

Trash, Refit, or Buy New?

Is your machine tool too dumb to upgrade?

Robert B. Aronson
Senior Editor

It's no joke that by the time you get your latest electronic device home from the store, it's obsolete. That same problem plagues many manufacturing managers.

The problem then is deciding whether to let things alone, buy new equipment, or upgrade existing equipment.

Three main categories have to be evaluated: mechanical performance, software, and controller.

On the technical side, greater precision and higher production are key requirements.

For example: Can the machine eliminate vibration that could be ignored a few years ago? Because of higher speed requirements, vibration can become more obvious, and is now a potential cause of cutting error. Or can the machine perform at the most recent definition of "high speed"?

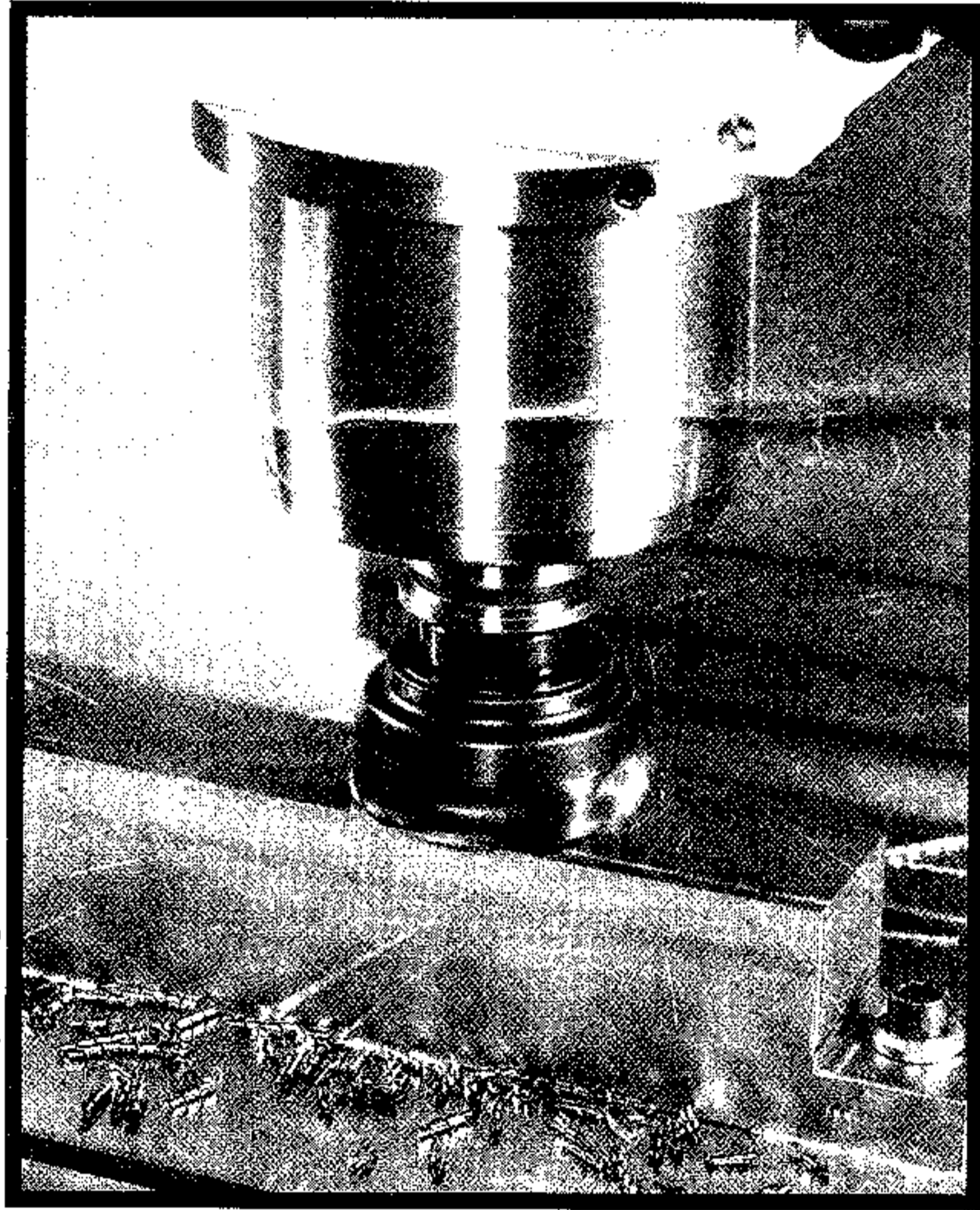


Photo courtesy Harding Inc.

Software is probably the most elusive feature to evaluate because of its rapid change. An additional complication is the many choices and providers. Finding the best versions at the right price to meet a particular need is tough.

Does the original supplier still exist? If so, is there still support for your version? If new versions are now available, can your existing controller process it, and can your present machine respond to the new commands? And not incidentally, can your operators run the system with the new software?

Many see the controller as the major feature to evaluate because of its critical "middle-man" task of reading, then responding to the program.

Then there are labor costs. Would you be ahead with a high-priced machine that is very easily operated? Or should you count on finding reliable operators who can handle a complex multifunction machine?

And there is the most obvious question: "How much can I spend?"

The answer is simple, if you know a few things about the future, such as what you will be making, from what, with what specifications, and at what price.

When buying or refitting, here are some factors offered by Chris Stine, vice president, United Grinding (Miamisburg, OH).

- If the machines needed are fairly standard, you don't need any special-purpose features, and if you are fairly sure future needs will be similar to what's now being manufactured, then purchasing a machine is probably the best move.
- Consider the cost of training a new operator, or even finding one, plus possible a machine maintenance personnel.
- What are the market conditions? When delivery books are full, there will be a delivery-time question. When there is evidence of strong buying, the lead time for new equipment may be longer than is practical for a given situation. This is particularly true when some special feature is needed. Or, the buyer who is desperate may be forced to buy some "less-than-ideal" unit, just to keep operating.
- When buying a standard grinding machine, for example, the investment gap between a new and reworked machine is not that great. Typically the cost of a rebuilt machine will be about 70–80% of a new unit.

On the other hand, United Grinding engineers strongly recommend a rebuild for a more specialized grinder (or any special machine tool). Features such as a requirement for increased speed or accuracy may significantly widen the cost gap, because the new specialized machine will cost much more.

- Will integrating the new equipment with your existing units be a problem? For example, will a higher-speed spindle increase your overall productivity, or just make one grinder produce more?
- The company also suggests you question the need for new technology. Many specialized machines were highly optimized when purchased. Additional performance increases offered by the new machine may not be necessary.
- How great have the improvements been for the type of machine you want? Hardware changes more slowly, so improvements over 10 years might be minimal. Over the same time period, software and controller changes will certainly be significant. The maintenance cost of the controller should also be considered.
- What you expect to be making in the foreseeable future will determine how advanced your equipment needs to be. If possible customer needs are totally unknown, then the machine with broader capabilities might be the best choice.

“When a manufacturer believes some machinery is obsolete because it cannot produce the required capacity, we very often find that the problem is not faulty equipment,” says Tim Welch of GE Fanuc Intelligent Platforms (Charlottesville, VA). “The real problem is equipment utilization. Most machines are underutilized. For example, often operators were never trained to be productive, but just to load material and run the machine.”

Welch notes that when you first suspect a quality problem, the best first move is to run a ball-bar test. That will determine whether machine wear or CNC servo adjustments is the issue.

It's also important, where production is the issue, to find the bottleneck. If the machine you plan to replace is not the villain of your production problems, then making it perform better won't help you.

Welch cites several factors that may cause inefficiencies, including:

- Best practices not identified and shared between operators.
- Insufficient training.
- No standard operating procedures for recovering from downtime.
- One operator asked to run multiple machines without changing processes to support it.
- The machine is not suited to a specific application.
- The machine works on materials that produce abrasive dust, such as graphite or cast-iron castings. This can cause premature wear problems.

Possible factors mitigating against new-machine purchase include:

- Hidden costs, such as new tooling, transfer and rigging, and training for operators, programmers, and maintenance personnel.
- Older machines tend to be well built. So if an older machine is mechanically sound, then replacing the CNC and drives may give you an impressive increase in productivity. The controller and drives should be considered as an integrated system.
- A labor agreement at your company that specifies one man work only one machine. If so, you may not be able to take advantage of the labor benefits a new automated machine may provide.

“Get rid of the dinosaurs!”

“But if you do buy new, it's wise to find out where your service engineers have to come from,” Welch continues. “Are they local, or do they have to fly in? What is the wait time before help arrives?”

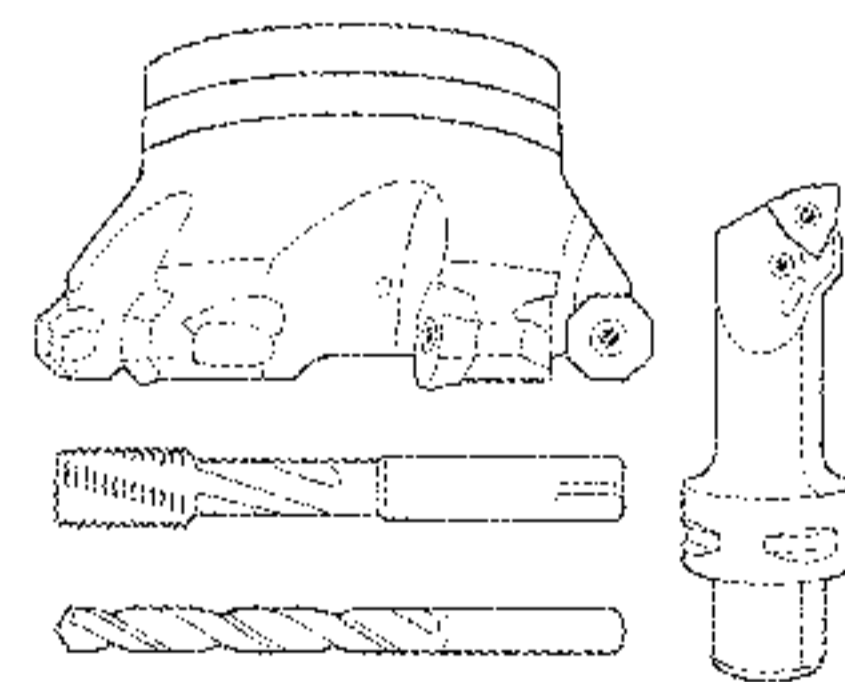
“But the big benefit from the right new equipment is the competitive advantage it gives the new owner over competition. Then there is the side benefit that new machines often impress potential customers.

“For machine tools that cost less than \$100,000 it may be difficult to retrofit the machine for less than the new machine price. Most retrofits are done on larger or more complex machines because the wide cost gap favors retrofitting,” Welch continues.

“GE Fanuc's philosophy is to continuously improve their products. But when the improvements are limited by the basic design, then we move to a higher level of technology,” Welch concludes.

Software maintenance can solve a lot of problems. But software obsolescence is easy to avoid, according to Ben Mund of CNC Software Inc. (Toland, CT). He offers these suggestions that a company can take to prevent them-

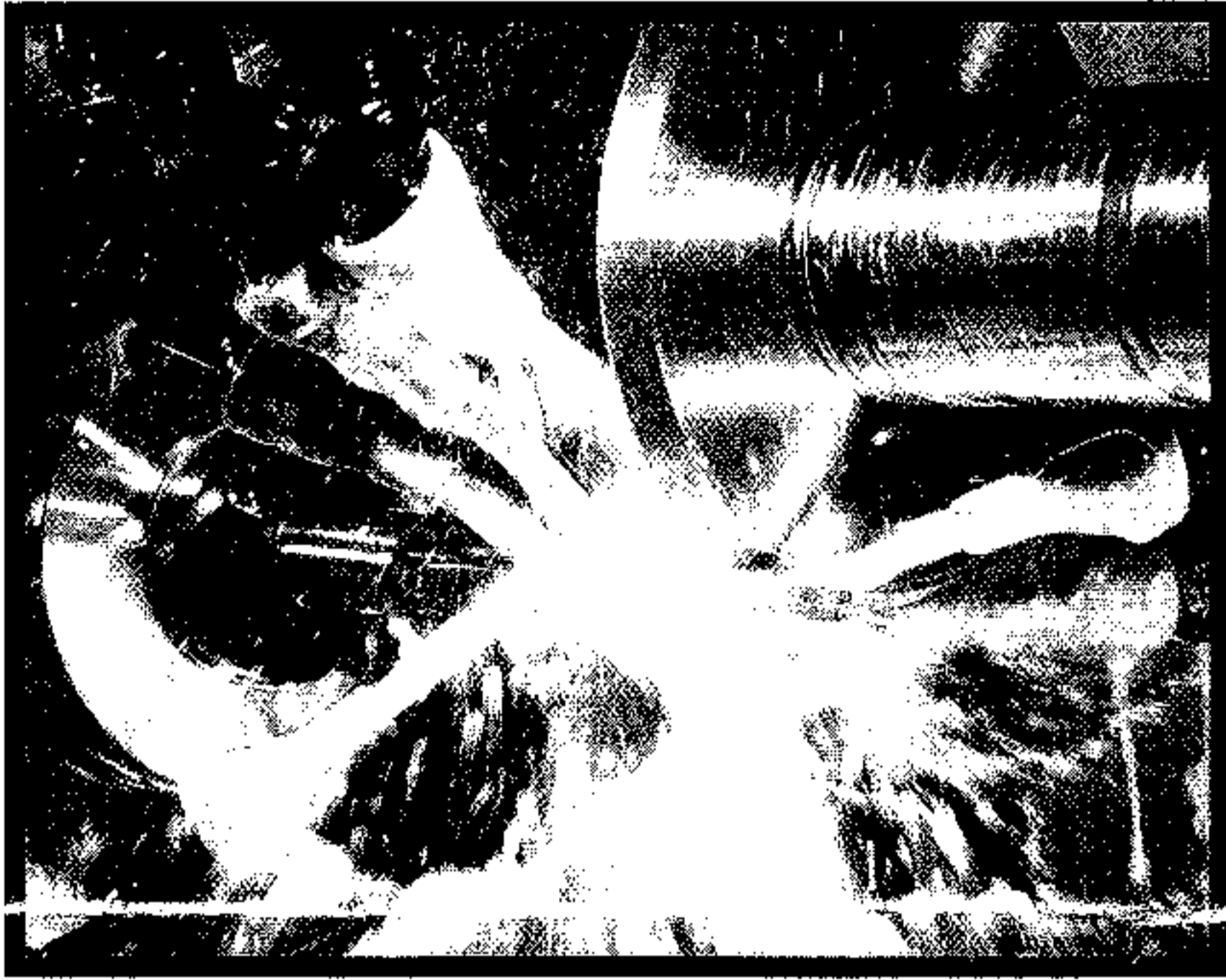
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Photo courtesy United Grinding



selves from being restrained by obsolete software, depending on their budgets.

“The first and most effective method is to take advantage of any software maintenance programs that your ven-

dor offers,” says Mund. “This includes CAD, CAM, and many other software packages. You completely avoid obsolescence by subscribing to maintenance, because you have immediate access to the very latest software that the company has to offer. Most companies that choose to subscribe to software maintenance programs find it to be an affordable investment with a big payback.

“One clear reason to be current on your software is the ability to communicate with all of your customers and vendors, knowing that you can accept their files using the most up to date file translators. This alone is worth the investment. Nothing is more daunting than getting a file that you cannot open or use. There is the added benefit of giving you an edge over competitive shops that may not use this tool, because you will have new techniques and tools that they may not have.”

If your budget doesn't allow an annual software maintenance subscription, consider updating to the latest version at least every other year. Although this does not guarantee that you are using the very latest software tools, it

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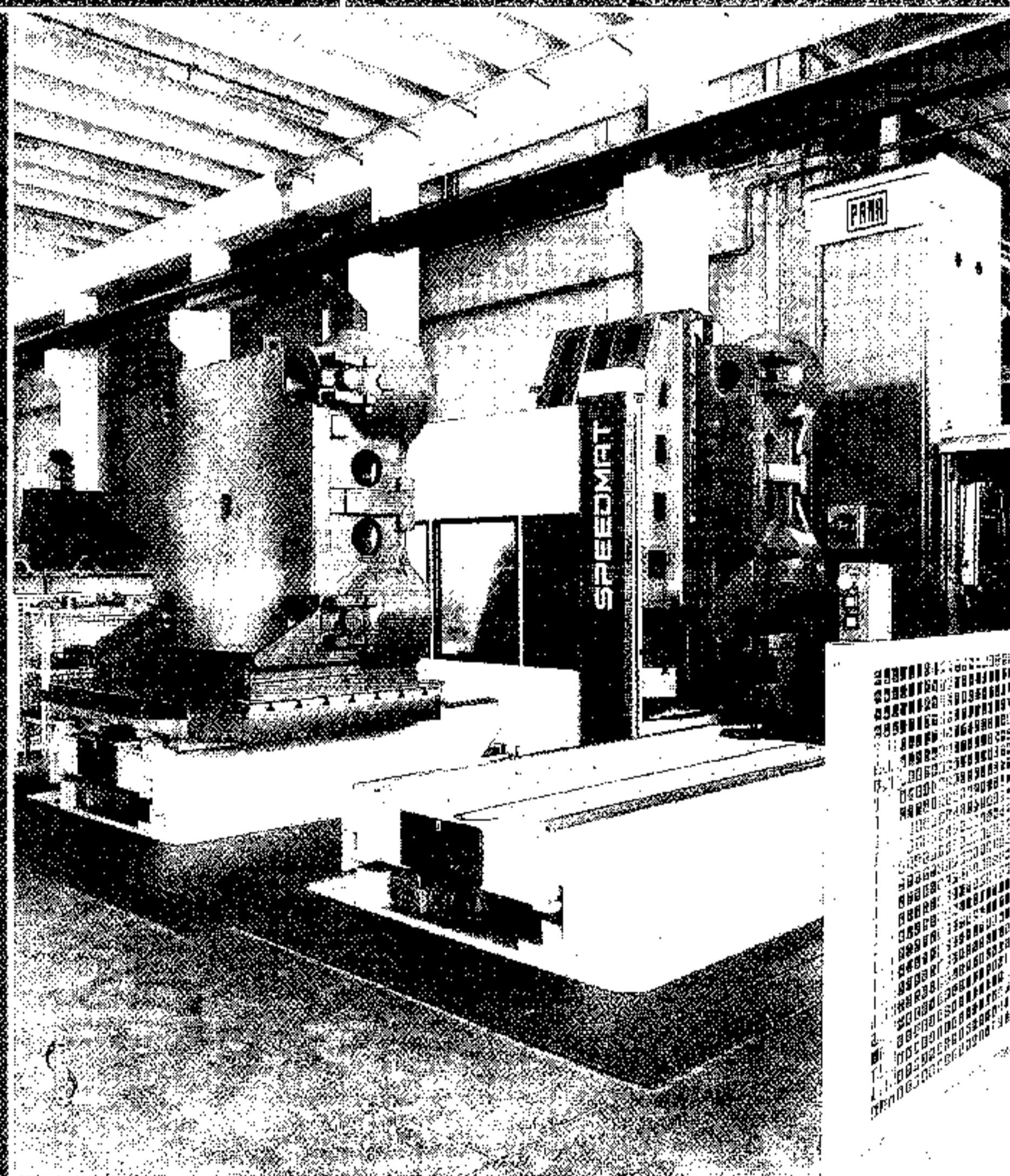
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does ensure that the tools you're using are fairly current, and can help you keep your competitive edge.

"If you're temporarily unable to do either of the above, you should at the very least make the most of the software you currently have," he says. "Many shops only use a small percentage of any given software package they own. Browse the company's Web site, look through the software's online help, and talk with your software reseller to find out what additional tools you have that you may not be using," Mund concludes.

Here's a list of "how to decide" suggestions compiled by United Grinding.

- **First, make sure the problem is defined clearly.** Perhaps the machine fails to meet expectations because it's worn out and needs repair, as opposed to being incapable of meeting a need due to design limitations.
- In the first case, consider the available options, from "do-it-yourself" repair, to hiring a rebuild company, to using the OEM to do the repair.

Critical Decision Tips

One obvious sign you might need to upgrade your equipment is you are obtaining fewer orders from your quoting process.

Some companies are reluctant to refit or buy new because things are going well and some or all of the machines are paid off. The trap here is you may wait too long to upgrade equipment because there is a lower overhead payment.

To get an accurate account of what your present machines cost, don't forget maintenance costs. That includes repair parts, labor, and the productivity lost while the machine was down.

Check with manufacturers of the machine tool you want. Some may offer inventory reduction discounts.

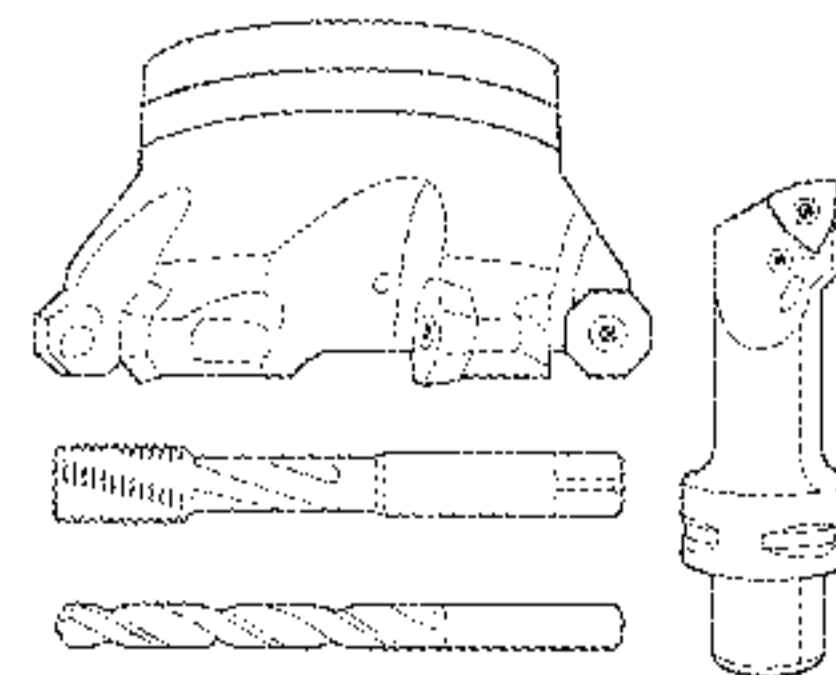
Thinking of the future, "going green" may reduce operating costs. Requirements for coolant, lubricant, and scrap disposal are getting tighter. The kinds of fluids needed might sway a decision. For example, grease lubricants greatly minimize the possibility of water-based coolant contamination resulting from a machine using way-lube oil.

Taxes are another consideration. The US government currently offers a one year 100% tax write-off for up to \$250,000 under Section 179 of the Internal Revenue Code (see http://en.wikipedia.org/wiki/Internal_Revenue_Code). It allows taxpayers to deduct the cost of certain types of property as an expense rather than requiring the property to be capitalized and depreciated. There are conditions—such as you must have made a profit in 2008. So a review of the latest rules with your accountant should be a first step.

But, it's an incentive to upgrade your equipment, even if your older equipment is functioning. Section 179 changes annually, and you should take advantage of this year's great business opportunity.

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Territory Manager
Hardinge Inc.
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Many OEMs (including United Grinding) offer both field repair and extensive rebuilds at the factory.

- An upgrade is probably the wrong decision if it's necessary to reconfigure axes or otherwise fundamentally change the

design or the complete control system. On the other hand, a modest change to a control, or even software, may yield a significant improvement.

- If your machine can no longer handle a job, it may be able to perform another function in your shop. For example, many otherwise obsolete tool grinders are used to perform preliminary fluting work before the tool is finished on a newer machine. But this approach has to be balanced against the cost of additional handling time and shop space.
- You should sell, trade, or scrap it if your machine is performing a function in which the competition has new, efficient machines and you are competing for the same jobs. You're pretty much forced to follow suit, so bite the bullet and get rid of the dinosaur.

"The only big companies that succeed will be those that obsolete their own products before someone else does," to quote Bill Gates, founder, Microsoft Corp. (Redmond, WA). And that implies constant changes in software performance. Older software can be a problem. Maybe your machine can't handle a new version, or the original supplier has gone out of business or no longer supports the software.

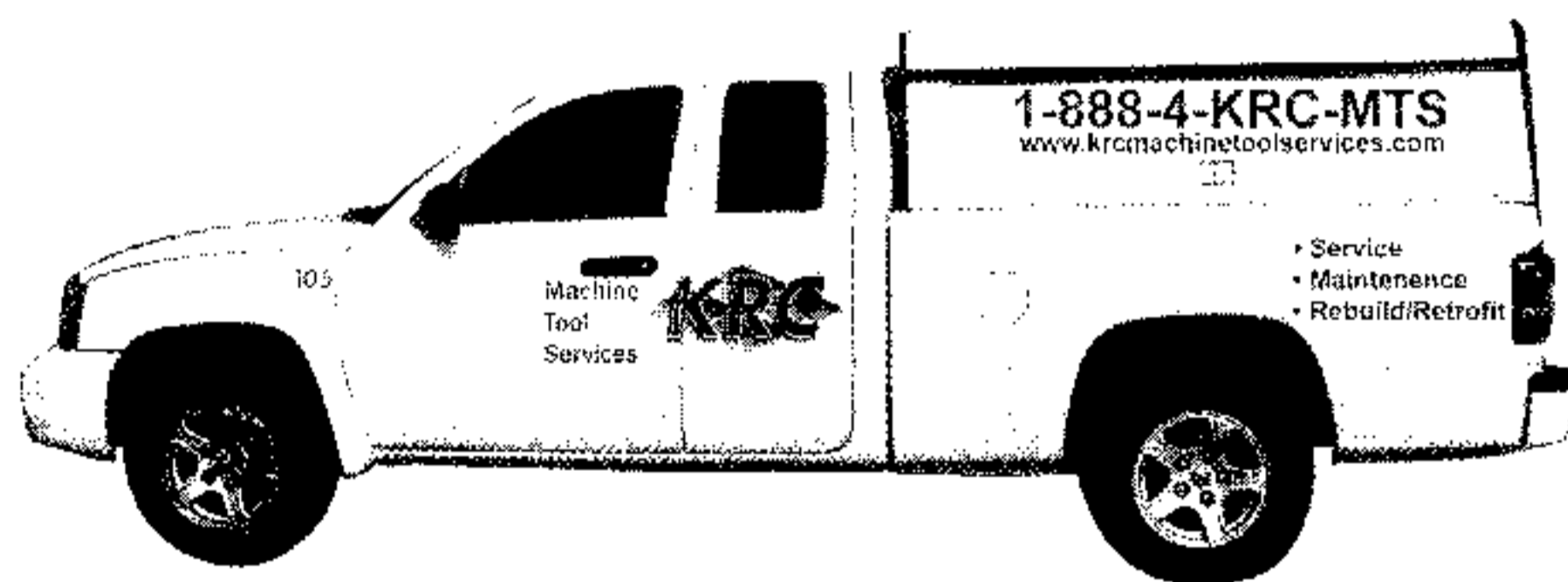
"Little attention has been paid to software obsolescence," explains Peter Sandborn of the Department of Mechanical Engineering at the University of Maryland (College Park, MD). "Management rarely has a clear idea of how software problems impact the whole system. And formal tracking and management of software obsolescence is just getting started."

One possible way to assist those who need help with "discontinued" software, Sandborn suggested, is an e-mail chat room, or a society of

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software users that would link those needing help with those who might supply it.

"Few, if any, system development and support organizations actually track and manage software obsolescence," he says. "Systems engineering approaches to concurrently manage software and hardware obsolescence are virtually non-existent, and there are no formal organizations sharing obsolescent data and information on software."

Buying new is one answer to resolving the obsolescence problem. First and foremost, you take advantage of the increased productivity provided by the latest technology. It is the goal of Mazak (Florence, KY) to continuously upgrade their machines. The company uses innovation to create innovation, implementing its own existing technologies to design and produce new machine tools. Because of the constant improvements, some companies find it profitable to replace their machines on a fixed schedule. The exchange time can be based on running time or a specific date.

"Question the need for new technology."

If purchase isn't practical, leasing may be the answer. This ensures an infusion of new technology at the end of every leasing period.

The overall goal at Mazak is to provide machines that pay for themselves by increased productivity. One of the more significant improvements has been in their spindle motors. They offer higher rpm and higher torques, and they are more compact. This translates into greater metal removal rates.

Machines are getting larger with increased X, Y and Z axis travels to efficiently produce both large parts and more parts per setup.

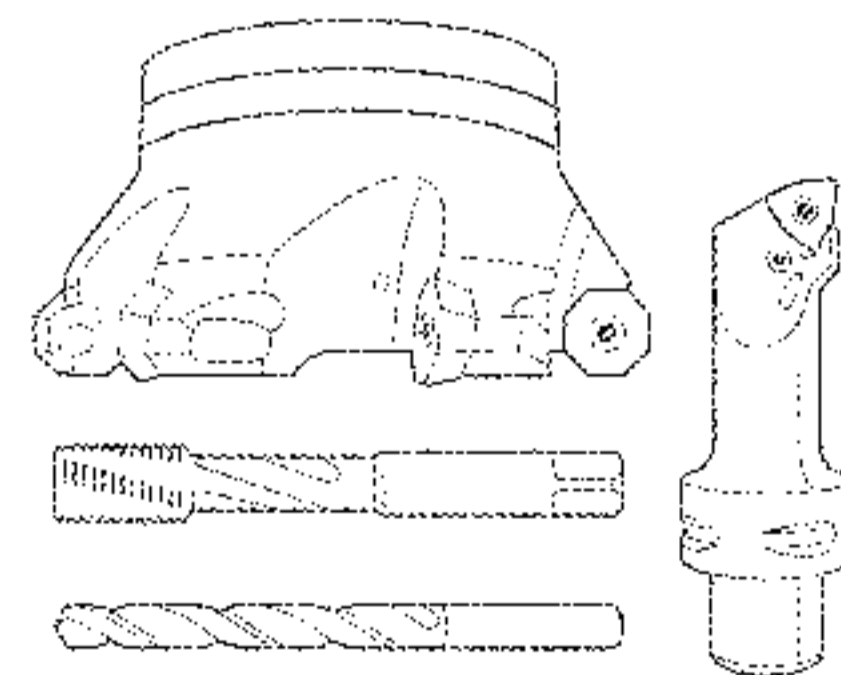
Software is becoming more efficient. In addition to machine tool motion programming, it can be used to schedule, provide tool management, and monitor key machine-performance features.


To improve productivity, Mazak machines offer palletizing, more multi-tasking technology, and simultaneous five-axis operation. The company designs equipment to more easily adapt to automaton, and some Mazak machines are offered with robots.

Disappointing Refit

We have done three upgrades/retrofits over the years, and all three have been disappointing at best. Being a slow learner, I finally came to the conclusion to bite the bullet and buy the new technology intact, where the mechanical parts, hydraulics, and electronics were matched. But since the advent of eBay, we have "junked" very little machinery.

Mark O. Sommer
Chairman and CEO
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"Controls are the key to the rebuild versus buy decision," says Vice President Jerry McCarty, MAG Fadal Machining Centers (Chatsworth, CA). "The number one consideration is the controller. Is it keeping current? Many manufacturers can save money in productivity and performance by replacing a slow-performing controller."

Repair may be a problem for those controllers with older printed circuit boards. If they have been discontinued, or are no longer supported by the manufacturer, that will play a large part in the rebuild decision.

"The need for more memory is also a common problem, because newer programs are more complicated so they need more computer space," says McCarty. "Even the oldest Fadal control can be equipped with additional memory, have a USB drive installed, and be updated to our current software release. We also keep our Fadal control backward-compatible, so any program ever written for a Fadal can be run on the current control with little or no editing."

When the mechanical elements of the machine are failing, the first signs are usually looser part tolerances. Positioning accuracy and repeatability are the first to go.

"We believe a rebuild is a good idea for the environment and for the cost-conscious machine shop," he says. "With Fadal machines, the iron is very good and so is the flame-hardened box-way design. For example, a unit that initially cost \$79,000 can be rebuilt for \$30,000. And that machine's performance will be up to or exceed the original specifications."

"Completely rebuilt machines can be refinanced as a new machine, usually with a five or six-year term, if you can find a lender," McCarty concludes.

Why upgrade or replace software? Most CAD/CAM software vendors upgrade their products on a regular basis, by developing new releases. They do this to stay competitive and to provide a valuable service to their existing customers. Whatever you spend on software will add up to a lot less than you will spend training your people to use the software, or less than what the part programs you do with it are worth.

"Protecting this investment is one reason customers pay for 'maintenance,' as most software companies call it," explains Bill Gibbs, president, Gibbs and Associates (Moorpark, CA). "Paying a little to make sure you have the latest software is usually a much better deal than tossing it out and starting over again, unless the new product is a lot better than what you have."

Many find that they have outgrown their CAD/CAM software, and this is a good reason to go looking for a product that will better provide the high productivity that you need.

"Every now and then a CAD/CAM company goes out of business and their product is no longer supported," Gibbs explains. "This is usually not an immediate crisis. The soft-

ware continues to work, after all. But it may not run on your next computer purchase. You may have difficulty acquiring post processors and services. As time goes on, you collect more disadvantages, and at some point it is a better decision to move on to a fully supported up-to-date product."

A retrofit program called Preferred Solution Partner has been launched by Siemens Energy & Automation Inc. (Elk Grove Village, IL). In this program, Siemens will supply CNC motor and drive packages, when needed, to a nationwide network of qualified retrofitters. The retrofitter handles the repair and Siemens provides engineering assistance and aftermarket support, along with all the warranty and back-up.

Siemens Retrofit Business Development Manager Tom Curfiss says the first step in a retrofit job is determining the scope of the work needed, then a retrofit partner will be selected. Smaller jobs will probably be handled locally with more complex problems going to a regional or national program partner.

According to Curfiss, there are two major reasons for a retrofit. The first is that the older controls and drives can no longer be serviced, or are not able to run the machine as the user requires. Recent encoder technology advancements simply make machines run faster, with greater precision and resolution than older hardware, so that even if the older components can still get serviced, retrofitting makes sense.

The second factor is a growing trend among many manufacturers, particularly job shops. They want to become more competitive or provide more value-adding services to current customers.

The "industry yardstick" to determine if a retrofit is practical is that it does not exceed 60% of a new machine's price. But in some cases, such as the need for extreme precision, a higher retrofit price might be a wise decision. The overall savings make it a worthwhile expense, especially with larger machining centers. ■

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