Fanuc computer numerical controls (CNC) are widely used on machine tools, robots, lasers, welding systems, and other types of equipment used in industry. They were initially developed in Japan, and have become one of the leading control systems in the world. They enhance the machine’s productivity with easy-to-access information and programming.

The history and evolution of Fanuc controls is normally associated with the history of CNC itself. In 1956, the first numerical control (NC) was developed in Japan. In 1958, the first commercial NC control was shipped from Fanuc to the Makino Milling Machine Company. In 1960, the first Fanuc 220 NC control was developed for commercial markets. This was also the year that the Kearney & Trecker Corporation in Milwaukee, WI introduced its Milwaukee-Matic Model II horizontal machining center at the Machine Tool Show. This was the first machining center that had an automatic tool changer, with a 4,000 RPM spindle, 200 IPM rapid traverse, and a 8.5 second, 30 tool automatic tool changer (ATC), available with a Bendix or General Electric control.

In 1966, the first all integrated circuit (IC) Fanuc control was developed, and in 1968, the first direct numerical control (DNC) was developed where multiple (NC) machines could be controlled by a central computer. Today, this is also called distributed numerical control (DNC) where a network of computers control the operation of multiple machines by sending a program to the CNC memory where it can remain and function independently. The operator is able to collect, edit, and return the program which is a significant advantage over a system that is dependent on a central computer. Thus, the term DNC has come to mean both direct and distributed numerical control.

A new shop floor networking trend is now emerging that is called direct CNC networking (DCN) where the CNC control is connected with an Ethernet cable to the standard office local area network (LAN) that also supports computer aided design (CAD) and computer aided manufacturing (CAM) systems. The benefit of DCN is the dramatic improvement in data flow speed. The throughput speed for Ethernet is one million characters per second, versus the typical rate of serial communications at 960 characters per second at 9600 baud.

In 1972, Fujitsu Fanuc Ltd. was founded, and in 1976, Fujitsu Fanuc Ltd. and Siemens A.G. together established the General Numeric Corporation. In 1977, the Fanuc USA Corporation was started, and in 1982, the corporate name was changed from Fujitsu Fanuc Ltd. to Fanuc Ltd. In 1985, the Fanuc series 0 control was developed, and in 1986, the GE Fanuc Automation Corporation was established in the U.S.A. by Fanuc and the General Electric Company that is the current ownership today.

The GE/Fanuc product line is divided into two groups, “Traditional” and “Open Factory.” The traditional line includes controls for standard machine tools for milling, turning, punching, and lasers. The control unit on this line of controls is a mere 60 mm thick. It also incorporates an ultra thin printed circuit board that is mounted behind a liquid crystal display.

The “Open Factory” line is based on the same concept as the “Traditional” line except that it combines the flexibility of PC hardware and Windows based software applications. It has the ease of operation like a PC, custom interfaces, networking, and diagnostics and is designed for machines combining CNC and PC technologies. The CNC and PC are not just connected, but are integrated, exchanging extensive amounts of data at rates consistent with the inter-workings of a CNC controlled machine. By utilizing Microsoft standards, they have a greater amount of flexibility and product stability. The operating system will support Windows 95, 98, 2000, NT, and CE platforms.

Continued on Page 5
As one may see from the listed CNC system specifications, many of the controls are similar, but have different applications. The letters after the control series indicate the control application such as milling, turning, laser cutting, and punching, etc. The series 21i are the lowest priced controls, the series 16i and 18i are considered the mid-range controls, and the series 15i is considered the fastest and most accurate control, recommended for the toughest applications.

The benefits of all of these controls are that they improve the automation of the machine tool, reduce operator fatigue, reduce human error, and provide consistent predictable machining time for each part that is made. Also, the basic machinist knowledge on standard machining practice is reduced for the machine operator. Consistent and accurate parts may be produced with accuracy and repeatability - once a program is verified, ten or even one thousand parts may be easily made. Running a different part is almost as easy as loading a different program, which may easily be recalled, thus allowing for fast change-overs. This is perfect for today’s “just-in-time” production requirements.

Machinists normally make the best programmers, operators, and setup personnel because they have the basic knowledge of standard machining operations needed to manufacture a part. They should know the machine’s maximum RPM, the number of spindle speed ranges, the spindle horsepower, the axis drive horsepower, the maximum travels, the different tools that the machine can hold, the rapid traverse rate, and the maximum cutting feed rate. They should also know

Continued on Page 6