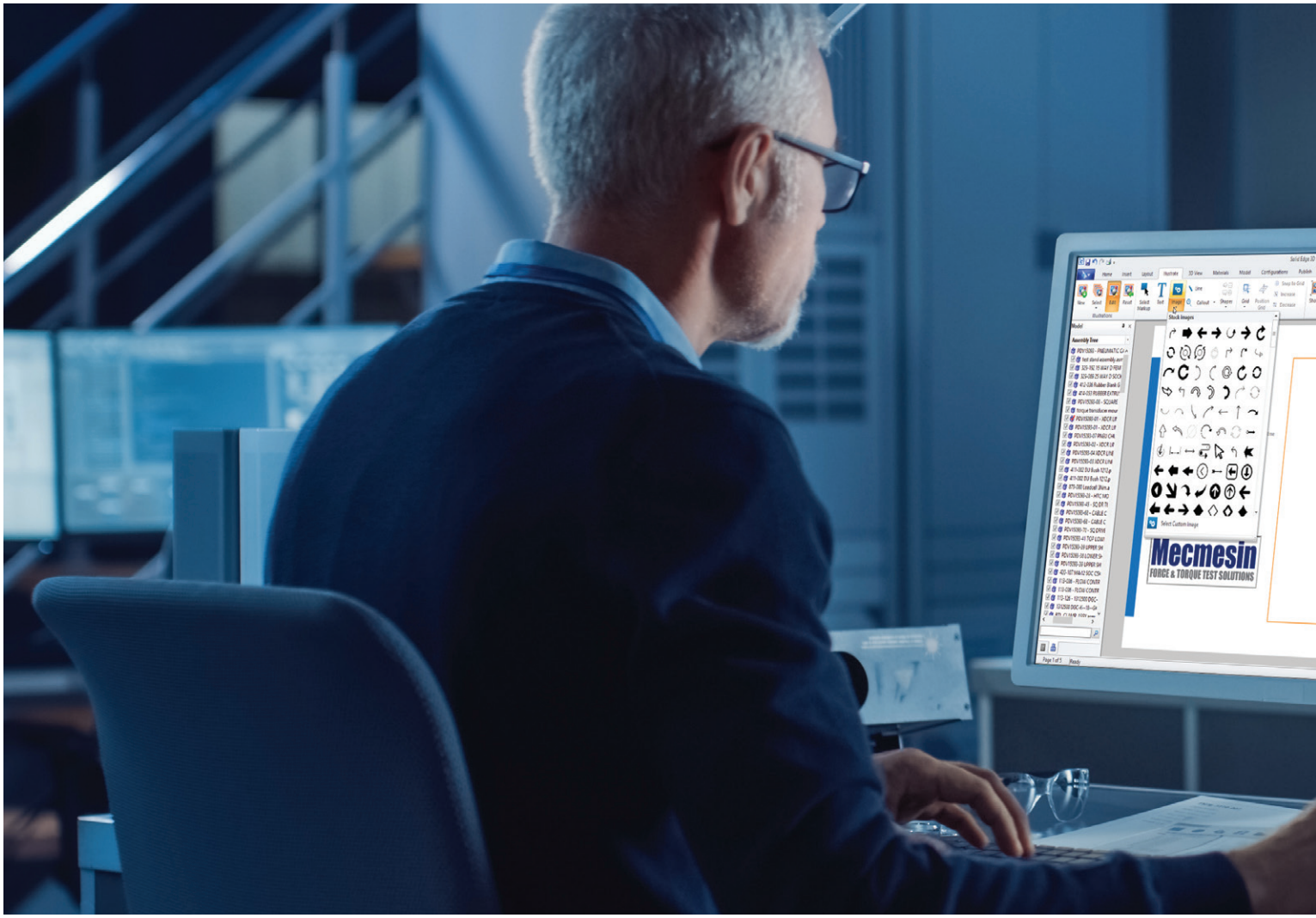
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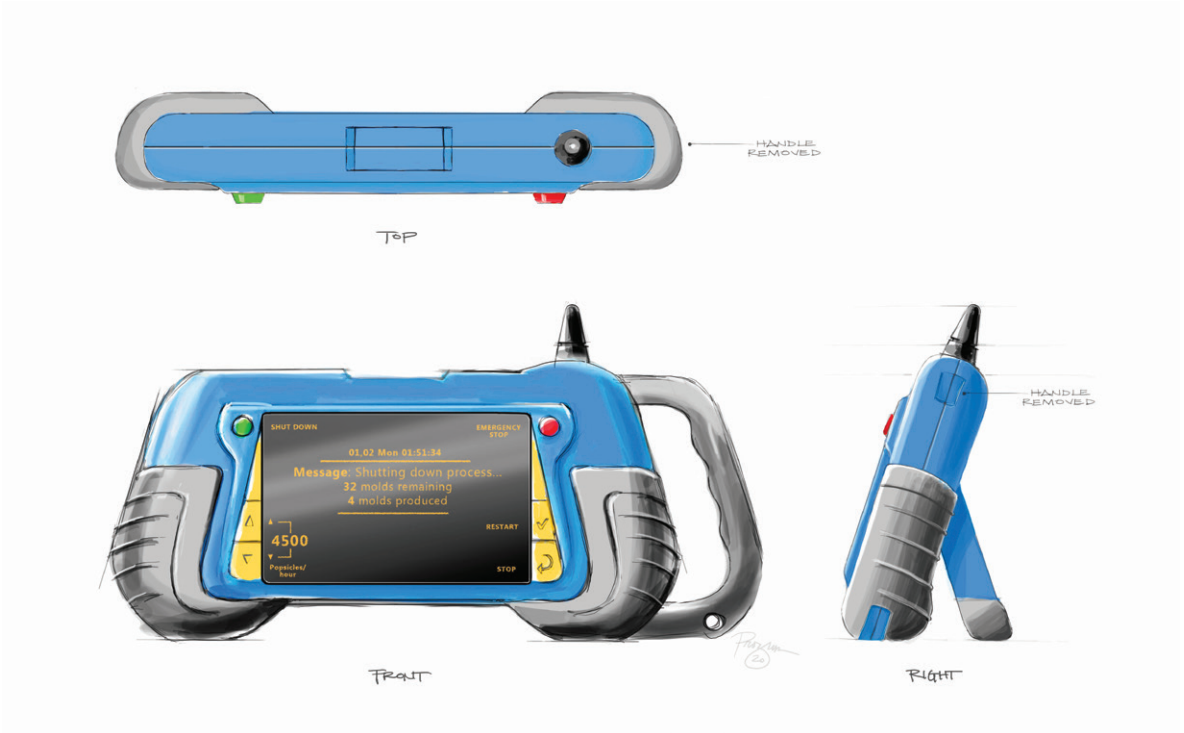
Introduction

Today designers and engineers are required to do more with less. Design isn't getting any simpler, and product development schedules aren't getting any more forgiving. Growing complexity and greater demands across the development lifecycle are pushing the boundaries of what is possible. The market wants better, higher quality products, faster and cheaper than ever before. Designers and engineers feel these pressures in a very real way. All too often they are hindered rather than helped by their design tools.

To help understand the challenges of modern product design, we partnered with Lifecycle Insights to conduct a research study, and heard from engineers and designers from across the globe. The 2020 Design Challenges Study measures the impact of the issues they are facing, and brings into focus how switching to Solid Edge® software, which is part of the Xcelerator™ portfolio, the comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software, can reduce frustration, save time and minimize development costs.

This eBook highlights six reasons to make a switch from your current solution. In each section we quantify the impact of the frustrations felt by modern engineers, and detail how you can mitigate these challenges by taking advantage of the capabilities and features of Solid Edge.



Reason one: leading-edge assembly performance

Modern-day products incorporate increasingly complex components and a significant number of moving parts into aesthetically-driven designs. This comes with a range of challenges for designers as the number of parts in an assembly grows.

The findings from Lifecycle Insights' 2020 Design Challenges Study reveal significant challenges for assembly performance during design. Fifty percent of respondents said they had to recreate or duplicate lost work because of issues in this area. Thirty-nine percent said it took more than 10 minutes for an application to load an assembly or execute an operation. These findings are a clear indication that many design applications fail to meet modern design needs.

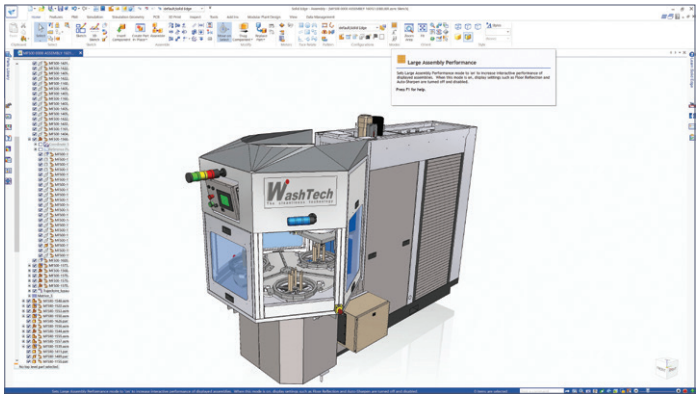
Survey says

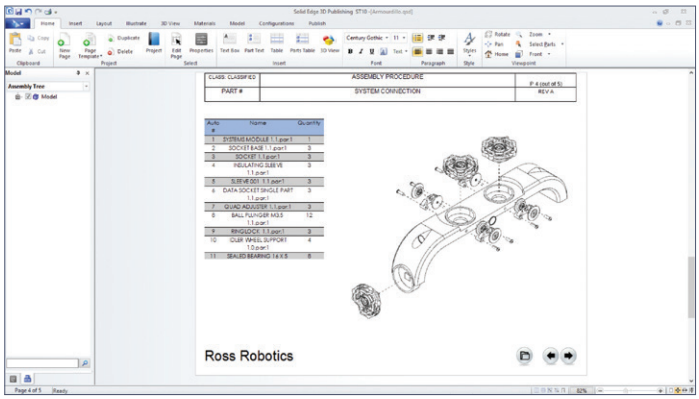
On average, respondents reported spending more than **20 hours a week** waiting for their assemblies to load, operations to execute or applications or models that have crashed to reload.

Fifty percent had to recreate or duplicate lost work due to assembly performance challenges.

Thirty-nine percent said it took more than 10 minutes for an application to load an assembly or execute an operation.

Lifecycle Insights' 2020 Design Challenges survey

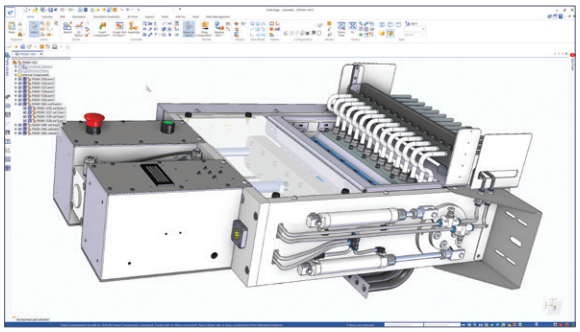




This is where Solid Edge can help, allowing designers to seamlessly work across large assemblies in real time, using automation and an intuitive user interface (UI) to expedite design. The high performance and usability of Solid Edge enables designers to realize productivity gains.

Using Solid Edge decreases memory load times and introduces a "lightweight mode." These features address many performance challenges of designing a large assembly. Solid Edge offers structured storage techniques for memory management; for example, when parts are only fully activated when required. Solid Edge also features auto-simplification techniques, allowing designers to create fast digital mockups of a large assembly. Smart selection tools allow designers to select relevant components quickly.

Solid Edge provides an intuitive user experience to design enormous models. Usability is further boosted by a new option to locate inactive components when designing a large assembly. Using Solid Edge also brings designs to life with full, photorealistic rendering of parts and assemblies and creates animations with sophisticated timelines to view complex operation sequences.



Using Solid Edge also provides several productivity enhancements for designers in its move/copy/rotate assembly command. This functionality helps designers lay out factory floors and machine designs with ease. Designers can cut-and-paste-and-assemble multiple parts into the same assembly or transfer them to a separate assembly while maintaining internal relationships and re-using constraints and other internal components. Designers can also retain internal relationships during a copy/paste process. The system highlights the relationship status, further enhancing the user experience and saving significant time compared to other solutions.

Reason two: turbocharged design documentation

Design documentation, both in the form of drawings and a model-based definition, is fundamental to the development process, but remains a pain point for many engineers.

The findings from Lifecycle Insights' study highlight these problems. Sixty-three percent of the respondents stated they edited drawings in a 2D application because it was easier and faster than in their 3D application. Thirty-seven percent stated they had received or delivered incorrectly manufactured parts because the drawing was out of date. Such issues should not exist in today's design landscape.

A range of Solid Edge capabilities address these issues, providing designers with a robust set of 2D and 3D drawing tools. Solid Edge supports global standards, including American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME), International Organization for Standardization (ISO), German Institute for Standardization (DIN), Japanese Industrial Standards (JIS), UNI, Euro-Asian Council for Standardization (GOST(ESKD)) and Chinese National Standards (GB), helping vendors and suppliers communicate effectively. Including these standards reduces the number of errors in drawings, increases design efficiencies and helps simplify the product development process. Solid Edge offers numerous dimension types and annotations, supporting these global standards.

Solid Edge provides a high level of flexibility. Designers can create drawings directly using 2D workflows derived from 3D models or with a hybrid approach. Solid Edge provides standard tools for these 2D workflows, such as a 2D model (for geometry) and drawing sheets (for AutoCAD layouts) with

2D model views available when annotating these models. The 3D workflows also provide the full range of drawing view types to document the 3D designs. As a result, designers can re-use dimensions and annotations from the 3D model for drawing views. This significantly reduces the detailing time for drawings.

During the documentation process, Solid Edge also offers a wide range of table types. If, for example, a company is migrating its existing 2D drawings (and the drawing views on those drawings) from AutoCAD to Solid Edge, the Create 3D command can be used to create 3D models in Solid Edge, using these original drawings as input. Solid Edge includes built-in goal seeking, a capability that automates engineering calculations to achieve a specific design goal, freeing designers from the burden of solving everyday engineering problems.

With the model-based design (MBD) capabilities in Solid Edge, 3D models include product manufacturing information (PMI) and other digital data using universal 3D PDFs. Users can access and view interactive representations of the manufacturing data. This enables the seamless exchange of information between engineers, suppliers and manufacturers across different software environments and organizations. To create an MBD using Solid Edge, PMI is added and displayed using 3D models as opposed to 2D drawings. This reduces the need for traditional 2D drawings in the first place. Once the 3D model is available, the user can harness one of many features available in Solid Edge. The smart dimension command, for example, allows the user to place dimensions in 3D spaces. The annotations tab also allows the user to create various PMI and geometric dimensioning and tolerancing (GD&T) symbols. It's easy to convert the PMI using a range of available and configurable templates included in Solid Edge.

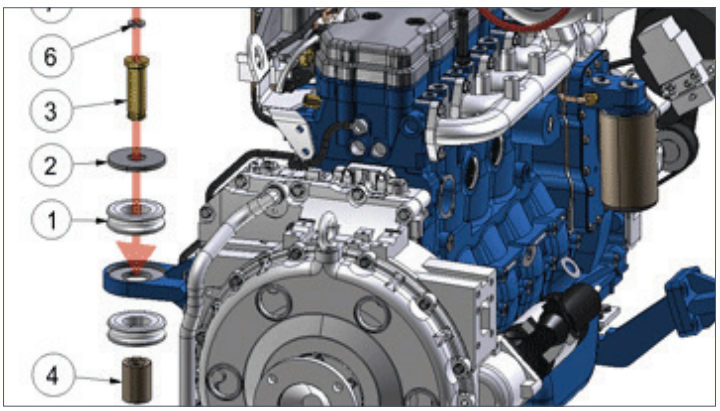
Survey says

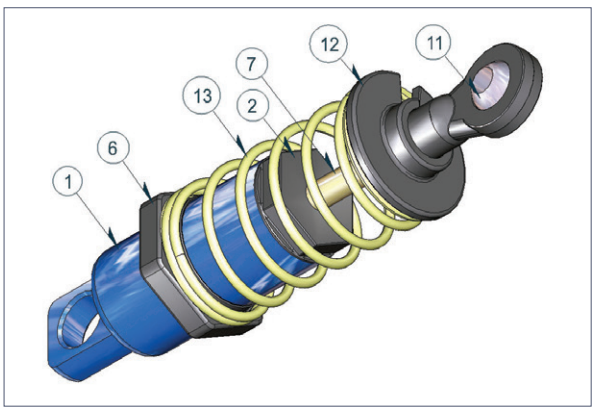
On average, respondents said their company's engineers spend more than **10 hours per week** creating design documentation, and then another **7.6 hours per week** amending or adding to that documentation.

Sixty-three percent edited drawings in a 2D application because it was easier and faster to implement those changes compared with a 3D application.

Thirty-seven percent had received or delivered incorrectly manufactured parts because the drawing was out of date.

Lifecycle Insights' 2020 Design Challenges survey





Reason three: powerful, intuitive sheet metal design

Sheet metal components are widespread in today's products. Developing such designs, switching back and forth between folded and unfolded states, is a common task. Yet, designers still face significant challenges when developing sheet metal components.

The findings from Lifecycle Insights' 2020 Design Challenges Study show that many designers and engineers still struggle to develop sheet metal models. Sixty percent of respondents said that they created sheet metal drawing details with lines and arcs instead of using the 3D model. Forty-two percent stated they manually calculated material relief for sheet metal parts.

Using Solid Edge streamlines every stage of the sheet metal development process. Solid Edge comes with a range of sheet metal-specific features. Designers can develop models from 2D sketches with fewer steps, for example, creating and automatically trimming multiple flanges in a simple operation. They can also make changes at every stage of the sheet metal design process, providing flexibility while maintaining the design intent.

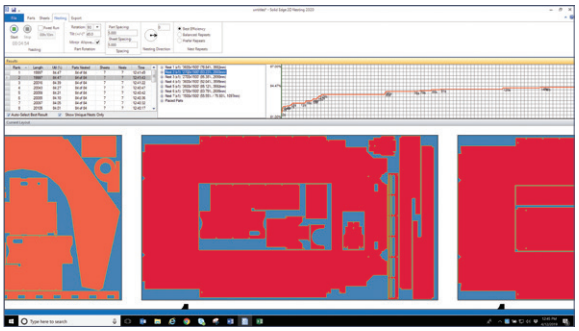
Survey says

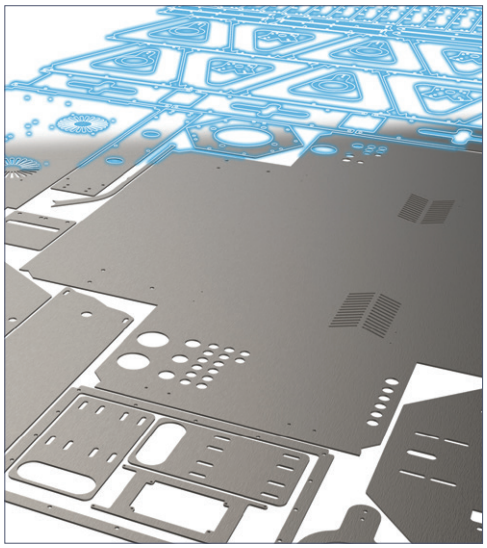
For sheet metal designers, over **seven hours per week** is spent extracting flat pattern data from CAD files.

Sixty percent created sheet metal drawing details with lines and arcs instead of using the 3D model.

Forty-two percent manually calculated material relief for sheet metal parts.

Lifecycle Insights' 2020 Design Challenges survey





Using Solid Edge expedites the design process: Process-specific commands allow designers to quickly model sheet metal parts and assess their manufacturability using automated workflows. Solid Edge also provides built-in design validation to improve product quality and includes unique functions to allow designers to build complex models quickly.

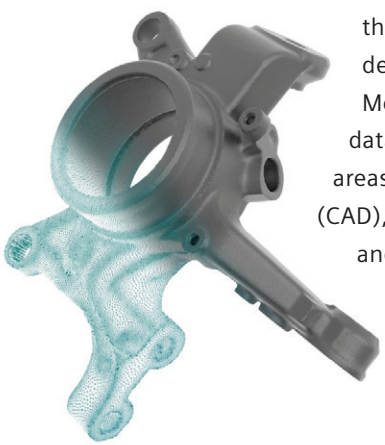
Nesting is a widely used process for sheet metal designs. Sheet metal manufacturers nest multiple sheet metal parts onto a material sheet to maximize material usage. Solid Edge features an efficient algorithm to achieve this: Solid Edge 2D Nesting. This algorithm is enhanced to deal with nonstandard shaped sheets, allowing designers to nest cutouts for cloth, leather or any other material. Designers can also add material costs and use the job multiplier to find the most cost-effective configuration while sorting by material or thickness to rapidly discover the optimal solution for the specific problem.

Reason four: next-generation modeling

Design data now comes into the development process from a wide variety of sources and formats. However, designers waste significant time remodeling or recreating such designs because, to date, they have had no other choice.

The findings from Lifecycle Insights' 2020 Design Challenges study reveal that many organizations struggle with reverse engineering data from 3D scanners, 3D printers and analysis inputs. Sixty-nine percent responded they had to recreate a 3D model to match data from a 3D scanner, 3D printing file or a finite element model (FEM). These are nonvalue-added activities that undermine the productivity of the design process.

The Solid Edge Convergent Modeling™ technology capabilities overcome these challenges. In conjunction with powerful 3D design tools, Solid Edge delivers smart functionality to work with mesh or triangle-based data. Mesh bodies can be imported from other systems, created by digital scanning or products based on a generative design analysis. Convergent Modeling allows designers to revise mesh density, fix and repair problems with faceted geometry and even use feature-like operations to add holes, rounds, cuts and protrusions. They can avoid recreating such geometries, boosting their productivity from the outset of the design process. Using Convergent Modeling also allows them to use such data across various practical application areas, including computer-aided design (CAD), computer-aided engineering (CAE) and computer-aided manufacturing (CAM).



Survey says

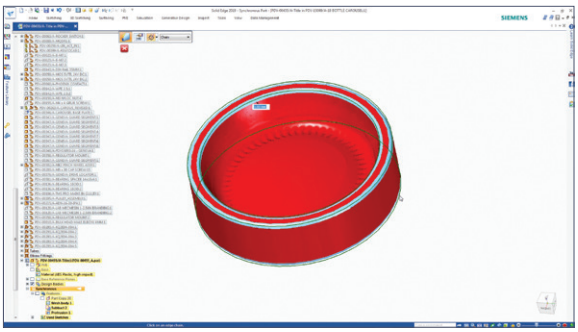
On average, a company's engineers spend a combined **eight hours per week** creating or recreating models instead of working with mesh geometry.

Sixty-nine percent had to recreate a 3D model to match data from a 3D scanner, a finite element model or a stereolithographic (STL) file.

Lifecycle Insights' 2020 Design Challenges survey

Solid Edge enables you to achieve this by leveraging two technologies commonly applied when defining digital 3D models: boundary representation (B-rep) modeling and facet modeling. Parasolid® software, which is the Solid Edge geometry engine, enables these two geometry creation techniques. Parasolid is the most widely used computer-aided geometric modeling kernel in the industry.

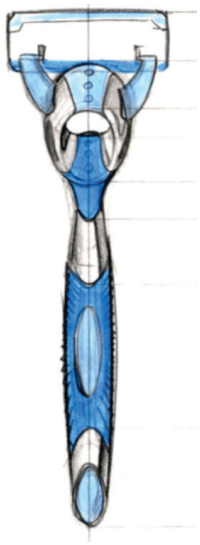
Parasolid is a Siemens technology that delivers complete 3D model compatibility between product development applications. This allows designers to create and modify digital 3D models with ease, boost many digital transformation initiatives and overcome many interoperability and data-based challenges.



Reason five: high-end industrial design without the complexity

Today's products are expected to have aesthetic appeal, including many of today's machines and equipment. Businesses, both large and small, must meet industrial design needs. Traditionally, smaller companies do not have the resources to address such a need. They are forced to outsource aesthetic design and take a siloed approach: Industrial designers use one set of tools, while mechanical engineers use another. This type of approach causes problems for today's development processes.

The findings from Lifecycle Insights' 2020 Design Challenges Study reveal that industrial design and mechanical design are still siloed. Forty-eight percent of respondents stated they delayed importing and working with initial industrial design geometry or updates. Another 55 percent stated the final physical product did not have the same look and feel as its digital counterpart. Such a disconnect between aesthetic and mechanical design should no longer exist.



Using subdivision modeling, Solid Edge provides advanced yet accessible industrial design capabilities. Designers can create complex and highly controlled aesthetic surfaces using the Solid Edge intuitive subdivision modeling toolset. It is suitable for users with any CAD expertise level, allowing them to easily create highly stylized shapes.

Survey says

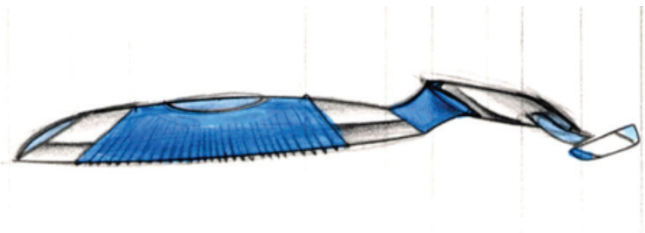
On average, a company's engineers spend a combined **9.4 hours** fixing geometry imported from industrial design or surfacing tools.

Forty-eight percent delayed importing and working with initial industrial design geometry or updates.

Fifty-five percent stated the final physical product did not have the same look and feel as its digital counterpart.

Lifecycle Insights' 2020 Design Challenges survey

An individual can create a stylized body, for example, using a polygonal cage to control its shape while capturing and refining specific design concepts. Compared to using polygons alone, this provides a higher level of design control while also lowering entry barriers. It's a tool that anyone can use, and it's included in several tiers of Solid Edge at no additional cost.



Reason six: productivity with predictive UI

Artificial intelligence (AI) and machine learning (ML) are progressing rapidly and are found in an increasing range of applications. These technologies can benefit the design and development space. But applying them is a complex undertaking, requiring specialist knowledge and expertise. While many have struggled to apply these technologies, Siemens Digital Industries Software has deployed them in Solid Edge to benefit designers. This marks one of the first uses of machine learning in a mechanical CAD application.

Solid Edge now includes a predictive user interface powered by artificial intelligence and machine learning. The system monitors and learns what modeling operations are used over time by the user. Then, it predicts what operations the end user is likely to want next, offering a short list of operations based on the previous usage.

This is an innovative application of machine learning techniques that increase the designer's productivity. Solid Edge effectively takes on an assistant's role, continually predicting and preparing what the designer or engineer wants to do next. As a result, Solid Edge is now starting to be used to understand the sequence of events during the design process. It understands what the designer is trying to accomplish to streamline the design process.

Switching made easy

Historically, transitioning from one CAD application to another is a complex undertaking. Designers have had to present a strong business case to argue the benefits of making the switch. The pain of moving designs from one application to another often results in broken geometries, undermining the new tool's potential productivity gains. Today, however, companies can minimize such issues by using the right solution.

Solid Edge comes with a range of tools to facilitate a smooth migration. Designers and engineers can directly open models, drawings and other deliverables created in other CAD formats using native Solid Edge. This allows designers to avoid data translation by using neutral formats. As a result, they no longer have to spend hours painstakingly fixing broken geometries, resulting in massive time savings. In addition to opening individual files, Solid Edge also provides bulk migration tools for parts, assemblies and drawings from popular CAD systems. In addition to reading in 2D and 3D geometry, these tools also transfer the links between parts, assemblies and drawings. These capabilities provide an accelerated and more straightforward path to transitioning to Solid Edge, enabling designers to make a strong business case to switch to Solid Edge from most CAD applications in the market.

Learn more about making the switch to Solid Edge

The cornerstone of the Siemens Solid Edge portfolio is Solid Edge mechanical design software, a market-leading 3D CAD application that enables product development with capabilities such as generative design, reverse engineering and design for additive manufacturing. These next-generation techniques are seamlessly integrated with traditional methods thanks to Convergent Modeling and their use is accelerated by industry-unique synchronous technology. The decades-old part, assembly and drawing design environment integrates seamlessly with a portfolio of affordable, easy-to-use software tools that address all aspects of the product development process, enabling you to go from 3D mechanical design to electrical design, simulation, manufacturing, and more using integrated data management along the way.

A modular and scalable CAD application, Solid Edge is available in four different tiers, ranging from basic design and drafting capabilities to a premium version that includes capabilities for designing more advanced embedded systems. All tiers are available as a perpetual (permanent) license or by subscription (monthly or annual) with maintenance, support and cloud-based licensing options.

Learn more at: siemens.com/switch-to-solid-edge

Try it yourself: solidedge.siemens.com/en/free-software/overview/

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Siemens Digital Industries Software is driving transformation to enable a digital enterprise where engineering, manufacturing and electronics design meet tomorrow. Xcelerator, the comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software, helps companies of all sizes create and leverage a comprehensive digital twin that provides organizations with new insights, opportunities and levels of automation to drive innovation. For more information on Siemens Digital Industries Software products and services, visit siemens.com/software or follow us on LinkedIn, Twitter, Facebook and Instagram. Siemens Digital Industries Software – Where today meets tomorrow.

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