TEN STRATEGIES FOR BECOMING AN EFFECTIVE CAD LEADER

Overview

Successful engineering organizations have two important things in common: they know how to utilize computer-aided design (CAD) technology in ways that consistently advance productivity and instill innovation in product development, and they are led by capable managers who know how to best leverage available CAD tools. You, too, can become an effective CAD leader by taking a strategic approach to the implementation and use of CAD software and related applications. These 10 strategies can show you how.

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The importance of CAD leadership

CAD technology has become the cornerstone of today's successful product development organizations. However, as with any tool, maximizing the potential benefits of your CAD system demands a combination of planning, organization, and expertise. Using the right tools at the right time and under the right circumstances can make the difference between success and failure. Ensuring that your organization deploys CAD tools in the most effective, efficient, and practical manner is the role of the CAD leader.

Product development challenges continually evolve, as do the CAD applications and related tools that are designed to help you overcome them. Competitive pressures require steady improvements in productivity and ongoing advances in innovation. With so many variables in play and goals that constantly change and grow, design and engineering groups require a leader who can sort it all out. Just as a symphony orchestra needs a conductor to bring many discordant sounds together into a harmonious, musical blend that is pleasing to the ear, successful design teams must have an effective CAD leader to orchestrate productive CAD usage, cultivate consistent team performance, and set an example of efficiency that percolates throughout the entire company.

Top 10 strategies for maximizing CAD impact

Why 10 strategies? You might think that maximizing the impact of your CAD tools is as simple as matching the needs of your designers and engineers with specific software capabilities. Although that indeed is a strategy upon which many managers have relied, it is extremely shortsighted—focusing only on current departmental needs—and falls well short of meeting the growing challenges associated with today's fast-paced global economy.

As a CAD leader, you need to consider how you will use CAD tools today and in the future, as well as how those tools will impact both your departmental and companywide organizational objectives.

True CAD leaders do not focus solely on the here and now, but take a near- and long-term view regarding the application of CAD technology. Nor do they concentrate just on their specific department. As a CAD leader, you need to consider how you will use CAD tools today and in the future, as well as how those tools will impact both your departmental and companywide organizational objectives. These 10 strategies can help you exhibit the CAD leadership necessary to improve your department's performance as well as that of your extended enterprise.

Strategy 1: Embrace best practices and new technologies

Getting the most out of your CAD system requires keeping abreast of emerging developments and determining how new technologies will impact your engineering processes. The term "best practices" is a moving, shifting target, because what was considered a "best practice" 10 years ago has most likely become obsolete today—just as how you currently do things will in all likelihood undergo a dramatic transformation 10 years from now.

It's important to remain open to new approaches, rather than sticking with old, comfortable ways of doing things. Back in the infancy of CAD, there undoubtedly were managers who resisted the move to CAD tools and wanted to hold on to their drafting tables to the bitter end. More recently, something similar has taken place with the migration from 2D to 3D CAD systems.

To keep pace with the evolution of "best practices" in product development, effective CAD leaders must not only remain vigilant in evaluating new tools and emerging technologies, but also in continually assessing how they go about designing and engineering products.

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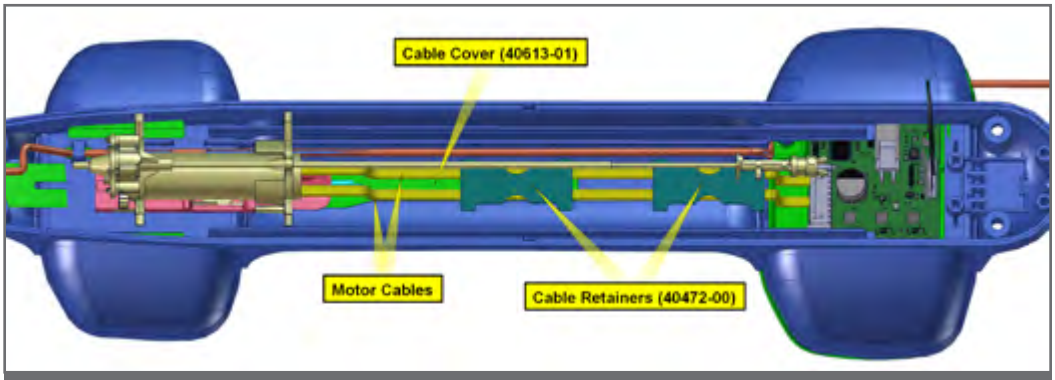
By formalizing your design workflows, you will be in a better position to identify areas where you can make improvements as well as determine the likely impact of new applications.

You can stay current regarding the state of the art in CAD software, as well as advances in hardware and infrastructure, by attending CAD conferences and industry events. Many of these events are now virtual, enabling you to obtain the information that you need online. Whether you are investigating a new breed of design software or evaluating the timing for upgrading computer hardware, prototyping machines, or other infrastructure equipment, it's prudent to make your assessments in terms of return on investment (ROI). Estimating how long it will take for a tool to pay dividends is the ultimate determination of what constitutes a "best practice."



Click here for an animation of one of Cardiovascular Systems' conceptual designs created in 3DVIA Composer.

3DVIA Composer™ enables you to automate the development of product documentation, assembly instructions, and design demonstrations from your CAD model.

Strategy 2: Develop skills and retain talents

Equally as important as choosing the right CAD tool to support your operations is putting it in the hands of skilled designers and engineers. No matter how automated technology becomes, product design will remain a creative, innovative process that depends upon the contributions of talented, highly skilled professionals. As a CAD leader, you are responsible for providing your team members with the tools that they need to perform their jobs successfully.

It's also your job to provide for continuing skills development and find ways to retain your most valuable engineering talent. These goals go hand in hand. If you help your team members acquire skills, through ongoing CAD training and professional development, and help them remain motivated in their work by feeding them a steady diet of engineering challenges, you will have done your part in keeping them interested and satisfied in their work.

But not just any training will do. You should tailor your training program toward the needs of both your organization and the individual. Try to match your company's needs with the interests and talents of specific team members. If your process requires advanced surface modeling and one of your designers has an obvious industrial design bent, providing that type of training addresses both needs. Look at your processes and assess your people. When it makes sense, customize training to meet the specific requirements of your group.

Some managers see the time and money allocated to CAD training as a budgetary item that they can cut. This view lacks foresight because the costs related to training are investments rather than expenses—investments in your organization's ability to efficiently solve engineering challenges and investments towards retaining your most talented engineers. An effective CAD leader understands the important role that training plays in a team's long-term success.

Strategy 3: Maximize integration and automation

Rooting out redundancy, duplication, and waste is the clarion call of effective CAD leadership. No single product development operation should be performed more than once, and no one should ever have to rebuild an existing model. Any time that design data has to be converted or translated creates opportunities for error. You can minimize the potential for costly errors and eliminate redundant processes by maximizing your use of integrated applications and leveraging automated approaches that fit your development process.

Exporting and importing design data typically occurs whenever you need to move a CAD model into another engineering application, such as an analysis/simulation package, a computer-aided manufacturing (CAM) machining system, or a product documentation publishing application. You may even have to manipulate a model's data format for use in some product data management (PDM) systems. Each of these data translations and/or conversions takes time and creates an opening for error.

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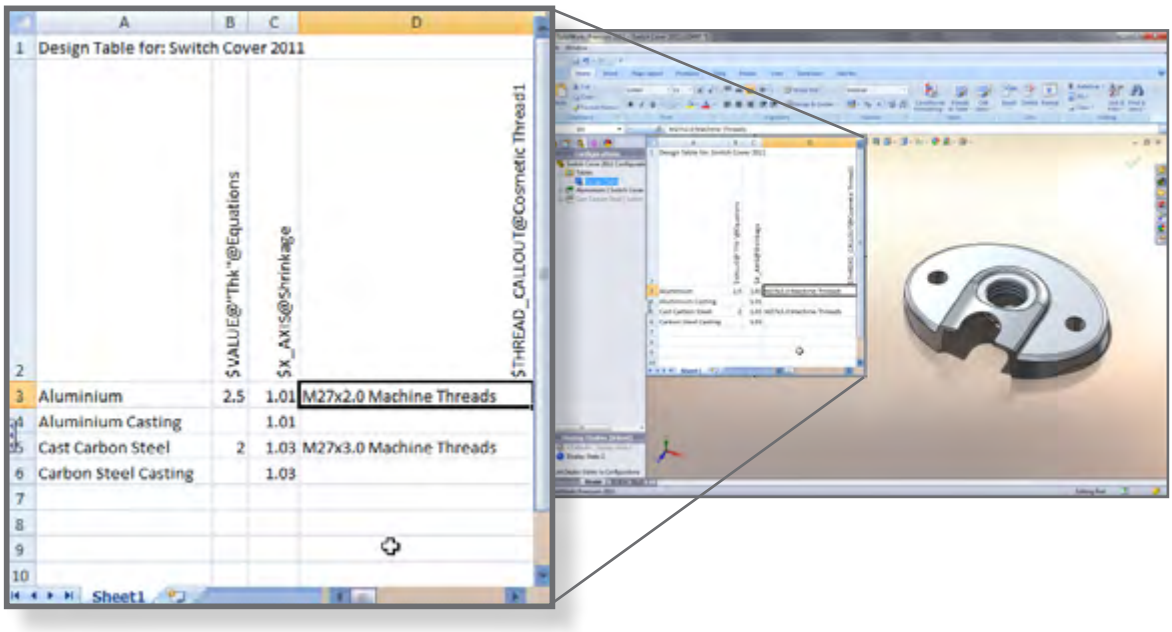
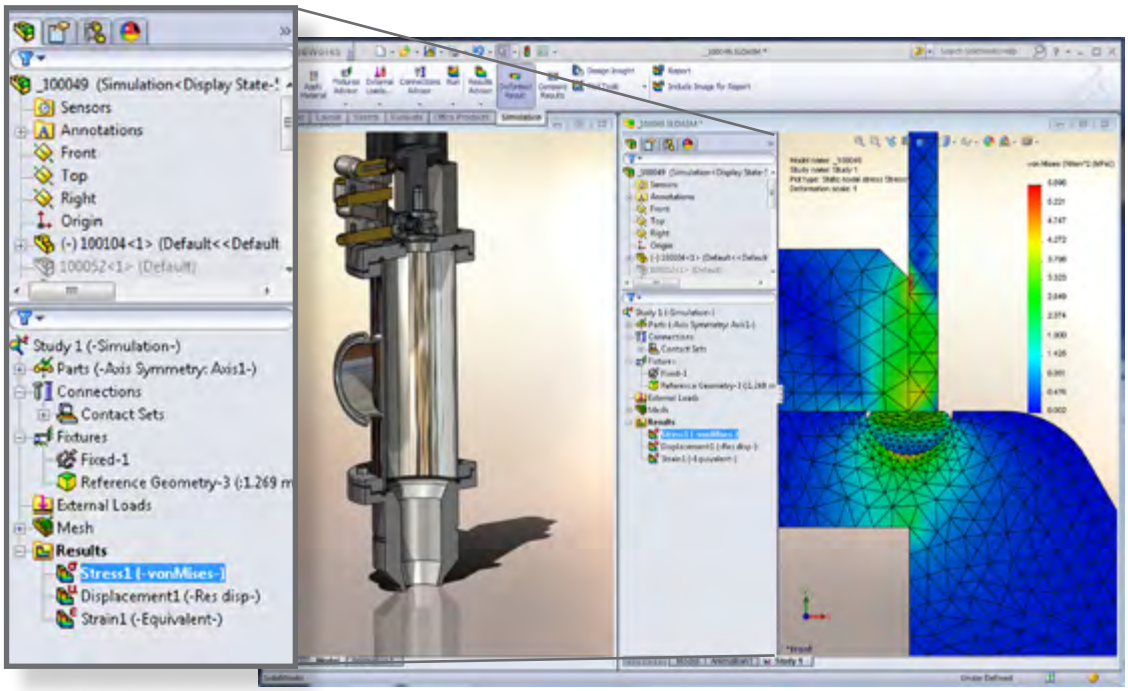
You can completely eliminate these issues by using an integrated suite of tools to address analysis/simulation, CAM, documentation, and PDM requirements. To achieve the greatest benefits, make sure that your integrated tools operate on the actual CAD model, rather than through an import/export paradigm. That way, you can rest assured that you have removed a major source of redundancy from your operations.

Design automation tools can also help you to minimize repetitive steps. For example, you can use design configurations, which build a complete set of models with varying attributes (e.g., size, weight, length), from a single base design, to create product families and maximize design reuse. CAD-integrated Knowledge-Based Engineering (KBE) systems can help you automatically create models of engineered-to-order designs. If you use a CAD system with an open Applications Programming Interface (API), you can even automate routine, repetitive CAD tasks.



With Configuration Tables, you can modify parameters to Scale features, Global variables, Cosmetic threads, and more.



Tools that are fully integrated within your CAD system, such as SolidWorks® Simulation software, can help you remove redundancies from your operations.

Strategy 4: Foster collaboration and innovation

A rising challenge for many design and engineering managers is how to supervise interaction among the growing number of players in today's product development environment. Because innovation has become an increasingly critical factor for manufacturing success in a global economy, more and more contributors, each bringing different areas of specialization, are now becoming involved in the process. While manufacturers once handled the bulk of product development—both design and manufacturing—in-house, many now work closely with strategic partners and vendors.

And even within a single product development group, the need for industrial designers to collaborate with mechanical engineers, and designers to work with analysts, and mechanical engineers to work with their electrical and manufacturing counterparts, can test a manager's ability to guide this interaction into a collaborative, yet productive, workflow. The effective CAD leader needs to consider CAD tools in the contexts of collaboration, communication, and control.

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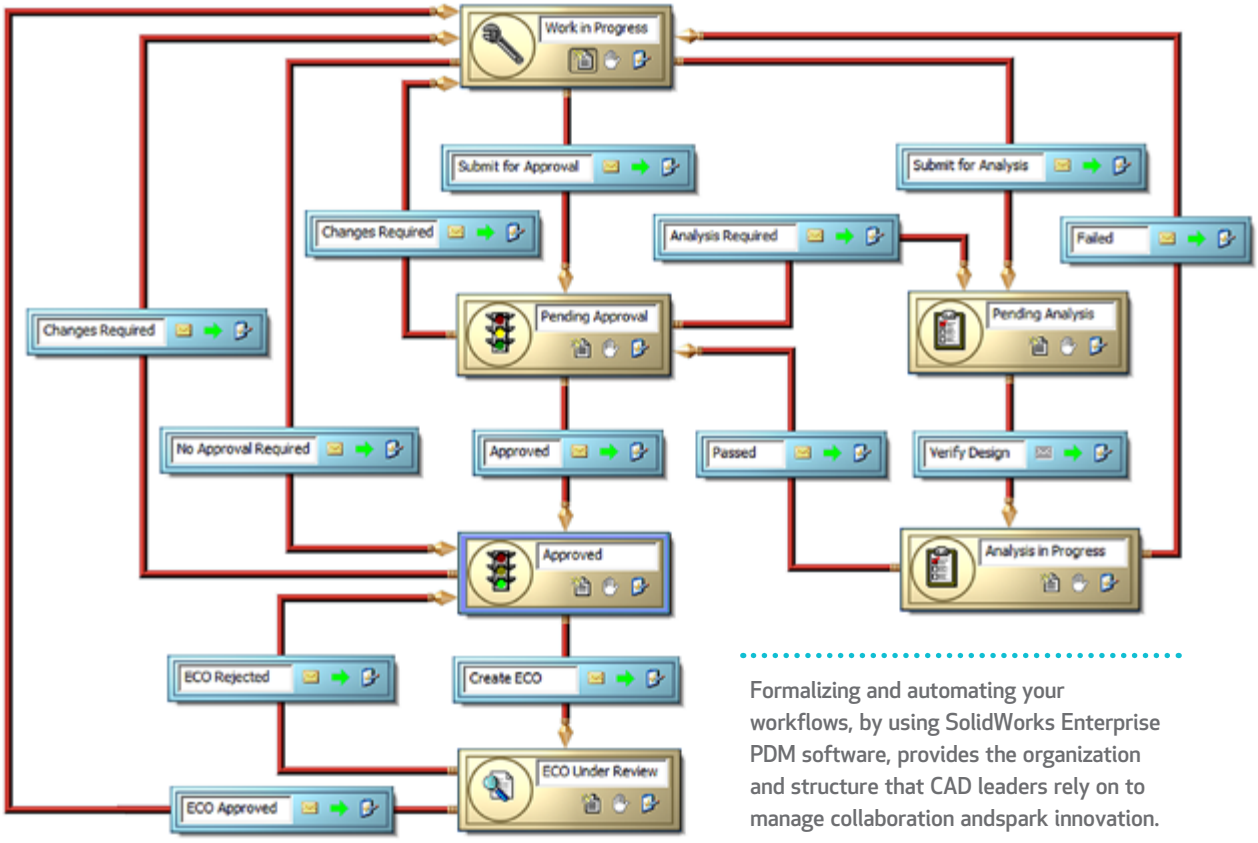
By using an integrated suite of CAD tools, which are fully compatible with each other, you can streamline the various interactions among designers, engineers, partners, suppliers, and vendors. An integrated system establishes a single design data language for all contributors.

Combined with an integrated PDM system that supports automated workflows, integrated tools enable you to control and manage a diverse, collaborative product development approach. By facilitating communication among players and establishing standard workflows, you can promote innovation in an efficient manner.

You should also consider the roles that design visualization and data access will play in a collaborative environment. How difficult is it for you to illustrate innovative concepts using 3D visuals and animations? Can you easily share design ideas by email? Can you administer and control access to sensitive design information? By carefully considering the demands of collaboration, you can bring structure to potential chaos, and produce the innovations your organization needs to succeed.



Formalizing and automating your workflows, by using SolidWorks Enterprise PDM software, provides the organization and structure that CAD leaders rely on to manage collaboration andspark innovation.

Strategy 5: Focus on continuous quality improvement

Continuous quality improvement is the mantra of many manufacturing organizations. It is also a primary focus of effective CAD leaders. Your CAD system can have a significant impact on the quality of the products that you design, the efficiency of your development processes, and the ramifications of your work on downstream operations. How well your CAD tools help you eliminate design errors, maximize productivity, and foster innovation will determine the size of your group's contribution to continuous quality improvement.

Everyone involved in product development wants to eliminate design errors, and with the right mix of CAD tools, you can pinpoint errors during design and avoid the delays and costs that occur when errors make their way into production. Are you using an integrated analysis/simulation application to identify potential performance issues? Are you ensuring sufficient clearances in your moving assemblies through the use of collision detection capabilities? Are you conducting draft analyses on injection-molded parts to ensure production of molds of consistent quality? Are you assessing the manufacturability of your machined parts? If not, there are integrated tools that can help you.

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A focus on continuous quality improvement also applies to your development processes. How do you complete tolerance stackups: manually or using an automated CAD tool? What about prototyping? Do you conduct physical tests or take advantage of virtual and rapid prototyping technologies? Do you have an integrated PDM system that gives you tight revision control and allows you to reuse designs that perform particularly well?

Sustainable design is an emerging area of focus for achieving continuous quality improvement. As consumer awareness of environmental impacts and preference for "greener" products continue to rise, assessing the sustainability of your products and processes becomes increasingly important. To get out in front of this trend, you can use CAD tools that evaluate the sustainability of your designs.

Strategy 6: Leverage design data throughout the enterprise

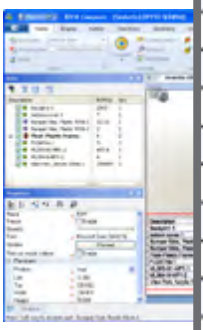
Today's CAD leaders recognize that product development is no longer the isolated, autonomous enclave of engineering that it was in the past. With the adoption and advancement of 3D CAD technology, product design data has become more accessible and usable for a variety of business operations outside of engineering. Functional areas that can benefit from 3D CAD models include manufacturing, quoting/purchasing, documentation, sales and marketing, and field service.

Manufacturing has long been a recipient of product design data, and 2D engineering drawings remain a staple of many production operations. Yet, with the availability of 3D CAD data and new CAD tools, you can do so much more than simply refer to sheaves of paper documents on the shop floor. In addition to using solid models to automatically generate tool paths, develop molds, and program CAM-based operations with a high degree of precision and control, engineers can now create 3D animated work instructions for use in assembly operations.

Effective CAD leaders recognize how valuable and information-rich 3D CAD models can be and understand how they can leverage this information in various ways to boost productivity outside of engineering.

The same approach applies to the creation of product documentation. Why spend time recreating technical illustrations for user's manuals, when that information already exists within a solid model? With today's modern 3D CAD tools, creating an exploded view, step-by-step user assembly instructions, or even a movie that shows how to put the product together is just a limited number of mouse clicks away. Purchasing can use CAD and automatically generated bill of materials (BOM) data to solicit quotes, place orders, and support just-in-time ordering for manufacturing. Sales and Marketing can use design data to create preproduction visuals for seeding the market.

Service personnel can access detailed maintenance and repair information—including complete movie animations of important procedures—online while they are in the field. Effective CAD leaders recognize how valuable and information-rich 3D CAD models can be and understand how they can leverage this information in various ways to boost productivity outside of engineering.



Description	BOM Id	Qty
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bottom cover-1	7	1
Bumper Side, Plastic REVb-1	12111	1
Bumper Side, Plastic REVb-1	2	1
Float-Plastic Frame-	4	2
FLOAT4s-1	3	1
ML303-B1-MP1-1	457-8	1
ML304-B-MP1-2	6	1
View Port, Acrylic 150m-1	209899	1

With integrated tools like 3DVIA Composer software, you can leverage CAD models to automate other business operations, such as the creation of product documentation and assembly instructions.

Strategy 7: Document and analyze productivity

CAD leadership requires more than intuition and observation. In order to make prudent, practical decisions about how to best deploy next-generation CAD tools to achieve your quality and efficiency goals, you need access to information about how CAD technology influences product development. The most accurate way to assess the collective and individual impacts of CAD tools is to establish baseline productivity statistics so you can document, evaluate, and analyze departmental performance.

How long is your average design cycle? What are your typical development costs? Do you track the number of design errors and engineering change orders (ECOs) per development cycle, or the volume of scrap produced on an annual basis? Are you monitoring the time and money that are spent on physical prototyping? In order to assess whether a particular design solution is having a positive effect on your bottom line—and generating a return on your CAD investment—you need to document and analyze your group's productivity.

In addition to providing valuable information on your department's overall performance, and the role CAD tools play in contributing to increased efficiency, documenting productivity can help you standardize on what works well, address areas that are problematic, and acknowledge success.

Modern 3D CAD tools can dramatically enhance your ability to demonstrate the aesthetics, performance, and fit and function of product designs in formats that are easy for anyone to comprehend.

As a design manager, your performance, and ultimately, your compensation, is tied to the success of every member of your team. Their success relates to the tools, training, and processes that you put in place. As a CAD leader, you need a scorecard for determining how well your team is doing, so you can assess whether your CAD tools are helping your team members move forward or holding them back. With this information, you can embrace processes that are more efficient, rectify areas of weakness, and use objective, factual information to recognize and reward achievement.

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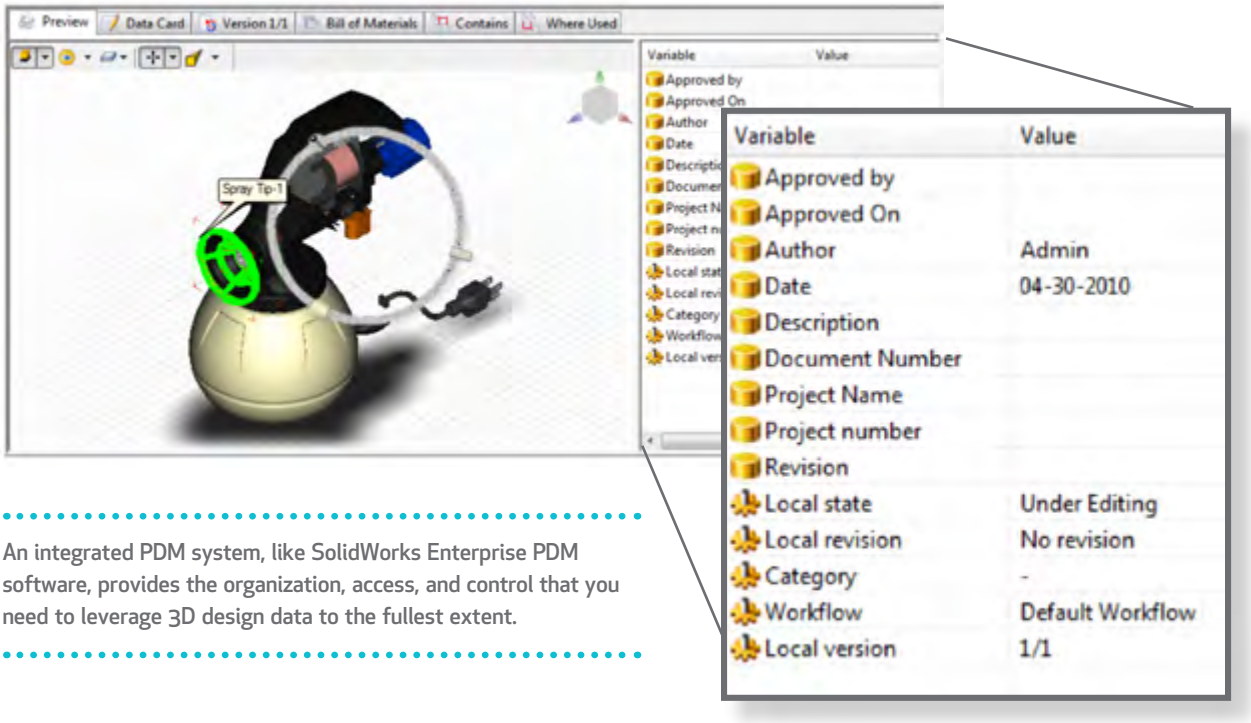
Strategy 8: Manage product design data efficiently

Using CAD tools to design innovative, error-free products will get you only part-way to your goal. An effective CAD leader realizes that creating solid models is only the beginning. How well you manage, leverage, and utilize product design data will determine the overall productivity of both your development process and manufacturing enterprise.

In the past, product data management (PDM) was more product document management. Engineering organizations managed documents—paper drawings—within large cabinets using elaborate sign-off systems for approving and releasing design revisions. In today's 3D realm, the sheer number of links, references, and associations between parts, assemblies, and configurations precludes a manual approach to data management. Fortunately, you have access to integrated PDM systems to manage data, control revisions, safeguard intellectual property, and unleash the power of 3D to the extended enterprise.

PDM allows you to formalize and automate workflows inside and outside of your department. Because modern PDM systems are easy to administer, you can control the level of access to design-related information that you grant to technical and nontechnical personnel. Within product engineering, you can set user rights for the players involved, including team members, partners, vendors, and suppliers, so that contributors can access and alter the only information related to their specific function. And they don't necessarily have to be on-site to access design data because some PDM systems support web browser access.

You can also administer, manage, and control access by colleagues outside of product development who can benefit from leveraging design data but cannot edit or change it. With PDM, you can provide nontechnical personnel such as managers, purchasing agents, marketing professionals, and service technicians with access to product design information—and control how they can use it. Moreover, they often don't need a CAD system for access.



An integrated PDM system, like SolidWorks Enterprise PDM software, provides the organization, access, and control that you need to leverage 3D design data to the fullest extent.

Strategy 9: Communicate effectively with business personnel

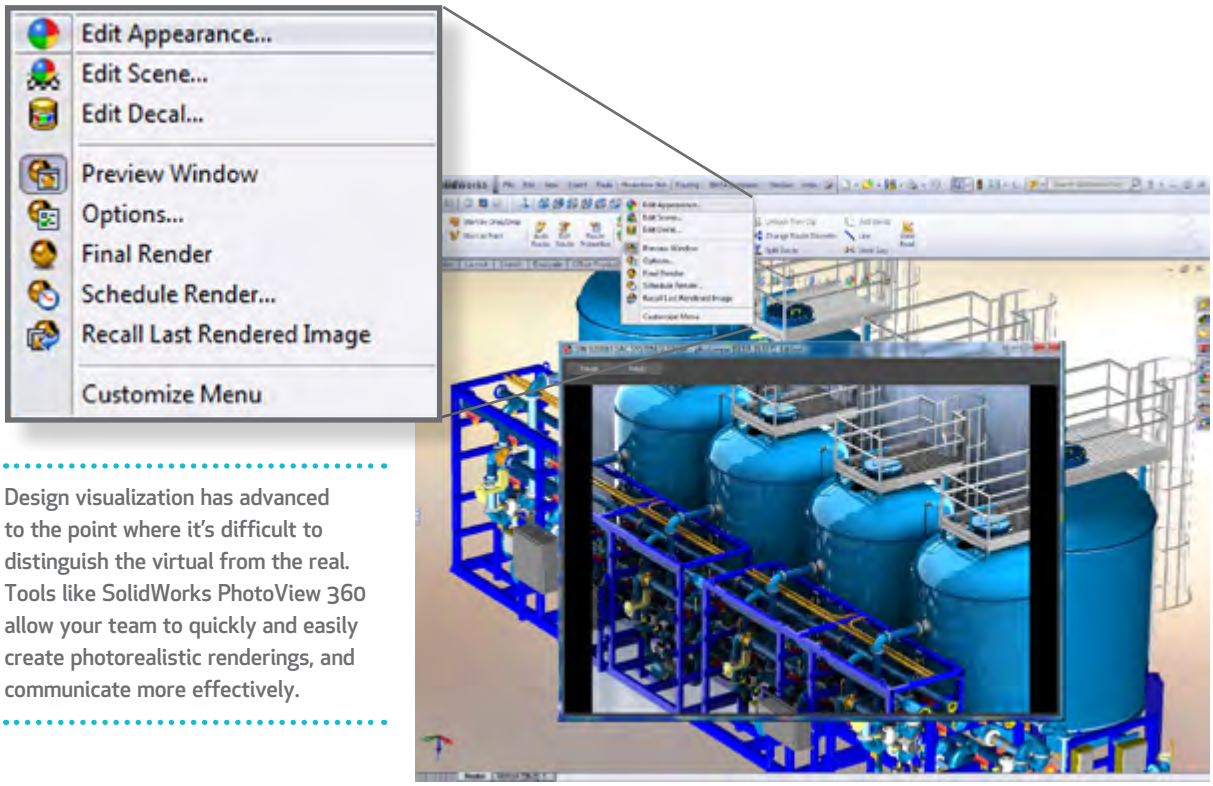
3D CAD technology represents a quantum leap in your ability to communicate design information with important audiences outside of product development. Extrapolating what an actual 3D physical product will look like from a 2D engineering drawing can be challenging for many engineers, not to mention how difficult this can be for those who don't work with drawings on a daily basis.

Effective CAD leaders appreciate how this obstacle can impede innovation and limit the potential for valuable input from key stakeholders outside of engineering, particularly when securing buy-in from management, customers, and partners regarding new product ideas or innovative concepts. They understand that a picture's worth a thousand words and that a 3D model—or better yet, a 3D animation—communicates more effectively than stacks of 2D drawings.

Estimating how long it will take for a tool to pay dividends is the ultimate determination of what constitutes a "best practice."

Modern 3D CAD tools can dramatically enhance your ability to demonstrate the aesthetics, performance, and fit and function of product designs in formats that are easy for anyone to comprehend. You can use these communication capabilities to create virtual animations and simulations that show how a design will perform within the confines of its operating environment. You can also illustrate the limitations of existing designs and how new approaches can extend and improve performance. You can even create photorealistic renderings of products that are difficult to distinguish from actual photographs, which your sales and marketing colleagues can use instead of incurring the costs of studio photography.

As a CAD leader, you should pay attention to the visual and communication formats that your design systems can produce. Creating standard file formats such as PDF, JPG, and AVI represents the minimum set of capabilities. You should also consider tools that allow you to compactly package a model—including transparency, cutaway, and model interrogation tools—for email distribution.



Design visualization has advanced to the point where it's difficult to distinguish the virtual from the real. Tools like SolidWorks PhotoView 360 allow your team to quickly and easily create photorealistic renderings, and communicate more effectively.

Strategy 10: Demonstrate product development contributions

Perhaps the most critical strategy for becoming an effective CAD leader is to find ways to demonstrate the value of the contributions that your product development team makes to your entire enterprise. By showing management how your team's performance contributes to your company's bottom line, you will be able to secure and maintain the support that you and your group needs to grow, improve, and innovate.

As stated previously, capturing, documenting, and communicating the productivity gains within your group—such as time savings (shorter time-to-market), cost reductions, and quality improvements (reduced returns/warranty claims)—is one way to communicate your design team's performance in business terms. In addition to tracking productivity internally, you can take advantage of vendor-sponsored case studies and other publicity opportunities to further promote your team's success.

Product development represents the very genesis of your company. Without innovative, reliable, and exciting products to manufacture, market, and sell, your company wouldn't even be in business.

You can also establish how your team's innovations impact sales and revenue. Take a look at your sales numbers. Is there a new product, product accessory, or product adaptation that is generating a sizable increase in sales? Much of that growth is attributable to the hard work, efficiency, and talent of your team. As an effective CAD leader, you should take advantage of every opportunity to promote the combined results of your leadership and the efforts of your design team in practical, business terms.

Product development represents the very genesis of your company. Without innovative, reliable, and exciting products to manufacture, market, and sell, your company wouldn't even be in business. You work hard to develop successful products—from initial R&D through commercialization and production. As a CAD leader, you should not be shy or reserved about letting others know about your accomplishments, particularly when you communicate them in pragmatic terms that they can understand.

Capturing, documenting, and communicating your group's productivity will help you demonstrate your achievements in business terms and secure the support that you need to grow, improve, and innovate.

Product development is increasingly woven into the fabric of the entire manufacturing enterprise, and your performance can significantly impact your company's success.

Effective CAD leadership critical for manufacturing success

In today's competitive global economy, CAD leadership has become a critically important factor to the success of manufacturers, both large and small. It all starts with product development, where technology, automation, and collaboration have joined creativity, talent, and engineering know-how to create an increasingly dynamic, fast-paced design environment.

Product development is no longer a silo of productivity and is increasingly woven into the fabric of the entire manufacturing enterprise. More and more contributors are now involved in the development process—and more and more functional areas can leverage CAD data—in the relentless pursuit of efficiency and innovation.

As a design and engineering manager, you are the conductor, the orchestrator, who is tasked with bringing all of these disparate elements together into a single, cohesive whole. In that role, you need to make decisions regarding how you leverage CAD tools that take the present and the future—as well as departmental and company needs—into account. By executing these 10 strategies, you can exhibit the CAD leadership that you, your team, and your company need to succeed.

To learn how SolidWorks solutions can help you successfully employ these strategies for effective CAD leadership, visit **www.solidworks.com**, or call 1 800 693 9000 or +1 978 371 5011.

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