Why Use Estimating Software?

Can computer-aided estimating software help your shop make money?

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In the manufacturing environment, estimating affects the economic condition of a business. It's the basis of your profit or loss. Estimates that are too high produce no work, because you are underbid and don't gain those potential orders or sales. You may win underbid jobs, but they don't produce the profit from which you can successfully grow a business.

If it makes chips it's good, but how do you estimate the cost of making those chips? Software can help. Owners and engineers find it easier to justify purchase of equipment and software used on the floor rather than estimating software.

Obtaining the correct quantity of bars, sheets, or castings is necessary. Whether you do it using your trusty calculator, write the numbers down, plug them into your shop management system for reference, or use a spreadsheet, it must be done. Part complexity must be considered, as that may affect the scrap percentage you wish to account for. Material loss for bar end at the saw operation and the kerf (amount left for facing and squaring operations, as well as the saw blade width) must be accounted for. Determination of the best sheet size to use to minimize scrap generated during nesting may be considered, and computer-aided estimating software should account for that as well.

It only makes sense that once your material requirements are determined you should have the opportunity to gather material prices. Whether you choose to call your material supplier, fax them the request for quote, e-mail them that request, or search your own database of stored material prices, estimating software should automate this process, saving you hours per week. The newest tool in the computer-aided estimating software toolbox is the ability to use the Internet to search for the best material prices from a variety of material suppliers. Just as travel Web sites allow you to search among multiple airline carriers, you can use the Internet to do the same for material prices.

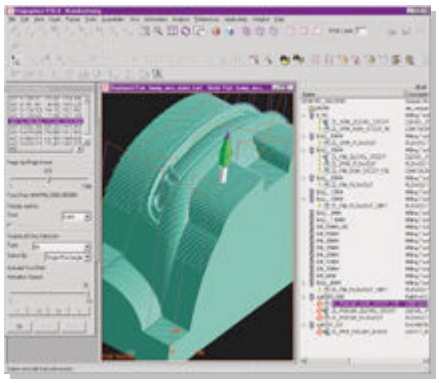
Process planning is the art/science of looking at the part and deciding that you will saw, CNC turn, machine, and then heat treat and plate the part. These are the steps or procedures you will go through to make the part per print. The method or process may have options. For example, you may decide on method A if the order is for 15 pieces, and establish a completely different method (method B) if the order is for 250 pieces, and yet still another method (method C) if the order is for 2500 pieces made in lot sizes of 500, but released over the next year. Estimating software must be able to highlight the best method, and indicate the cost differences

between the methods. Opportunities to select standard operating procedures should exist. This capability will allow you to standardize your methods, and give you the capability to train potential estimators quickly and build consistency into your operations.

The establishment of proper cycle times must be engineering-based. That is, based upon machines, materials, and manpower. One huge difference between manual calculation of cycle time and computer-aided calculation is the time necessary to determine the exact time consumed when performing a specific operation on a specific machine. For example, finish turning must take into account rapid approach distances, clearance planes, whether you use constant surface speed for different diameters, tool-change time, ramp-up time for the spindle to reach the required spindle speed, available horsepower, and other issues. Without the exact machine parameters, you produce nothing more than a glorified, expensive guess.

Once the proper cycle time has been calculated, the cost of labor at that operation must be applied. During this phase, the machine employed may determine a different cost, because one machine may have a different labor rate associated with it than another. The efficiency of one machine may determine a different cost as well, since the throughput from an older machine may differ from a new model of the same machine. Cellular manufacturing considerations may influence the cost, as one employee may be called upon to perform several functions over three different machines, thus dividing his labor across those machines. The efficiency of those operations may be affected, because the operator will not be devoting 100% of his time to them.

Whether you prepare quotes manually, use a spreadsheet, or use your shop management system, you must give customers something for their consideration. Your quote letter, which is often the only response they may receive to their Request For Quote (RFQ), will speak for you. Internal miscommunication as to the terms of the quote, the prices for the different quantities, or delivery capability can hamper any possible future business. Estimating software should be able to generate your quote letter with the click of one button. Customization of the quote letter, internal to your estimating program, should be available, as learning another software program to make custom forms is counterproductive.



Toolpaths calculated, machine scheduled, operator assigned--but what will the job cost? (Image by Unigraphics.)

You already have the information in the system; it's just a matter of pulling that data. Sending the letter should be just as easy, whether you choose to print and mail, print and fax, fax directly from the computer, or e-mail--it should all be at your fingertips.

There is an economic impact when purchasing anything for your facility. For estimating software there is an immediate and negative cash flow--payment for the software and training. But there must be a positive cash flow in response to the implementation of such a tool. Look at the software as a tool that will allow you to incorporate Value-Added Engineering functions, assist in eliminating the costs of unreliable estimates, help you understand the value of time, allow you to review cost reduction/cost avoidance, and enable you to see marketing's role in the use of computer-aided estimating software.

Parker Hannifin uses the value-added engineering capability of estimating software. This company has established a VAVE (Value Added Value Engineering) Group to ensure fair costs to the company, and profits for its suppliers. Although Parker Hannifin wants its suppliers to be successful, it doesn't want to pay more for a part than necessary. Using computerized estimating software as a value engineering tool has worked well, and the software's capability to run an estimate against several different manufacturing methods simultaneously--for multiple quantities--gives the buyers an idea of what to expect for both prototype and production quantities. Their facility practices lean manufacturing and cellular concepts, as well as VAVE. Serving the aerospace industry, Parker Hannifin provides gas-turbine fuel systems, including products like the fuel nozzles in a jet engine's hot section. Its facility assembles machine parts for its customers, purchasing nearly all of its machining from outside suppliers. Knowing the outside cost of parts is one goal of the company's VAVE program.

After engineers design the engine parts and receive customer approval for them, the designs arrive in Value Engineering. Here, manufacturing engineers start looking at methods of manufacture. Everything designed by the company is made of high-temperature superalloys. Manufacturing engineers must determine not only the feeds and speeds, but how to cut them, methods and types of workholding, and the equipment to use. While the facility doesn't manufacture the part, they do need to prepare an estimate based upon the machinery in their supplier base to determine a cost. This information gives others on the team, and in the buying group, a good idea of the actual part cost before they issue an RFQ to pre-approved suppliers with those capabilities.

One timesaving capability of the estimating software is its ability to simultaneously run an estimate against several different manufacturing methods. Many times suppliers will make prototypes for the facility. This can involve one or as many as 500 pieces. There are times when a prototype is needed quickly. The engineers will share the routing, and whatever other process planning information they need, such as the times, the operations, and even the tool list.

Getting back to reality is one of the engineering group's goals. They want to help their suppliers make money and be successful. However, they also want to know they are paying what the part is worth. If it takes two minutes to make the part, then the company should pay for two minutes of labor, burden, machine, and profit. It's the fudge factor that they'd rather not pay.

Unreliable estimates are costly. When looking at the costs of unreliable estimates everyone can readily identify the first one, *underquoted*. Either something was missed--possibly a tolerance was overlooked--or the estimator anticipated better performance on a given machine on a given material than was achieved. In any case, you missed the quote and now you have two options: attempt to resolve the price difference with the customer, or maintain your credibility, honor your commitment, and find a way to make the part for the quoted price.

Pass this information on to your shop manager and you'll likely get one of two responses: "There's no way we can make it for that price," or "We could attempt to eliminate a certain operation and try to salvage the job." Either way you are playing with fire, because pushing a job that's already known as a loser through your facility does nothing to help the estimating department's credibility on the floor. Likewise, attempting to shortcut operations can lead to higher-than-normal opportunities for scrap, which further reduces the profit for that job. Establishing credibility through consistency--one of computer-aided estimating software's key benefits--will assist the facility as a whole. The estimating department will prepare estimates by referring to what the shop floor can produce, and confidence in the numbers that the estimating department sends to the shop floor will allow less room for second-guessing, enhancing throughput.

Small shops and manufacturers often don't take advantage of software technology, even compared to their peers in other industries. More often than not, it isn't the financial investment that's responsible for this situation, but the perceived investment in time. Time is money--no doubt about that--as most shop owners and facility managers will agree. Helping them see this in their terms, however, can be more difficult.

Here's an example. The medical community doesn't expect $500/hr surgeons to fill out patient admission forms, prepare the operating room, or supervise billing procedures. Personnel who do those jobs are paid $15 - 45/hr. Yet many shops neglect to change the administrative side of their business at the same pace as they change their shop procedures. Many purchase the latest drills, the newest machines, the best tools--everything related to shop work or making chips. But they don't seem to keep the same pace on the other side of the wall.

There are exceptions, such as CAD/CAM or shop control software, which are viewed as being on the shop-side of the wall, or an administrative necessity like accounting software. But many still feel software, or more specifically the computer, is a gamble, and represents a loss of control or even delegation.

If software can bring to the manufacturing operation such benefits as time savings, speed, and increased productivity, all of which directly impact the time portion of the equation, why can't we see the value of the time gained by employing such a tool? Is it because the folks using the software don't make anything?

For some years now, the CAD/CAM function has been seen as a necessity by just about every manufacturer and job shop. That recognition has been followed by the knowledge that the scheduling and controlling of shop functions can be best done using a computer. Other packages, like Tool Inventory Management and/or Statistical Process Control

software, which have proven to require more effort than many were willing to put forth, have not been perceived as vital.

Most companies know they must have some computer tools, but don't feel that developing an estimate with a computer is a necessity. Yet developing estimates and process plans, and providing customers with accurate and dependable prices, is a shop's business. If the shop can't do that quickly and accurately, it can't compete. And if a shop can't compete, what good is that new high-speed machine on the floor? One question I often ask customers is, "If you can't respond to the RFQ by its deadline, what confidence have you instilled in your customer that you can make the part-delivery deadline?"

Identifying and implementing cost reduction methods for existing parts is always a major responsibility for facilities that make production runs. Cost avoidance typically is performed before producing the first chip. Getting the cost out of the design as early as possible is where the biggest value-engineering benefit resides. As we all know, it's very difficult to get cost out of a design after production begins. You can be locked into your design because in the field everything has to be backwards and forwards compatible. Once manufacturing has gone down a path any distance, engineering is extremely reluctant to back out and rework a design.

For existing product lines whose design won't be changing, engineers may find they are paying premium prices. Re-estimating those products with software can give the company's procurement buyers a better-cost target, and highlight opportunities for savings.

Many facilities are developing "should-costing." That is, what this part should cost. Software offers another avenue by which facilities can validate whether they are getting the right prices and costs. Many times, when customers go out for competitive bids, the pre-estimated costs can set the tone for what the market will bear. When doing development work, and even prototype work, the final print may not be available. Using estimating software can allow you to say to your suppliers, "here's what we think it should cost, and here's the reason why." With the right information for your suppliers, such as routings and layout sheets, possibly even cost-breakdown worksheets, you can assure them your numbers are accurate and justifiable.

One additional function of the estimating package is the chance to research and highlight opportunities for more business. By using the built-in reporting and sorting tools inside the program, research can be done to find missed opportunities and areas of weakness. You may find that all the jobs you quote that use stainless steel have a lower quote/order ratio than those made with aluminum.

Many software providers will tell you that, in job shops and small to mid-sized manufacturing firms, software sales have been pushed aside in favor of new equipment. Before the current slowdown in economic activity, we saw a good deal of money spent on making piece parts: buying machine tools, buying tooling.

As mentioned before, CAD/CAM and shop-control software are considered essential. But while CNC is essential to a specific machine tool, you bet your business on every estimate you prepare. So why do machine tools still make it to the front of the line when it comes to purchases?

An uneasy mistrust of software seems to exist. Recently, a systems integrator and software distributor told me he'd lost an expected software sale. The customer told him he needed more capability and would buy a new CNC vertical machine. "If I were to prove to you this software will help you schedule the plant better," my friend asked the customer, "so that you wouldn't need to spend 15 times the software cost, would you buy the software instead?" The answer was no.

We all know that some software, properly applied, can eliminate the need for additional hardware. Some software can contribute as much to a shop's return on investment (ROI) as any machine--often at a far lower acquisition cost. What will it take for shop owners to consider manufacturing software to be essential?

Where's the fault? Is it the bankers who think nothing of granting a $250,000 loan for a turret punch press, but won't advance $20,000 for software nearly as quickly? Do we as software developers need to develop new ways to determine ROI? Or is it simply mistrust for what cannot be seen--the fact that the owner cannot see parts coming from

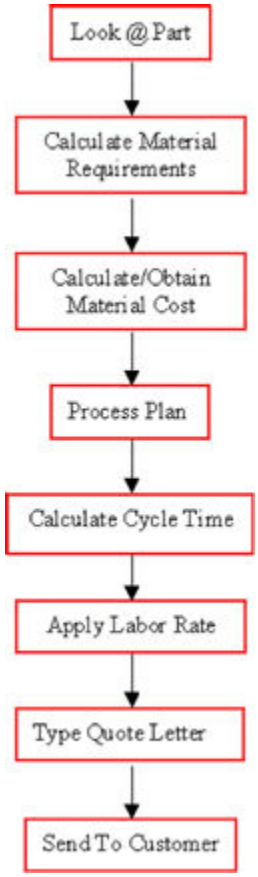
the software on the plant floor? Either way, shop personnel must come to understand that software is a tool just as a machine is a tool.

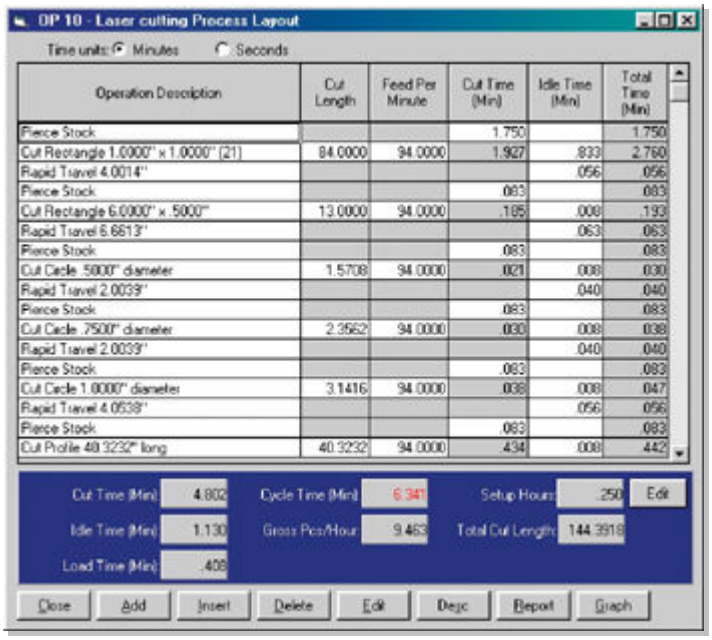
Cost estimating software speeds up the process of preparing a quote for customers by automating a procedure that's very often done manually in small and mid-sized shops.

In many facilities, design engineers design a part, then electronically send it to manufacturing engineers, who plan the process and give back the cost results to the design/marketing group. Design/marketing then decides what steps need to be done to get the part within the cost parameters. Today we face a new trend, design for cost effectiveness, which is much like the process of design for manufacturing.

With the latest technology in the estimating field, Feature Recognition Technology, design engineers can use computer-aided estimating software, select the solid part, recognize the part's features and, based on the tools and machines available, automatically suggest the manufacturing method. The software can then send the engineer-turned-estimator the tools and costs needed to manufacture the part. Design engineers can modify a diameter, or possibly modify that chamfer into a radius, and upon selecting "extract machinable features," realize the impact of manufacturing costs they just designed into/out of the part.

Estimating software will affect your bottom line; it has a direct economic impact. It will cost you money up front, and it will be different. Certainly it requires some work to implement. Given the obvious reasons to consider acquiring a tool like computer-aided estimating software, you may overlook it as a benefit to your bottom line. By doing so, you may also be overlooking the very tool required to help you reach that elusive "next level." Your decision to acquire such software may be the decision that turns your estimating department into a profit center. Remember, you truly bet the business on every estimate you do.





Computer-aided estimating software permits the user to accurately determine machining time and cost for each job. Note that the time to cut each entity or edge appears on the screen.