

A Buyer's Guide for the Move to 3D CAD

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Making the move to 3D CAD.

You're thinking about it, right? Most likely you are, given that you're reading this particular eBook. But actually there's a little more to it than that. You've thought about making the transition before, and you're not alone. According to the **2D and 3D CAD Trends in Product Design** study, 73% of the respondents using 2D CAD considered moving to 3D, but ultimately backed away. And it's easy to see the reason why: in the past, the transition was potentially frustrating to users and disruptive to product development.

But believe it or not, times have changed. The past few years have brought substantial and significant changes in terms of CAD technology. Changes that directly affect how quickly and easily organizations can start using 3D CAD. So much so that an entire segment of manufacturers are reconsidering making the change. Now they have a different question to answer...

Which CAD software should you select?

Choosing the right software provider can actually be more difficult than deciding to move to 3D in the first place. Why? To start, the products in this mature industry have wide-ranging capabilities. It's easy to get overloaded. Furthermore, this industry is undergoing rapid change. And it can be very difficult to keep up with the latest advances in technology, and how software providers are leveraging them.

Ultimately, that's why this eBook is important. In it, you will find several categories of capabilities representing the most important advancements in the industry, which you should consider as part of your selection criteria. These categories and lists will help you cut through the noise to determine what is most important for you and your organization. Because once you determine that you want to move to 3D, selecting CAD software shouldn't be the thing to stop you from moving forward.

PTC[®]

This eBook makes several references throughout to a survey-based study titled *2D and 3D CAD Trends in Product Design*. The study,

conducted by PTC, includes responses from over 7,000 individuals in product development organizations and was completed in September 2011. The full set of results is accessible at <http://www.ptc.com/go/2d-3d>.



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Supporting the Users' Transition to 3D

Some organizations *replace* 2D with 3D, but 4 in 10 organizations *add* 3D alongside 2D, according to the *2D and 3D CAD Trends in Product Design* study. Adding 3D as a complement to 2D helps ease user frustration and mitigates disruptions to product development. So if making the transition easy is a high priority, it will be important to include these capabilities as part of your selection criteria.

- √ **Integrated 2D Functionality:** When you transition to 3D, you could always keep your 2D CAD software around. That way you can avoid forcing your team to use 3D all the time, preventing frustration and disruption. But you could still be missing an opportunity to make adoption easier. By selecting 3D CAD that includes integrated 2D, you can allow users to utilize both ways of modeling as needed.
- √ **Easier 3D with Direct Modeling:** In the past, moving to 3D meant users were forced to learn complex new concepts such as parametrics and features, resulting in a steep learning curve. However, direct modeling approaches provide users with simpler and easier geometry manipulation mechanisms, such as pushing, pulling or dragging. It is important to make sure these capabilities are included as well.

- √ **Powerful Modeling with Parametric Features:** A major reason to move to 3D is to leverage the tools commonly used to automate intelligent change. And ultimately that is powered through parametrics and features. This set of software capabilities is important to include alongside 2D and 3D direct modeling.

The traditional move to 3D has been to replace 2D with parametric feature-based CAD, resulting in a frustrating and disruptive transition. Today, *supporting the users' transition to 3D* is more focused on letting them continue to use 2D if necessary, offering an easier means of 3D modeling with direct modeling as well as providing the full-fledge powerful functionality of parametric feature-based approaches. The key is to select CAD software that offers these three means of modeling as an integrated set, not as three separate pieces of software. That, ultimately, is what enables an easier transition to 3D.



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Supporting the Entire Design Cycle

There's more to the transition from 2D to 3D than creating models: the recent advances of CAD technologies can have a sizeable impact on overall product development as well. Capabilities important to other aspects of the design cycle that should be considered include:

- √ **The Transition of Design Release:** Findings from the *Trends in Concept Design* study show that 61% of respondents recreate the concept design once it goes to the detailed design phase. This rework represents a huge waste of time. CAD models should be able to move seamlessly from concept design to detailed design.
- √ **Reusing and Tweaking Existing Designs:** Today's schedules are tight. And that means existing designs need to be reused and tweaked for a new purpose. Direct modeling offers a world of new ways to quickly and easily change existing designs, even if you didn't design it. When a CAD application offers both, you can take advantage of the flexibility of direct without forfeiting the power of parametric.
- √ **Multi-CAD Interoperability:** It would be great if everyone used the same CAD software, but that's not today's reality. Despite that fact, you must find a way to pass design data back and forth. Look for capabilities that enable design data translation without loss of model fidelity.
- √ **Multi-CAD View and Markup:** When it comes to

providing design feedback, people have been using view and markup technology for years. Unfortunately, those tools and CAD haven't always been interoperable, making it difficult for engineering stakeholders to get the feedback. Look for view and markup tools that are integrated with CAD as a way to close the design feedback loop.

- √ **Suggesting Changes with Direct Modeling:** While view and markup tools add clarity, nothing removes ambiguity, and shortens review cycles, like an actual 3D model. By incorporating the simplicity of direct modeling, some CAD applications can now be used by cross-functional and casual users to make suggested changes, which can then be reviewed and accepted or rejected, within the actual 3D model itself.

When thinking about the *entire design cycle*, it's important to consider capabilities to eliminate the recreation of design data such as interoperability, direct modeling and integrated view and markup.



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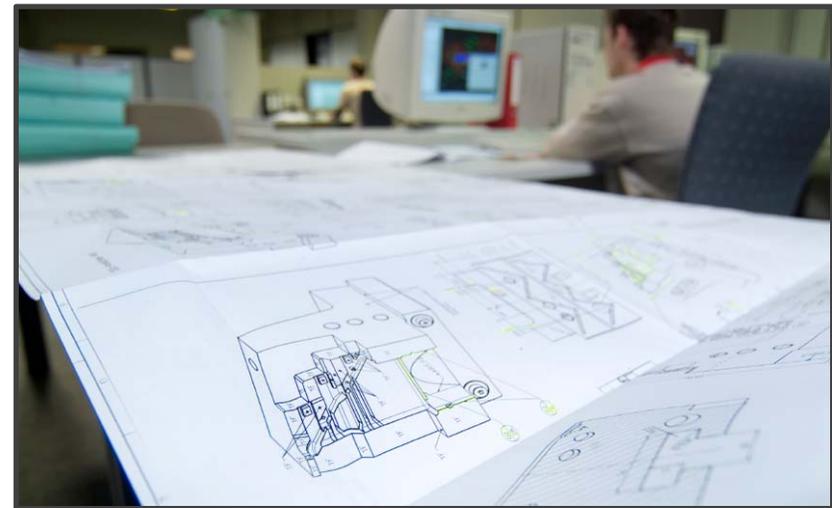
Bringing Legacy Designs Along

A common challenge when moving to 3D is working with legacy 2D drawings. The traditional means of addressing that challenge has been to start new projects in 3D and convert legacy 2D designs as necessary. However, there are newer approaches today that lets you avoid that conversion effort and still be productive. Here are the capabilities and their implications to consider for selection criteria.

- √ **Opening Legacy 2D Designs in Context:** More important than simply opening legacy 2D drawings is being able to put the views of the 2D drawings into the context of a 3D model. Once there, you can visualize the 2D and 3D data together, allowing organizations to leverage valuable IP without substantial rework. The past few years have seen more software providers integrate visualization software into their CAD software, enabling more users to leverage this exact sort of workflow. Seriously consider this capability for your selection criteria when you are assessing CAD software.
- √ **Using Legacy 2D Designs:** Truly leveraging legacy 2D drawings to their greatest extent means more than just viewing 2D and 3D data in the same context. An added value is to use the entities in the views from the 2D legacy data to create and then drive 3D geometry. Today, some software providers have incorporated 3D modeling capabilities that recognize, understand and leverage the entities in views from 2D legacy drawings to do exactly that. In fact, this functionality is used to drive the

transition from sketches in concept design to more detailed 3D models. That capability alongside direct modeling approaches accelerates the pace at which an organization can build out 3D models from 2D legacy drawings.

Concerns over 2D legacy drawings have often plagued those transitioning to 3D in the past, but advancements in the CAD industry offer new advantages. The integration of visualization technologies into CAD software enables users to open 2D legacy drawings in the context of 3D models. The incorporation of 2D sketching and 3D direct modeling allows users to quickly turn views from legacy 2D drawings into 3D models. All of which assists in *bringing legacy designs along* in the transition to 3D.



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Supporting Downstream Processes

With the right software, there's an opportunity for the move to 3D to improve downstream processes as well as the design cycle. Here are some details.

- √ **Manufacturing Planning and Ramp-Up:** After design release, manufacturing uses CAD models of the product to design tooling and generate NC code used to manufacture products. Advancements in 2D and 3D interoperability and direct modeling now enable manufacturing engineers to do so with less translation and hassle.
- √ **Service Planning and Documentation:** Another application of CAD-like capability is the use of 3D models to both plan and document service procedures. Consider this application of 3D models that allows for the concurrent and integrated development of service information as part of your criteria.

For *processes downstream from engineering*, there are opportunities to leverage design data to allow cross-functional resources to do their jobs faster and more independently.



A Centrally Managed Product Record

There's no doubt, today's new CAD capabilities are powerful. But if you don't manage your design data, the wrong deliverables could end up being used downstream, causing havoc and errors. To avoid that, here are some things to consider.

- √ **Managing Detailed Designs:** If you don't explicitly track and control which versions and iterations are used, especially amongst a team, important engineering decisions can be made based on the wrong information.
- √ **Managing Manufacturing Content:** It's important to create manufacturing deliverables based on the *right* design deliverables. But if you're not tracking and controlling the manufacturing deliverables, you cut metal with the wrong NC code and produce jigs and fixtures that don't fit.

Whether your data are designs or manufacturing deliverables, managing your data is just as critical as your method of authoring them. *Centrally managing the product record* is crucial.



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The Value of a Good Partner

Investigating and selecting a software solution based on its capabilities is important; but it has its challenges. The software provider should be a good *partner*. And that involves a number of things.

- √ **Breadth, Reputation and Responsiveness of Technical Support:** No software is perfect. And at some point, you will find yourself logging an issue you found in the software. Take into account the software provider's global support, the type of support staff and their internal processes.
- √ **Alignment to a Software Provider's Vision:** Most software providers have a vision of the industry problems they want to solve. Some are grand in design. Some are focused in a specific context. Finding a good match means the future direction of the software will more closely fit what improvements you want to make in your company.
- √ **Solvency of the Software Provider:** Another important question to ask yourself is this: will this software provider be around for the long haul? We're not yet clear of difficult economic times. With product development so critical to your company's recovery, you want to make sure your software provider is around to support your efforts.

- √ **Forging Relationships:** Nothing in product development or software is perfect, so it's best to be ready when issues arise. But lacking unlimited resources, a software provider must pick and choose where to invest their development resources. Building and retaining long-term strategic relationships are a way to ensure that high priority issues are escalated and resolved appropriately.

Ultimately, the success in using a new software solution isn't all about technical capabilities but also includes the *value of a good partner*. This includes good technical support, alignment in terms of vision, solvency of the software provider and the ability to forge strategic relationships.



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A Buyer's Selection Punch List

As you start to think about the criteria you want to use to select your 3D CAD software, keep in mind that the CAD industry has changed in the last few years. New innovations and technologies developed in the last few years offer new advantages. Here's a punch list of criteria you should consider.

The Selection Punch List

- √ Today, *supporting users to transition to 3D* is more focused on letting them continue to use 2D, offering easier 3D direct modeling and the functionality of a parametric feature-based approach in 3D. Integration of these three sets of technologies is key.
- √ Think about the *entire design cycle*, and consider capabilities that help to eliminate the recreation of design data like interoperability, direct modeling and integrated view and markup.
- √ The incorporation of visualization technologies into CAD software enables users to open 2D legacy drawings in the context of 3D models. The integration of 2D sketching and 3D direct modeling can quickly turn views from legacy 2D drawings into 3D models. All of which assists in *bringing legacy designs along* in the transition to 3D.
- √ For *processes downstream from engineering*, there are opportunities to leverage design data to do their jobs faster and independently.

- √ Whether designs or manufacturing deliverables, effectively managing the your data is just as critical as authoring them in new ways. *Centrally managing the product record* is critical.
- √ Ultimately, the success in using a new software solution isn't only dependent on technical capabilities but also about the *value of a good partner*. This includes good technical support, alignment in terms of vision, solvency of the software provider and the ability to forge long-term strategic relationships.

Despite the fact that 3D modeling is now in its third decade, the past few years have seen meaningful advances that make transitioning to 3D easier. As you look at CAD software, keep those advancements in mind. They can make a significant difference.

For more information on this eBook series and other content to assist in your move to 3D, visit <http://www.ptc.com/go/2d-3d>.