

AUTODESK® AUTOCAD®

# GAINING A COMPETITIVE ADVANTAGE

ADDING 3D MODELING TO YOUR 2D DRAFTING AUTOCAD WORKFLOW



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# INTRODUCTION

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The demand for 3D is rapidly growing, as it offers shorter design cycles for faster deliverables and more detailed visualizations than 2D CAD.

And those advantages have real business value. By 2023, 3D design-based CAD is expected to generate \$8,387.57 million in revenue, 196% more than 2D design.\* So, it's no surprise that across the architecture, engineering, and construction (AEC) industries and design firms alike, 3D modeling is increasingly winning favor over standard 2D CAD. 3D modeling not only improves the efficiency, accuracy, and productivity of a design process, but also provides a more detailed visual representation for end users. And it's because of this dual benefit to a business and its customers that having 3D CAD software is now a major competitive advantage. Just ask Commonwealth Engineers, an environmental engineering firm in Indiana that lost a \$100M+ lead engineering and construction design deal because they didn't have 3D capabilities.

While larger enterprises often have the resources to support the transition from 2D to 3D, most small-sized business struggle to successfully adopt 3D CAD software. In this guide, we'll share the story of how Commonwealth Engineers made the move from 2D to 3D and a step-by-step approach for how you can, too.

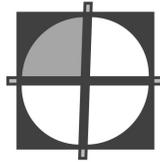


\*BIS Research: Global Computer-Aided Design (CAD) Market Analysis and Forecast (2017-2023)

# ABOUT COMMONWEALTH ENGINEERS

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As a small firm with four offices throughout Indiana, Commonwealth Engineers focuses primarily on local water and wastewater projects within the state.



**COMMONWEALTH™**  
**ENGINEERS, INC.**

For years, they used AutoCAD 2D drawings—that is, until they lost a more than \$100 million lead engineering and construction design deal to a national firm. When they asked why they'd lost the bid, the client said it was because the national firm had 3D capabilities and Commonwealth Engineers did not.

That was it—it was time to move to 3D to become even more competitive.

# CHOOSING 3D CAD SOFTWARE

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To decide which 3D software is the best choice for your business, you'll want to compare your options based on the end user experience, technical requirements, and cost.

## **SOME QUESTIONS TO HELP ADDRESS WHICH SOFTWARE IS RIGHT FOR YOUR BUSINESS INCLUDE:**

1. Does your current CAD software have 3D modeling capabilities?
2. Do you have the opportunity to upgrade or subscribe to a version of software that includes 3D capabilities?
3. Are there industry collections that bundle tools together?
4. Does the software support TrustedDWG compliance and file interoperability?
5. What is the total cost of ownership (TCO)? Remember to include factors like number of licenses needed, storage upgrades, powerful workstations and possible IT resources.
6. What training is available?
7. Is there an accessible user community?



*When Commonwealth Engineers first started evaluating the options, they realized that they wouldn't be able to implement and create custom content.*

**“The AutoCAD Plant 3D toolset really worked for us because it had the most catalogs of content created with the equipment and the piping already built into the software, saving us time and effort in creating our own,” explains Commonwealth Engineers designer and CAD Manager Josh Wheatley.**

## BENEFITS OF SUBSCRIBING TO AUTODESK INCLUDE:

- **Technical support:** Every subscriber has access to:
  - **AUTODESK SUPPORT SPECIALISTS**—You can schedule a call, chat online (limited availability), or email us.
  - **REMOTE DESKTOP ASSISTANCE**—Get secure hands-on troubleshooting.
  - **ONLINE RESOURCES**—Access our knowledge base with help documentation, tutorials, training videos, and community support forums.
- **Access to the latest software:** Get instant access to the latest releases and enhancements.
- **Use software anywhere:** Use your software at home or when traveling.
- **Access previous versions:** Download and use previous releases (available for most Autodesk products).
- **Flexible term lengths:** Get exactly the software you need for as long as you need it. Subscribe monthly, annually, or for 3 years.
- **Administrative tools:** Simply and effectively manage software licenses, seats, and usage from your Autodesk Account.



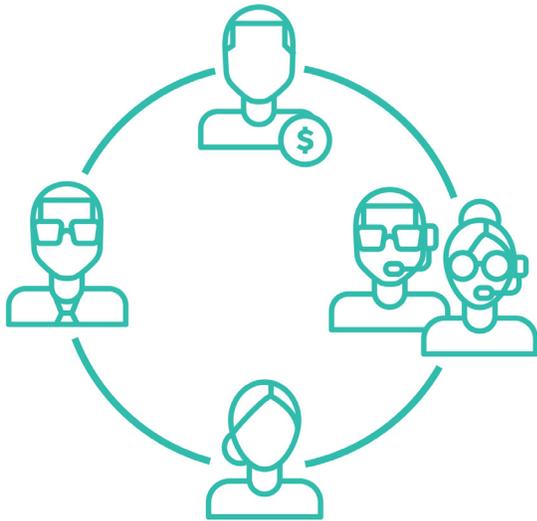
### DID YOU KNOW?

When you subscribe to AutoCAD, you now get access to specialized toolsets as well as the AutoCAD web and mobile apps.

# MANAGING EXPECTATIONS

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Much of the marketing claims used by software vendors cause many to assume that the transition to a 3D design process will be quick and simple. The truth is, it takes time, planning, and some getting used to. From the outset of making the transition from 2D to 3D, it's important to set expectations so that everyone can be more understanding of any challenges or setback that may occur.



**USERS** expect that their current workflow will likely change

**PROJECT MANAGERS** expect to accommodate timelines for difficulties and delays

**CAD MANAGERS AND IT STAFF** expect that 3D software may require new hardware and software configuration and expansion of network resources

**C-LEVEL EXECUTIVES AND SENIOR MANAGERS** expect that all of the above is a normal for the transition from 2D to 3D

# TRY BEFORE YOU BUY

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Any 3D CAD software that you consider should offer a free trial. But don't just test the software itself—test everything related to running the software. By using the same network systems, directories, and standards you'll use in production mode, you'll not only debug the software, but also emulate its actual working environment. Here's a step-by-step list of how to ensure a thorough, controlled, successful test process.

## **STEP 1: SET UP A TRIAL INFRASTRUCTURE**

To build the trial infrastructure, follow these steps so you can get the software up to production standards quickly.

- Acquire software trial versions or licenses
- Create required network folders and set up correct permissions
- Organize standards-related files, such as templates, families, content libraries, etc.
- Outline filing/project directories
- Compile training materials to support yourself and your users

## **STEP 2: IDENTIFY YOUR TEST PILOTS**

With some basic training, a small group of test users, or test pilots, can explore how the software works for their company and determine if it suits their needs. Software test pilots are a special breed of user who realize they'll be trying out new tools that will present challenges—possibly even crashes—yet are still excited to be a part of the process to prepare the software for production. Test pilots should have the product and software expertise to evaluate the software properly and can be pulled away from day-to-day work. With a CAD manager or IT staff involved during the trial period, you can ensure that what's learned during the test project will be transferred to the rest of the team once the deployment takes place.

### **STEP 3: CREATE AN ISOLATED PRODUCTION ENVIRONMENT**

Your test pilots should receive any software and customized setup on their machines configured in a way that they can always revert to standard CAD tools if project demands dictate it. Think of this as the ejector seat that allows them to escape the new CAD tool if a project crash is imminent. You'll want to test the software on a project that's neither too easy, nor too hard, but representative of a medium-complexity job for your company. The goal is to prove new software on a working project but to keep the risk profile low in the event of data corruption, version conflicts, or other unforeseen difficulties. Lastly, set up the test project to deliver new software exactly as it would work in a production environment so you can debug the installation files and network concurrently with software debugging.

### **STEP 4: INTERVIEW YOUR TEST PILOTS**

Check in with your test pilots as they evaluate the trial software and be ready to learn from their experiences. Always ask the following:



- What problems did you have?
- Which symptoms did you notice as errors occurred?
- What was confusing and what worked well?
- What would make the software easier to use?
- How would you explain your experiences to other users?

This process is the fastest way to generate accurate user feedback that will not only help you debug the software, but also create training materials for eventual production users. Take detailed notes of your debriefing sessions to document what you learned for reference later.

## STEP 5: IMPROVE, ITERATE, AND REPEAT

Now that your test pilots have shared their feedback, it is time for you to adjust your software accordingly, document those changes for training purposes later, tweak the test project as needed – and repeat the process. Each iteration of the process should run more smoothly than the last as you continually improve your trial deployment to arrive at a point where your test pilots agree the software is ready to go. You might be tempted to rush the deployment process by bypassing additional testing. However, remember that every iteration will make the software that much easier for users to learn and use. More test pilot missions will pay off later in reduced training time.



“When ownership starts receiving the costs for new software, additional hardware requirements, estimated time required, and the rest, you must be ready to justify them,” Wheatley explains. “We had meetings in which I explained step-by-step how and why we were going to implement this process.”

# ADAPT TO THE ADOPTION

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Most companies don't have the luxury of temporarily shutting down their business while they transition to using new software. To maintain business as usual in tandem with onboarding, build ramp-up time into the day-to-day schedule. This includes the time necessary for initial training and applying it to real projects, as well as the time it'll take for your users to become as productive using 3D software as they were using 2D.

Here are a few tips for a more seamless deployment:

- Install the software as-is now and customize later
- Create a how-to video to save time working with IT or CAD Managers to install
- Consider how the transition will impact third-party software, which may require subsequent upgrades
- Manage files in a single location to make sure you are managing the files only once
- Have some hooks built in to facilitate different user preferences
- House your entire CAD support folder on the network to avoid multiple plot libraries on different users' workstations



“If you're sensing some resistance to change, reframe it with a focus on skills growth. Some of my colleagues have 15+ years of experience doing 2D AutoCAD drafting,” Wheatley says.

“Now they've expanded their roles and knowledge, which is great for their careers.”

# TRAIN FOR SUCCESS

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How can you structure a training program that sets up your team for success?

Here are best practices to follow:

- **Start at the beginning:** To prevent knowledge gaps, your training should start from the very beginning of a project and continue through to the end, so nothing is missed.
- **Use what you do in exercises:** To make the lessons relevant to your business, have real-world examples based on your company's inventory.
- **Teach the features you need and skip the rest:** To ensure the training is valuable, don't bother teaching features that aren't relevant to the design models that you'll be producing.
- **Incorporate standards:** To establish habits of efficiency from the start, demonstrate the file naming conventions, folder structure, where files need to be saved, and if standard content is pulled from a specific library as part of the training.
- **Keep sessions brief:** To avoid fatigue and overload it's best to teach in several shorter sessions, rather than a single longer session.
- **Provide refreshers:** To reinforce lessons without running another instructional session, make training available in a shareable format, such as video recordings.



“We used our reseller to brainstorm different options based on our current situation,” Wheatley explains. “They also came in and demonstrated different programs that could potentially fit. I also relied on our structural subcontractor for assistance and help. They use Revit and provided me with someone that I could turn to for help.”

# PILOT A PROJECT

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After completing training, run a pilot project to put newly learned skills into practice. If your company uses subcontractors, be sure to account for how your 3D designing processes will impact the workflow, merging and coordinating models with everyone else involved in a project.



“I took a recent 2D design that was just starting construction and turned it into a 3D design,” Wheatley says. “This allowed me to lay out the full design on something that wasn’t under deadline. This pilot project paid for the training and software by finding construction issues prior to change orders from the contractor.”

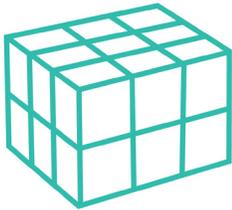
# GET TO WORK

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By this point, you should be ready to implement 3D modeling into your CAD design workflows. Autodesk provides tutorials to get you started.



[A Quick Start into AutoCAD 3D Solid Modeling](#) teaches you the basics of 3D solid modeling using ten commands and how to apply practical modeling techniques with step-by-step instructions, real-life models, tips, and demos.



With [3D Modeling in AutoCAD](#) you can learn how to take your ideas from concept to completion by creating and editing solid objects; creating smooth, free-form shapes using meshing tools; and leveraging the power of surface modeling.

# CONTINUING EDUCATION

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Here are recommendations to stay fresh and pave a successful path for the next project:

- Attend [Autodesk University](#) and watch the sessions available online to learn new ideas and ways of doing things.
- Take advantage of the [Autodesk Knowledge Network](#), which includes:
  - Download and Installation guides with step-by-step instructions for different installation types, instructions for how to prepare your system, and methods for downloading various products and services.
  - Design files, tools, templates, object enablers and other enhancements, to work with files across products, bug fixes, and production documentation—all available to download.
  - Getting Started guides to help learn the fundamentals of AutoCAD, including how to begin [3D modeling](#)
- Visit the [AutoCAD blog](#) to learn more about how to get the most out of your CAD experience from industry experts and customers.
- Use the [Autodesk Forums](#), to share your knowledge, ask questions, and explore popular topics.

# CONCLUSION

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Five years into its adoption of 3D modeling, Commonwealth uses AutoCAD, the Plant 3D toolset, Revit, Civil 3D, and Navisworks, depending on what the project requires.



“Today, Commonwealth Engineers is exploring and implementing even more capabilities to our design workflow,” Wheatley says. “By having 3D modeling designs, we can collaborate with other firms using BIM 360. We have explored 3D printing options. Most recently, we have implemented VR that allows our current and potential customers to immerse themselves into our facility designs during the design process. Using VR, allows the customer to see what the space will really look like, as well as side-by-side collaboration throughout the entire process.

None of this would be possible if Commonwealth Engineers did not adopt 3D modeling.”



## DID YOU KNOW?

You can get access to AutoCAD, the AutoCAD web and mobile apps, Revit, Civil 3D and more when you subscribe to the AEC Collection. Learn about the integrated BIM tools for building design, civil infrastructure, and construction [here](#).

