

PC-Based Controls

This paper explores the benefits of PC-based controls for use on machines that conduct high-speed machining with micro-tooling. The paper's intent is to prove that PC-based controls for such machines are absolutely essential in today's changing manufacturing market.

What's a PC-based control?

An advanced control unit is required in order to conduct complex machining operations.

Specifically, a PC-based control is best suited to fill the role. Such a unit consists of a personal computer, also called the controller, and the appropriate software, created by engineers and tailor-made for the specific customer.

Increased complexity means increased expectations

The types of parts being manufactured today are getting more and more complex. Many companies are faced with an increasing number of parts that need a lot of special work done to them. The greater demands that companies are placing on their machines these days means that these machines must be increasingly more flexible.

A more flexible machine means a more complex machine, since the only way a machine can be more flexible is if there are features and routines for every possible contingency. This increases the complexity level of the machine.

Unfortunately, the more complicated the plumbing, the easier it is to clog up the drain. Therefore, the need for increasing the machine's complexity gives birth to another need, and that is the ability to monitor a machine's vital statistics.

Most machines are not equipped with PC-based controls. Their controls are DOS-based and run just one application which cannot be changed.

To sum it up, the PC-based controls need to function much in the same way as a human brain, issuing complex commands, regulating normal functions, and monitoring the body's health and performance.

The available brains

The "brain" of the machine is similar to a garden-variety Windows-based personal computer, the kind one can buy off the shelf at many stores. Specifically, it's a PC that's specially configured to the industrial requirements of the machine. This "brain" makes the machine function in the same role that a printer has with a conventional PC.

The PC is placed in a ventilated, sealed enclosure to protect it from the potentially detrimental industrial environment. The software is loaded onto the machine according to the customer's needs. The machine controls the pick-and-place system and multiple axis, facilitates robot integration, diagnoses hardware, monitors tool wear, keeps track of alarms and monitors the temperature, and can be networked throughout the plant.

The software is Windows-based and can handle multiple applications. The advanced controls are user-friendly yet have the needed complexity to allow desired flexibility. The controls are written with the hardware in mind. The Pentium-based PC operating system offers easy to use 'canned cycles', with an intuitive control that utilizes look ahead buffers. The highest performance is provided by concerted cooperation between the control software, precision ways, accurate ball-screws, and high-speed digital-servo drives. The specifically developed control software yields the performance needed for high-speed machining applications. Smart high-speed digital-servo drives dynamically correct any residual mechanical imperfections.

As an added advantage, customers can upgrade and service these computers themselves, and as time goes on, customize them if they want.

An effective combination

The solution requires a combination of the appropriate hardware and software; in this instance the modified PC and the correct programs to control the machine. This package, known as the PC controls, functions as the machine's brain and gives manufacturers the capability of handling many different applications.

Conclusion

In order to keep up with the demand for increasingly difficult and diverse parts, machines need the ability to do more complex, detailed work on a consistent basis. This calls for a more advanced control system that provides the needed adaptability and flexibility. A PC-based control system fills the need and makes this all possible.