Presentation on

MECHANICAL WORKSHOP

By: Hafiz Muhammad Rizwan
PPE

Suitable Personal Protective Equipment must be used before using a tool, Machines, check its safety instruction
PPE

- Head protection
- Eye and Face protection
- Hearing protection
- Arm and Hand protection
- Foot and Leg protection
- Protective clothing
HEAD PROTECTION
HARD HATS WORK BY DISSIPATING FORCE
EYE PROTECTION
HEARING PROTECTION
ARM AND HAND PROTECTION
FOOT AND LEG PROTECTION
PROTECTIVE CLOTHING
LOOSE CLOTHING HAZARD
INTRODUCTION

- Lathe machine is also known as “the mother/father of the entire tool family”.
- Lathe is one of the most impotent machine tool in the metalworking industry.
- A lathe operates on the principle of rotating workpiece and a fixed cutting tool.
- The cutting tool is feed into workpiece which rotates about its own axis, causing workpiece to be formed to the desired shape.
The lathe machine is one of the oldest and most impotent machine tools.
As early as 1569, wood lathes were in use in France. The lathe machine was adapted to metal cutting in England during the Industrial Revolution.
Lathe machine also called “Engine Lathe” because the first type of lathe was driven by a steam engine.
TYPES OF LATHE MACHINE

- Engine Lathe
- Bench Lathe
- Copy Lathe
- Automatic lathe
- Turret Lathe
- Computer controlled lathe
**LATHE MACHINE OPERATION**

- **Turning**: to remove material from the outside diameter of a work piece to obtain a finished surface.
- **Facing**: to produce a flat surface at the end of the workpiece for making face grooves.
- **Boring**: to enlarge a hole or cylindrical cavity made by a previous process or to produce circular internal grooves.
- **Drilling**: to produce a hole on the workpiece.
- **Reaming**: to finishing the drilling hole.
- **Threading**: to produce external or internal threads on the workpiece.
- **Knurling**: to produce a regularly shaped roughness on the workpiece.
The Milling Machine

- Developed in 1860’s.
- Can be used for milling, drilling, boring, and reaming.
- Can machine in one, two, or three planes, X, Y, Z
- Used to produce one or more machined surfaces accurately on workpiece, One or more rotary milling cutters.
- Workpiece held on work table or holding device and brought into contact with cutter.
- Vertical milling machine most common
- Horizontal milling machine handles operation normally performed by other tools.
TYPES OF MILLING AND ITS PARTS

A RAM
B VERTICAL HEAD
C QUILL
D TABLE
E SADDLE
F CROSSFEED HANDLE
G VERTICAL FEED CRANK
H KNEE
I VERTICAL POSITIONING SCREW
J BASE
K COLUMN
L TABLE HANDWHEEL
M TABLE TRANSMISSION
N RAM TYPE OVERARM
O ARBOR SUPPORT
P SPINDLE
VERITY OF OPERATION

- Face milling.
- End milling.
- Keyway cutting.
- Dovetail cutting.
- T-slot and circular slot cutting.
- Many facing operation done with fly tool.
- Gear cutting.
- Drilling.
- Boring.
VERITY OF MILLING CUTTERS

- Helical Cutter
- Plain Milling Cutter
- Two-Lip End Mill
- T-Slot Cutter
- Double End Mill
- Shell End Mill
- Woodruff Keyway Cutter
- Left Hand Cutter
- Right Hand Cutter
- Left Hand Spiral
- Right Hand Spiral
- Slab Mill
- Helical Mill
- Course Tooth Mill
- Corner Rounding Cutter
- Convex Formed Cutter
- Gear Tooth Cutter
- Staggered Tooth Mill
- Side Mill
- Interlocking Mills
- Metal Slitting Saw
- Single Angle Cutter
- Double Angle Cutter
- Concave Formed Cutter
• What is a CNC Machine?

• CNC: Computer Numerical Control

• Conventionally, an operator decides and adjusts various machines parameters like feed, depth of cut etc depending on type of job, and controls the slide movements by hand. In a CNC Machine functions and slide movements are controlled by motors using computer programs.
There are many different types of CNC Machines used in industry, Such as:

• Mills and Machining Centers
• Lathes and Turning Centers
• Drilling Machines
• EDM Sinker and wire cut Machines
• Flame and Laser-Cutting Machines
• Water Jet Profilers
Different ways of data input are:

- Program operation with CAD CAM.
- Program data transfer from PC to CNC Machine Control Unit.
- Program data transfer from PC to DNC by RS232 data cable.
Controlled by G and M codes.
- These are number values and co-ordinates.
- Each number or code is assigned to a particular operation.
- Typed in manually to CAD/CAM by machine operators.
- G & M codes are automatically generated by the CAD/CAM software.
CNC PROGRAMMING KEY LETTERS

- O - Program number (Used for program identification)
- N - Sequence number (Used for line identification)
- G - Preparatory function
- X - X axis designation
- Y - Y axis designation
- Z - Z axis designation
- R - Radius designation
- F - Feed rate designation
- S - Spindle speed designation
- H - Tool length offset designation
- D - Tool radius offset designation
- T - Tool Designation
- M - Miscellaneous function
CNC LATHE AND MILLING PARTS

Lathe operation

Milling operation
IMPORTANT G AND M CODES

- G00 Rapid Transverse
- G01 Linear Interpolation
- G02 Circular Interpolation, CW
- G03 Circular Interpolation, CCW
- G17 XY Plane, G18 XZ Plane, G19 YZ Plane
- G20/G70 Inch units
- G21/G71 Metric Units
- G40 Cutter compensation cancel
- G41 Cutter compensation left
- G42 Cutter compensation right
- G43 Tool length compensation (plus)
- M00 Program stop
- M01 Optional program stop
- M02 Program end
- M03 Spindle on clockwise
- M04 Spindle on counterclockwise
- M05 Spindle stop
- M06 Tool change
- M08 Coolant on
- M09 Coolant off
- M10 Clamps on
- M11 Clamps off
- M30 Program stop, reset to start
CNC MACHINE ADVANTAGES/DISADVANTAGES

Advantages:

• High Repeatability and Precision e.g. Aircraft parts
• Volume of production is very high
• Complex contours/surfaces need to be machined. etc
• Flexibility in job change, automatic tool settings, less scrap
• More safe, higher productivity, better quality
• Paper work, faster prototype production, reduction in lead times

Disadvantages:

• Costly setup, skilled operators.
• Computer programming knowledge required.
• Maintenance is costly and difficult.
Thank You