



The Top CAD Technology Trends of 2018

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Which new and evolving technologies are having the biggest impact on CAD managers and users? Should you be keeping an eye on generative design, augmented reality, mobile CAD, or something else? Representatives of seven CAD software developers provide their picks for which to watch, and why.

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Which developments are having the biggest impact now — and will shape the CAD environment in the coming months?

The digital design world is never static. New software and hardware capabilities, workflows, and technological developments are continually entering the scene, in AEC firms and product development companies alike. Distinguishing between the truly impactful developments and the merely novel ones can help you make wiser decisions about investing your resources and preparing for changes. In the words of Brian Thompson, general manager, CAD Segment, PTC: “Pay close attention to CAD trends. Your competitors are, and with good reason: The past several years have seen lightning-fast changes in everything from product design to production methods.”

Here, we’ve collected insights and predictions from seven CAD software companies about how CAD and related technologies are changing. Our goal is to help you make better decisions in order to remain competitive in a challenging, complex environment.

Reality Capture and Augmented Reality Provide New Perspectives

PTC’s Thompson, like many others in the industry, believes that augmented reality (AR) will become “indispensable” to product developers: “Before CAD, people had to analyze 2D production drawings to guess what a product would look like in 3D. With traditional CAD, we can see what our 3D models look like, and can even put them in a simulated environment on our computer screens. Now with AR, we can superimpose computer-generated imagery and data onto the real world.

“In terms of strategy, AR means team members can share designs and feedback quickly and easily. You see proposed design changes in the real world without ever building a physical prototype. And you cut costs as trainees and technicians access AR experiences, instead of heavy, outdated, and infuriating manuals. Moreover, with advanced AR tools, there’s no reason to send data files. You control who accesses your design, and share it with the confidence that your intellectual property (IP) is protected,” Thompson concluded.

Steve Johnson, vice-president of product development at Vectorworks, is also keeping an eye on AR. “The effects of AR can already

From the editors of

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be seen across an expanding value chain that has a reach beyond that of traditional CAD,” he said. “We know about the growing affordability of headset technologies of virtual reality (VR), where CAD models, locked for so many years behind 2D windows of your computer screen, are opened and entered for amazing new immersive experiences. AR has potential for an even greater impact.

“AR harnesses a broad array of maturing technology including software, motion and location sensors, computer vision, and artificial intelligence. All of this technology is converging quickly and being deployed to mobile devices. We will soon see expansion to hands-free wearables such as head-mounted displays and smart glasses. With AR, CAD can be placed directly into your current reality. Even today, AR applications on your phone can sense the geometry of your surroundings while tracking your motion through it.”

Santanu Das, senior vice-president, Design Modeling Products, Bentley Systems, predicts that reality modeling — which is already “affordable, secure, and available” — will grow in importance. “The ability to capture site data quickly and easily to create engineering-ready 3D models for use in planning through construction and into operations is invaluable, and I believe it will soon be compulsory for project teams, at least on infrastructure projects. Tasks that used to take considerable time and effort to develop can be done with drones, LiDAR and photogrammetry sensors, the cloud, and apps like ContextCapture in a matter of hours.

“Some countries already require a reality model in advance of every infrastructure project. I believe we’ll start to see a similar requirement for reality modeling in requests for proposals (RFPs) and specifications very soon in the United States as well.

“In the medium to longer term, development will also be influenced by virtual and mixed reality, which will not only use CAD as a foundation for an immersive customer experience but also give CAD engineers new opportunities to truly experience their designs at every stage, from ideation to final product,” said Das.

*VR and AR
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Platform Evolutions: Cloud and Mobile CAD Make It Big

Mobile CAD is becoming a bigger player, both in tandem with desktop CAD and, in some cases, on its own. Klaus Vossen, Corel’s senior product manager, Technical Graphics, believes that devices themselves will influence how mobile CAD changes going forward: “Currently, phones and tablets tend to be best suited for tasks like 2D editing, 2D drawing, annotation, and review. However, as mobile hardware evolves, we expect CAD software developers will have new opportunities to create apps with deeper 3D support, making mobile devices increasingly important in CAD workflows.”

Dan Monaghan, vice-president of marketing at Vectorworks, sees more cloud services based on open standards in our future. “From simple storage and file management services like Box, Dropbox,

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— **Jon Hirschtick**
CEO, Onshape

and Google Drive, to more sophisticated SAS-based cloud management tools, we'll see CAD managers taking on more cloud project management and collaboration responsibilities in 2018."

Jon Hirschtick, CEO of Onshape, believes that 2018 will be the "tipping point" for cloud-based CAD. "Different vendors have different interpretations of cloud CAD, but they all realize that most engineers will be moving the bulk of their work online over the next 5–10 years." According to Hirschtick, as cloud CAD spreads its wings, we'll see powerful new developments in both parametric modeling and data management, without the "pains and limitations" of product data management (PDM) systems and copying files. "We'll all be traveling on a new frontier of product design tools — you might think of it as 'Parametric Modeling 2.0' and 'Data Management 2.0.'"

And what does Hirschtick mean by Parametric Modeling 2.0? "It will be about reinventing aspects of parametric modeling that have been ugly or unreliable in the past: aspects like in-context design, custom features, multi-part modeling, configurations, and standard content. These are all going to become robust and reliable tools that users will regularly depend on to design faster than ever."

Cédric Desbordes, sales and marketing executive for Graebert, pointed out that the burgeoning use of mobile CAD is changing not just work platforms, but workflows, improving interactions between users in the field and their offices. "Unlike some years ago, CAD users are now likely to work on a variety of devices. They may first of all work on more than one computer. They may also use their smartphone or tablet to annotate or modify drawings on the go. They need such a flexibility to use their license on any device. Mobility is therefore an increasing trend, and it involves more than working from different devices and operating systems. It is also strongly impacting the workflows."

"We see mobile CAD reaching maturity in some markets such as Japan, where iPads are massively deployed. Mobile devices are, however, not replacing computers ... [they] are replacing paper, in a more effective way, for on-site activities such as viewing, annotation, surveying, and quick updates. Productivity is increased by better sharing of knowledge and shortening production cycles."

"The ability to synchronize files across devices and users becomes therefore fundamental. This is an area where we see that the cloud is bringing a lot of value. The interest for cloud-based CAD solutions is therefore emerging. We are living a transition period with an ecosystem of different devices, platforms, and technologies that will need to work in synergy for some years," Desbordes concluded.

The Internet of Things Demands Design for Connectivity

Another cloud-dependent technology trend that will affect CAD users in 2018 — and beyond — is the Internet of Things (IoT).

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General Manager
CAD Segment, PTC

Thompson of PTC believes that the rise of smart, connected products is reshaping how designers work. “The physical and digital worlds are converging, and, as a result, the concept of the product is quickly evolving. First the product carries out its purpose in the physical world, and now, it’s also becoming a vehicle for collecting selected data streams that have value to all users, inside and outside of the company.

“Sounds good, but for CAD users, that means the golden-hued era of opening up a CAD program and designing in isolation is over. With the Internet of Things (IoT), design engineers find themselves increasingly working with more and better data, as well as accommodating a larger pool of colleagues.

“For example, engineering may want data coming in from a product or a prototype in order to create a more robust or efficient design. But the service department may want to make sure the product collects a different set of data to better support products in the field. Marketing may even want its own unique collection of information.


“In short, we see traditional product design evolving to become a new discipline: design for connectivity. And it’s a team sport. More stakeholders than ever must be present from the first moments of product design, and together they must decide the IoT strategy for the whole product.”

CAD Evolutions: The Rise of 3D and More DWG Options

Corel’s Vossen predicted that more designers will be working in 3D. “Looking ahead, the rise of 3D design will continue to be a major trend in both desktop and mobile app development. Among smaller businesses, we still see a substantial portion of today’s engineering work done in 2D; however, demand for advanced 3D design is growing. We expect more small business users in the AEC space will be taking on 3D design projects, whether they’re transforming 2D drawings to 3D models or creating 3D designs from scratch.”

Desbordes of Graebert shared observations about the DWG-editing segment of the CAD market. “The major trends we see in this user base can all be summarized as a strong demand for agility. Indeed, we see DWG editing entering in a new era. The ability to read, create, modify, and/or annotate technical drawings is becoming a utility, just like word processing or spreadsheet programs.

“On the budget side, companies like to deploy such solutions to a larger audience to better share the technical knowledge, but in a cost-effective way. Ten years ago, the companies looking for alternatives to AutoCAD were mostly small- or medium-size firms. This is not true anymore, as even very large accounts are now looking for cost savings to reallocate their IT budgets to building information modeling (BIM), 3D engineering, or artificial intelligence (AI).



*Training is
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This trend is also strongly encouraged by the transition of our competitors to a subscription-only business model.”

Whatever design paths your company decides to follow, some form of training will be essential for successful implementation of new applications and workflows. Monaghan of Vectorworks expects to see an increase in remote training options. “No longer is it enough to create great technology; CAD companies have a responsibility to help firms leverage that technology and turn it into real productivity. We’ll see CAD companies helping CAD managers to gain the knowledge they need to keep their firms from falling behind the technology curve. We’ll need more and more learning, with an increased shift to free, online formats that are easily accessible from anywhere.”

Simulation and Generative Design Improvements Benefit Designers

It’s certainly not a new technology to CAD users, but Hirschtick of Onshape feels that new breakthroughs will kick off a “renaissance” in simulation that will benefit design teams. “First, there is SIM-SOLID’s meshless simulation, which completely eliminates the need for meshing, the most painful and time-consuming step in using analysis tools. Meshing is extremely hard and specialized work, and very error prone — it’s not unusual for meshing to eat up days or even weeks. But now, you can get simulation results right away, freeing you to focus on other critical tasks.

“The second breakthrough is the ANSYS Discovery Live tool, which incredibly produces simulation results in real time. You can edit geometry and see stress or fluid flow results update literally as fast as you can rotate the model ... it definitely has the potential to significantly speed up your design work.

“Third, continued improvements in generative design tools will result in new heights for simulation-driven optimization. As more of these functions are automated in tools like Frustum’s Generate, you’ll be able to take advantage of generative design for parts that can benefit from it. And it’s not just for 3D printed parts; generative design can now be used for machined and cast parts, too,” Hirschtick commented.

Daniel Graham, director of Fusion 360 Product Management for Autodesk, said, “We’re also excited to see companies start to discover the power of generative design and its potential to transform how we make things. We’re working to make Autodesk Generative Design more available so our customers can start to explore a whole new world of AI-powered solutions that it opens up to them.”

Manufacturing and CAD Achieve Tighter Integration

“I think this will be the year that design and manufacturing come together in a very real way,” said Autodesk’s Graham. “Standalone desktop CAD doesn’t cut it anymore, especially for the average



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midsize company that has distributed teams and a decentralized supply chain. Waterfall product development is being replaced by agile design, which means that data management is critical. Teams are moving to cloud-based platforms that keep everyone on the same page, regardless of how many changes are made in the process. Whether you're sketching new concepts, completing validation studies, generating an updated CAM toolpath, or tracking a product on the shop floor, everything will be part of a single, connected ecosystem."

According to Thompson of PTC, additive manufacturing will get a CAD boost this year. "More and more, design engineers recognize that the CAD model itself can impact the success of their 3D-printed products. For example, does the design include walls so thin they might break on the print platform?"

Expect to see CAD systems do more to optimize designs for additive manufacturing

"In 2018," Thompson continued, "design engineers will demand their CAD systems optimize design for additive manufacturing, much the same way those tools already optimize mold design or tool paths for subtractive manufacturing. This will help make additive manufacturing more popular as more and more print jobs succeed. You can complete your model, and hours later hold your design in your hands. If you're a major automotive manufacturer, it's even more fun to cut the time to create a prototype of an engine part by 75%."

Onshape's Hirschtick expects a huge increase in online sourcing and manufacturing. "Manufacturing high-end and complex custom parts — either one-offs or in low-volume batches — has become as easy as ordering a pizza. Using an online platform such as ZYCI.com, engineers can upload their CAD models and get instant price quotes and lead times based on the geometry and materials," he observed. "The reason why an aerospace company [for example] would outsource for parts like this is simple. They are constantly improving designs and materials, and these online specialists are perfect for cost-efficient rapid prototyping. The more iterations they do, the more they innovate. Vendors are able to offer more competitive pricing online because these smaller jobs are filling up their facilities' downtime."

Ultimately, the pressure to "get to market faster, create quicker iterations, and offer product customization or differentiation will only get tougher," Hirschtick noted. "When the competition is using modern tools, technologies, and processes, you won't be able to get away with running in place."

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