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# Professional CAD – Now it is Personal

## INTRODUCTION

Humans are creative beings; they imagine things and then make them. Our earliest ancestors fashioned many things, from rough wooden shelters to stone choppers. This creativity, this ability to conceive of things that do not exist and then make them, is what sets us apart from all other species. It is one of our greatest strengths.

Of course, tools are required to make these things, and the earliest tools were made from the things we saw around us: wood, stone, bone, animal parts, and plants. Most of these have long disappeared with only fragments of those ancient choppers, crushers, scrapers, spears, and arrowheads surviving to the present.

Tools also represent the technology of their time, and are technical by their very nature, whether the scientific principles upon which they are based are known or understood. Even Stone Age and Bronze Age tools, based on simple machines, wedges, levers, inclined planes, wheels, axles, and pulleys, embodied fundamental principles of physics and mechanics. Mankind's imagination took these simple machines and used them to build ever-more complex machines, creating a cycle of technological innovation that continues today.

Throughout history, new tools and technologies have only been available to the elite, the individuals who have the ability and resources to create or master them and who then use them to foster their own survival. Over time these new tools and technologies become more broadly available or "democratized," from stone choppers to the mastery of fire to personal computers and cell phones. And now 3D CAD systems.

## TRADITIONAL CAD USAGE

Most CAD users are engineers or other technical professionals or students in a technical field that use software that is purchased and owned by their companies or educational institutions. Most CAD software is expensive, complex, hard to learn and use, and typically requires special training and a high-end personal computer. The best known CAD software programs such as CATIA, Unigraphics, Pro/ENGINEER, SolidWorks, Autodesk Inventor, and Solid Edge typically cost a minimum of \$5,000 and often as much as \$20,000 or more when fully equipped.

Clearly, software products costing \$5,000 to \$20,000 are not personally accessible or affordable for most people. Additionally, the companies that sell these products specifically prohibit the use of the products anywhere else but the computer the product was originally loaded on. And while many of these companies offer less expensive software for classroom use, these "educational" versions are even more restricted, with

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onerous limitations such as not being able to print, watermarked files, and file formats that are unusable by other versions of the software.

We see this pattern over and over again in the life cycle of new, desirable tools and technologies: initially they are restricted to a professional or societal elite, who enjoy their benefits due to knowledge, power, or wealth. But eventually these technologies become more broadly available. There are myriad examples: consider literacy, indoor plumbing, electric appliances, automobiles, air conditioning, air travel, computers, word processing, graphics, telephones, and the Internet. All of these were initially available only to the elite and are now ubiquitous.

## **WHAT IS PERSONAL CAD?**

What makes a CAD system personal? It is simply the ability for a person to break free of the restrictions imposed by the traditional CAD vendors and own their own CAD system, deciding for themselves how to use it. It is personally accessible, without intervention; you don't need an employer to buy it for you, or to teach you how to use it. Personal CAD enables individuals today, whether they are professional engineers, students, or hobbyists, to own their own CAD software and do with it as they please. This "personal CAD" trend started around 2005 when powerful 3D CAD tools and technologies became accessible to people worldwide as the result of the proliferation of personal computers and the Internet, coupled with the actions of two companies, Google and Alibre, who made versions of their powerful CAD software available for free to anyone with a PC and an Internet connection.

Fortunately, personal computers with Internet connections are pervasively available throughout the world. Powerful computers, fully capable of high-end 3D graphics can be purchased for less than \$500. High speed Internet connections are available for a small monthly fee added to your television or phone bill. And with Google SketchUp for architectural design, or Alibre Design Xpress for mechanical design, you can simply download a completely free, full-featured 3D CAD product that actually works without restrictions. The popularity of these products has shown that there is widespread interest in using 3D beyond the typical CAD Designer/employee role. Since their introduction, millions of copies of these products have been downloaded.

The name "Personal CAD" might imply non-professional or amateur use such as that associated with a hobby or home project. While this is one way it is used, Personal CAD is more commonly characterized by commercial use. It is motivated by professional interest, where the CAD software can be used for anything from simple training and skills advancement, to activities with an explicit commercial intent like contract work or consulting or an entrepreneurial venture to design the next great widget. The software is permanently owned by the individual and travels with them; it's now one of their "tools of the trade."

## **IT'S TIME FOR PERSONAL CAD**

In many industries, individuals skilled in a particular trade have their own personal set of "tools of the trade." Writers have word processors, photographers have cameras and lenses, painters have paints and brushes, woodworkers have saws, drills, lathes, and a variety of other specialized tools. This trend has also been seen in desktop publishing and graphic design, as formerly exclusive desktop applications have become ac-

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cessible to anyone. Now it's commonplace for graphic designers and photographers to own personal copies of Adobe PhotoShop and Illustrator

Similarly, those embracing Personal CAD are engineers and other technical professionals that use CAD software at work, or others in the company that collaborate with these CAD users. Considering how quickly technology adoption moves today, if we project this trend into the relatively near future, a time is coming when owning a personal 3D CAD system will be as common for designers, engineers, machinists and others in manufacturing industries as a carpenter owning a set of hand tools, or a writer owning a word processor.

Personal CAD use is not just about learning 3D CAD, however. That is an important skill, but it's really about using state-of-the-art tools to exercise the more important skill of problem solving and innovation through design and engineering. As with any skill, the more you do it, the better you get. And honing these skills is a critical key to survival for any individual or business in today's increasingly competitive global environment. Those using a Personal CAD system such as Alibre Design often use another CAD system like SolidWorks, Pro/ENGINEER or Unigraphics at work. It's rare that someone using one of these expensive products at work can justify its purchase as a Personal CAD system. With Alibre Design they not only benefit from learning a different tool that can deepen their understanding of 3D CAD by exposing functionality in a different way, but they also improve their marketability by expanding the range of applications with which they are familiar.

Personal CAD is equally compelling for 2D CAD users. An individual working for a company that uses 2D CAD such as AutoCAD LT, will oftentimes want to obtain a 3D CAD product to develop a design concept or do some type of outside consulting well before their employer seriously considers the purchase of 3D software. The employer is then exposed to work their employee is doing with their "personal" product, often through actual work on company designs or projects that the individual decides they can do better in 3D. Once an employer sees the benefits of 3D in a real production scenario they are much more likely to invest in the tool themselves.

## **WHY PERSONAL CAD IS IMPORTANT**

With the advent of Personal CAD, the opportunity and potential human benefit is enormous. In addition to the clear personal benefits for the individuals that adopt a Personal CAD system, as well as the benefits to their employers, the proliferation of Personal CAD will also enable many more great problem solving ideas and innovations to be captured and turned into real things with real benefits for humanity. An important reason that the Dark Ages came to an end was the expansion of literacy to common people, ending the time of the scribes and monks of medieval Europe sitting behind high walls and jealously guarding their knowledge, "protecting" the masses from literacy. One can see a somewhat parallel situation today, when less than one in ten college educated engineers has unrestricted access to CAD software at work. Not because the knowledge to use it is jealously guarded, but simply because the software is too expensive. Imagine if all of these educated professionals and the people they work with had access to their own personal CAD tools what they might create.

With more than 6 billion people alive today, there are many more smart people with great ideas than there have ever been. Already innovation and invention are chang-

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ing society and the world more rapidly than we can imagine, with most of these changes accruing to humanity's benefit. If we can get great tools in the hands of smart people then the potential benefits are truly unlimited.

## **THE FUTURE OF PERSONAL CAD**

Already a surprisingly large number of people have the tools to manufacture physical products in their garages and workshops. Innovators and inventors have many affordable options to turn the ideas they capture in their Personal CAD systems into prototypes and real functioning products that solve real-world problems. Computer Numerical Control (CNC) machines enable their owners to take CAD files directly from a computer and create the physical products from metal, plastic, or wood. 3D Printers are also growing in popularity, with two models introduced recently that sell for less than \$10,000. In addition, several "Do It Yourself" (DIY) kits for building a personal 3D printer can be found on the Internet.

With the proliferation of Personal CAD and low-cost manufacturing, innovation itself will become "democratized," and 3D design skills, at least among the technically inclined, will be as common as using email.

### Interesting Links:

#### Google SketchUp

[www.sketchup.com](http://www.sketchup.com)

#### Alibre Design Xpress

[www.alibre.com/products/xpress/xpress\\_for\\_all.asp](http://www.alibre.com/products/xpress/xpress_for_all.asp)

#### Personal CAD case studies and testimonials

[www.alibre.com/success/customerstories/default.asp](http://www.alibre.com/success/customerstories/default.asp)

[www.alibre.com/success/customerstories/testimonials.asp](http://www.alibre.com/success/customerstories/testimonials.asp)

#### Affordable CNC and 3D printers

[www.tormach.com](http://www.tormach.com)

[www.shopbottools.com](http://www.shopbottools.com)

[www.sherline.com](http://www.sherline.com)

[www.microproto.com](http://www.microproto.com)

[www.minitech.com](http://www.minitech.com)

[www.cncmasters.com/CNC%20Jr%20Mill.htm](http://www.cncmasters.com/CNC%20Jr%20Mill.htm)

[www.cnc-router-routers.com/index.html](http://www.cnc-router-routers.com/index.html)

[www.taigtools.com/cmill.html](http://www.taigtools.com/cmill.html)

[www.syilamerica.com/products.asp](http://www.syilamerica.com/products.asp)

[www.modelin3d.com](http://www.modelin3d.com)

[www.desktopfactory.com](http://www.desktopfactory.com)

#### Do it yourself 3D printers

[www.fabathome.org](http://www.fabathome.org)

[www.reprap.org/bin/view/Main/WebHome](http://www.reprap.org/bin/view/Main/WebHome)