

General Software

Low-Cost CAD: Can a \$500 Product Go the Distance?

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Cadalyst Labs Report: We put five budget-friendly tools through their paces to see which could be winning options for professional use.

The end of the '80s brought an end to big hair, shoulder pads — and \$20,000 mainframe CAD software. Fortunately for all of us, today's hairstyles and CAD prices are more down to earth. Whether your CAD budget is \$7,500, zero, or anywhere in between, you won't pull your hair out finding viable professional options.

CAD options in the lower end of the price range are particularly interesting. Many, in fact, offer features and functionality that seem to rival that of Autodesk's AutoCAD for thousands of dollars less. The question is, Can these products go the distance in a professional environment? Can they support workflows that involve clients and partners that use AutoCAD? Are they sophisticated enough to be easy to learn and use productively? We at Cadalyst Labs decided to find out by evaluating five options in the \$500 price range.

The Low-Cost CAD Market

Before we get to the product evaluation, let's take a higher-level look at the low-cost CAD market. At least 50 products are available worldwide that range in price from free to approximately \$2,000 — easily rivaling the number of CAD-specific products that exist in the higher price range.

Bob Mayer, COO at IMSI/Design, developer of the popular line of TurboCAD software, said the retail market for low-cost CAD hasn't changed fundamentally in recent years. Long Nguyen, U.S. distributor, said, "The market has started to accept more low-cost CAD solutions recently. As low-cost CAD becomes more ubiquitous, companies will specialize and innovate in different fields. As a result, we will see CAD solutions which are specific to many different realms of manufacturing, architecture, motion simulation, and engineering."

Franco Folini has a unique perspective on the range of CAD software available today, from the most affordable to the most complex and expensive options. He is president and cofounder of Novedge, the largest online reseller of CAD, 3D, and graphics software — more than 6,000 products, to be specific. "I believe there are plenty of professional situations where \$500 software will solve your problems," he said. "We get calls from people who want to design a swimming pool, a wedding ring, furniture. ... Entry-level software is perfect for professionals working with basic geometry."

Free CAD tools are becoming increasingly common; however, if this trend is affecting the low-cost CAD market, the developers who spoke with Cadalyst haven't see it yet. Mayer said, "We know that Dassault Systèmes claims millions of downloads of its [free] 2D DraftSight product; however, our 2D CAD sales continue to increase year over year."

Nguyen added, "There has always been a dividing line between free CAD software and commercial software. If free CAD tools were equally reliable, compatible, and fully featured, they would easily overtake the market. That is not the case, though. Users still rely on the quality of commercial software."

Who Uses Low-Cost CAD?

"We think that [users of CAD in the \$500 range] fall into two groups: hobbyists and 'prosumers,'" said Bob Mayer, COO at IMSI/Design, developer of the TurboCAD software line. "By prosumers, we mean professional users of CAD who are looking for real value in the product. TurboCAD LTE Pro is a perfect example of this. The prosumer buyer of this product is someone who is familiar with the AutoCAD or AutoCAD LT product and wants to stick with that familiar [user interface] and functionality, but get it (and more) for a real value price. The majority are not first-time CAD users. Hobbyists, however, will tend to be first-timers in the world of CAD."

For GstarCAD, said Nguyen, "Most of our users have had experience with CAD, and more specifically AutoCAD. Our most advanced CAD users are independent consultants who require the best software. Other customers include small manufacturing shops and independent designers with limited budgets. We also have users in the architectural and tool-and-die industries. Outside of the U.S.A., large corporations have adopted GstarCAD as the standard CAD software."

At Novedge, an online reseller of more than 6,000 CAD, 3D, and graphics software products, the reality differs. President and cofounder Franco Folini said, "Entry-level software tends to be adopted by professionals and companies new to CAD." Because of that inexperience, he explained, those customers tend to request more technical support than do Novedge customers who purchase more complex and expensive products. "What we notice is that people buying entry-level products have big expectations for tech support and having a relationship with the vendor. They need more hand-holding in terms of installation and use. ... Higher-level customers are in a more structured working environment. They have CAD experience, in-house resources, and training." Folini said that low-cost CAD accounts for approximately 5% of revenue for Novedge.

Although Mayer and Nguyen do observe customers moving from AutoCAD to their lower-cost options, Folini does not. "In our experience at Novedge, we are not seeing people downgrade from AutoCAD LT to \$500 products."

Return on Investment

Should you opt to spend slightly more money — say, \$1,000 to \$1,500 — what could you expect for the extra investment? In addition to the obvious answer of more robust features, Folini said you'll generally find a better user experience.

"My personal opinion is that sometimes it's just the experience with the product, the user interface, that sets it apart. If you compared features lists and matched them up one-by-one, you probably get a 70% to 80% match. But what I've seen is that the user interface in the entry-level system might not be so good. Ten years ago, the UIs in low- vs. mid-range products were very similar, but now the mid-level product UIs are noticeably better."

Less-sophisticated UIs can make some low-priced products more difficult to learn, Folini continued, but they have plenty of features for the professional user. "Unless you are working with complex geometry, they work pretty well. As far as software interoperability and DWG support, they are OK for most people," — especially the IntelliCAD-based products, he said. "These products are pretty good at producing DWG and DXF files, and you can go anywhere with those, transfer drawings to anyone."

Folini has watched as the IntelliCAD Consortium has run into financial trouble and scaled back efforts to create a reliable alternative to AutoCAD. Price wars have sprung up, prices have fallen, and products have become less competitive, he said. "As a result, the entry-level market is not generating the resources and seeing the level of competition necessary to keep it growing and progressing." He concluded by saying he hopes the consortium can renew its efforts and restore the competition necessary to keep the market growing and progressing.

Looking Ahead

Eyeing the future of the low-cost CAD market, Mayer said, "I anticipate a time when low-cost CAD will be primarily available on a subscription basis directly from the developers." "The reseller channel for CAD — both brick and mortar, as well as online — will continue to shrink, and more and more of the business will simply be direct to the user." And, he added, "There's a whole new group of CAD applications coming that will be optimized for the unique attributes of mobile computing devices such as tablets like the iPad."

Low-Cost CAD: Five Options

For this roundup of low-cost CAD solutions, Cadalyst editors selected five products to evaluate. We narrowed down a long list of budget-friendly options to those in the \$400–\$600 range that had potential to replace AutoCAD in a professional office.

Evaluation criteria. In an effort to experience each of these tools from installation through new-user orientation just as a typical user would, the process involved no vendor briefings or special tutoring sessions. Except where noted, installations went smoothly on a Windows 7–based machine.

Evaluation was based on creating new files, opening a series of existing sample drawings, and working with geometry, all the way through plotting — all while contrasting the tool with AutoCAD. We gauged overall functionality including customization and programming as well as overall experience from the perspective of an AutoCAD user. We placed particular emphasis on evaluating the user interface (UI) to measure ease of use and the learning curve for each product.

Our goal in this evaluation process was not to declare a winner, but rather to provide a basis for determining whether each tool might be a viable choice for your office to consider as an AutoCAD replacement. If yours is an AutoCAD LT or Bentley Systems MicroStation office, this evaluation should serve you well also.

Given that all these tools are roughly the same cost as an annual AutoCAD subscription and that each comes with a learning curve, we're not convinced that any would merit switching from AutoCAD. However, if you're looking to purchase new CAD seats, these tools deserve consideration. A free trial version is available for each option to get you started. For further details about each product, see the table, "[Low-Cost CAD: Five Professional Options.](#)"

Bricscad v12 Pro

Bricscad v12 Pro from Bricsys integrates 3D direct modeling with the familiar 2D feature set of native DWG. It supports hundreds of third-party applications, according to the developer. It sells for \$505.

New Bricscad files are created using AutoCAD standard DWT files and saved in AutoCAD DWG/DXF formats from the 2010 version back. We opened a variety of AutoCAD sample files all the way through the 2012 format and found the results to be generally fine, with a few exceptions. (See "Cons" in the accompanying summary box.)

Bricscad's user interface looks much like that of recent AutoCAD releases, focused on user-arranged toolbars and palettes (although a ribbon menu is not used) wrapped around the top and sides of the drawing area, with the Command prompt at the bottom. Creating and working with geometry in Bricscad feels very much like using AutoCAD. Geometry editing, including grip editing, functions much as it does in AutoCAD, but double-click editing varies by entity type — hatching, most notably — and isn't always AutoCAD-like.

As a bonus, parametric-style constraints very similar to those in AutoCAD 2012 (minus the AutoConstraints) let you make 2D parametric drawings. Zooming, panning, mouse-wheel support, and keyed-in commands all function as an AutoCAD user would expect, although right-clicking when no object is selected defaults to an Enter key, as was the case in older versions of AutoCAD.

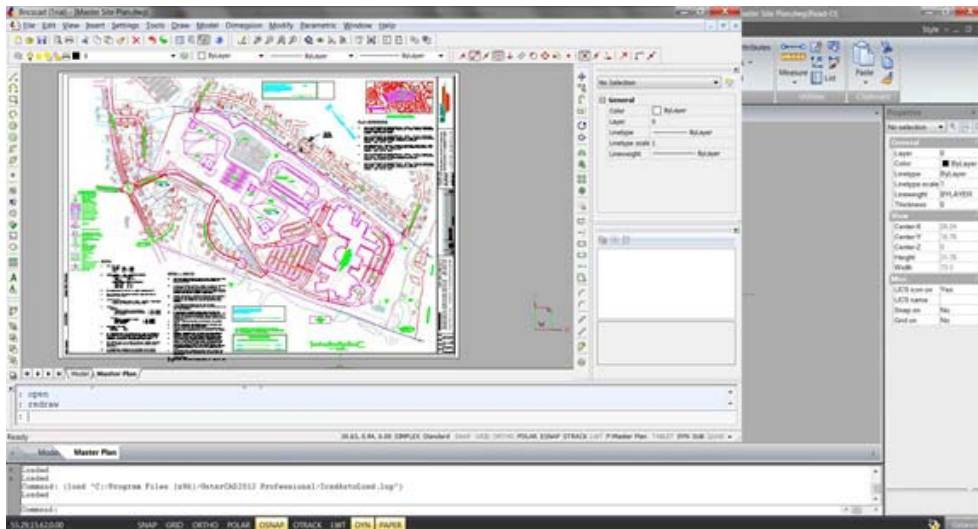
Printing is conducted via an interface that looks very similar to AutoCAD 2012's Plot dialog box but, curiously, keying in Plot invokes the Command line instead of a dialog box. You create plotter definitions and plot styles very much like you would in AutoCAD. Bricscad now supports STB plot style table files.

Finally, you can set up your own shortcuts, palettes, toolbars, and other interface components using a unified CUI (Customize User Interface) command that saves settings to a PGP file (not interchangeable with an AutoCAD PGP file). AutoLISP routines can be loaded via AppLoad (just like AutoCAD), so CAD managers and power users can tweak Bricscad most any way they like.

Pros: Very similar look and feel to AutoCAD 2012, minus the ribbon. Customization and AutoLISP support are excellent and very similar to that of AutoCAD. Handles irregular viewports, xrefs, and file attachments without a glitch. Includes 2D parametric functionality.

Cons: Reading 3D geometry using proxy conversion is clunky at best, and at times problematic. Bricscad v12 Pro can't read AutoCAD 2012 viewports with Model Documentation–generated views.

In Summary. Bricscad is an AutoCAD-compliant tool that can create and work with DWG data with a nonribbon-based interface that most users of recent AutoCAD versions will learn quickly. If your workflows involve complex layout views or details generated with detail/section views, you can expect problems when files are shared between Bricscad and AutoCAD users. CAD managers familiar with AutoCAD customization can get right to work customizing Bricscad. For companies that need to create parametrically controlled drawings, the constraint functionality is another bonus.



A sample DWG file as it appears in Bricscad v12 Pro.

GStarCAD Professional 2012

Based on IntelliCAD technology, GStarCAD Professional is a 2D/3D CAD solution from Suzhou Gstarsoft touted for its AutoCAD compatibility and openness for CAD application development. Available for \$520, GStarCAD is more ribbon compliant and generally more "visual" in its interface than the other IntelliCAD-based software we looked at.

This program creates new files using AutoCAD standard DWT files, and files are saved in AutoCAD DWG/DXF formats from the 2010 version back; curiously enough, the 2004 file version is the default. We opened a variety of AutoCAD sample files all the way through the 2012 format and found the results excellent, with a few notable exceptions (described in "Cons" in the summary box included here).

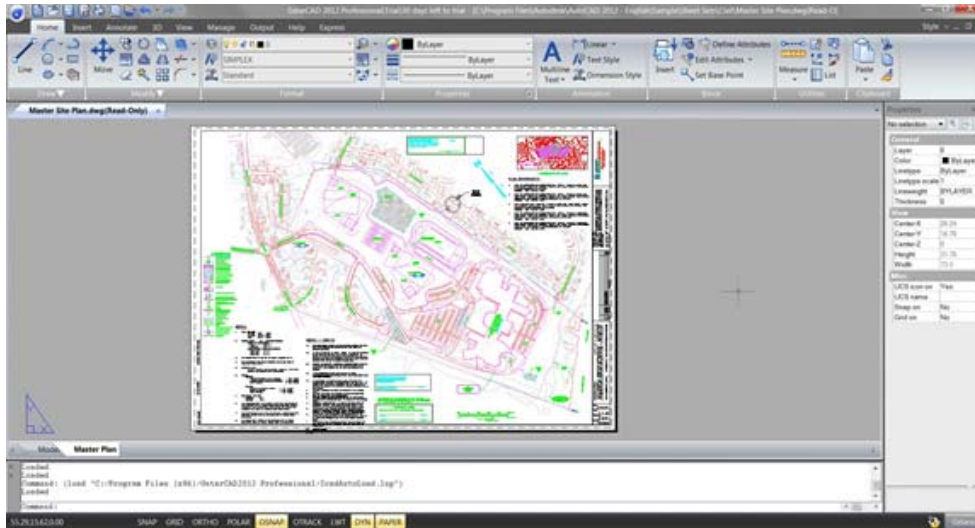
GStarCAD's UI looks very much like AutoCAD 2012's ribbon-based interface, with an additional bar across the top of the drawing window to facilitate fast switching between opened drawings — something like Quick View drawings in AutoCAD. The ribbon tabs are arranged in a way that's very similar to AutoCAD, albeit with some tabs and functions missing. Creating and working with geometry in GStarCAD feels very much like AutoCAD as well as other IntelliCAD-based programs. Editing geometry, including grip editing, functions like AutoCAD; however, given that it offers a ribbon-based interface, the absence of ribbon-based double-click editing (available in AutoCAD) surprised me. Zooming, panning, mouse-wheel support, keyed-in commands (including AutoCAD 2012-like AutoComplete), and right-click functionalities function as an AutoCAD user would expect.

Pros: GstarCAD operates almost exactly like AutoCAD 2012. It runs AutoLISP routines and handles irregular viewports, xrefs, and file attachments without a glitch. Block libraries and the EasyArch add-on for drawing 2D architectural elements make GstarCAD a great value.

Cons: The software has problems reading 3D geometry using proxy conversion. Can't read AutoCAD 2012 viewports with Model Documentation-generated views.

Printing is conducted via an interface that looks and feels exactly like AutoCAD 2012, all the way down to the PlotterManager command and plot styles, but the STB file format is not supported. Finally, the ability to set up your own shortcuts, palettes, toolbars, and other interface components via a clone of the AutoCAD CUI command, and to load AutoLISP routines using Appload (again, just like AutoCAD) mean customizers familiar with recent AutoCAD releases can get right to work.

In Summary. GStarCAD is an AutoCAD-compliant tool that can create and work with DWG data in an interface that will make AutoCAD 2011/2012 users feel right at home — probably requiring the least training of any of the programs evaluated. Companies that use complex layout views with viewport-specific visualization features will find GStarCAD directly compliant with AutoCAD files. Customization capabilities and LISP support are the best of all the programs evaluated for this article — and the most like AutoCAD — so CAD managers familiar with AutoCAD customization should have no problem adapting to GStarCAD.



A sample DWG file as it appears in GStarCAD Professional 2012.

IronCAD DRAFT 2012

IronCAD DRAFT is an AutoCAD-compatible 2D mechanical drafting tool that enables users to work in 2D but also to view, leverage, analyze, render, and reference 3D model data created by suppliers, customers, and colleagues. At \$595, it is the most expensive of the five products in this roundup.

Creating new design files in IronCAD DRAFT is facilitated via a variety of template (TPL) files in ANSI, GB, or ISO unit systems and typical drawing borders. Files are opened and saved by default in the IronCAD DRAFT EXB file format, but may also be saved in TPL (template), AutoCAD 2010 (or earlier) DWG or DXF, or IGES file formats. We opened a variety of AutoCAD and DGN sample files and found generally good results, although some AutoCAD 2012 viewport formatting caused problems. (See "Cons" in the summary box included here.)

You can switch IronCAD DRAFT's UI between the default, minimalist ribbon-style interface and a pull-down/toolbar interface that reminds me of AutoCAD Release 14. It's easy to switch between the two UIs, but AutoCAD users likely will end up using the pull-down/toolbar interface more than the ribbon option. Either way, the interface is otherwise sparse, lacking a system tray and displaying only minimal toggles. Of the programs evaluated, IronCAD Draft has the most minimalist feel, which may make it the easiest for non-AutoCAD users to learn.

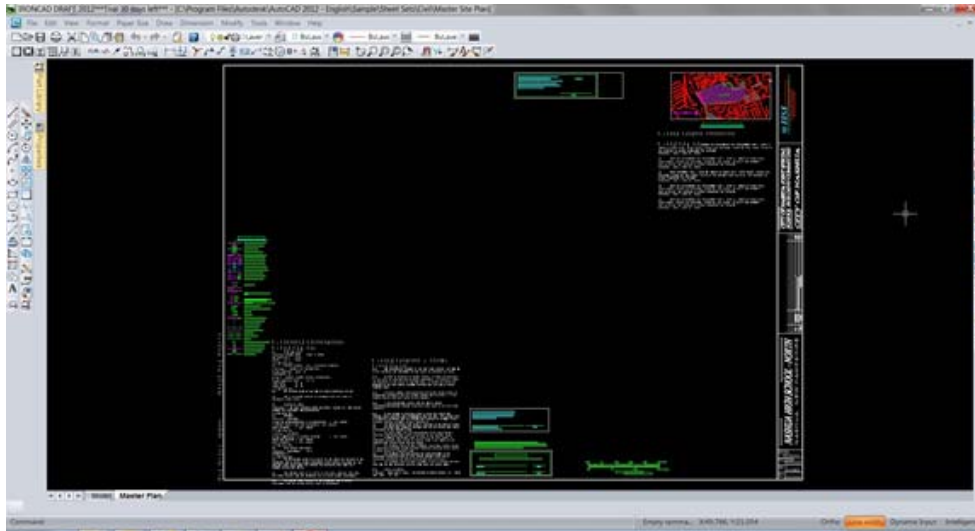
Creating geometry is largely a matter of using ribbon options or toolbar buttons to initiate commands, although some keyed-in shortcuts, such as L for Line, are available. Any Command line prompting appears in the lower band of the screen — very different from AutoCAD. You can turn on a Command Line Panel if you'd rather it look like AutoCAD. Coordinates can be entered in the floating cursor box using the keyboard; via dynamic input (if toggled on); or by locking onto existing geometric features using object snaps. IronCAD's object snaps can snap within blocks and other annotation types. This is very much like AutoCAD functionality, but implemented differently enough that it takes some getting used to. Geometry-editing commands such as Move, Mirror, and Trim work in a similar select/input mode as they do in AutoCAD, but with additional options presented at the Command line; grip editing follows the same logic as it does in AutoCAD; and double-click editing entities invokes a properties-editing palette in most cases (text editing being an exception). You can zoom and pan via icons, an F3 shortcut is predefined for Zoom All, and the mouse wheel supports zoom/pan just as in AutoCAD.

Printing uses your operating system print drives and proprietary configuration files that use the object line width you set during entity creation to drive plotted line weights — unless you specify a line weight-to-color relationship that overrides entity types. This behavior is much more similar to MicroStation than to AutoCAD. For users accustomed to AutoCAD plotting, IronCAD DRAFT printing will be a major adjustment.

In Summary. IronCAD DRAFT is a functional CAD tool that can work with DWG data, but the most dissimilar to AutoCAD in all respects. If AutoCAD emulation isn't critical and mechanical drafting is your main mission, IronCAD DRAFT is a good choice. Conversely, if AutoCAD work methodology is desired to minimize training time, IronCAD DRAFT could be problematic. Companies that interact heavily with users generating data with recent releases of AutoCAD will likely experience compatibility problems with complex layouts.

Pros: Parametrically driven mechanical symbols are thorough and valuable for mechanical drafters. IronCAD DRAFT can read projected 3D geometry from AutoCAD 2012.

Cons: Least similar to AutoCAD, making cross-training more difficult. Couldn't read complex AutoCAD viewports generated from AutoCAD 2012's Model Documentation feature. No LISP or VBA support.



A sample DWG file as it appears in IronCAD DRAFT 2012.

ProgeCAD 2011 Professional

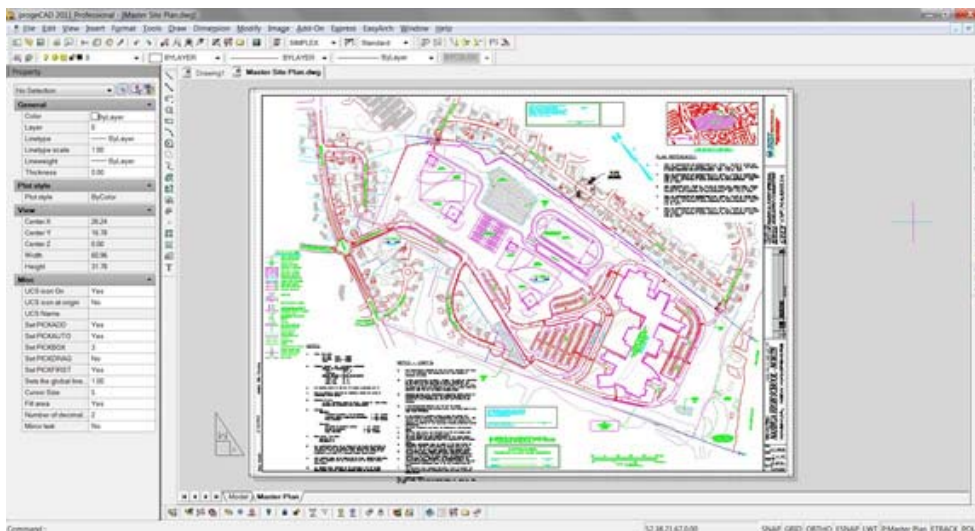
ProgeCAD 2011 Professional from progeCAD USA is a general-purpose 2D/3D CAD solution, powered by IntelliCAD, that works with AutoCAD DWG files from v2.5 through 2012. ProgeCAD is more like older versions of AutoCAD, where keying in commands and using toolbars is the default mode of input, than the other IntelliCAD-based program we looked at here. At \$399, it is the least-expensive product included in this roundup.

Creating new design files in progeCAD Professional is based on AutoCAD standard DWT files — two of which are provided and more of which can be created on your own, just as in AutoCAD. The program saves files in AutoCAD 2010 DWG format by default, or in earlier DWG or DXF file formats if specified. When opening existing drawings, the same file types are supported. We opened a variety of AutoCAD 2012 and earlier sample files and found the results excellent, with a few notable exceptions (explained under "Cons" in the summary box).

The progeCAD UI looks very much like the UI of recent AutoCAD releases, without the ribbon. Because progeCAD is based on technology from IntelliCAD (which has had the goal all along to deliver AutoCAD-compatible CAD tools), creating and working with geometry felt almost exactly like AutoCAD, all the way to the Etrack and Esnap tools (which emulate AutoCAD's OTrack and Osnap). Editing geometry emulates AutoCAD functionality, including grip editing, to a T. Throughout the process, all zooming, panning, mouse-wheel functions, keyed-in commands — and even using the spacebar to repeat the last command — flowed exactly as they do in AutoCAD, making this a very easy tool for AutoCAD users to learn.

Printing uses operating system print drivers and reads/writes AutoCAD CTB/PCP configuration files (with the STB file format being notably absent), but the interface is multitabbed and requires some navigation to understand what's going on. Finally, the ability to set up your own shortcuts, palettes, toolbars, and other interface components via the MenuLoad command and the ability to load basic AutoLISP files (minus Visual LISP) will make those with legacy custom code very happy.

In Summary. ProgeCAD 2011 Professional is an AutoCAD-compliant tool that can create and work with DWG data and has an interface that AutoCAD users can learn quickly. Companies that use complex layout views with viewport-specific visualization features will find progeCAD directly compliant with AutoCAD files. Customization and LISP support mean that CAD managers can tailor the software to fit their users, although existing routines may not run if they contain certain Visual LISP functions.



A sample DWG file as it appears in progeCAD 2011 Professional.

Pros: Very similar to AutoCAD. ProgeCAD Pro can run basic AutoLISP routines and handle irregular viewports, xrefs, and file attachments without a glitch. Included block libraries and the EasyArch add-on for drawing architectural elements provide extra value.

Cons: Clunky-to-problematic reading of 3D geometry using proxy conversion. Couldn't read AutoCAD 2012 viewports with Model Documentation-generated views.

TurboCAD LTE Pro v4

TurboCAD products from IMSI/Design have long been popular with Cadalyst readers. TurboCAD LTE Pro, the second most affordable option in the line, is described as a professional 2.5D drafting and detailing solution. Although it is designed to compete with AutoCAD LT, we chose it for this roundup due to its \$500 price.

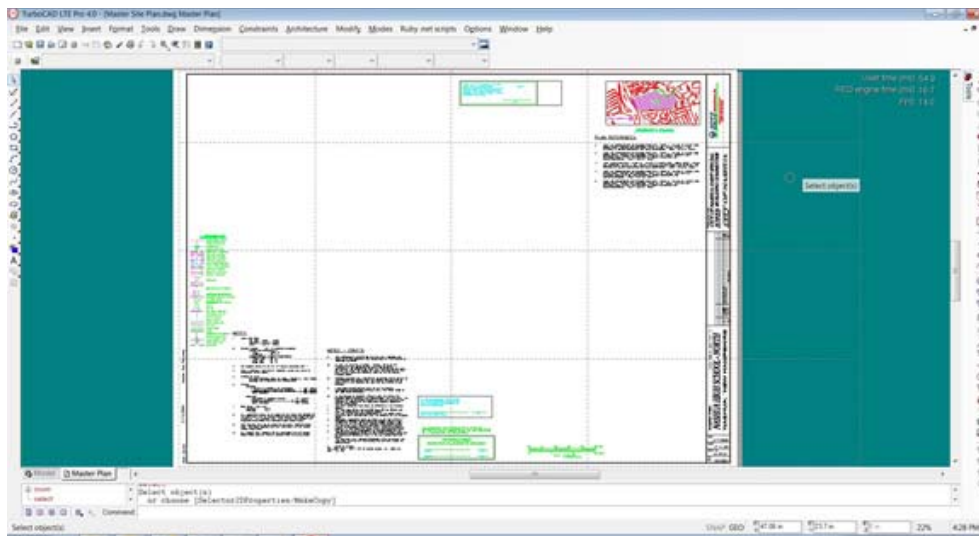
Installation of TurboCAD LTE Pro went fine, but the included graphics driver had to disable the Aero visual theme in Windows 7 in order to run. Once the basic Windows theme was applied, TurboCAD fired right up.

Users create new design files in TurboCAD LTE Pro via a variety of template files in ISO and ANSI standard unit notation with typical drawing border sizes. Files are saved by default in the TurboCAD TCW file format, but may also be saved as AutoCAD 2010 (or earlier) DWG or DXF, or Intergraph DGN vector formats, as well as a variety of other CAD and image formats. The same file types are supported when opening existing drawings. We opened a variety of AutoCAD and DGN sample files with generally good results.

TurboCAD LTE Pro's UI encompasses pull-down menus and toolbars along the top of the screen, with toolbars and palettes to the left and right and a Command prompt/history area along the bottom. One thing the UI doesn't have is a ribbon menu. Creating geometry feels very much like drawing with AutoCAD; coordinate input, directional input, and intelligent snap locators appear to be modeled after the AutoCAD UI. Editing commands such as Move, Mirror, and Trim all work in conjunction with snap locations, much like they do in AutoCAD, but selecting objects for editing (such as AutoCAD grip editing) felt very different, as multiple objects may be stretched or modified in an extent-style editing frame. Zoom/pan and wheel mouse viewing also functioned just as one would expect in AutoCAD. As fans of keyboard entry, we were happy to find that favorite command shortcuts (L for line, E for erase, etc.) worked exactly as they would in AutoCAD. Finally, a unified CUI command means you can set up your own shortcuts, palettes, toolbars, and other interface components just the way you want.

Printing uses your operating system print drivers, with a print style utility mapping colors to print characteristics such as pen widths (much like an AutoCAD CTB file).

In Summary. TurboCAD LTE Pro is a functional CAD tool that can create and work with DWG and DGN data, with an interface look and feel that will be familiar to AutoCAD users. Companies that use complex layout views with viewport-specific visualization features can expect to have compatibility issues when interacting with AutoCAD users.

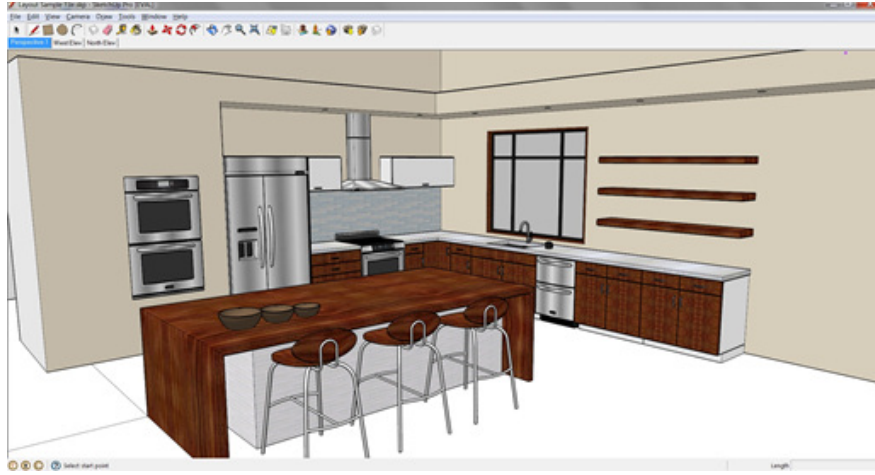


A sample DWG file as it appears in TurboCAD LTE Pro v4.

Final Thoughts

Could a low-cost CAD solution go the distance for your company? We hope this roundup has provided enough insight to help you begin answering that question. Ultimately, you'll know best if a product is a viable option if you put it to the test. Fortunately, the five products featured in this roundup — and most others in the low-cost category — are available as free trials. Download those that pique your interest and see what they can do to boost your workflow — and your bottom line.

Sidebar: A Note About SketchUp



For years, SketchUp has been a very popular 3D modeling tool — primarily among architects — even as its ownership has passed from @Last Software to Google and, as announced in late April, to Trimble. SketchUp Pro (the version for commercial use, \$495) includes Layout 3, a companion product for creating professional design documents, dimensioned drawings, and presentations from SketchUp 3D models.

SketchUp is a great tool for quickly developing visually rich 3D models from scratch or based on raw DWG geometry. But it can't directly edit DWG or DGN files and it lacks an annotative feature set, which are essential to any drafting/detailing department — and, therefore, we didn't include it in this product roundup.

In its current state, SketchUp can't serve as the centerpiece of a drafting department, but for conceptual 3D modeling, it's a great tool at a good price.

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Re: **Low-Cost CAD: Can a \$500 Product Go the Distance?**

by: **tommcgill**
on: **August 22, 2012 - 10:32am**

For the VERY casual user there are always the FREE options available running under the Linux operating system, that is: QCad; BRL-CAD; Open CASCADE; FreeCAD; VARKON; Electric. It may mean venturing outside the comfort zone of Windows but running Linux inside a virtual machine won't risk hurting your computer. The only investment is time.

AutoCAD Tips!



Autodesk Technical Evangelist **Lynn Allen** guides you through a different AutoCAD feature in every edition of her popular "[Circles and Lines](#)" tutorial series. For even more AutoCAD how-to, check out Lynn's quick tips in the [Cadalyst Video Gallery](#). Subscribe to Cadalyst's free [Tips & Tools Weekly](#) e-newsletter and we'll notify you every



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