HOW SOLIDWORKS SOFTWARE SPEEDS CONSUMER PRODUCT DESIGN

White Paper

OVERVIEW

SOLIDWORKS® solutions bridge the gap between industrial design and engineering by providing powerful conceptual sketching tools, robust and easy-to-use surfacing capabilities, the ability to easily transition design from concept to detail, and the industry's top mechanical engineering environment—all rolled into one software vendor solution. In this paper, you will learn how SOLIDWORKS® software provides a complete modeling and social environment for taking designs from concept to manufacturing.

INTRODUCTION

The consumer product industry faces a unique set of challenges because it must quickly bring new products to market with cutting-edge aesthetics, coupled with market-leading functionality, while delivering competitive manufacturing costs. One of the most critical demands is managing the transition from design to engineering. Today, consumer product designers use many generic or specialized tools to define the look and feel of a product either by creating sketches or flowing surfaces that often distinguish state-of-the-art industrial design. Mechanical engineers, however, typically use different tools to turn the industrial designers' creations into mathematically precise, functional, and manufacturable designs. Unfortunately, these individual tools traditionally have separate interfaces and model data sets that require a time-consuming and error-prone translation process or involve starting over and recreating your design when moving from one world to the other.

As an industrial designer, you may use sketchpads, modeling clay, foam, and specialized software tools that are fine for conceptualizing designs based on complex organic surfaces. But when the conceptual design process is completed, these tools provide only a fraction of the information needed to fully define the design. For example, most industrial design software doesn't generate the parametric history that can be crucial to efficiently managing the engineering change process. Because most software defines only a surface model, you may find it difficult to move to a physical prototype. The solid volume beneath the surface often affects its appearance, such as when the surface is glass. When you create a physical prototype with a surface model, you end up with additional work, because the surface model doesn't define wall thickness, hole depths, inlays, or connections between components.

Life would be much simpler if industrial designers could use solid modeling tools similar to those used by mechanical engineers. With these tools, you can create a feature-based, parametric model that captures all the information needed to mathematically define the design and to manage the change and documentation process. But traditional solid modeling software doesn't have the intuitive sketching and surfacing tools that you need to quickly generate the large number of design concepts required to create and evaluate an advanced design. Instead, you are locked into confined areas that limit you, for example, to defining a surface patch with either two or four sides, but not three, five, or more sides.

Dassault Systèmes SolidWorks Corporation has overcome this problem by offering a new social-enabled, solid modeling toolset with the powerful sketching and surfacing capabilities needed to turn out a stylish consumer product with smoothly flowing lines and distinctive features. Built on the **3D**EXPERIENCE® platform, SOLIDWORKS Industrial Designer complements the current SOLIDWORKS offerings, enabling industrial designers to create the stylistic and geometrical definition, before moving to SOLIDWORKS for detail geometrical design, testing, documentation, manufacturing, and sales and marketing—which your company's engineers and suppliers are probably already using—to turn concepts into reality. As a result, industrial designers and mechanical engineers can seamlessly share information and work simultaneously on the same model. This, in turn, makes it possible to move to market much more quickly, and to evaluate the form and emotional response of a product as well as the functionality and manufacturability of your concept designs before investing time and money.

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To create the best product, it is important to be able to rapidly develop multiple concept designs and gain feedback from your design stakeholders in a short space of time. Industrial designers need a tool that enables them to capture their design ideas quickly, without having to think about CAD.

SOLIDWORKS Industrial Designer adds new and unique conceptual design capabilities to the SOLIDWORKS portfolio. The ability to sketch concept ideas directly into the CAD environment in 2D or directly onto 3D surfaces, and the ease of creating complex freeform surfaces and solid shapes with innovative subdivisional (subD) modeling helps industrial designers realize their ideas in a faster and more streamlined way than ever before.

SOLIDWORKS Industrial Designer helps industrial designers in three unique ways:

1. Capture more concepts in less time

Using a sketching tablet or mouse, designers can sketch directly in the CAD system, capturing ideas in a natural and intuitive manner. Sketches form the basis of the 3D models so that no time or effort is lost when transitioning to 3D. Conceptual 3D models are created using innovative subdivisional modeling and industry-standard parametric surface and solid modeling tools. Subdivisional modeling ensures curvature continuity throughout the modeling process, making it much easier to create ergonomic, stylized design concepts. Creating more concepts means more options and possibilities to design the best products possible.
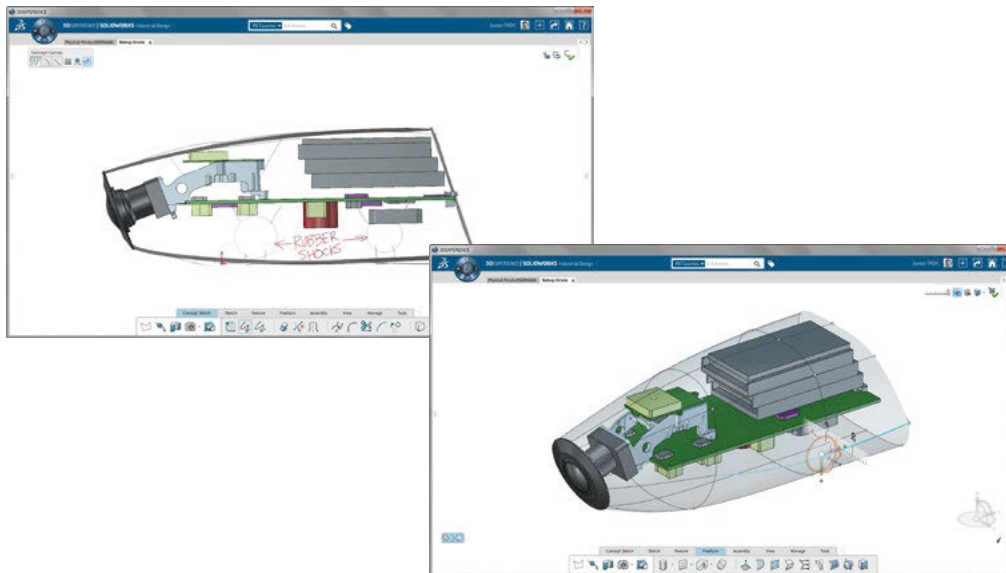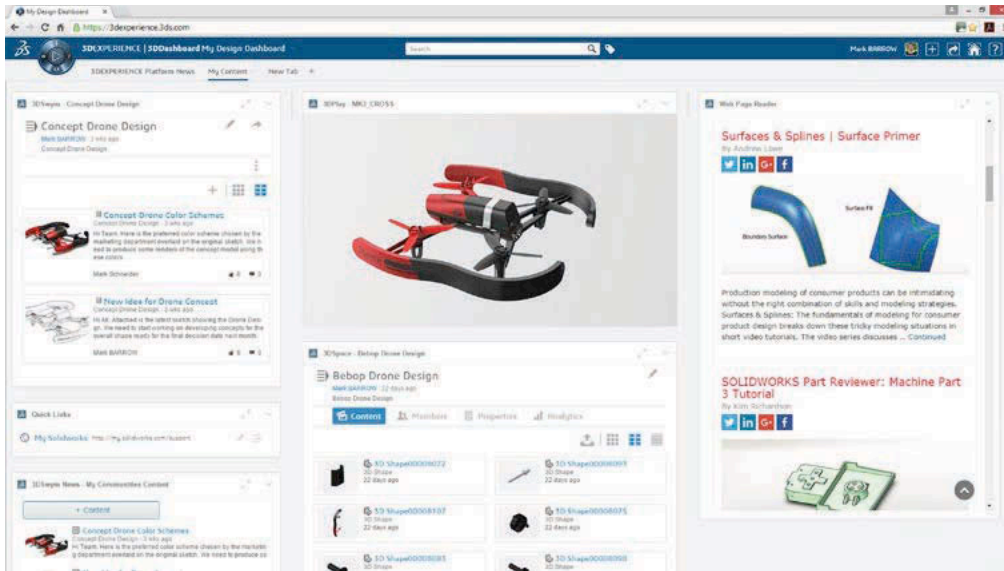

Using SOLIDWORKS Industrial Designer, you can sketch directly into the CAD system to capture new innovative design ideas and then use the sketch as the inspiration for fast subdivisional, push-pull surface modeling.

2. Collaborate and share designs with important stakeholders

SOLIDWORKS Industrial Designer is more than just CAD software. It uses online tools ("the cloud") and services to accelerate the design process. These online tools deliver transparent data management, online collaborative spaces, and project communities.

Collaboration with SOLIDWORKS **3DEXPERIENCE** solutions comes in two flavors: codesign collaboration and community co-review. Codesign is enabled through online collaborative spaces where the project design data are stored. These data are accessible to the whole design team, not just SOLIDWORKS Industrial Designer users, via secure invitation. Community co-review occurs through project communities enabling designers and users to share design data and collaborate on a design project. By setting up online communities, design team leaders and users can invite colleagues, suppliers, and customers to question and comment upon the designs in order to guide the project anytime from anywhere.

3. Work seamlessly with mechanical engineers using SOLIDWORKS

SOLIDWORKS Industrial Designer is complementary to the SOLIDWORKS portfolio of products; designs created in either application can be opened, edited, and updated, ensuring that no time and effort is lost when moving from concept to design.

The **3D**EXPERIENCE platform-enabled SOLIDWORKS Connector also adds cloud storage and social innovation capabilities to SOLIDWORKS CAD software, meaning that existing SOLIDWORKS users and designs are directly connected to SOLIDWORKS Industrial Designer users and designs, further enhancing the complementary design of this new product offering.

When a design concept is chosen, SOLIDWORKS Premium is the best tool to take a design from concept to detail design and manufacturing.

After the chosen concept from SOLIDWORKS Industrial Designer is opened, the model can be detailed by adding features in SOLIDWORKS such as ribs, fillets, shell operations, bosses, holes, and other manufacturing features. If the original design is changed using SOLIDWORKS Industrial Designer, then the SOLIDWORKS model can be updated and all downstream features in SOLIDWORKS will be updated without the need to recreate or redefine them. This unique workflow to SOLIDWORKS saves time and effort when taking an idea from concept to manufacturing design.

This also means that your team can work in parallel. While the industrial design concept is being finalized, other members of your team can be testing the design, detailing or laying out inspection criteria, rendering for sales and marketing materials, or even costing the design—all with the knowledge that if anything changes, those changes will simply update and ripple through to all downstream applications and processes.

CONCEPT DESIGN + DESIGN REVIEW AND SELECTION → **DETAIL DESIGN** → TESTING AND REFINEMENT → MANUFACTURING → SALES

The detail design process can start with a concept model directly from SOLIDWORKS Industrial Designer or from a concept sketch, image, or set of requirements.

Detail designing in SOLIDWORKS is made easier and more productive, SOLIDWORKS boasts the best user interface in CAD, tools that were typically hard to use have been made available to all by simplifying the process and providing user guidance and assistance when needed.

Specific plastic design features such as snap hooks, mounting bosses, and vents automate the creation of standard fastening-type geometry. Along with curve creation and surfacing workflows, SOLIDWORKS offers a great solution to create, modify, and add detail to consumer product designs, whether you are starting over or detailing designs from SOLIDWORKS Industrial Designer or other industrial design products.

The vast majority of consumer products' contents consist of purchased components, such as circuit boards, semiconductors, batteries, motors, bearings, fasteners, and displays. Today, you are often forced to redesign purchased and commonly used components with each project. SOLIDWORKS, on the other hand, provides you with the Design Library, a central location where you can access a wide range of standard, vendor-specific, and internal company design libraries. You can add new parts simply by dragging and dropping them into the design. 3D ContentCentral® saves time and improves accuracy by providing easy access to the 3D CAD models of leading component manufacturers. You can browse product categories to view competitive products, configure the supplier's parts to meet your requirements, and drag and drop products right into the design.

SOLIDWORKS product data management software gives you the creative freedom to vault many versions of the same part, assembly, or drawing. You can create personal digital assistants with different styles of screens and keyboards for design review. Plus, you can explore various "what if" scenarios by studying different saved versions of a part or an assembly, and then use SOLIDWORKS analysis tools to evaluate their performance.

For detail electrical design, SOLIDWORKS Electrical solutions integrate schematic and 3D modeling capabilities to enable bidirectional and real-time collaboration between electrical and mechanical engineers.
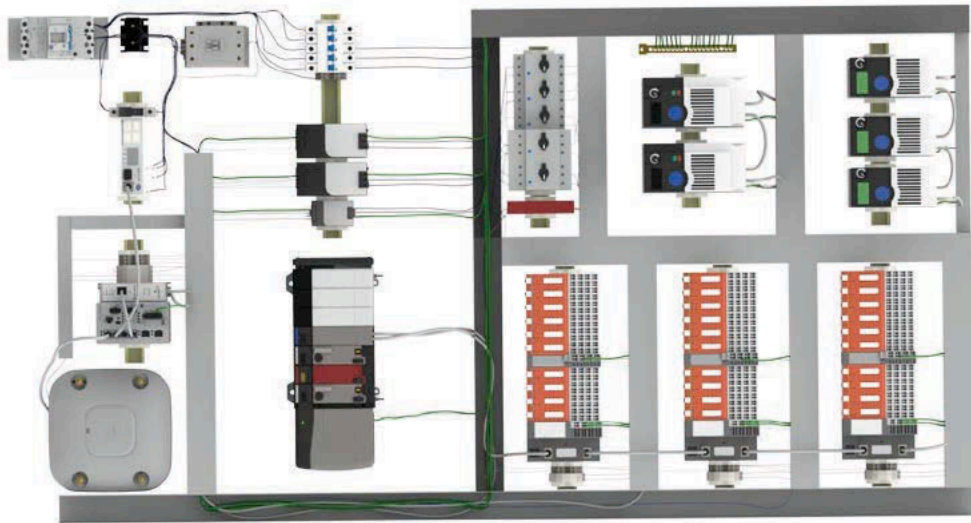
With SOLIDWORKS Electrical Professional, single-line and multiline schematic tools, including an integrated library of thousands of symbols and parts, enable quick planning of your embedded electrical system.

For 2D schematics, SOLIDWORKS Electrical Schematic is a powerful, easy-to-use suite of collaborative schematic design tools. Built-in libraries of symbols, manufacturer part information, and 3D component models provide common reusable materials optimizing design reuse. Streamline and simplify an array of tedious design tasks, from PLC and terminal block to contact cross-reference assignments with our automated design and management tools. SOLIDWORKS Electrical 3D enables you to place electrical components and use advanced SOLIDWORKS routing technology to automatically interconnect electrical design elements within the 3D model. Determine optimal lengths for wires, cables, and harnesses, all while maintaining design and bill of materials (BOM) synchronization between electrical and mechanical designs.

Using SOLIDWORKS makes it possible for you to move rapidly from a concept to a product. SOLIDWORKS provides all the other necessary operations to create a precise part definition with the same user interface and same geometrical file format used for conceptual design. You can associate design intent with features through the parametric history, which automatically adjusts the rest of the design to accommodate the change. Finally, for manufacturing and ongoing part maintenance, you can drive design changes by simply entering values in a table.

Consumer products need to be robust and stand up to varying levels of abuse during their lifespan. It is important that new products are tested before manufacturing to ensure costs are minimized. Integration of the industrial design with mechanical engineering tools means you can evaluate the mechanical performance of the design at a much earlier stage. SOLIDWORKS Simulation—included with SOLIDWORKS Premium—helps you determine the stress, strain, deformed shape, and displacement of components under operation, in order to avoid field failures. You can also use this tool to quickly identify and solve problems by generating new computer models quickly and inexpensively. After determining the exact duty cycle of components, you can often reduce the cost and weight by using lighter-duty components or by removing material where it isn't needed. Using SOLIDWORKS Simulation Professional, a separate add-on solution, you can even perform "drop tests"—simply drop the design from a specified height to see if it breaks.

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After or during the detailing process, you can easily use the 3D assembly model in SOLIDWORKS to quickly create production-level 3D MBD (Model-Based Definition) or 2D drawings. For example, create section views by simply drawing a line. With SOLIDWORKS, you can section the assembly and create the drawing view automatically. You can quickly create exploded views that describe how to assemble the consumer product by first arranging components in 3D, and then selecting sections to define 2D detailed drawing views. Then you can easily annotate these views with balloons keyed to the bill of materials that highlight components of interest.

As the design is generated, SOLIDWORKS automatically maintains the bill of materials, and can export it as an Excel spreadsheet or in other formats for import into the material requirements planning system. With this information, you'll save time and eliminate errors during the purchasing process. The software tracks a wide range of information, such as the manufacturer of purchased components, model number, size, and weight. You can generate a single bill of materials for multiple projects with numerous parts, quantities, and configurations, in order to speed the transition to manufacturing and also to purchase in greater quantities at lower prices.

Engineering changes typically occur at a release phase. Using SOLIDWORKS can help you avoid costly mistakes by ensuring that changes made anywhere in the process automatically update all product documentation, including parts, assemblies, and drawings.

To ensure product quality, SOLIDWORKS Inspection software automates the creation of ballooned inspection drawings and inspection sheets for First Article Inspection (FAI) and in process inspections. Save time and virtually eliminate errors by speeding up this repetitive manual process.

You can create your inspection documents regardless of your existing CAD system, using either the standalone SOLIDWORKS Inspection application or the integrated SOLIDWORKS Inspection add-in.

The SOLIDWORKS Manufacturing Network (My.SolidWorks.com) simplifies the process of finding design and manufacturing service providers that use SOLIDWORKS and work with native SOLIDWORKS files, thereby avoiding the need for converting or re-creating design files. You can easily find the right supplier on the network by browsing through categories, ranging from a machine shop to an outside design firm, or by searching on keywords.

For design collaboration at any stage of the design process, the social capabilities of the **3D**EXPERIENCE platform can be accessed using both SOLIDWORKS Industrial Designer and SOLIDWORKS. This enables stakeholders to view, comment, and provide feedback on design-related questions, suggestions, or updates, removing the barriers and time constraints usually experienced when working in team environments or with external contributors. Social collaboration comes as part of the SOLIDWORKS Industrial Designer package or as an add-in to SOLIDWORKS.
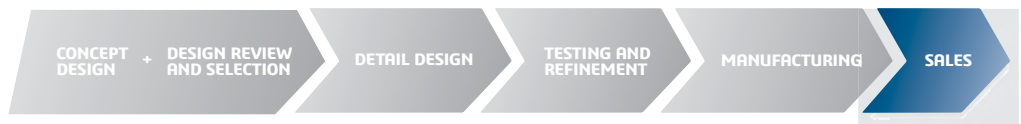
At any stage of the design process, it is vital that you are able to create sales-ready images of your products to help describe the design to others and win business.

Throughout the consumer design workflow, SOLIDWORKS provides rendering solutions to ensure you can create the product visualization at any given time.

Using SOLIDWORKS Industrial Designer not only enables you to create new innovative concept designs for new product ideas, it makes it possible to evaluate design visualization up front of any

detail design. Inbuilt CATIA® Live Rendering delivers high-quality lighting simulation to provide industrial designers with a fast and easy way of evaluating how their design idea could look in real life. The ability to collaborate and share the lifelike design with other stakeholders ensures that design decisions are made fast with input from the whole team.

When using SOLIDWORKS for detail design, fully integrated, PhotoView 360—included with SOLIDWORKS Professional and Premium—makes it easy for you to provide photorealistic renderings that demonstrate how a design will look without expensive mock-ups, prototypes, or studio photo [mock-ups] sessions. You can also combine PhotoView 360 with the SOLIDWORKS animation capability to create photorealistically rendered animations. For example, you can revolve the product 360 degrees on a turntable to see how it looks from every angle, or you can capture the motion of moving parts to show a clamshell-style cell phone being opened and closed.

If you are required to create marketing-quality images for print or web, you or another member of your company can use SOLIDWORKS Visualize, the standalone rendering solution included with SOLIDWORKS Professional and Premium, that provides best-in-class rendering quality and performance. This means that high-quality, sales-ready renderings can be created without tying up the SOLIDWORKS license, making you and your company more productive.


SOLIDWORKS | Visualize

Use SOLIDWORKS Visualize to deliver photorealistic imagery and content to Marketing much earlier to help promote the newest products via web/or print.

CONCLUSION

By allowing industrial designers and mechanical engineers to work with complementary, connected software tools, SOLIDWORKS Industrial Designer and SOLIDWORKS Premium make it possible to bring superior products to market in less time and at a lower cost. You can improve product performance by evaluating functionality at the concept design stage and by rapidly generating superior alternatives that can be inexpensively implemented. In addition, you can reduce time-to-market by streamlining design review and feedback with design stakeholders through innovative online social collaboration, and by eliminating the need to re-create designs from scratch in the mechanical engineering environment. Finally, you can lower manufacturing costs by considering the manufacturability of alternative concepts in the early stages of the design process.
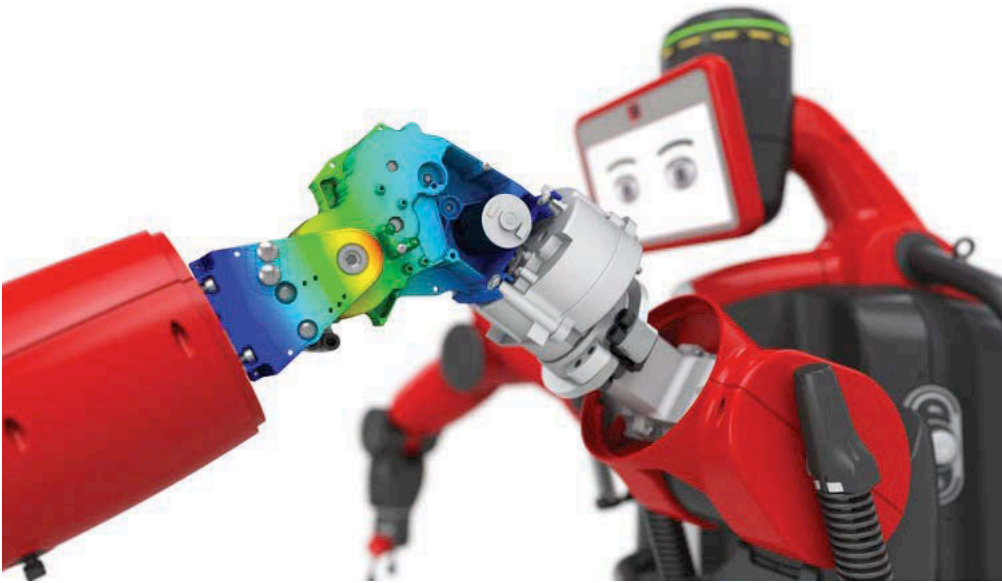
▶ For more information on how SOLIDWORKS speeds consumer product design, visit www.solidworks.com or email info@solidworks.com.

Our 3DEXPERIENCE® platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3D**EXPERIENCE® Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 190,000 customers of all sizes in all industries in more than 140 countries. For more information, visit **www.3ds.com**.

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