

9 *Optional Features*

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9.1 Introduction

The vast majority of CNC's in the field today are the heavily proprietary or "closed" systems. To add or upgrade one of these machines takes a coordinated (and expensive) effort by everyone in the service network. The movement is under way to "open things up" driven in large part by the promised flexibility of upgrading to the new "open" machines.¹

Trying to circumvent the option policies on proprietary CNC's is anticipated by a plentiful use of technical roadblocks and detailed sales policies. Both points effectively manage the network of service in regard to securing optional features from the OEM's. Adding fancy options to a closed CNC system will only happen after the dealer, control builder and machine builder are satisfied that a proposed option makes sense, both technically and financially. The machine dealer then quotes the entire option price, passing along the OEM charges and any after-market expenses in the final firm quotation given to the customer.

Such options can include high speed cutting, running touch probes, or adding linear scales to a machine. In the case of linear position scales, the control builder would supply the scale interface electronics and calculate the application parameters. Engineers from the machine builder would decide the best under table installation for the scales. The after-market scale manufacturer would supply the actual scales and related technical specifications. The dealer attends with the final installation and demonstration.

9.2 Control Builder Options

End-users often make inquiries about control options. Their interest begins with the common *plug-in* accessories be-

1 See the references given in Section 3.2 and 7.9

fore moving into the newer and more advanced systems offered on the CNCs of today. Finding the control options available for a particular machine starts with a call to the salesman. They run down a list of accessory control options and put together a nice written price and availability quotation.

At the time of quotation the option is fully explained and a purchase price is laid on the table. To be sure the option performs as advertised, it should be fully explained and demonstrated as a condition of the purchase. This ensures that a newly purchased accessory gets its full use and operation at the machine.

9.2.1 Factory Applications

Big dollar options exist in the coordinated *manufacturing cells*. A typical cell application uses several CNC machines linked as components in the collected assembly of a single product. The manufacturing linkage between machines is built using conveyers, robots, automatic fixtures and part pallets, all orchestrated by a central layout of carefully sequenced *cell* instructions. Most pieces in the *linkage* need expensive control options to run the electro-mechanical options.

Consider two quick examples. To maintain overall *process flow* in a manufacturing cell each stand alone CNCs must share I/O data with the central cell network. This sharing of data is accomplished using expensive hardware options for shared network communications. Another option displays an extra screen for programming the automatic storage and retrieval of pallets from a honeycomb of possible locations.

9.2.2 CNC Platforms

Before a machine leaves the show room, the choice of a control builder and computer platform version is decided. The major builders offer a few choices of standard CNC platforms. Some shops stick with one or two brands for everything in the shop, while others like to get the one best deal from everybody.

Either way, once a specific version of a proprietary CNC platform is chosen, the option to change or modify to another version is essentially past. The market place will decide if this choice remains acceptable or if systems will start opening up.

Major machine shows offer the full line-up of control platform choices, from fully open PC compatibles with a mouse to the fully closed one package systems. Different levels of PC based controllers are now available for new machine applications as well as retrofit of the older controls.

9.2.3 Serial Communications

A remote PC computer linked by cable to the main NC computer provides a fast exchange of program, offset and parameter data, the same communication link lets a small laptop run a towering CNC machine with a *spoon-fed* part program.

To review, part program data is either 1) keyed in by hand, 2) loaded by tape, or 3) sent through the interface. The interface method attracts increasing attention. Paper punch systems exchanged the NC data on older machines using a standard parallel Facit data interface. Since then, builders have adopted the RS232 standard for serial communications. The RS422 standard is also offered for longer remote transfers, although the RS232 standard continues to satisfy the majority of users.

The RS232 standard interface includes settings for the baud rate, stop bits, data bits and handshaking. Both computers must be set up ahead of time with matching interface settings. To review, information moves at the interface *baud rate* setting—the higher the baud, the faster the exchange. *Handshaking* dictates how the two connected computers handle the lightning fast, stop-and-start bursts of computer data.

A single RS232 *port* running at 4800 or 9600 baud is standard. Control options expand this to include additional data ports, high speed ports, data buffers and more exotic handshaking protocols. High speed ports push the baud rates up in the