THE TOP FIVE REASONS TO SWITCH TO SOLIDWORKS FOR PRODUCT DEVELOPMENT

White Paper

OVERVIEW

The trend towards greater automation and data sharing among product development and manufacturing technologies—often referred to as the Smart Factory or Industry 4.0—is having a dramatic impact on the types of tools designers need to develop products. Manufacturers have embraced automation because it provides many competitive advantages, and product developers increasingly face design, workflow, and data requirements that extend beyond the capabilities of traditional, single-point 3D modeling and 2D drawing solutions. Meeting these emerging automation and data-sharing demands requires designers to utilize an integrated 3D product development system like the SOLIDWORKS® design-to-manufacturing environment. With integrated SOLIDWORKS solutions, product development and manufacturing organizations can help lead this automation transformation. This paper details the primary benefits—the top five reasons—to switch to the integrated SOLIDWORKS 3D product development ecosystem.

BEYOND CAD MODELING: PRODUCT DEVELOPMENT NOW UNIFYING DESIGN, ENGINEERING, AND MANUFACTURING

For the past few decades, designers, engineers, and others involved in the development of products often viewed computer-aided design (CAD) systems as geometry and/or drawing generators. Production personnel needed 2D engineering drawings to manufacture parts and assemble products, so single-point CAD solutions—first in 2D and more recently in 3D—were all that product designers needed to create the models, output the drawing prints, and build the bills of materials (BOMs) required for production. If the product design geometry was needed to support another function, that data would be translated, converted, or rebuilt to meet that purpose. While this product development perspective and approach sufficed for much of the now-waning Third Industrial Revolution—the Digital Age—it will prove to be woefully insufficient for meeting the product development needs of the emerging Fourth Industrial Revolution—the Internet of Things and Artificial Intelligence—which demands higher levels of interconnectivity, data sharing, and automation.

In the Smart Factory or Industry 4.0, CAD systems are no longer single-point design solutions that merely generate drawings for production, with different engineering disciplines using separate design packages to create their distinct portions of a product design. In today's emerging smart factories, product developers need an integrated CAD system that not only produces multidisciplinary CAD data but also concurrently leverages 3D CAD data for all other functions, including production. By making 3D CAD data the foundational DNA of the entire enterprise, manufacturing organizations can capitalize on the growing opportunities for improved efficiency, greater collaboration, and increased innovation inherent to an integrated product development system.

This integration goes beyond combining different engineering disciplines (e.g., industrial, mechanical, surfacing, electrical, and electronic design) into a single compatible design system and extends to a host of downstream functions, such as visualization, validation, cost estimating, manufacturing planning, data management, manufacturing, quality control, documentation, packaging development, and marketing. Moreover, integration doesn't mean just the ability to work with the CAD data via import/export/conversion protocols; it means having access to and working with the same CAD data concurrently—with updates due to changes made automatically and propagated to all other functions—within a single native environment, rather than through a longer, more costly, sequential process.

Take CAD and computer-aided machining (CAM) as an example. Until recently, these two functions typically used separate data streams that frequently diverged, resulting in a higher probability of quality issues and loss of design intent. The historical separation of CAD and CAM into different data streams also limits communication and discourages collaboration between design and production professionals. Yet CAD/CAM integration is only one example of the many potential benefits of using an integrated 3D product development system like SOLIDWORKS.

An integrated 3D product development system helps you save time and reduce costs, increase accuracy and improve quality, facilitate collaboration and ensure design for manufacturability throughout the design process. Perhaps most importantly, switching to an integrated 3D ecosystem like SOLIDWORKS will help your organization create the innovative products of tomorrow more efficiently and cost-effectively.
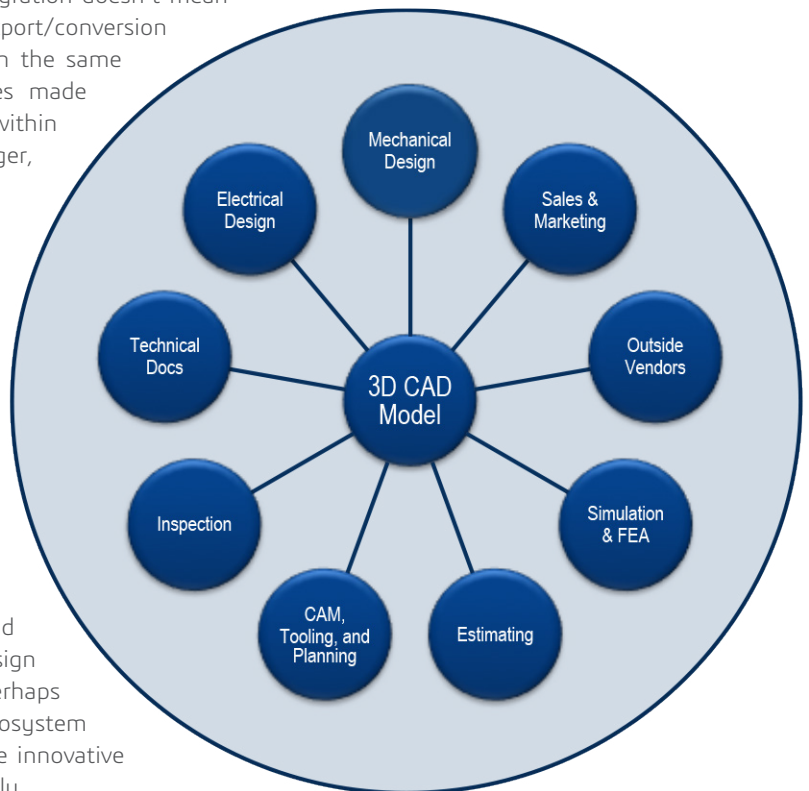
THE FIVE REASONS TO UPGRADE TO AN INTEGRATED 3D PRODUCT DEVELOPMENT SOLUTION LIKE SOLIDWORKS

There are many reasons why manufacturers should move to an integrated 3D product development environment like SOLIDWORKS, ranging from ease-of-use to an extensive set of related, integrated solutions. Most of these reasons fall within five primary categories of benefits that align with the product development and manufacturing goals of leading companies. The top five reasons to make the switch to SOLIDWORKS:

1. **Boost Productivity**
2. **Reduce Costs**
3. **Improve Quality**
4. **Foster Collaboration**
5. **Increase Innovation**
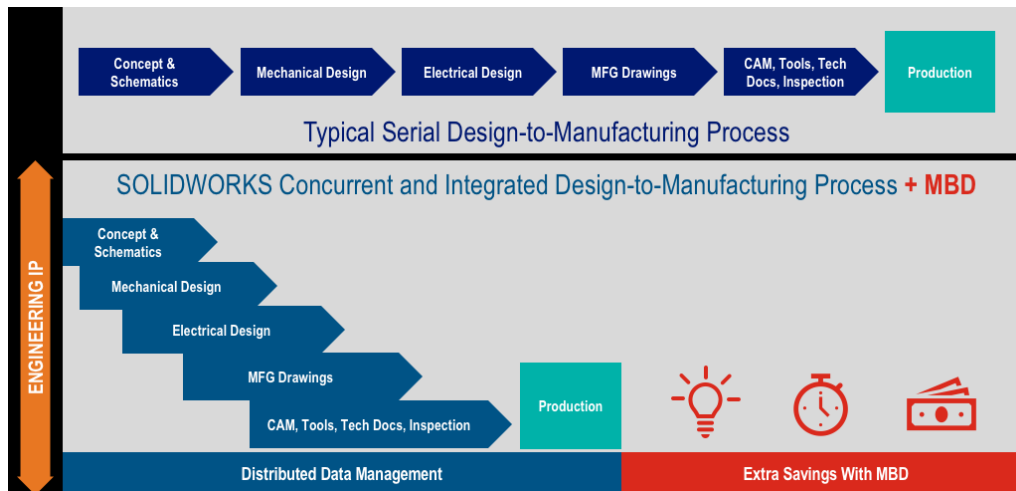
REASON 1: BOOST PRODUCTIVITY

Boosting productivity and product development and manufacturing throughput without sacrificing quality or incurring unnecessary costs is the ultimate goal of, and a critical success factor for, all manufacturers. An integrated 3D product and development environment like SOLIDWORKS can support the improved product development/manufacturing workflows required to take productivity gains far beyond what's possible with traditional approaches.

Concurrent, Integrated Design Shortens Time to Market

When nobody involved with product development or manufacturing has to wait on data to start his or her task or function, development and production cycles take less time, ultimately shortening time to market. Instead of working in a linear, sequential manner, product development organizations can leverage an integrated 3D product development ecosystem like SOLIDWORKS to implement a more efficient, concurrent, "hub-and-spoke" approach that enables all functions to access and work with the latest 3D product data, with this universal or "master" data updated automatically for all functions whenever design changes are made.

### Seamless Integration Promotes Concurrent Product Development

A fully integrated 3D product development solution like SOLIDWORKS allows every function to directly work with the master 3D product data at the center of the process. Seamless integration of all applications eliminates the need to import, export, translate, convert, rebuild, or repair data, saving time in many areas and promoting a concurrent approach to product development and manufacturing. By eliminating data manipulation and updating tasks, and supporting a more efficient, concurrent approach, integration alone can provide productivity gains that contribute to shorter product times to market.

Improved Handoff to Manufacturing

Instead of working from a set of difficult-to-read-and-manage engineering drawings, or spending time changing product designs to resolve manufacturability issues, production personnel can directly access the master 3D model for production and collaborate with designers to address manufacturing problems early in the process. In addition to saving time by supporting a more thorough assessment of design for manufacturability issues prior to release to production, an integrated 3D product development environment reduces the time required to create tooling and G-code for CNC machining via tools like SOLIDWORKS CAM, and 3D production with SOLIDWORKS Model-Based Definition (MBD) software.

"SOLIDWORKS helps me with the process from idea to actual product because it's not just a 3D program; it's not just a CAM program; it's all in one. ...It's so smooth to make changes."

— Matt Moseman, Product Development Specialist, Ringbrothers
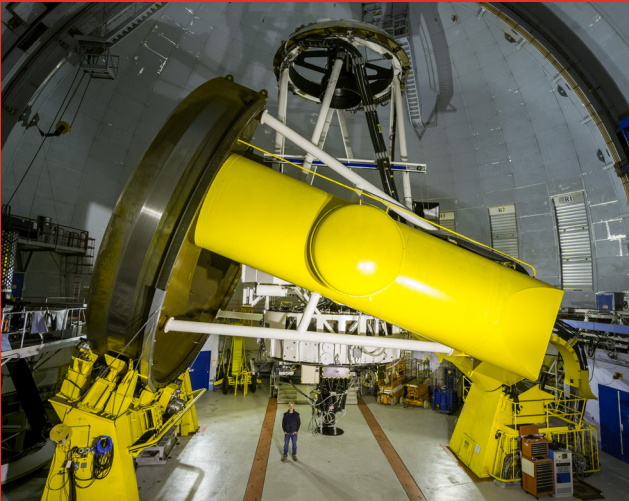
a case in point

UPGRADING A WORLD-CLASS OBSERVATORY WITH SOLIDWORKS

The Canada-France-Hawaii Telescope (CFHT) Corporation operates a world-class, 3.6-meter optical/infrared telescope from an observatory atop the summit of Maunakea, a 4,200-meter dormant volcano located on the big island of Hawaii. CFHT provides the research community with a versatile, state-of-the-art astronomical observing facility that not only helps users consistently achieve their scientific goals but also fully exploits the research potential of the Maunakea site.

When the CFHT Observatory was built in the 1970s, design work was done through drawings, with stacks of vellum stored at the observatory's headquarters in Waimea. These drawings were converted into 3D models 10 years ago using Autodesk® Inventor® software, but CFHT decided to move to SOLIDWORKS software to make facility upgrade projects faster, easier, and more cost-effective.

"I gave Inventor an honest try, but I found the software to be cumbersome to use and I needed a tremendously powerful workstation to run it," explains Instrument Designer/Machinist Greg Green. "I'm so much more productive using SOLIDWORKS software. My boss was amazed with how fast I can model a new design in SOLIDWORKS, which is the main reason that we made the switch."

By choosing to standardize on SOLIDWORKS software, CFHT cut its development cycles in half, realized increased compatibility with vendors and partners, expanded CAD usage to the observatory itself, and improved its design visualization capabilities.

To read the full Canada France Hawaii Telescope case study, click here.

Better Engineering Change Management

There's been some reluctance among product development organizations to make design or engineering changes late in the process for fear that it would cause them to miss their expected delivery date. With an integrated 3D product development solution like SOLIDWORKS, manufacturers can incorporate changes from any department with little or no effect on the original delivery date, because the change will automatically update all related materials (e.g., G-code, documentation). You won't have to incur additional time to make these changes manually, and will even be able to quickly evaluate optional production methods, such as machining, injection molding, casting, and additive manufacturing.

Leveraging Master 3D Models to Support Other Functions

The area with perhaps the biggest potential for boosting productivity with an integrated 3D product development ecosystem is leveraging the master 3D model to support all other functions. You can create photorealistic renderings with SOLIDWORKS® Visualize, share and communicate designs with anyone using SOLIDWORKS eDrawings, validate design performance with SOLIDWORKS Simulation, estimate production costs with SOLIDWORKS Costing, generate G-code for machining with SOLIDWORKS CAM, complete quality assurance with SOLIDWORKS Inspection, prepare product documentation with SOLIDWORKS Composer™, support manufacturing/assembly with SOLIDWORKS MBD, and manage data and processes with SOLIDWORKS Distributed Data Management solutions, including the SOLIDWORKS PDM (product data management) system.

REASON 2: REDUCE COSTS

Along with saving time, all product development and manufacturing organizations want to hold the line on or reduce development costs. That's because unnecessary, avoidable costs directly impact profit margins by increasing the cost of goods sold. With an integrated 3D product development ecosystem like SOLIDWORKS, you can reduce costs by shortening design cycles and accelerating time to market, as well as by eliminating duplicative, unnecessary tasks and associated costs.

Concurrent, Integrated Design Eliminates Unnecessary Costs

An integrated 3D product development environment like SOLIDWORKS saves money both by increasing productivity and by eliminating the costs associated with tasks that are no longer necessary with a concurrent product development and manufacturing workflow. Examples of these types of unnecessary costs are often in the areas of printing, maintenance, and storage of paper drawings; conversion, translation, and/or repair of design data; more than multiple rounds of physical prototyping; and higher than necessary volumes of scrap/rework arising from data miscommunications or revision errors.

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>
> — Victor E. F. Xavier, Engineering Manager, Brudden Equipment Ltd.

Minimizing Engineering Change Orders During Production

Everyone involved with product development and manufacturing realizes that engineering change orders (ECOs) cost money: both in terms of the time required to implement them, and the costs associated with updating all related materials (e.g., documentation, packaging). With an integrated 3D product development system like SOLIDWORKS, you can reduce the number of ECOs required, as well as the costs associated with implementing them. Because all functions leverage the master product data prior to production, the fidelity or completeness of a design is much improved, lessening the number of ECOs required. But in the event an ECO is required, it becomes less time-consuming, less costly, and more tenable with an integrated solution.

Working with Master 3D Models Saves Money

Providing all contributors to product development and manufacturing with access to the master design model saves money because completing tasks concurrently—with automatic updates to all functions when changes are made—is more efficient and eliminates costs associated

## ACHIEVING FITNESS EQUIPMENT MARKET LEADERSHIP POSITION WITH SOLIDWORKS

Brudden Equipment Ltd. is known throughout Latin as the manufacturer of the Brudden® brand of agricultural machinery, but the company also produces recreational kayaks, as well as the market-leading Movement® brand of physical fitness equipment, with the largest market share in the Latin fitness equipment market.

Several years ago, the company decided to re-evaluate the Mechanical Desktop® and Autodesk Inventor design tools it used as part of efforts to better support the company's growth and product expansion. After evaluating the Pro/ENGINEER® and SOLIDWORKS 3D design systems, Brudden standardized on SOLIDWORKS solutions in 2013 because SOLIDWORKS had the shortest learning curve, was competitively priced, and provided access to integrated engineering tools.

"We wanted to streamline and accelerate development—with faster solutions for handling sheet metal, complex geometries requiring surfacing, and integrated design analysis—to support our product line expansion and need for greater throughput," explains Engineering Manager Victor E. F. Xavier. "SOLIDWORKS was simply the best solution for introducing 3D design across Brudden."

By moving to SOLIDWORKS, Brudden achieved its goals of controlling costs and increasing throughput, shortening product time-to-market by 25 to 30 percent, cutting prototyping costs by 40 percent, quadrupling annual new product development throughput, and winning the 2015 international iF DESIGN AWARD for its Movement equipment designs.

To read the full Brudden/Movement case study, click here.
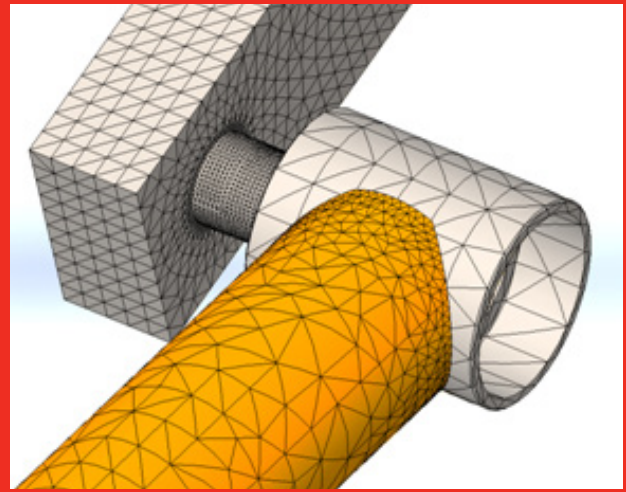
with manually updating related materials. When you use an integrated 3D product development environment like SOLIDWORKS, making a design change doesn't result in the need to rework tooling, documentation, packaging, or marketing materials from scratch. Because these functions began working with the master 3D product model in a concurrent manner, their materials will update to reflect changes to the master model automatically.

Cutting Prototyping Costs and Field Failures

By implementing an integrated 3D product development solution like SOLIDWORKS, manufacturers can cut costs associated with additional rounds of physical prototyping, field failures, and warranty claims through more frequent use of integrated design simulation tools for virtual prototyping. Because simulation tools are more seamlessly integrated—operating directly inside the 3D CAD design environment—they become more accessible and useful during design.

Slashing Training and Maintenance Costs

An integrated 3D product development ecosystem like SOLIDWORKS reduces training, administration, and maintenance costs when compared to those associated with multiple single-point solutions. With everyone involved with product development and manufacturing working on a single, familiar platform with a common user interface, training and maintenance costs simply go down. Maintenance costs decrease through economies of scale—better maintenance deals from multiple users on one system compared to individual users on multiple systems. With the same user interface for all integrated applications, and opportunities for more cost-effective internal training programs, training costs also fall.

REASON 3: IMPROVE QUALITY

While accelerating time-to-market remains the primary objective for product development and manufacturing organizations, doing so at the expense of product quality and performance is a sure strategy for failure. Quality products are the best way to build and cement brand loyalty, and with an integrated 3D product development system like SOLIDWORKS, you don't have to make a trade-off between speed and quality because you can have both.

Minimizing Probability of Human Error

One of the biggest advantages of deploying an integrated 3D product development ecosystem like SOLIDWORKS is that it minimizes the probability of mistakes related to human error creeping into the process. With a central, master set of product data maintained by an integrated PDM system, the opportunities for human error related to data manipulation—instances requiring someone to import, export, translate, convert, rebuild, or repair data—simply disappear. With fewer opportunities for human error, an integrated platform by its very nature will have a positive impact on product quality.

Updating Design and Everything Else

Using an integrated 3D product development environment like SOLIDWORKS also minimizes the chances for errors related to having multiple personnel update data to reflect design changes. Because everyone involved—from production personnel to documentation authors to quality assurance professionals—works with the same master product data, all of the materials reflected by that data are automatically updated when a design change is made. Instead of having many people perform manual checking and updating tasks when design changes are needed, product development and manufacturing organizations can simply make the design change to the master model, and have that change automatically reflected in everything else.

Validating Performance

More prototyping can be done virtually with an integrated 3D product development solution like SOLIDWORKS because of the utility, speed, and accessibility of integrated simulation tools. Because designers can more frequently simulate design performance within their modeling environment as they create product designs, the fidelity, completeness, and quality of the design in terms of performance improves throughout the product development process. This results in the creation of better-quality designs that are more fully analyzed and interrogated before a physical part is machined or printed, and reduces prototyping requirements, while simultaneously improving product quality.

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> — Paolo Palestro, Sales Manager, Burocco Industrial Valves
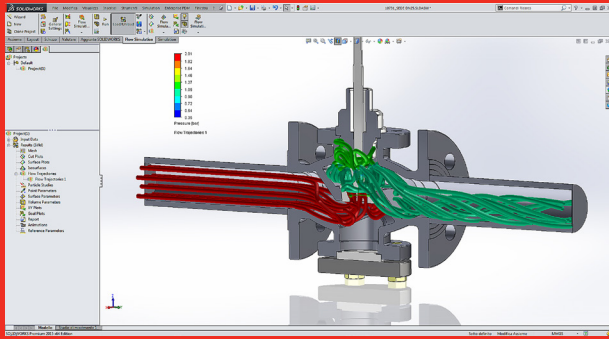
Eliminating Revision Errors

Instances of someone using an out-of-date design revision containing errors that have since been fixed, or lacking critical improvements made in the most current revision, vanish with a solution that includes tight version controls like those of the integrated SOLIDWORKS PDM system. Easy to administer and manage, SOLIDWORKS PDM ensures that the most current design revision resides at the center of the product development effort, where it can be accessed by all product development and manufacturing users. With improved version controls, product development organizations can completely eliminate revision errors and have greater confidence in the integrity of design data.

More Flexibility to Make Design Improvements

With an integrated 3D product development system like SOLIDWORKS, users have greater flexibility—more time and space—to continue to make design improvements throughout the process without having to compromise on quality in response to deadline and budget pressures. Because making design changes is quick and easy, requiring no additional manual effort other than making the change to the master design, there's also a greater willingness among the product development and manufacturing teams to continue to make improvements to the product design, which has an ameliorating effect on quality.

OPTIMIZING INDUSTRIAL VALVE DESIGN PERFORMANCE WITH SOLIDWORKS

Since 1954, Burocco Industrial Valves has designed and manufactured stainless steel industrial valves for regulating, shutting off, and turning on the flow of water and other fluids. The company collaborates with customers and partners to develop new valves to address varying customer requirements and specialized applications in the chemical, pharmaceutical, cryogenic, food processing, textile, and iron and steel industries.

In 2015, Burocco determined that it needed a better solution for accurately calculating fluid flows within its valve designs than the Autodesk Inventor and Fusion 360 3D design tools it had used. After investigating available solutions, Burocco decided to standardize on integrated SOLIDWORKS design environment, implementing the SOLIDWORKS design, fluid-flow analysis, technical communication, and PDM software. The company chose SOLIDWORKS solutions because they are easy to use, are fully integrated with the SOLIDWORKS CAD system, and provide access to a wide range of integrated applications.

"Our principal need was the ability to accurately calculate the flow of a fluid inside our valves," recalls Sales Manager Paolo Palestro. "For us, the value of SOLIDWORKS is in the integrated applications," Palestro stresses. "We view CAD systems as very similar, but the SOLIDWORKS platform gives us access to the integrated tools that we truly need."

By transitioning to SOLIDWORKS, Burocco shortened its design cycles by 25 percent, predicted fluid flows with 98 percent accuracy, increased design reuse by 50 percent, and eliminated turbulence within valves without physical prototyping.

To read the full Burocco Industrial Valves case study, click here.

Integrated Inspection and Quality Assurance

Conducting quality assurance inspections of key components—whether the parts come off your own production line or are delivered by a manufacturing partner—is critically important for maintaining consistently high levels of quality. You can improve the effectiveness and efficiency of quality assurance inspection efforts by using CAD-integrated inspection tools. Instead of relying on 2D paper prints, outdated inspection criteria, or inspecting against the wrong revision, you can use integrated SOLIDWORKS Inspection software to automate your quality assurance inspection process, improve its effectiveness, cut down on manual errors, and reduce inspection overhead.

Take Advantage of Photorealistic Imagery

One aspect of product development that often gets overlooked is the quality of product imagery used to support product marketing and sales and facilitate collaboration with nontechnical design stakeholders. That's because until the past decade, most of this imagery consisted of professionally shot photography. Back then, high-quality photorealistic renderings of products required unique skills and the use of special software. However, with SOLIDWORKS Visualize software, you can use your CAD models to quickly and easily create photorealistic imagery that is indistinguishable from high-end photography. In addition to improving the quality of product imagery, this approach allows for greater flexibility in creating marketing materials prior to production and eliminates the cost and disruption of professional photo shoots.

REASON 4: FOSTER COLLABORATION

Developing innovative, successful products of high quality efficiently and cost-effectively often demands the input of new perspectives, approaches, and ideas. However, if product development and manufacturing teams work in isolated silos—primarily because they use separate tools and speak a different data language—they have fewer opportunities for the interaction and collaboration that can result in winning product ideas. An integrated 3D product development environment like SOLIDWORKS enhances collaboration internally, with external partners, and with the growing SOLIDWORKS user community.

MultiDisciplinary Design and Engineering Collaboration

Many of today's successful products require the coalescing of different engineering disciplines into a single design. Consumer electronics, for example, often require mechanical design of the housing and controls, electronic design of the printed circuit board (PCB), and electrical design of the wiring and power schematics. Instead of developing each of these elements separately and sequentially, using incompatible design packages and then trying to bring it all together, mechanical, electronic, and electrical engineers can collaborate on the design in the same design environment using SOLIDWORKS mechanical, SOLIDWORKS PCB electronic, and SOLIDWORKS Electrical design software.

Design, Engineering, and Manufacturing Collaboration

Just as an integrated 3D product development system like SOLIDWORKS encourages designers of different engineering disciplines to work together to develop product designs, an integrated platform fosters greater collaboration among designers, engineers, and manufacturing personnel. Working in the same development environment, engineers can collaborate with designers to improve performance through the use of integrated simulation and design optimization tools; and manufacturing personnel can collaborate with both designers and engineers to assess the best production approach and improve the manufacturability of product designs. SOLIDWORKS MBD software takes collaboration a step further by outputting information-rich 3D product manufacturing information (PMI) that is tied to the master design data.

> "Since we implemented SOLIDWORKS, we were able to easily find personnel that doubled the size of our engineering department to meet the needs of our growing business. My colleagues thought that SOLIDWORKS was the better package, and they've convinced me that that's the case. It's certainly made it easier to recruit strong, qualified people, and our training requirements have been reduced."
>
> — Tom Marcella, Solutions Manager, Applied Robotics, Inc.

Concurrent Development Compels Collaboration

An integrated 3D product development environment like SOLIDWORKS makes the transition from sequential to concurrent development occur naturally and smoothly, which in turn compels higher levels of collaboration among everyone involved in product development and manufacturing. When everyone uses integrated tools, they begin speaking the same data language about elements of the product design instead of focusing on the data limitations inherent to using incompatible applications. This makes collaboration more effective and desirable because team members will concentrate more on the product design and less on confronting incompatible data issues.

Tapping the Resources of a Growing User Community

In addition to encouraging greater internal collaboration, the integrated SOLIDWORKS 3D product development ecosystem provides manufacturing organizations with the ability to collaborate with the expanding resources of the vibrant and growing SOLIDWORKS user community. This community includes industry-leading reseller support, as well as the large number of active SOLIDWORKS users (5.6 million and growing) and students receiving SOLIDWORKS training at leading colleges and universities. Beyond the attractive recruitment pool available to manufacturers, the SOLIDWORKS user community offers a host of valuable resources, including MySolidWorks, a one-stop web portal for accessing community resources; access to the 3D ContentCentral® online catalog of downloadable 3D models from leading component manufacturers; and the SOLIDWORKS User Group Network (SWUGN), which provides opportunities to collaborate and socialize with other local SOLIDWORKS users.

IMPROVING TOOLING CONNECTIVITY DESIGN AND COLLABORATION WITH SOLIDWORKS

Applied Robotics, Inc. is a leading global provider of specialized end-of-arm tooling and connectivity solutions for the automation and robotics industries. Founded in 1983, the ISO-9001-registered company designs and manufactures innovative automation service solutions, including tool change systems, collision sensors, grippers, and connection systems.

Several years ago, Applied Robotics reevaluated its Solid Edge® mechanical design and E3® electrical design packages because of difficulties related to using the electrical schematics application and recruiting engineers who were trained in the mechanical package.

Applied Robotics standardized on SOLIDWORKS solutions—implementing SOLIDWORKS Premium mechanical design and analysis software, and SOLIDWORKS Electrical Schematics design software—because it's easy to use, is well known among the engineering professionals that the company wants to recruit, and provides a cleaner, more integrated approach to mechanical and electrical schematics design.

"Since we implemented SOLIDWORKS, we were able to easily find personnel that doubled the size of our engineering department to meet the needs of our growing business," notes Solutions Manager Tom Marcella. "My colleagues thought that SOLIDWORKS was the better package, and they've convinced me that that's the case. It's certainly made it easier to recruit strong, qualified people, and our training requirements have been reduced."

By choosing SOLIDWORKS solutions, Applied Robotics enhanced the quality of its electrical schematics, improved recruitment of trained design engineers to support growth, realized a more cost-effective electrical schematics solution, and facilitated system assembly.

To read the full Applied Robotics case study, click here.
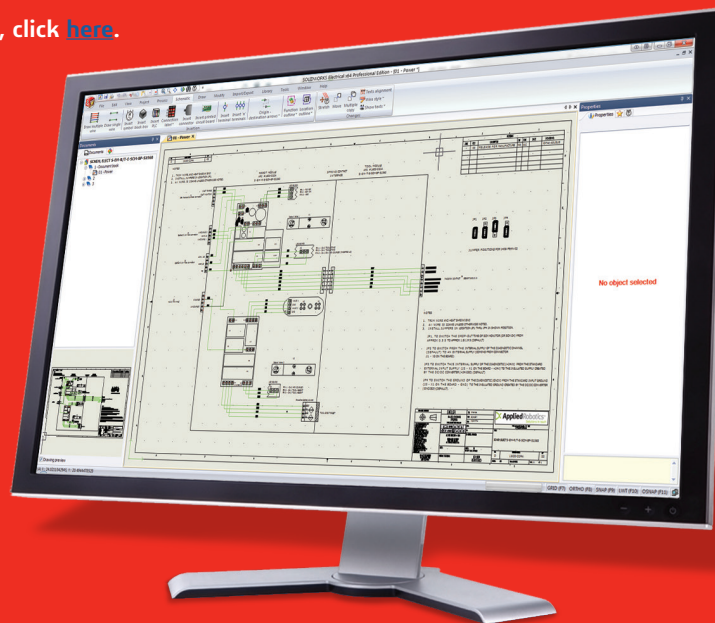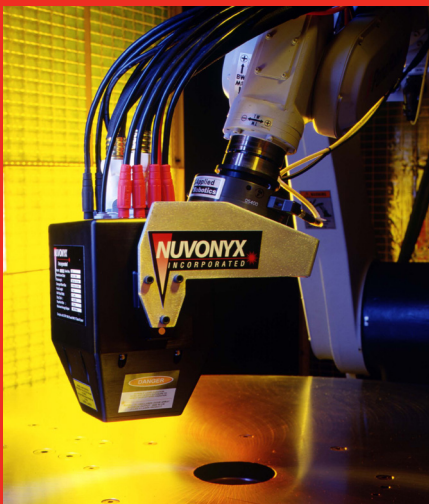
REASON 5: INCREASE INNOVATION

Innovation is more than a buzzword for leading manufacturers. That's because of the numerous examples of how innovative product approaches, or the addition of innovative product features, can turn a market on its head or establish an entire new market and product category. Innovation can disrupt existing markets, establish new markets, and lead to market dominance. By implementing an integrated 3D product development system like SOLIDWORKS, manufacturers can achieve the product development agility, design flexibility, and collaborative freedom to inspire the innovative products of the future.

Freedom for Investigating Innovative, Outside-the-Box Approaches

One of the positive impacts of an integrated 3D product development ecosystem like SOLIDWORKS is how it can liberate product development and manufacturing teams to step outside of the norm. Complacency is arguably the opposite of innovation. Concurrent design with an integrated platform pushes personnel out of their isolated silos into a more agile, flexible, and collaborative work

environment. With less concern for the busywork that isolated approaches formerly created, product development and manufacturing professionals will be energized by the freedom to investigate innovative, outside-the-box approaches and concepts via improved visualization, simulation, and rapid prototyping. Although many of these ideas may not pan out, the ones that do may make the difference between success and failure.

Creating Internet of Things (IoT) Devices on an Integrated Platform
The advent of digital and Internet technologies—along with artificial intelligence—is ushering in the fourth Industrial Revolution, these changes are opening up entirely new product possibilities and categories—such as the Internet of Things—compelling manufacturers to accelerate electromechanical product development. Manufacturers have introduced a host of innovative IoT products in recent years, ranging from thermostats, lighting controls, and personal fitness systems to industrial mechatronics, machine-to-machine communications, and network equipment applications. With an integrated 3D product development environment like SOLIDWORKS, manufacturers can more quickly and efficiently develop innovative IoT products by uniting mechanical, electronic, and electrical development within a single, collaborative design environment.

Exploring "What If" Scenarios
In addition to unifying the efforts of mechanical, electronic, and electrical designers, an integrated 3D product development solution like SOLIDWORKS provides the embedded simulation tools that designers and engineers need to quickly explore a range of possible design approaches. By having access to the integrated tools required to evaluate multiple "what if" scenarios—what if I use a different material, change the layout of this cooling channel, or try a more aesthetically pleasing shape?—designers and engineers can broaden their approach to design. The more options that product development and manufacturing teams can investigate, the greater the likelihood will be that they will have the eureka moment that characterizes the discovery of innovation.

Incorporating Packaging Design and Production as Part of Product Design
Sometimes the package sells the product. However, this typically doesn't happen when manufacturing organizations approach packaging design and production as afterthoughts. Just as with the many other functions connected to product development and manufacturing, packaging design and production can benefit from the use of an integrated 3D product development system like SOLIDWORKS. The obvious benefit of tying packaging design to the master product data in a hub-and-spoke integrated system is that the packaging design will automatically update to reflect changes made to the product it contains. With the greater agility, flexibility, and freedom of an integrated environment, packaging designers can also evaluate optional packaging approaches to reduce costs, improve appearance, or simply make the product package easier to open.

Advancing Innovative Marketing and Customer Service Strategies
Innovation extends beyond development of the product itself with an integrated 3D product development solution like SOLIDWORKS to include the use of innovative approaches to marketing, documentation, and customer support. For example, with SOLIDWORKS, manufacturers can efficiently create stunning photorealistic marketing images with integrated SOLIDWORKS Visualize software prior to production to seed or tease the market. With integrated SOLIDWORKS Composer software, manufacturers can publish interactive, animated online product user manuals, which utilize animations to demonstrate how to use or assemble a product, as well as interactive online parts manuals that customers can access by using a smartphone app to scan a QR code and quickly and easily order replacement parts. And, of course, because these materials are tied to the master product data, they will update automatically whenever product changes are made.

"One of the reasons that we stayed with SOLIDWORKS was the efficiency and reliability of SOLIDWORKS PDM to capture all of the changes that we make as we resolve issues and refine the design. In short, we'd rather pay for the SOLIDWORKS suite because it is fully compatible—all of the solutions working together—and doesn't erect roadblocks that have to be overcome, which has become increasingly important as we ramp up for mass production."

— Diana Standish, Engineering Manager/PDM Administrator, Arcimoto, Inc.

INNOVATING A NEW, ELECTRIC FUN UTILITY VEHICLE (FUV) CATEGORY WITH SOLIDWORKS

Founded in 2007 to catalyze a shift to a more sustainable transportation system, Arcimoto, Inc., (NASDAQ: FUV) broke new ground in the transportation industry by establishing the fun utility vehicle (FUV) category for electric vehicles. Although early R&D took place in the company machine shop, management realized that refining vehicle development and preparing for mass production required the use of advanced design and engineering tools.

Arcimoto chose the SOLIDWORKS design platform because it's easy to use, includes robust sheet metal and weldment design capabilities, and provides access to a complete set of integrated solutions, such as analysis, product data management (PDM), and electrical design tools. The company stuck with SOLIDWORKS software—even after being offered free software by Autodesk—due to the progress its engineers had made using SOLIDWORKS.

"One of the reasons that we stayed with SOLIDWORKS, even when offered free competitive software, was the efficiency and reliability of SOLIDWORKS PDM to capture all of the changes that we make as we resolve issues and refine the design," explains Engineering Manager/PDM Administrator Diana Standish. "In short, we'd rather pay for the SOLIDWORKS suite because it is fully compatible—all of the solutions working together—and doesn't erect roadblocks that have to be overcome, which has become increasingly important as we ramp up for mass production."

By standardizing on SOLIDWORKS solutions, Arcimoto brought the first electric Fun Utility Vehicle (FUV) to market, cut vehicle weight by nearly 40 percent, streamlined and minimized prototyping requirements, and improved the manufacturability of the vehicle chassis and components.

ESTABLISH A SMART, AUTOMATED FACTORY WITH THE INTEGRATED SOLIDWORKS 3D PRODUCT DEVELOPMENT PLATFORM

As industry transitions from the Digital Age to the time of the Internet of Things and Artificial Intelligence, also known as the Smart Factory or Industry 4.0, manufacturers face increased competitive pressures and market demands to develop higher-quality, more innovative products more efficiently and cost-effectively than ever before. Responding to these challenges successfully requires greater interconnectivity, data sharing, and automation in product development and manufacturing.

Fortunately, manufacturers can benefit from this transition by switching from traditional single-point 2D drawing and 3D modeling design solutions to the integrated SOLIDWORKS 3D product development system. With an integrated multidisciplinary CAD environment like SOLIDWORKS, product development and manufacturing teams can concurrently leverage the master 3D CAD product data for all other functions, including production. By switching to integrated SOLIDWORKS solutions, you can boost productivity, reduce costs, improve quality, foster collaboration, increase innovation, and be well on your way to establishing and maintaining a smart, agile, effective, and successful product development and manufacturing organization.

To learn more about how the integrated SOLIDWORKS 3D product development platform can improve your product development and manufacturing effort, visit www.solidworks.com or call 1 800 693 9000 or 1 781 810 5011.

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 220,000 customers of all sizes in all industries in more than 140 countries. For more information, visit **www.3ds.com**.

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