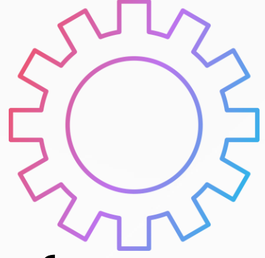
CNC TECHNOLOGY

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 MACHINES-CONTROL SYSTEM



- The CNC control system is in charge of managing the motion and speed of the machine tools used in everyday industrial processes.

FUNDAMENTAL ASPECTS OF CONTROL

In general CNC machines are programmed and controlled to accomplish the major three actions-

- A. Positioning of tool in 2 or 3 or more axes.
- B. Motion-relative velocity of tool wrt work piece
- C. Switching function i.e. direction of rotation of spindle, coolant ON/OFF etc. are to be controlled

TYPES OF CONTROL SYSTEM IN CNC TECHNOLOGY

The CNC control system can be classified based on :

1.)MOTION TYPE CNC

- Contouring System
- Point to Point System

2.)CONTROL LOOP SYSTEM

- Closed Loop system
- Open Loop system

3.)NUMBER OF AXIS TYPE CNC

- 2-axis machines
- 2.5-axis machines
- 3-axis machines
- 4-axis and above

ATC- AUTOMATIC TOOL CHANGER

Once set up on your CNC machine, an automatic tool changer follows a quick set of steps to swap tools in and out. Heres how it works.

- The tool change command is given to the machine via the computer.
- The tool to be changed assumes a fixed position known as the tool change position.
- The ATC spindle moves to that position to pick up the tool.
- The z-axis moves between the machine tool rack/rotary to pick up/drop off tooling.
- Internally, the spindle opens or closes the chuck to exchange tooling before returning back to work.

USES OF ATC

- An automatic tool changer **improves the production and tool-carrying capacity of a CNC machine by changing tools very quickly without the help of a manual operator**. In doing so, the ATC dramatically reduces downtime on a given project.
- Ability to switch between a large number of tools without requiring a human operator
- Increased efficiency
- Reduced labor cost
- Increased machine versatility
- Increased safety for employees and equipment
- Ability to change larger and heavier tools with ease
- Increased edge finish due to more appropriate tooling per process

TURRET MECHANISMS

- Turret indexing refers to the process of rotating the turret of a machine tool (such as a lathe or milling machine).

- Turrets refer to mechanisms that allow for yaw (side-to-side) rotation of another mechanism. This is typically done for the purpose of positioning an intake or scoring mechanism. For example, a shooter could be mounted on a turret to allow for aiming without turning the robot.

- In a turret-lathe, the combination of a turretslide, and a turret rotatably mounted thereon and having in its lower face an undercut groove concentric with its axis, with a vertically-movable clamping-pin, havinga finger which enters the undercut part of said groove, a shaft mounted in the turret-slide, and mechanism

TURRET MECHANISMS IN LATHE

- The tool turret is mounted directly on the saddle and the feed is given by moving the entire unit.
- The turret lathe can thus operate under more serve condition accommodating heavier work pieces with higher cutting speeds, feeds and depth of cut.
- Turret lathes are capable of turning bars up to 200mm diameter using collets as well as handling irregular jobs like castings and forgings with chucks.
- Some turret types lathes are equipped with crosswise movement of the hexagonal tool turret by hand or power.

TURRET LATHE