Router to invest in, there are several important aspects to consider. The end result of CNC Router design and construction should be greater than the sum of its parts. The quality of a CNC Router's components, in addition to the history and reputation of the company, should be weighed heavily during the buying process.

This technical section will cover vital aspects to the buying process, such as: spindle options, tooling basics and maintenance, fixturing requirements, CNC accessories and software; items which, when looking to purchase a CNC Router, should be considered without exception. However, the first topic to be considered is the router itself.

CNC Router Components

The CNC Router market runs the gamut from hobbyist machines at $5000, up to huge CNC machining systems that cost in excess of $200,000. The idea is to find the CNC Router with the right price to performance ratio within your budget.

Size and space requirements should be decided upon before other more complex CNC features. Allotted shop space in relation to a router's work envelope can determine whether a 14" x 19" tabletop model or a 59" x 120" CNC system with a moving gantry are the right machine specifications to research.

After deciding on a machine's footprint (e.g., 109" x 149" x 60"), the element that greatly determines the quality, durability and overall performance of a CNC Router is found in its drive components. Basically, what method is used to move the machine's axes. Techno's CNC Routers utilize THK rails and ball screw drives, which provide smooth play-free motion, require minimal maintenance, provide excellent accuracy and long life. The placement of the ball screw is in the center of the axis of travel, which eliminates the possibility of racking (i.e., when the system twists due to misalignment). This also ensures that the Techno machine does not need to be realigned ever, causing no wear on the drive or carriage system. Eliminating the downtime spent repairing damage from racking, results in increased productivity and profits.

Some CNC Routers use other drive systems, such as the rack-and-pinion gear drive. The racks are typically installed on the outside of the machine, thus exposed to the elements. As the machine cuts, debris collects on the rack. These foreign materials get ground into the racks and gears, causing more friction in the drive system which, in turn, causes wear and makes the machine less accurate and unstable.

In a rack-and-pinion system, there are typically two drive motors required to run the one axis (one on the right side and one on the left side of the machine). The two motors must stay completely in sync with one another. When these motors get out of sync, racking occurs. Racking deforms the gears within the system, wearing down the components, and the unit itself can be jolted out of square.

The choice between what drive motors to use first comes down to either servo or stepper motors. Servos are typically the more expensive motor, but certain Micro-Stepper motor options bring parity to the purchase price. The big difference between the two motors is in how they run. Steppers, as the name implies, have a set number of steps per revolution. Movement is measured assuming that each commanded step has been completed. Most steppers are run in what is called an open-loop configuration. This means that the location of an axis is not verified on an ongoing basis. The motor is commanded to move a certain distance and it is assumed the move is successful without verification. This can cause problems when excessive vibration or resonance from the motor/machine construction can cause the stepper motor to lose steps or even stall.