

# Gear Inspection For The Long Haul

*Beating the controller obsolescence demon.*

**Douglas Beerck & Mark Cowan**

*Question:*

We just received permission to purchase our first CNC gear inspection system. With capital approvals so hard to come by, especially for inspection equipment, I want to be sure to purchase a system I can count on for years to come. My past experience with purchasing CNC equipment has shown me that serviceability of the computer and the CNC controller portion of the system can be a problem in just a few years because of the obsolescence factor. What information do I need to look for when selecting a supplier to reduce the risk of obsolescence, as well as to reduce the long-term servicing costs in the computer and controls portion of the system?

*Answer:*

As we have all painfully discovered, obsolescence of our CNC controls, computer hardware and software, machine tools, inspection equipment, etc., can be expensive. We have come to expect a long life out of the mechanical portion of our CNC inspection machines. After all, inspec-

tion machines don't see the tooling forces applied to machine tools, and they typically operate in a cleaner, more temperature-controlled environment than other equipment. But the electronic and computer hardware and software are victims of a rapidly changing technology, with a much shorter serviceability. Keeping ahead of product developments in these areas is a constant battle.

When purchasing CNC gear inspection systems with the goal of maximizing product life and serviceability, a number of "optimum design factors" should be taken into account. These include cost, reliability, performance, flexibility, upgradability and serviceability. Another factor of increasing importance is the networking capability of the system. Let's take a look at each of these factors, keeping in mind their long-term design considerations, costs and points to remember when researching suppliers.

**Cost**

When we talk about cost in this article, we are not looking at the initial system cost or a cost breakdown of the computer controller itself. We are

referring to the long-term cost associated with the design of the software and computer controller itself. The overall system price may or may not be attractive at the time of purchase, but the real question is, can the product, which you expect to be using for years to come, be economically serviced in the future? What design criteria were used on the computer controller? Some initial questions that can be asked easily without being an electronics or software genius include:

1. Did the system supplier design the controller specifically for the application, or is this unit a generic off-the-shelf package?
2. Does the system supplier make the controller, or is it purchased complete? From whom?
3. Will the system supplier agree to service the controller as well as the machine? If not, who will?

Off-the-shelf, generic CNC controls may appear to be more cost-effective at the time of sale, but they may or may not lend themselves to future upgrading or component-only replacement.

A CNC system supplier should be intimately familiar



**This column will answer your questions about gear machinery controls and electrical systems. Send your questions to Mission: Controls, P. O. Box 1426, Elk Grove, IL 60009, or fax them to 708-437-6618.**

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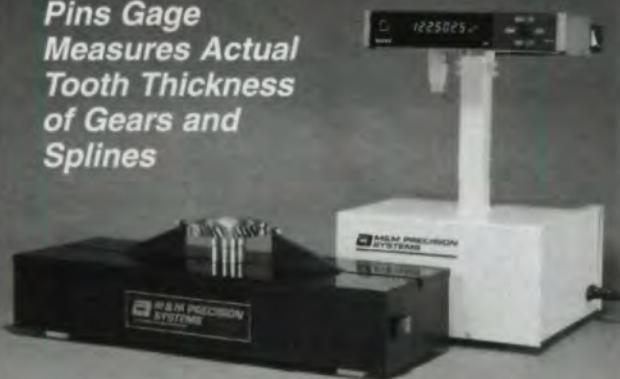


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## MISSION: CONTROLS

with the design of the controller and its operating software if he is, in fact, going to service this equipment for you. He or she should be able to tell you things about the design of the controller that reduce the cost of service for you in the years to come.

### PC or Not PC?

Today's machine controllers are more and more moving into the PC environment for a number of reasons, including cost. If the system supplier's control hardware is not PC-based, find out why not.

What specific advantages can a CNC PC-based system offer? Perhaps the biggest is that the design utilizes the industry standard architecture (ISA) bus to ensure multiple vendor selection of components and international service support. With multiple vendor selection of the system's computer and control components, the cost of service typically is reduced. Your system supplier is not held hostage by one component supplier, a situation that raises his cost of doing business with you.

A PC-based system will also function with a standard operating system, such as DOS. Maintenance of control and software can be addressed more easily with the use of such a standard operating system. File maintenance, updates, etc., can more easily and more cost-effectively take advantage of standard modem technology in the PC environment.

As mentioned earlier, CNC gear inspection systems usually have machine hardware that outlives the computer and control hardware and software from a functional standpoint. Newer computer hardware usually means

faster processing speed. The computer industry has gone from 286 processors to Pentiums in about 10 years. By using a PC-based platform, standardization of much of the computer/controller hardware lends itself to multiple sources for upgrading, retrofitting, etc., for the years to come.

### Reliability and Performance

Questions regarding reliability and performance follow the same logic as those relating to the system as a whole. All suppliers of CNC gear inspection equipment typically quote impressive uptime percentages, accuracy and inspection times. How does the supplier back up these statements? Can the supplier give you the names of other customers who are using the type of controller hardware and software he is offering you? How many systems using this configuration are in the field operating today?

### Flexibility

Will this system be able to address not only your present needs, but also your future ones? Can software options be added later? How much will it cost to do so? Can the software be modified by the supplier if your needs change over time? How much software customization is done by this company? Can the vendor provide you with the names of customers for whom software was modified? Does the supplier offer a computer/controller package that allows you to purchase replacement components (i.e. monitor, keyboard, CPU, etc.) direct from the component manufacturer if you choose? Are these standard components truly "standard," available from several sources?

### Upgradability

Chances that the system you purchase today will meet all your requirements five years from now are usually slim if your company is adding products, changing designs, improving processes, taking on new customers, etc. Does your supplier offer the ability to upgrade your system's software and computer hardware over time?



Fig. 1 — M & M Precision's 4-axis, Model 3025 PC gear process control system.

### Networking Capability

Once again, analyze your future requirements. Will you have a need for multiple systems? Will you have the need to do off-line part parameter entry or tolerance modification as your needs change? What about downloading data to a central computer where information can be evaluated, stored, etc., by another source? What costs are associated just with the networking requirements? If networking is or may be a requirement for you, this is another reason to look at a PC-based system. Today's PCs offer plenty of power and lower networking costs than most other alternatives. Most end users that utilize a centralized data analysis site for their SPC, process control,

etc., work with a PC-based system. Look at the supplier's ability to assist you in networking as well as his or her ability to interface to your existing network if you are already using one.

**Closed Loop Process Control.** With the advancement of gear inspection software and CNC technology, some manufacturers offer the ability to link the inspec-

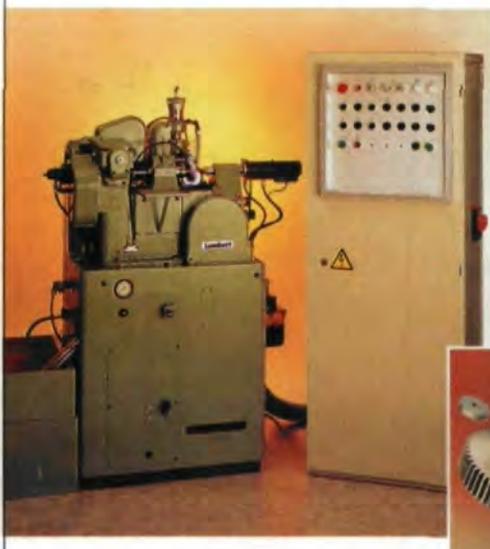
tion system directly to the machine tool, sending machine tool setting change data based on the inspection results. Even if your current machine tools do not offer the ability to interpret this data, what about your future machine tool purchases? If you are considering this degree of process control, the selection of a CNC inspection system should include research into the supplier's capability in this area and the willingness to work with you and the machine tool manufacturer.

### Serviceability

Last, but certainly not least, is the serviceability factor of the equipment you are purchasing. There are basically two schools of thought

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### MISSION: CONTROLS

among end users. Some users of computer-controlled equipment prefer servicing the equipment themselves as much as possible after the warranty period expires in an effort to keep costs at a minimum. If this is your view, consider a number of points. Can the computer itself be serviced locally by either factory or independent sources

Many end users look for the system supplier to be their sole support arm. If this is your view, make sure the company you deal with has an adequate service staff. Does the company handle all service calls directly or does it contract out to independent service companies? If your system is made overseas, where are the people who will service it based?

#### Longevity

The future and stability of your proposed vendor's business is a consideration as well. How long has the company been in business? What is its position in the industry? Is it profitable? Getting service on equipment manufactured by a company no longer in business or no longer servicing your market can be extremely difficult.

#### Conclusion

As with all capital equipment, selecting the appropriate CNC inspection system and vendor requires research. Obsolescence and serviceability considerations also require you to look into the future a bit more than some other purchases might. Look at the long-term view and your future requirements. Looking at the big picture today can mean big savings tomorrow when it comes to meeting your CNC gear inspection system needs well into the future. ⚙

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#### ONE OF THE ADVANTAGES

OF THE PC-BASED

SYSTEM IS THAT IT

USES THE STANDARD

ISA BUS, ENSURING

MULTIPLE VENDOR

SELECTION AND BROAD

SERVICE SUPPORT.

after the warranty expires? When dealing with a machine made overseas, look at some of the critical components—CPU, drive boards, etc. Are these standard components that can be purchased from more than one source? Is the system supplier willing to help you go directly to the component manufacturer if you need to? How about the diagnostic capability of the system? What documentation is supplied for maintenance and serviceability? Is diagnostic software available and accessible by the end user?

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