

CNC Mill Buyer's Guide

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INTRODUCTION

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It's been nearly 50 years since the advent of computer numerical control (CNC) sped the evolution of milling machines into machining centers. It dramatically advanced machine tool control and deeply changed the culture of manufacturing. With the declining price of computers and development of open source CNC software, the entry price for CNC mills has dropped significantly over that time; but buying a new CNC mill remains a very significant capital investment for manufacturers, one that requires attention to detail and due diligence on the buyer's part.

What should a manufacturer look for when buying a CNC mill?

We posed that question to Andrew Selway, senior sales consultant at Ontario, California-based Selway Machine Tools Company, one of the nation's leading sales and service providers of CNC machine tools and automation systems. He offered a detailed and experienced perspective on this question.



CNC machines then...



...machine today.

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DETERMINING BASIC CHARACTERISTICS: KNOW YOUR BUSINESS

DETERMINING BASIC CHARACTERISTICS: KNOW YOUR BUSINESS

There are two types of uses for CNC mills: **R&D prototyping** and **commercial manufacturing**.

For the purposes of this discussion, we're focusing on the latter.

Typically, the first thing a manufacturer needs to determine is the size of mill required. To do this, take into account the nature of the business and why the tool is needed. Are you buying it for a specific part? Is your production low volume/high mix or high volume/low mix? Or is it somewhere in between?

The specific nature of the production will dictate the size of the CNC milling machine needed. "If a manufacturer is at capacity and it's time to buy a new machine—and typically they're buying a machine for the department where capacity issues are causing a problem—look for a machine that covers 80 percent of the work in that area at a minimum," says Selway. "That will determine the size to consider."

After size is determined, companies usually look at features that cannot be readily changed in the field: typically the spindle, horsepower, torque, and rigidity. The type of materials being manufactured and/or whether a part being manufactured needs cycle time reduction generally determine these choices. "If you have a higher speed spindle, for example made of aluminum, you can put more parts in the bucket at the end of the day," notes Selway.

Of course, cost is always a basic consideration; as the machine gets larger and more powerful, it gets more expensive. So there's always a cost/risk assessment. "If the parts a company is making now are 30 inches long, they're not going to buy a 30-inch-long machine; rather, they should go to 40 inches," explains Selway. "A company should have historical data to indicate what size parameters should cover the work. If 40 inches looks like it will cover more than 80 percent of the work, going to 50 inches may not be worth the extra cost based on projected future work. There's always a projection and assessment involved."



Low volume/high mix versus high volume/low mix

THE 80/20 FACTOR

THE 80/20 FACTOR

Typically, 80 percent of the cost of a CNC mill goes towards the core machine (i.e., the basics discussed earlier), while 20 percent covers options or customizing the machine for specific work. “One buyer may find that probing is an important option, while another wants bigger tool storage because they run a largely just-in-time operation and need the ability to break down the machine to put another job on it quickly. These options provide the ability to get a job from print to part faster.”

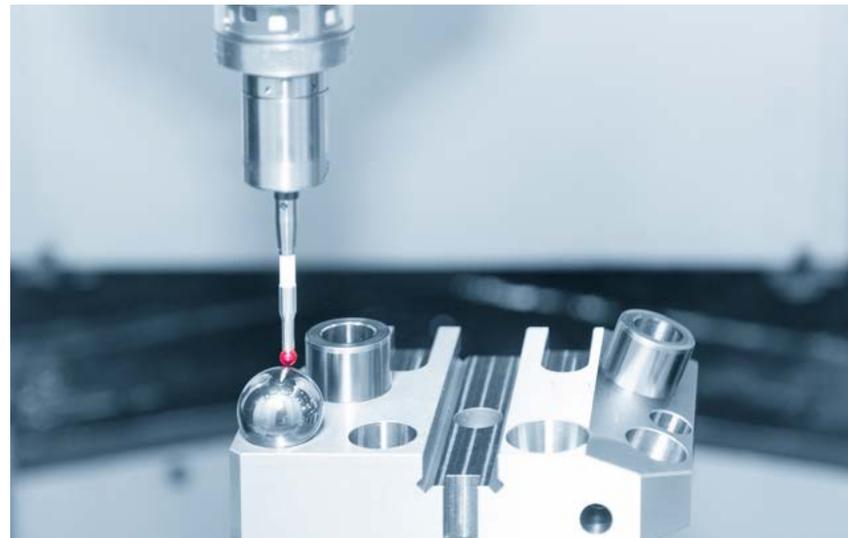
Moreover, probing allows the user to walk away from the machine because it checks measurements or tools in process. In the manufacturing environment, it streamlines the process by eliminating manual involvement, and therefore drives down the risk of human error.

Another manufacturer may use that 20 percent for a high-speed spindle that will shave minutes off cycle time. In that case, when a company is using the tool to crank out parts, there’s no need for the larger tool storage. In the end, the work applications dictate where the marginal dollars are spent.

To get more from a machine as work changes over time, or to streamline processes, the

manufacturer may decide to upgrade the core CNC mill. In general, most options available are field installable, albeit at a little higher price than if they were bought with the core purchase.

“Elements such as a fourth axis or adding a rotary cable are always options,” notes Selway. “Most software options through any of the control builders are field installable. Generally the only ones you can’t change in the field are things like type of spindle and speed. You can change the controller, but it’s so cost prohibitive you may as well buy a new machine.”



Save time with on-machine inspection

CONTROLLER AND DATA CONSIDERATIONS

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Selway points out that with CNC mills, the machine manufacturer matches the controller with the machine almost without exception. Typically they purchase a controller from a trusted supplier (e.g., Fanuc, Mitsubishi, Siemens) at a level that fits the machine's capabilities.

“ CAM software has grown leaps and bounds in the past few years.”
Andrew Selway, Senior Sales Consultant.”

Increasingly, manufacturers are adding controller options such as HSM and expanded memory. “CAM software has grown leaps and bounds in the past few years. This software, along with the tools paths and power they provide, require a high-speed look ahead and other dynamic functions from the control. There's a lot more in the algorithms to enable the mill to move faster and more nimbly, meet the requirements for more advanced operations, and help the hardware move forward with software, which always advances at a faster pace.”

CONTROLLER AND DATA CONSIDERATIONS

The way the data gets to the mill from the controller has evolved over time. Historically, RS232 cables were used, typically creating a bird's nest of cables above the machine shop. This was a slow process, particularly because the distance between the mill and the programming facility increased. It often took a long time to download a program.

These cables gave way in time to PCMIA cards that were used to upload programs more rapidly; today Ethernet and USB are gaining wide currency. "Ethernet is the best data option for a Greenfield site; but some vendors offer Wi-Fi and third-party companies are doing Bluetooth and Wi-Fi," he says.

There is a general desire for a more secure way to handle data. "More enterprises are using USB sticks, which are portable yet can be tracked. Those programs are incredibly valuable assets, and using the USB sticks offers an easy and secure way to assure both performance and governance."



Heidenhain controller

OTHER ESSENTIALS

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The strength of the distributor has a direct correlation to how CNC mill manufacturers are responded to in regional markets. How do you separate yourself when there is so much competition?

Selway elaborates: “Support is very important. If a machine goes down, that’s the manufacturer’s income. It’s not like a copy machine. Typically, in a manufacturing shop, everything is in that spindle; anything that moves and runs into metal at high speeds will have issues at times. So having a distributor that inventories parts and provides excellent field service is important.”

Distributors increasingly have to satisfy customers that don’t specify the machine they want, but rather come in with parts. “As a result, distributors are seen more as partners than they were in the past,” he notes. “Increasingly, they’re consultants as much as salesmen. Among better distributors, this trend is reflected in their staffing that now includes more application engineers.”

Another area that’s currently high on the manufacturer’s radar is training. Finding qualified personnel is a challenge because these machinists are leaving the workforce faster than they’re being replaced; additionally, the pace of technological advance requires a more educated worker.

Consequently, good training is an important consideration when acquiring equipment such as CNC mills. “Customers are willing to invest in training,” explains Selway. “It makes sense for them to do business with those that can provide it.”



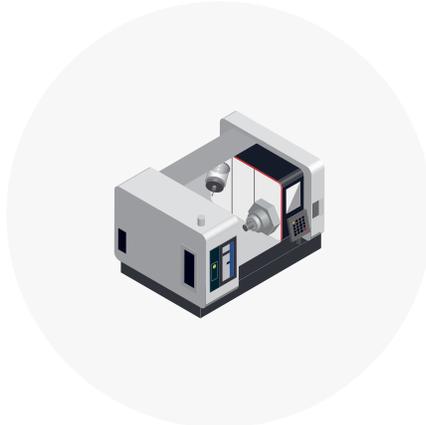
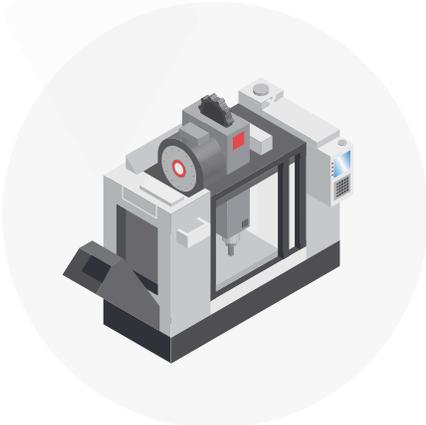
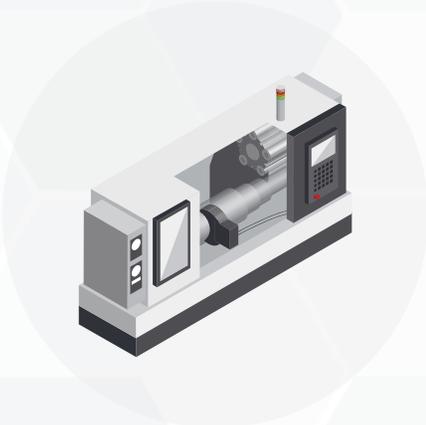


CONCLUSION

FINAL REMARKS

Look at your current needs, and future goals. Pick a machine and controller that you can grow into if at all possible.

If you have to choose between different upgrades, choose the one that provides the most value or “bang for the buck.” Don’t neglect training for machines and software. Consider service times and how down time will effect your business.



To explore more information about CAM programming and CNC machining, visit our manufacturing resource center.

[RESOURCE CENTER >](#)



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