What Every Shop Should Know About Choosing a PC-Based CAD/CAM System

A good CAD/CAM system helps you improve the quality of your work, program jobs more quickly, handle more complex jobs, accept a wide variety of new projects, and boosts your bottom line. This booklet provides important information to help you select a CAD/CAM system to run on your personal computer.

Section 1 lists software selection guidelines. *Section 2* suggests ways to evaluate a software reseller. *Section 3* covers hardware selection. *Section 4* discusses ways to use your CAD/CAM system more effectively. The *Checklist of Questions to Ask* summarizes the selection guidelines.

Section 1: Software Selection Guidelines

A good way to begin your search for a CAD/CAM system is use one of the popular search engines on the Internet such as Google or Yahoo. The Internet is an excellent tool for finding information. Searching under "CAD/CAM," "CAM," or a specific product name is a good place to start. A word of caution about the Web: "unofficial" Web sites may contain outdated or incorrect information. For the most up-to-date information, it's a good idea to stay with official Web sites from the companies who manufacture the products you are researching.

If you have limited access to the Internet, or prefer starting your search with printed material, another excellent tool for finding information is to read the advertisements in the trade magazines to see what systems are available and what the newest features are. Ask other local shops about the CAD/CAM software they use. This is a great opportunity to hear the pros and cons of many different software packages before investing in one.

Attending trade shows is a good way to see many software packages at once. Trade show demonstrations are generally short and show the most exciting features of the software. Most demos are pre-rehearsed and make the software look powerful and easy to use, while avoiding any problem areas. Attending a trade show may be an easy way to meet the people who will be selling and supporting what you buy. This can remove the pressure to buy that is sometimes prevalent at a demo in your facility.

Because trade shows do not provide the full picture, it is important to schedule personalized demos once you have narrowed down your choices. Then you can see how the system performs with drawings and toolpaths that are similar to your work.

Try to involve everyone affected by the new system in the selection and decision process. This way, you can consider more than one point of view and the new system will have greater acceptance.

The specific features you need will depend on your applications and what capabilities you might need in the future. Be skeptical of feature-by-feature comparison lists, which frequently make one CAD/CAM package appear more powerful by comparing it to much older versions of the competitors' products. Rate each system according to your research and observations. Consider the following:

User Interface

Is the screen arrangement logical and easy to read?
: Does the software feel familiar and include a layout that is logical?

Can beginners and experts pick functions conveniently?
: Are the functions organized so that beginning users can find what they need easily, but expert users have full access to the deeper functions?

Are important or “active” menu elements highlighted?
: If you need to enter data or make specific picks, does the software highlight these items, or group them together for easier use?

Can you customize the menus and graphics display?
: Find out if menus, toolbars, and screen colors are customizable for greater ease of use and flexibility. Customizing menus to meet your needs saves both time and money.

CAD Functionality

Does the software price include file translators?

If you will import geometry from other CAD systems, find out if there is an extra cost for geometry translators. If possible, test the file converters with sample files from the other CAD systems, using typical geometry. Look for translators for IGES, Parasolid, SAT (ACIS Solids), DWG, DXF, CADL, VDA, STL and ASCII, as well as the ability to read product-specific files such as SolidWorks, Autodesk, Solid Edge, specialty cabinet software, and others. You should also find out what add-on translators are available.

What entity types can it create, import, and export?

The ability to create, import, and export complex entities such as solids, NURBS curves and surfaces allows you to model geometry more easily, both in 2D and 3D.

Are there direct "links" to popular CAD software packages?

Some packages have "links" to popular software packages to speed programming. Tell your reseller what CAD packages you use to find out what links are available.

Is it easy to modify geometric entities?

Can the system dynamically modify solids, splines, NURBS curves and surfaces?

How easy is it to create a model from a print?

If you will normally work from drawings, have the representative create geometry from a print during the demo. If time is short, have them model a section of a complex print. Be sure you see both 2D and 3D geometry creation. Giving representatives your prints is more a test of their experience than a test of the software's capability. It is best to send them the print in advance, but have them create the part geometry from scratch in the demo.

CAM Functionality

Can the system machine simple and complex parts easily?

Some companies specialize in complex 3D toolpaths, but their 2D toolpaths may be difficult to use. In the demo, see how easy it is to create 2D, 3D and multiaxis toolpaths.

What entity types can the system use for machining?

Can you machine solid models, splines, NURBS curves, and multiple surfaces? Can you machine different types of data, such as a solid and a surface, with one toolpath? How easy are these toolpaths to create?

Are toolpaths easy to edit?

It is important that toolpaths are easy to edit for manufacturing changes. During the demonstration, ask to see the full range of toolpath editing capabilities. Watch out for the possibility that a superior toolpath editor exists to correct results from an inferior toolpath generator.

Are the toolpath and geometry linked?

Linked (or "associative") toolpaths and geometry allow you to make changes to your model or machining strategy and immediately create an updated toolpath without re-entering data.

Is the system truly flexible?

Does the software offer a variety of machining techniques, or does it force you to use a single strategy for a given project?

Can the system calculate feeds and speeds?

Are tool and material libraries available from which the system can generate feed rates and spindle speeds automatically?

Are gouge and undercut avoidance built in?

Ask to see examples of automatic gouge protection or undercut protection on various types of toolpaths.

Can you manually override defaults and protections?

Can you manually override any machining defaults such as feed rates, spindle speeds, gouge avoidance or undercut protection? It is important that you have the final decision.

Will the software optimize feed rates?

Ideally, feed rates should decrease as the tool cuts more material, and increase as the tool cuts less material. This helps keep a constant chip load on the cutter for longer tool life and more efficient cutting. Does the software automate this process?

Does the software customize itself based on your machine?

Some software packages allow you to choose the machine on which you intend to program, and display only the toolpaths you can create for that machine.

Does the software verify your part on-screen?

A software package that has its own verification is important. It allows you to see your part being machined before actually being cut, and check for any errors that might have been made.

NC Code Output

How does the system create NC output?

Many CAD/CAM systems use translation programs called post processors to customize the NC code output. This gives you the flexibility to handle many different controls.

Does the software price include post processors?

Find out the cost to provide posts for all your machines. What is the cost to get additional posts later? How much do posts for multi-axis controls cost? Are there costs involved if you want to change your posts?

Who will customize the NC output for your system?

The NC output may need fine-tuning for your controls and shop practices. Will the reseller customize the post processors, or will the software company make the changes?

Can you customize the post processors?

User-customizable post processors allow you to make changes yourself, or with the help of a tech support person.

Is it easy to switch a program between machines?

In some CAD/CAM systems, the same toolpaths can simply go through a different post processor to go to a different control. In other systems, you must reprogram the part from scratch.

General Software Information

Are the CAD and CAM functions in the same package?

For the most convenience and ease of learning, look for a system where you do not have to switch between software applications to create geometry and toolpaths.

Is the software developer strong in both CAD and CAM?

Does the company have expertise in CAD but not in CAM? You want to be sure that the software company has the experience to develop and improve all aspects of the product, and do it well.

Are third-party packages available to add on?

Although it is best if the main software is written by one company, add-on utilities from other companies will increase the power and flexibility of the system.

Is there a growth path to more powerful software?

You may not need full 3D, 5-axis NC programming now, but you should find out if higher levels of software are available and how much it costs to upgrade later. Some companies charge a lot for upgrading while others make you only pay the difference between the product costs, with no penalties for buying only what you needed at the time.

What other software is available from the company?

Even if you only do milling, you should see if the company has other machining software, such as lathe or wire EDM. If you expand your machining capabilities in the future, you can get a familiar system.

Is the software network-compatible?

If you plan to have more than one seat of the software, find out how well the system takes advantage of a network environment.

What operating system is required by the CAD/CAM software?

Is it compatible with the system running in your shop? Will you have to be trained in an operating system and its maintenance?

Does the company offer access via the Internet?

Can you upload problem files to the vendor via a local phone number? Can you download software patches? Is there an FAQ area for quick solutions to your problems? Do they have a web site where you can get up-to-date information?

Is the software widely used?

A widely-used or industry-standard software package will help ensure that you will be able to find qualified programmers, and helps ensure a strong community for support and idea exchange.

Software Maintenance and Update Policies

How frequently are software updates provided?

Instead of asking how often they plan to release updates in the future, find out the number of updates released in the past few years, or the release dates of the past few versions. What enhancements did these updates include? Also, software maintenance programs often provide more frequent updates, keeping your software current at all times.

How much do software updates cost?

Some companies charge a fixed amount for each update. With other companies you pay an annual maintenance fee, and get maintenance releases throughout the year without having to wait for updates to occur. A few offer both options, which allows you to choose what is best for your needs. For many companies, budgeting an annual amount to keep software current is an easier and almost automatic process. Decide if it is worth the investment to get software that is constantly being updated throughout the cycle, which can help you compete as a company by using the latest and best software.

Software Training

What kind of training is available for the software?

Training may be available from the software company, the regional software reseller, and local vocational schools or colleges. Self-training material might also be available, including workbooks, on-line help functions, or multimedia training programs.

Does the software price include training?

Find out how much training is included in the price of the software and how much any additional training will cost.

How much training will you need to become productive?

How many days of training are necessary to learn the basics of the system? Realistically, the amount of training needed to become productive also depends on the experience of the trainee.

Are advanced training courses available?

After mastering the basics, you can increase your proficiency with advanced training. The most powerful functions may be too complex for a beginning class.

Technical Support

What technical support is available?

Technical support should be available through the software reseller and the software company. You should be able to expect good answers and a quick response.

How much will technical support cost?

Is tech support included in the system price? Do you pay an annual charge for support, or are you charged by the call, or both? Does the reseller charge for their own technical support separate from the software company's support?

Does the company publish customer newsletters?

Newsletters can provide technical tips and information about the ongoing development of the software.

Does the company Web site offer downloads?

Most software packages today offer update patches, maintenance releases and other tools via their Web site, letting you choose when to access them.

Is there a user group for the software in your area?

User groups may be independent, or run by the software company or reseller. You can see how other companies use the system, and learn about shortcuts and new features.

Software Developers

Is the software company well-established and stable?

Find out how many programmers, tech support and training people work for the company. Is the company financially sound? Is it well-established with a good history? Since CAD/CAM is such a highly competitive market, some vendors may spread false or misleading information about the stability of their competitors. Look for unbiased sources.

Second-Hand Software: It Is Usually Not Legal

Although it is referred to as buying CAD/CAM software, you are actually licensing it. Buyers enter into an agreement with the software company to use their system. Most CAD/CAM licensing agreements state that the software may not be transferred or sold to another company. If you accept the terms of the software and do not abide by them, your software license could become invalid.

Piracy of software can be a felony offense. The consequences can be imprisonment, confiscation of your computers, and closing of your company. Disgruntled employees or competitors often turn pirating companies in to the software developers. Before acquiring second-hand software, call the software company and ask about their licensing agreement. Even if the software is transferable, there may be charges for relicensing, updating to the current version, training and technical support.

Section 2: Evaluating A CAD/CAM Reseller

Many of the leading CAD/CAM developers sell their software through a Reseller network. This means that you can get your CAD/CAM system from a representative who lives and works in your area. These resellers form an important link between you and the CAD/CAM developer — they offer the strength and dependability of a large company on a local scale.

Your CAD/CAM reseller plays an important role in your use of the software. They will offer you technical support, answer your questions and make sure you are productive as quickly as possible. Therefore, it's important to evaluate them when choosing a new CAD/CAM system.

What should you look for when evaluating a reseller? Here are some suggestions:

What is the reseller's history?

How long has the reseller been in operation and how long have they been selling the product you are investigating? If they have been successfully selling and supporting the software for years, chances are they have a strong company based on a good product, and will be there when you need them.

A newer reseller may also have a lot to offer. Do they have previous experience with the software or a good background in the manufacturing or CAD/CAM industries? Look for evidence that a new reseller is willing to go the extra mile for you. Choosing a product supported by a responsive reseller with satisfied customers is a good start.

Does the reseller offer local support?

Training and support are crucial to a smoothly running shop. A good reseller will make sure that you have the support you need. This can be done through support contracts which let you call whenever you have a question. Most also offer training either on or off-site. Schools and colleges often offer training classes in specific CAD/CAM systems, and your reseller may be able to put you in touch with these facilities.

In addition, many resellers offer their own Web site, user groups, seminars and training sessions for new versions. These allow you to easily get updated information and software utilities, and help put you in contact with other shops that do similar work.

Is corporate support also available?

Does the developer fully support the reseller with the latest information, training, and technical support? This is important for a number of reasons. If you have a highly specialized question that your reseller wants to double-check, he or she should have full access to the developer to get your question answered. Also, although your local reseller should do all he can to support you, sometimes they may be tied up helping other users. Make sure that the CAD/CAM developer offers backup technical support in case your reseller is temporarily unavailable.

What is the reseller's territory?

Some CAD/CAM developers will assign a specific territory, such as a state, to a single reseller. If the territory is small, the reseller may handle all sales and support through his company. If the territory is large, they may have their own network of sales and support staff to ensure proper customer service. This allows a single reseller (and any support network they may have) to concentrate on servicing local users and handling local issues.

Is the reseller dedicated to the CAD/CAM software?

Top-notch resellers, just like NC programmers, try to find the best CAD/CAM package and stick with it. One who sells several competing CAM products may have their time and skill spread across too many packages. A reseller that offers "best in class" software is more likely to be an expert with that package.

What is the reseller's skill level?

When you schedule a demo, ask them to program a part that is similar to your work. The representative should be proficient enough to program your part while explaining the process in a way that is clear and easy to understand. This is a good sign that he or she understands your work and will be able to support you in the future.

What is the reseller's reputation?

When you're investigating CAD/CAM systems, it's often a good idea to ask other shops for their recommendations. The same is true for a CAD/CAM reseller. A reseller with a reputation for prompt service and reliable support is better than one who is out to make a fast profit without the long-term commitment to your satisfaction and success with the product. You may want to ask for references and call some local users to find out what they think of the reseller's support and service.

Does the reseller demonstrate computer literacy?

Your reseller should be able to help you choose hardware with the correct system requirements to get the most from your CAD/CAM system. Some resellers offer computer hardware as well as CAD/CAM software, while others may be able to recommend a hardware reseller.

Is the reseller familiar with your industry?

A good reseller will have a working knowledge of your industry in general, as well as local issues that may affect you. He or she may also be able to give you direction, advice and industry contacts such as machine tool dealers and suppliers.

They should also be familiar with several different types of machining, such as milling, turning, wire EDM, and routers. This helps assure that if you add additional machines to your shop, your reseller will be able to help set you up with the correct NC programming software.

How strong is the reseller network?

Is the reseller part of a strong worldwide sales and support network? This is useful for you because resellers often rely on one another for tips and advice from around the globe. In addition, other resellers in the network may develop add-ons to the CAD/CAM package and may know of software utilities that can help you in a highly specialized application. If they are in contact with others in the network, they will be able to let you know about these specialty tools.

Section 3: Hardware Selection Guidelines

PC hardware becomes obsolete very quickly. It is helpful to study the current prices and configurations on popular hardware vendors' Web pages and in their printed advertisements. A more powerful computer is more expensive initially, but it is a better value in the long run. Software will perform better and the computer will become obsolete less quickly.

Choosing PC Hardware

Your choice of PC hardware makes a vital difference to the productivity of your CAD/CAM system. Before choosing a computer, ask about the minimum as well as the recommended hardware configurations for the software you are buying and for upcoming releases, because the requirements may increase as the software is enhanced over time.

Minimum requirements mean the software will run but perhaps just barely. If you buy hardware to meet minimum requirements, you may have to replace or upgrade it quickly. It may also be painfully slow to use. Recommended requirements will be more expensive, but the improved performance will be worth the extra cost, especially if you are using the software for programming complex 3D parts. Ask for the minimum and recommended requirements for:

- Processor type
- Processor speed
- Amount of random access memory (RAM). The more you buy the faster your system will run.
- Type of graphics card. The more video RAM on the graphics card, the faster the display.
- Hard disk size
- Minimum required screen resolution
- Operating system and version
- Additional hardware, such as a modem or CD-ROM
- Ports such as a USB or parrallel port for security device

Choosing a Brand of PC

Your safest choice is to buy a reputable, name-brand product with a good warranty. If you buy mail-order, you should be able to get replacement parts quickly from the manufacturer. If you buy from a local company, they should be knowledgeable enough to solve hardware or configuration problems.

Some companies offer "bargain" computers assembled from generic components for a low price. However, the hardware may not be as compatible as advertised and troubleshooting can waste a great deal of your time. Before buying, make an agreement that you can return the computer if your CAD/CAM system doesn't run properly on it.

You should also check to see if a company is selling you refurbished hardware in a new case. Warranties on this type of equipment may be less and breakdown of equipment may happen sooner.

Buying a Used Computer

Be sure to get specific information about the used computer before making a decision. See the list shown in the previous "Choosing PC Hardware" section. If the computer does not meet the recommended hardware specifications for the CAD/CAM system, find out how much it will cost to upgrade it. It could cost more to buy and upgrade a second hand PC than to buy a brand-new computer. Make sure the software that comes with a computer can be transferred to a new owner. For many software packages, this is in violation of their software license agreement and you may end up paying much more for this “bargain.”

Section 4: Using Your System Effectively

Important PC Software and Utilities

To operate your PC efficiently, you will need several important software utilities, described briefly here.

Backups:

Files can become corrupted and hard disks can fail, so you should regularly back up your work. You can use Microsoft's standard backup utility or buy software specifically for making backups to tapes, CDs, or backup drives.

File Compression:

These utilities compress files, decreasing their size so you can store more information on disks or other media, or save time transmitting files. The files must be uncompressed with the same utility before you can use them again.

Virus Protection:

If you share data with any other computer, virus scanning software is an absolute necessity. Set up a regular schedule for running virus scans on your hard drive. For maximum safety, run a virus check on every external file you receive before you access it. Subscriptions to companies that provide virus protection software is like having low cost insurance. If you do not have virus protection software running, your computer will most likely get infected, potentially causing loss of data.

Disk Defragmentation:

As files are deleted, "holes" are left in the data on the hard drive, which get filled with small files and fragments of larger files. The more fragmented the data becomes, and the slower the system runs. Disk utilities such as Microsoft's *Disk Defragmenter* will rewrite the data with no holes or fragments. See your Windows manual for warnings and complete instructions.

Networking:

A network can interconnect computers of different types in order to share data and peripherals. Networking requires special software and hardware.

System Management Issues

To gain the greatest benefits from your CAD/CAM system, you need to utilize the system completely, choose good operators, get proper training, and keep the software updated.

Choosing CAD/CAM Users

Don't rely on one person to know the software. Train someone who can make a change or do a job if the normal user is unavailable. Choose people who are open to new technology, and willing to learn. CAD/CAM software is a tool to help designers and NC programmers do their jobs more efficiently. Someone who is unfamiliar with prints, NC programming and machining cannot simply go to CAD/CAM training and become productive with the system.

Getting the Most from Training

Spend some time using the system before going to the training. Work through any examples or exercises that are available and note any questions. When you attend training, you will learn far more about the software because it is somewhat familiar.

It can be difficult to make a transition to a new software package. It may seem easier to work the old way than to use the new, unfamiliar system. It is important to persist in using the software until you develop more proficiency. Continue to learn the higher capabilities of the software by taking advantage of advanced training for experienced users.

Utilizing Technical Support

If your software does not run properly, and you are unable to resolve the problem using the documentation, don't hesitate to call for technical support. You might have a hardware configuration problem, or be experiencing conflicts with other software. If your NC code output is not correct, editing the files by hand should be a temporary solution only. Insist that the software reseller or developer customize the output properly for your control.

Staying Current

A good CAD/CAM system is constantly being enhanced to make it more powerful and easier to use. To stay competitive, continue to update your software and learn the new capabilities of each version. An annual maintenance program can assist you in staying up to date. As new enhancements to the software are made, they will be released to you, allowing you to use these new improvements before the customers who wait to purchase their update. Attend user group meetings to learn new ways of using the software and contribute your ideas for future enhancements and product direction. Make sure you are receiving a Customer Newsletter if the company offers one and check their website frequently for updated information.

In Conclusion

A good CAD/CAM system will help you improve the quality, efficiency and competitiveness of your shop. Choosing a system, especially your first one, is not a simple process. This guide gives you the tips and insights that many shops don't learn until after they have bought the wrong system. Learn as much as you can about the products, and you will make the best decision the first time.

Checklist Of Questions To Ask

Software Name:

Software Company:

Software Reseller:

User Interface

Is the screen arrangement logical and easy to read?

Can beginners and experts pick functions conveniently?

Can you customize the menus and graphics display?

CAD Functionality

Does the software price include file translators?

What entity types can it create, import, and export?

Is it easy to modify geometric entities?

How easy is it to create a model from a print?

CAM Functionality

Can the system do simple and complex parts easily?

What entity types can the system use for machining?

Are toolpaths easy to edit?

Are toolpaths and geometry associative?

Can the system calculate feeds and speeds?

Are gouge and undercut avoidance built in?

Can you manually override defaults and protections?

Will the software automatically optimize feed rates?

NC Code Output

How does the system create NC output?

Does the software price include post processors?

Who will customize the NC output for your system?

Are post processors customizable by the user?

Is it easy to switch a program between machines?

Is visualization of NC code output available?

General Software Information

Are the CAD and CAM functions in same package?

Is the software developer strong in both CAD and CAM?

Are third-party packages available to add on?

Is there a growth path to more powerful software?

What other software is available from the company?

Is the software network compatible?

Software Maintenance and Update Policies

How frequently are software updates provided?

How much do software updates cost?

Software Training

What kind of training is available for the software?

Does the software price include training?

How much training will you need to become productive?

Are advanced training courses available?

Technical Support

What technical support is available?

How much will technical support cost?

Does the company publish customer newsletters?

Is there a users group for the software in your area?

Software Developers

Is the software company well established and stable?

Software Resellers:

What is the reseller's history?

Does the reseller offer local support?

Is corporate support also available?

What is the reseller's territory?

Is the reseller dedicated to the CAD/CAM software?

What is the reseller's skill level?

What is the reseller's reputation?

Does the reseller demonstrate computer literacy?

Is the reseller familiar with your industry?

How strong is the reseller network?

Minimum Recommended Hardware Requirements

Processor type and speed:

Random access memory (RAM):

Graphics card:

Hard disk size:

Operating system and version:

Additional hardware or software:

Recommended Hardware Requirements

Processor type and speed:

Random access memory (RAM):

Graphics card:

Hard disk size:

Operating system and version:

Additional hardware or software:

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