

CNC TECHNOLOGY

UNIT - I INTRODUCTION TO CNC MACHINE TOOL

CNC (Computer Numerical Control), the instructions are stored as a program in a micro-computer attached to the machine. The computer will also handle much of the control logic of the machine, making it more adaptable than earlier hard-wired controllers

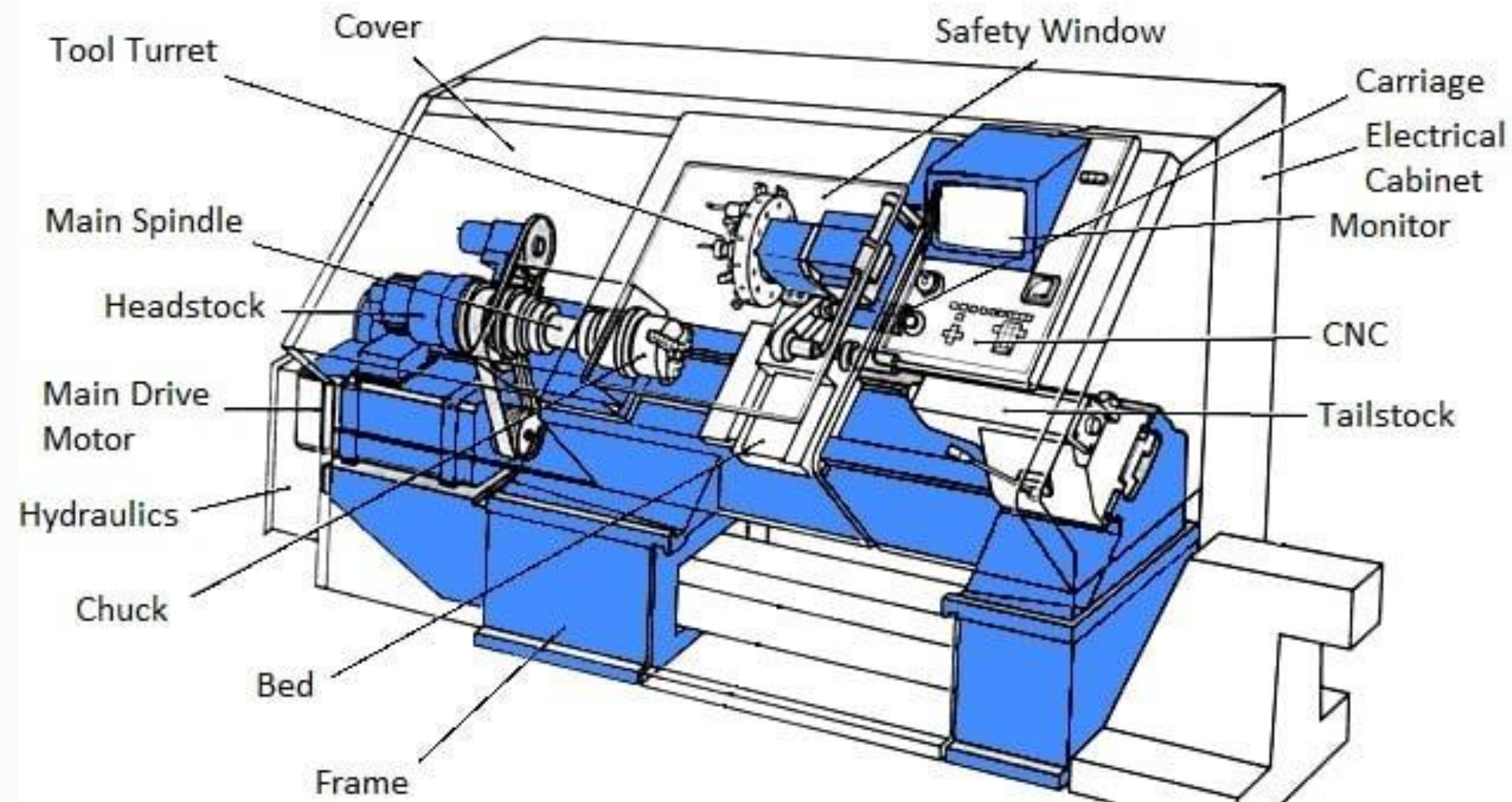
CNC TURNING CENTER

- CNC turning centers are advanced computer numerically controlled machines. They can have 3, 4, or even 5 axes, along with a multitude of cutting capabilities, including milling, drilling, tapping, and ofcourse, turning. Often these machines have an enclosed setup to ensure any cut material, coolant, and components remain within the machine.

TYPES OF CNC TURNING CENTERS

There are two broad categories of CNC turning centers

- Horizontal Turning Center
- Vertical Turning Center



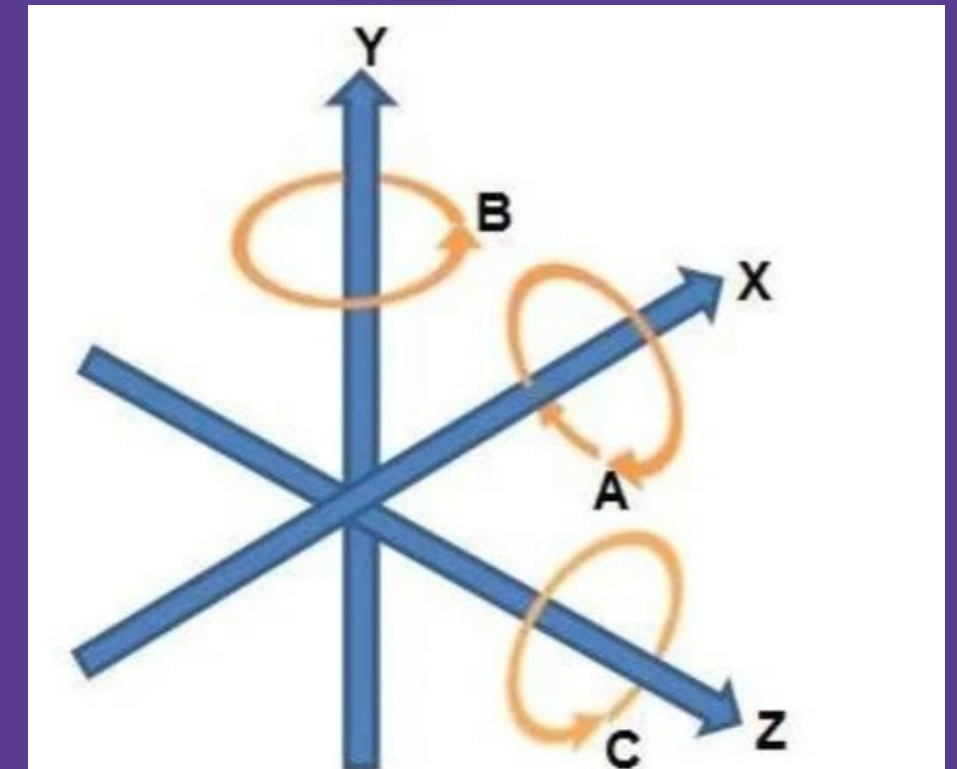
TYPES

HORIZONTAL TURNING CENTER

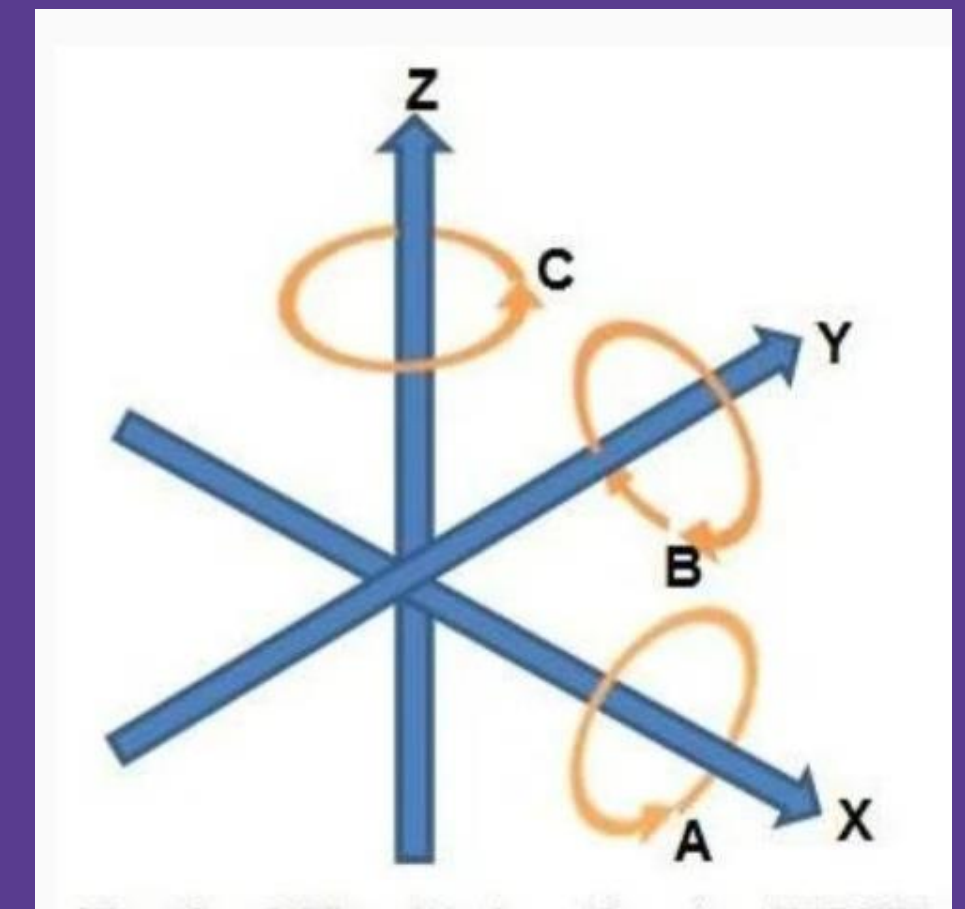
- With a horizontal turning center, the spindle is horizontally oriented, and tools are mounted out of the side of tool holder and cut across the workpiece. With this type of turning center, gravity pulls the chips away from the workpiece

VERTICAL TURNING CENTER

- A vertical turning centre is a cross hybrid from the turning centre and the vertical lathe. Shorter components not requiring sub-spindle, tailstock or bottom turret can benefit from a vertical construction lathe rather than horizontal to keep the machine footprint small.



HTC



VTC

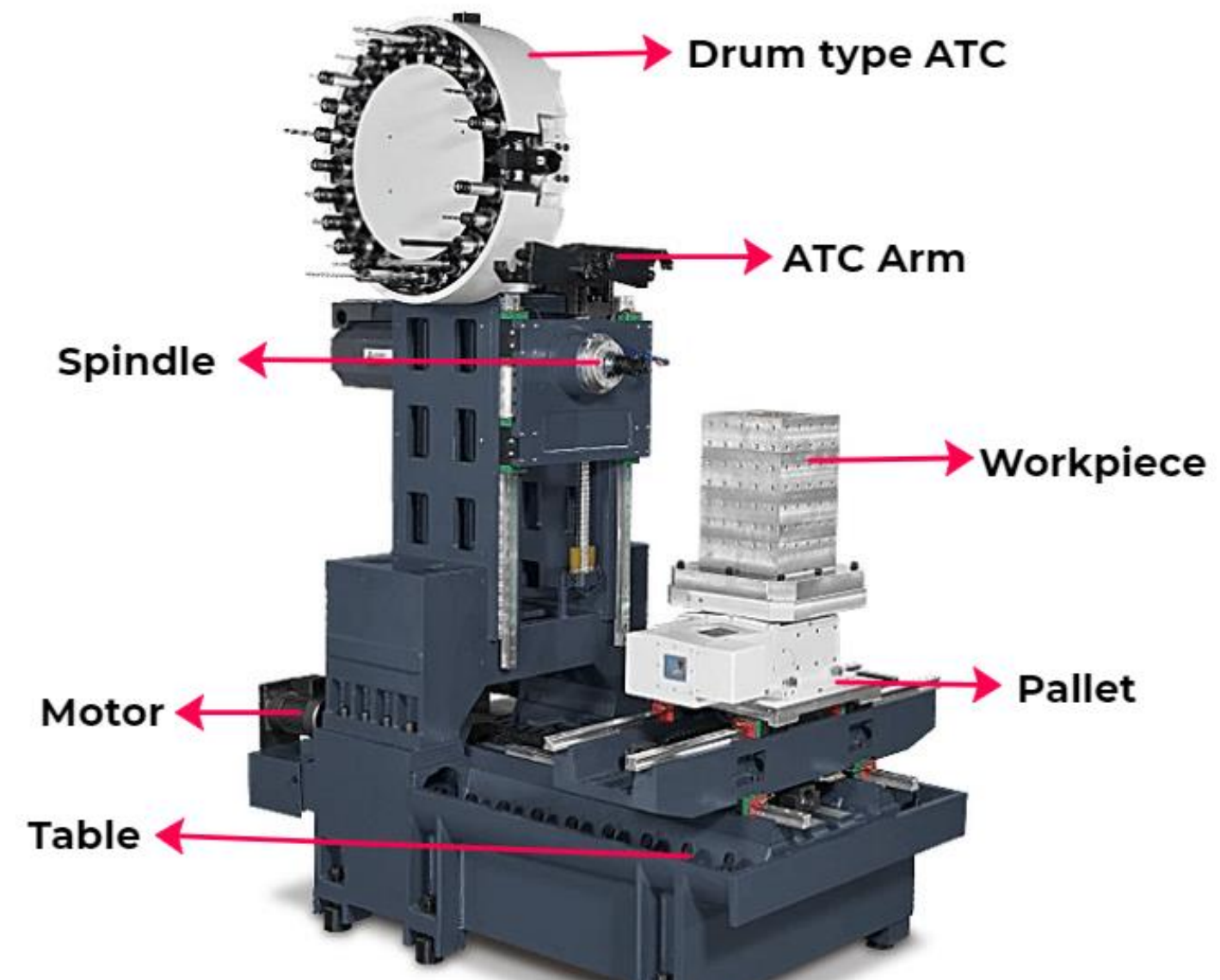
CNC MACHINING CENTER

- A machining center is a CNC machine tool that can perform different operations like milling, boring, and drilling, with high accuracy and minimal time. It consists of an automatic tool-changing mechanism that enables it to use multiple cutting tools during the machining process. [It can automatically bring several various different tools to the work location](#)

TYPES OF CNC MACHINING CENTERS

[There are three broad categories of CNC turning centers](#)

- Horizontal Machining Center
- Vertical Machining Center
- Universal Machining Center



TYPES

HORIZONTAL MACHINING CENTER

- A horizontal machining center (HMC) is a machining center with its spindle in a horizontal orientation. This machining center design favors uninterrupted production work. One reason for this is that the horizontal orientation encourages chips to fall away, so they don't have to be cleared from the table.

VERTICAL MACHINING CENTER

- CNC vertical machining centers (VMCs) remain machine shop staples. These milling machines have vertically oriented spindles that approach workpieces mounted on their table from above and commonly perform 2.5- or 3-axis machining operations. They are less costly than horizontal machining centers (HMCs), which makes them attractive to small job shops as well as larger machining operations

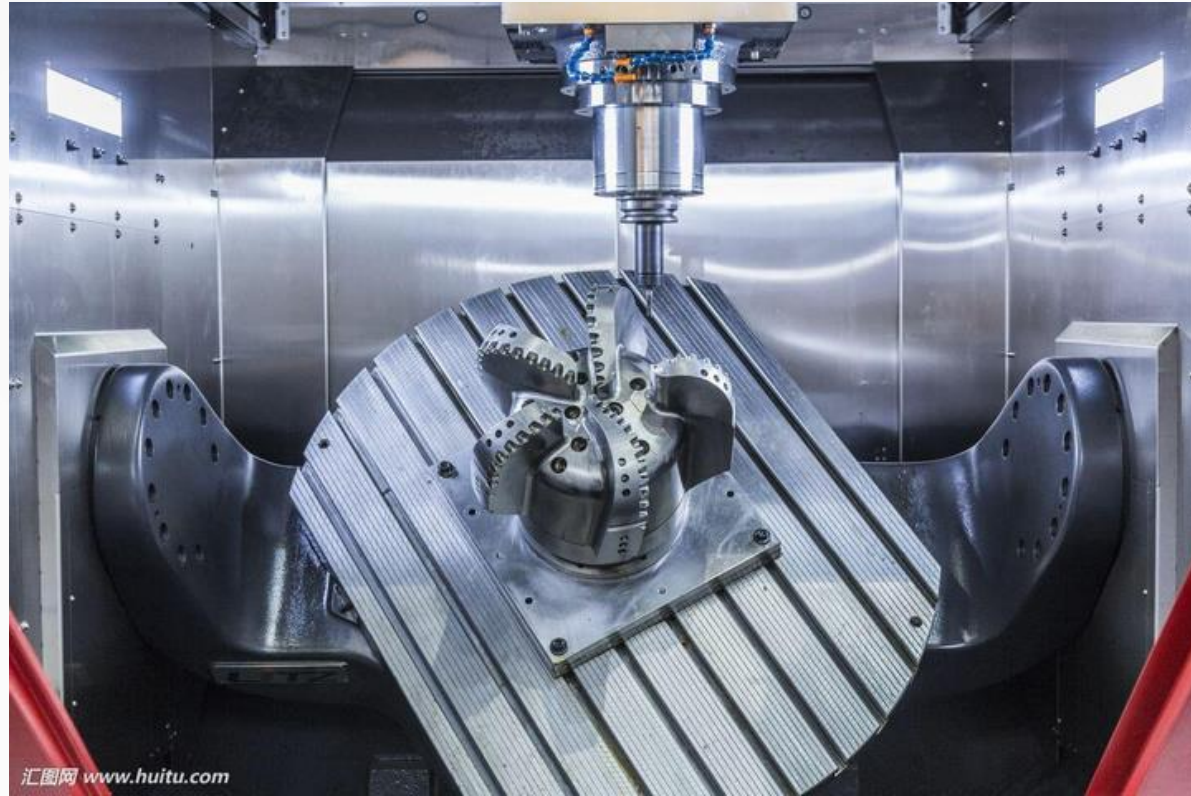
TYPES

UNIVERSAL MACHINING CENTER

- These are similar to horizontal machining centers but with the spindle axis capable of tilting from horizontal to the vertical position continuously under computer control.
- This machine centers consists of 5 or more axis.
- Such machines facilities access to the top surface of work piece mounted on a horizontal machining centre so that all the five sides of a components can be machined in a single set up..



5-AXIS MACHINING CENTER



- The term “5-axis” refers to the number of directions in which the cutting tool can move. On a 5-axis machining center, the cutting tool moves across the X, Y and Z linear axes as well as rotates on the A and B axes to approach the workpiece from any direction.

6-AXIS MACHINING CENTER



- 6-Axis is designed for volume machining of aluminium, steel, cast iron and model making materials. It uses a unique 3-axis milling head to allow simultaneous 6-axis CNC Machining Center.