FAST, AFFORDABLE, NEXT-GENERATION PRODUCT DEVELOPMENT FOR SMALL AND MEDIUM-SIZED MANUFACTURERS

The SolidWorks®/ Dell™ 3D Design Solution

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Executive Summary

Accelerating Your Innovation

Good product design isn't about speed, it's about quality. With SolidWorks℠ solutions and an Intel-based Dell Precision™ Workstation, small and medium-sized companies can now have both. That means knowledge workers can imagine quickly and transform ideas into high-quality products with exceptional speed. It also means that small and medium-sized businesses can be even more effective partners to their large, multinational manufacturing customers, who are increasingly looking to their partners to bolster their product development supply chain.

What makes this possible? Advancements in:

- **Software tools:** SolidWorks' most recent software integrates critical tasks to help make idea generation, model testing and visualization easier than ever before. It helps reduce the need for physical prototypes and accelerates innovation through iterative model creation and testing that previously was only available using large-scale supercomputers.
- **Hardware tools:** Dell Precision workstations with dual Intel® Xeon® processors make the engineer's virtual workbench possible. Engineers can iterate through design and analysis of their ideas quickly and create the finished product virtually, helping to reduce product development time and investments associated with physical prototypes and testing.
- **Workflows:** With advancements in both software and hardware, knowledge workers are no longer constrained by serial workflows. These workers are migrating to parallel workflows and learning to design while modeling, simulating or rendering. They are modifying one design while simulating another. They are maximizing their creative thought process and are no longer being inhibited by the dreaded hour glass as other complex processing tasks consume their workstation. Parallel workflows are now possible, and your knowledge workers now have a powerful new ally to help transform their innovative ideas into products faster than ever before.

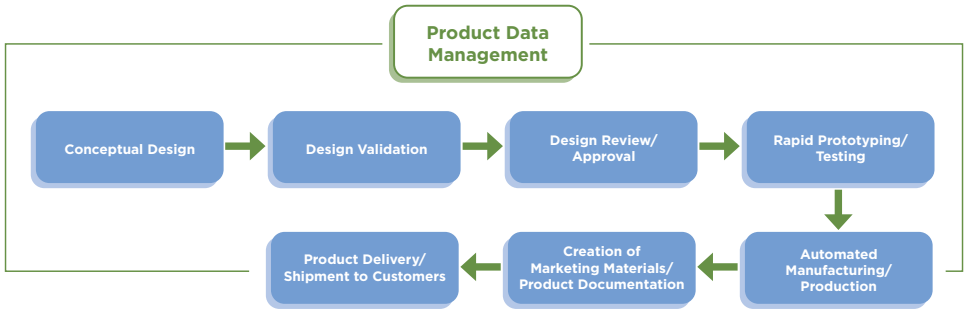
With SolidWorks 3D CAD software, integrated engineering and manufacturing tools, and advanced, high-performance workstations, manufacturers can:

- **Compress design cycles while avoiding development delays**
- **Reduce or eliminate physical prototyping and testing, thereby greatly minimizing scrap/rework**
- **Improve customer/partner communications and enhance customer/vendor interactions**
- **Promote innovation and deliver high-quality products quickly, consistently and cost-effectively**

As such, 3D product development platforms can help small and medium-sized manufacturers meet product design and production challenges head-on while helping to increase profitability, enabling them to maintain the edge they need to succeed in the face of stiff global competition.

The SolidWorks/Dell 3D Product Development Platform

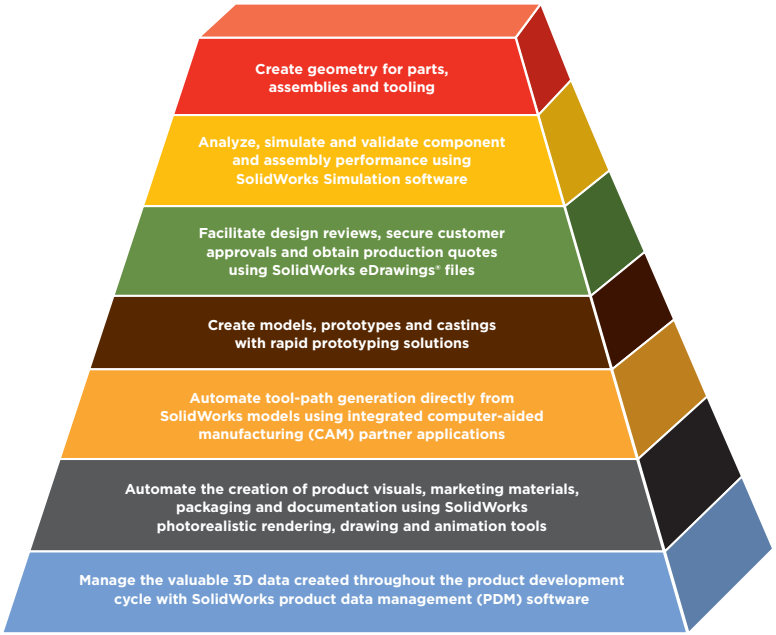
The combination of SolidWorks software with SolidWorks-certified workstations delivers an extremely productive, efficient and dependable solution for designing, validating and manufacturing products in 3D. By deploying 3D CAD software on the latest Intel-based Dell Precision workstations, product development professionals can solve complex problems quickly, process large 3D data sets efficiently, and meet the biggest engineering challenges head-on—without compromising their budgets. While consumer or corporate desktop and mobile systems may be marginally less expensive, it is the SolidWorks certification process that helps ensure that customers get the design experience necessary for environments that need fast and predictable innovation from their designers. In fact, some mobile workstations can deliver better performance than some desktops of just two years ago—providing the performance customers need with the added benefits of a mobile system.



SolidWorks 3D Product Development Software: An Integrated Solution

The SolidWorks 3D product development solution is not a single CAD program; it is a fully integrated software suite with a common-interface application specifically designed to provide solutions at each stage of product development. These tools enable small and medium-sized manufacturers to enjoy the same capabilities previously available only on high-end systems used by large multinational corporations, at a fraction of the cost.

SolidWorks delivers true integration that leverages 3D CAD files across the entire product design chain, from conceptual design, simulation, validation and testing to computer-aided machining, mold production, assembly, documentation and training. Using a single common data format and a fully integrated application, companies can eliminate delays related to file conversions and translations. Integration can help improve quality by minimizing the potential for human error, reduce costs related to scrap and rework, and maximize the impact of training efforts. SolidWorks provides a comprehensive solution that is powerful, reliable and manageable. At each phase of the product development cycle—from conceptual design to production, packaging and product introduction—manufacturers can use SolidWorks to:



Conceptual Design with SolidWorks

SolidWorks 3D CAD software running on Intel-based Dell Precision workstations delivers a robust set of modeling tools to meet geometry creation needs. Whether companies are designing large assemblies involving thousands of individual components, single parts involving simple geometries, tooling for injection molding, or complex surfaces and organic shapes for consumer products, SolidWorks provides the power to enable product development teams to work quickly and accurately.

The breadth of the software's capabilities ranges from the specialized to the routine. SolidWorks can help companies check for interferences within assemblies and subassemblies, fold sheet metal into intricate forms and shapes, develop molds and castings, generate complex surfaces and patterns, and more. Whatever the product development needs, SolidWorks can provide the tools for generating innovative, conceptual designs while helping to reduce geometry creation steps.

With SolidWorks Configuration Management, companies can create multiple design variations—different capacities, lengths, weights, etc.—from a single design. If an organization needs to make a modification, it only needs to change the base design because SolidWorks will update all configurations automatically.

SolidWorks also allows organizations to leverage legacy 2D design data, maintain compatibility with other CAD system data formats, create bills of materials (BOMs) almost instantly, generate engineering drawings automatically and download online component models directly into a 3D design.

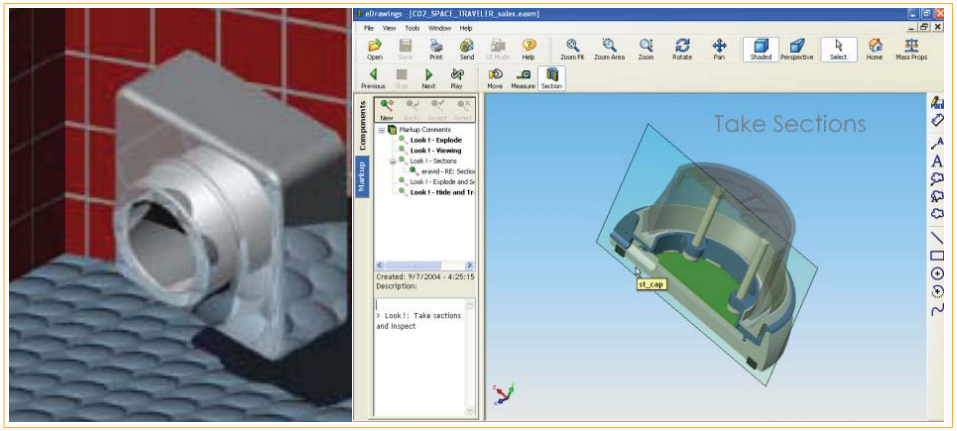
Design Validation with SolidWorks Simulation: Virtual Prototyping Workbench Accelerates Innovation

With the power of Dell Precision workstations, users are discovering new ways to reduce the time lag between an idea and a product. In the past, manufacturers utilized a process of repetitive prototyping and testing to validate designs. Today, users have a new tool to help reduce the need for costly and timely physical prototypes and accelerate innovation: the virtual workbench.

Directly integrated inside SolidWorks software, SolidWorks Simulation software supplies complete and detailed performance information that a company can use to help reduce the need for expensive physical prototypes, improve product quality and shorten time-to-market. Companies can eliminate costly product development delays, unfruitful detours and field failures by using SolidWorks Simulation to help them validate parts and assemblies early in the product development process.

Design Reviews, Communication and Approvals with eDrawings

To easily share design concepts, manufacturers can use SolidWorks eDrawings software. With innovative SolidWorks eDrawings files, product design teams can supply accurate, easy-to-understand representations of 3D models to anyone, anywhere, via email. With a SolidWorks eDrawings file, the recipient can rotate, zoom and pan the model as well as use the markup function to add notations and comments. Users can even animate a SolidWorks eDrawings file. With SolidWorks eDrawings capabilities, users can facilitate design reviews, secure customer approvals and communicate effectively with manufacturing specialists. With improved communications, companies can minimize or eliminate costly surprises, delays and rework.



Product Data Management with SolidWorks PDM

SolidWorks software includes the SolidWorks PDM data management system, a powerful PDM tool that engineering workgroups can utilize to control design revisions, safeguard valuable product information and manage diverse types of product design data.

Unlike static 2D files, 3D files contain references, associations and interrelationships that link them to other files, such as parts, drawings, BOMS, multiple configurations and assemblies. SolidWorks PDM helps manufacturers manage, preserve and safeguard these relationships to make sure they remain intact. The software also enables revision control and helps prevent the overwriting of CAD files and other data management-related errors.

Rapid Prototyping: Helps Reduce Cost and Expedite Imagination Delivery

Beyond simulation, many manufacturers are looking at these new virtual workbenches as a tool to produce rapid prototypes for a variety of purposes, ranging from form and fit to testing. These virtual products can be routed quickly to the customer to gather immediate feedback and rapidly incorporate changes.

In addition to virtual prototypes, SolidWorks Solution Partners employ rapid prototyping systems to support fast, cost-effective production of 3D concept models and physical prototypes directly from SolidWorks CAD data. Organizations can access a full range of compatible rapid prototyping technologies to produce 3D models for prototype testing and design communications functions.

Manufacturing Production

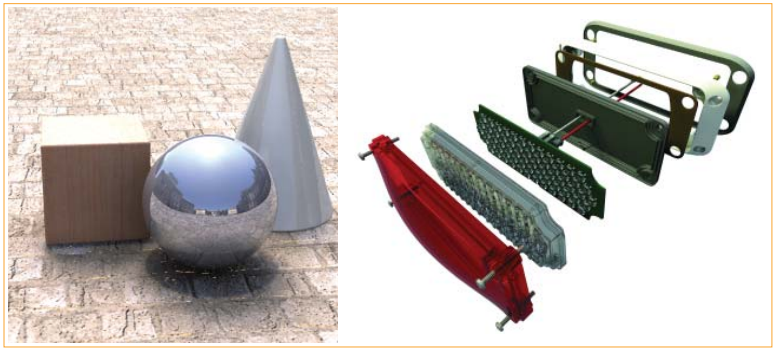
Manufacturers can save more time and eliminate other potentials for error by using an integrated CAM package for generating tool paths and controlling manufacturing processes. Integrated CAM software enables companies to utilize SolidWorks 3D CAD data to drive an important stage in the product development process. Instead of relying on manufacturing vendors or specialists to generate the correct tool paths, companies can help ensure manufacturing is accurate when they use the actual solid model.

With SolidWorks CAM Solution Partner applications, organizations can automate the manufacture of finished parts, prototypes and tooling directly from 3D CAD data. Compatible CAM applications support the complete spectrum of design data formats and production techniques. Solutions are available for 2-5 axis milling machines; 2-22 axis lathes; multi-sided milling machines; multi-function lathes and mill-turn machines; and CNC punch, laser, plasma and flame machines.

Easy, Accurate Marketing and Documentation Creation

Creating marketing and documentation materials is easy with SolidWorks, as the product development process uses a single, common data file. This allows product development teams to start production of marketing materials and user manual documentation well in advance of actual product production. Using the PhotoView 360 photorealistic rendering tool, companies can utilize the SolidWorks model to create images for use on the Web as well as in brochures, product sheets and catalogs. With SolidWorks, companies do not have to wait for an initial manufacturing run to create product marketing and documentation materials.

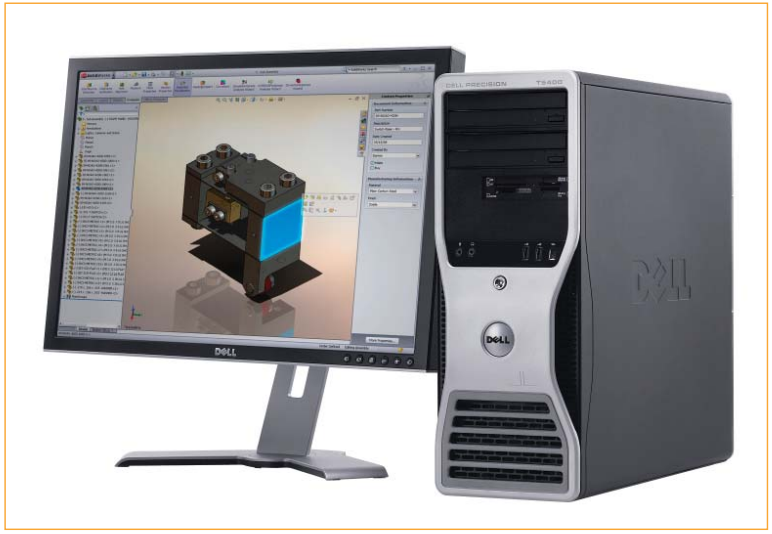
SolidWorks 3D CAD provides users with a range of flexible tools for creating product graphics and images in a variety of file formats. In addition to generating marketing images, users can produce exploded views for use in assembly instructions, product user manuals and parts lists.



Making It All Happen Fast

It has been said that features always demand more computational power; the same is true with SolidWorks 3D. The software helps you accelerate your innovation with virtual workbenches utilizing technology from Intel and Dell. The Dell Precision workstations are feature rich. In addition to available 64-bit operating systems, some workstations can sport up to 8 computational cores, and can provide the disk and memory capacity to meet even your largest assembly (e.g. 1M components), analytical and rendering requirements.

These innovative virtual workbenches are also scalable to help meet your ongoing needs.



Dell offers a variety of workstations optimized for next-generation product development, including:

Dell Precision Dual Socket Workstations

The Dell Precision T7500 and T5500 are ultra-high-performance workstations designed to maximize performance and scalability. These powerhouse platforms feature powerful, multi-core Intel Xeon processors, 64-bit capability and large memory access, professional OpenGL® graphics[1], and RAID options to power through the most complex design and analysis workflows.

Dell Precision Single Socket Workstations

The Dell Precision T3500 is designed to deliver exceptional performance at a great price. With 64-bit multi-core Intel Xeon processor technology, the T3500 offers excellent data processing speeds and performance. And with support for dual native PCIe x16 graphics cards, you can enjoy incredible graphics performance or quad-monitor capability in a very affordable workstation.

Dell Precision Mobile Workstations

The Dell Precision M6400 17-inch platform is the ultimate in mobile performance workstations, offering all the power of fixed workstation computing. Designed for ultra-high-end performance needs with professional OpenGL graphics[1] and optional Intel Core™ 2 Duo Quad Core Extreme Edition processing, the M6400 can handle even the most graphically intensive programs, making it an ideal choice for engineering design and analysis professionals.

The Dell Precision M4400 15.4-inch mobile workstation offers expanded technology choices, great graphics and display options to help meet today's and future business needs. OpenGL discrete graphics solutions[1] are designed to handle the demands of advanced 2D and 3D applications, including CAD design. These applications are supported by up to 8GB[2] of memory and optional Intel Core 2 Duo Quad Core Extreme Edition processing to help ensure fast data delivery for efficient multitasking.

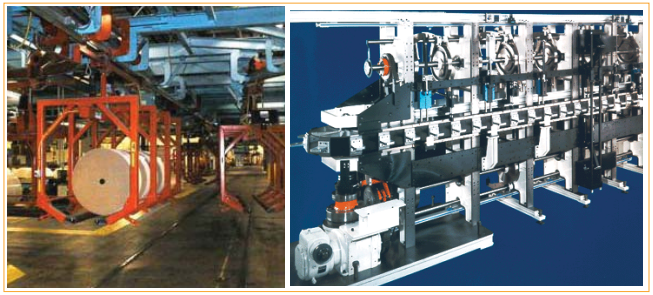
Case Study*

Manufacturers worldwide depend on SolidWorks and Dell to help them outpace the competition. Consider the following case study highlighting successes at Assembly & Test Worldwide (ATW).

Assembly & Test Worldwide manufactures systems that automate product assembly and testing for a broad range of industries, including consumer goods, food packaging, automotive, heavy truck, agricultural machinery, life sciences and more. Headquartered in Dayton, Ohio, the company operates 6 divisions at 11 facilities around the world. Its ATW-Dayton division specializes in custom solutions for component assembly and test.

The challenge: ATW-Dayton implemented a 3D development platform in 2001 with the intention of shortening design cycles, reducing development costs and improving product quality. However, after using its initial 3D design package for three years, the company's engineers began experiencing system crashes, stability issues and capability shortfalls, particularly in the development of large assemblies. "Our engineers routinely work with large assemblies of between 1,000 and 5,000 components," explains Bill Budde, president of ATW-Dayton. "In 2004, we took another look at available large-assembly capabilities in conjunction with efforts to automate processes and standardize procedures. We were also interested in investigating integrated analysis capabilities."

The solution: ATW-Dayton division decided to review its initial evaluation of 3D CAD systems, which had shown SolidWorks software to be a strong 3D CAD solution for large-assembly development. To affirm the software's anticipated benefits, the company ran three SolidWorks workstations in parallel with its previous CAD system on an actual project. The culmination of that benchmark experience was a consensus of opinion among ATW-Dayton engineers that SolidWorks CAD software was easier to use and more intuitive. "Another important part of our justification in moving to SolidWorks was the ability to conduct assembly analysis using integrated SolidWorks Simulation software, which we could foresee using heavily," Budde recalls. ATW-Dayton implemented 20 seats of SolidWorks Professional and six seats of SolidWorks Premium software on a mix of newly-acquired Dell Precision fixed and mobile workstations. Since then, ATW has standardized on SolidWorks across all facilities, increasing its total number of seats to 70.



*This case study is for informational purposes only. DELL MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS CASE STUDY.

The results: The benefits of implementing the SolidWorks/Dell 3D design solution go beyond the improved handling of large assembly designs at ATW-Dayton. Since installing SolidWorks, the company has cut its product design costs by approximately 10 percent, increased throughput by an estimated 10 percent, reduced steel usage by about 10 to 15 percent via integrated assembly analysis capabilities, and improved design visualization and communications.

"The transition to SolidWorks provided an impetus for our focus on process improvement," Budde notes. "We got to use many of the great tools SolidWorks provides for achieving standardized procedures and process improvement, and the performance we have realized using Dell Precision workstations has been consistently high. The move to SolidWorks and Dell has worked out well and has provided a stepping stone for improving our processes."

ATW-Dayton engineers also use SolidWorks Simulation analysis software to validate and simulate design performance, reducing material costs without having to build expensive prototypes. "Before SolidWorks Simulation, we overbuilt our press frames and pick-and-place machines," Budde explains. "We were concerned that if they were not heavy enough, deflections and high stress levels could lead to premature component wear or the creation of excessive customer scrap and downtime. The motto of our industry used to be: 'When in doubt, make it stout.' With SolidWorks Simulation, we discovered we could save money by using design optimization to cut unnecessary material while still providing a high-quality product that performs to specification."

In addition to saving time and cutting costs, the SolidWorks/Dell 3D design solution helps ATW-Dayton communicate design concepts more effectively to customers, vendors and partners. "We use SolidWorks eDrawings files extensively to share data with our customers and tooling suppliers. We also had opportunities to use SolidWorks animation capabilities in conjunction with Dell Precision advanced graphics on the sales end, using a working model to illustrate a process or concept to customers," Budde explains. "There is definitely a 'wow' factor when you can communicate with customers in 3D. It's sure a lot better than trying to describe a 2D drawing sitting on the table."

With the new 3D solution, ATW has:

- Cut product design costs by approximately 10 percent
- Increased throughput by an estimated 10 percent
- Reduced steel usage by about 10 to 15 percent via integrated assembly analysis
- Improved design visualization and communications

Conclusion

Invention That Gets Out Into the World Is Innovation

With SolidWorks 3D solutions and Intel-based Dell Precision Workstations, small and medium-sized companies can now achieve both speed and high quality.

Knowledge workers can employ powerful new virtual workbenches to accelerate their imagination and quickly iterate through three-dimensional ideas.

They can quickly test for form, fit and function—quickly eliminating bad ideas.

They can validate design integrity, identifying and quickly removing designs that do not measure up.

They can document and collaborate with partners and customers easily, diminishing miscommunications and helping to accelerate approvals.

Isn't it time to give your designers a powerful 3D virtual workbench and accelerate your innovation?

For more information on implementing a SolidWorks/Dell 3D design solution, visit
www.solidworks.com or www.dell.com/precision

[1]Significant system memory may be used to support graphics, depending on system memory size and other factors.

[2]GB means 1 billion bytes; actual capacity varies with preloaded material and operating environment and will be less. Up to 1GB may not be available with 32-bit operating systems due to system resource requirements.