SNS COLLEGE OF TECHNOLOGY
(AN AUTONOMOUS INSTITUTION)

Department of Mechanical Engineering

CAD/CAM and Automation

Unit – II

Types of CMM

https://tinyurl.com/y934hzdw

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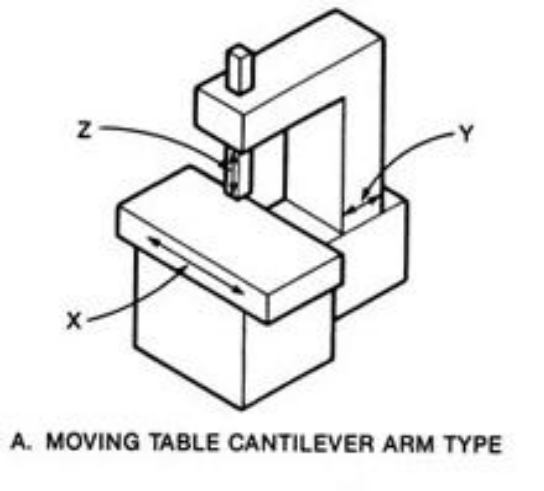
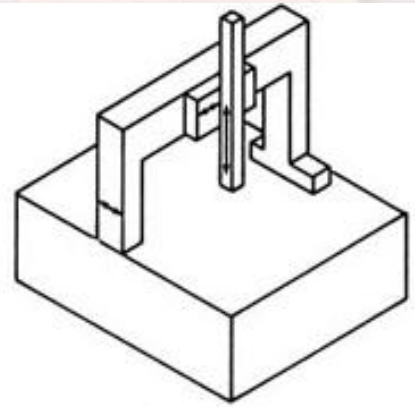
TYPES OF CMMs

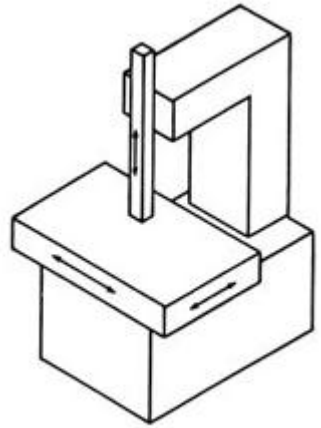
- The basic CMM has three perpendicular axis; x,y,z
- The physical configuration of CMMs vary widely, but they all provide a way to move a probe in three axes with respect to workpiece
- Five basic configurations that are used more frequently
  1. Cantilever
  2. Bridge
  3. Column
  4. Horizontal arm
  5. Gantry

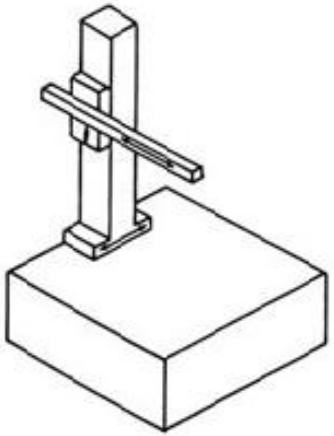
Types of CMM



A. MOVING TABLE CANTILEVER ARM TYPE


B. MOVING BRIDGE TYPE


C. COLUMN TYPE


D. MOVING RAM HORIZONTAL ARM TYPE

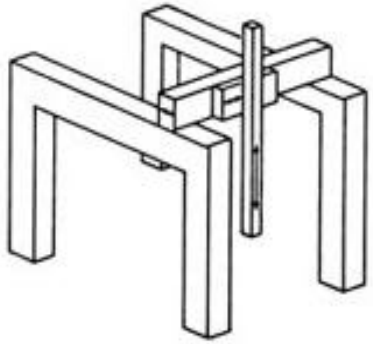
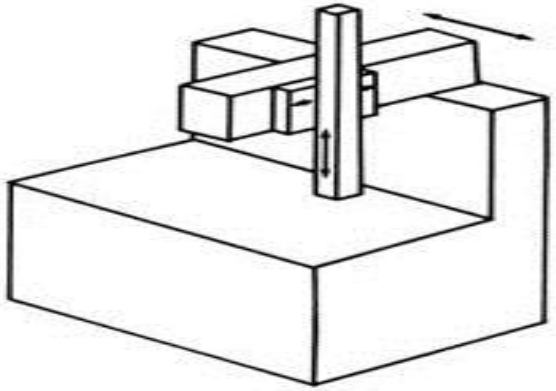
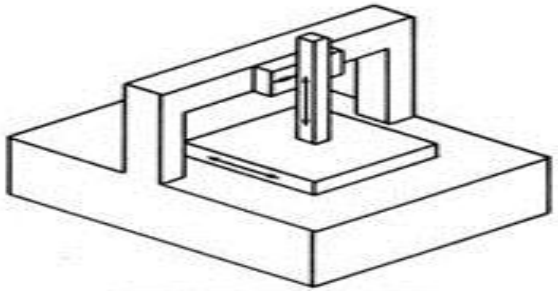

E. GANTRY TYPE

Figure resource :
https://tinyurl.com/ybw7jkpe

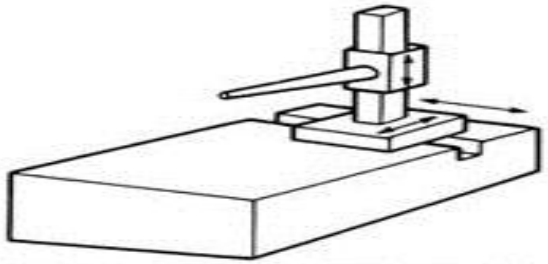
Other configuration



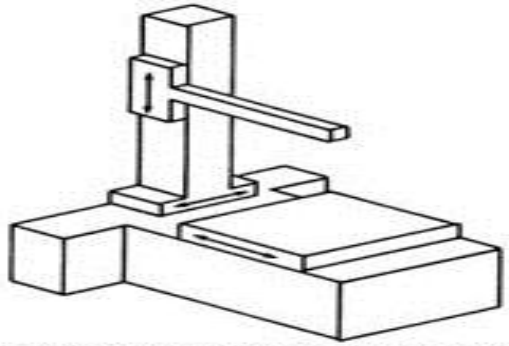
FIXED TABLE CANTILEVER TYPE



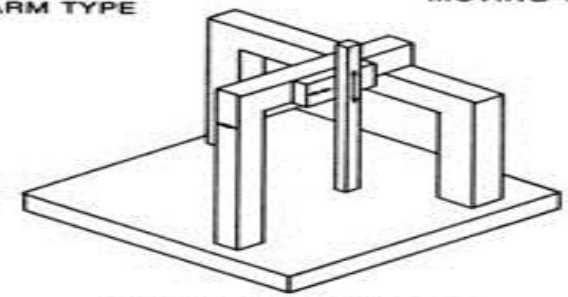
FIXED BRIDGE TYPE



FIXED TABLE HORIZONTAL ARM TYPE



MOVING TABLE HORIZONTAL ARM TYPE

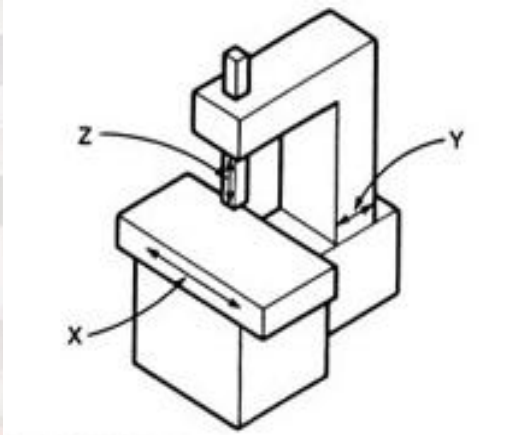


L-SHAPED BRIDGE TYPE

Figure resource : https://tinyurl.com/ybw7jkpe

Cantilever type

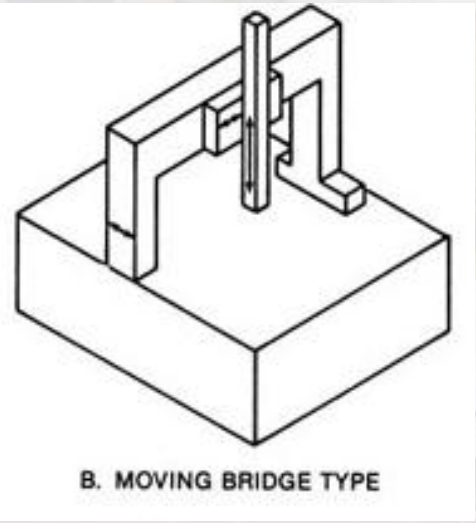
- A vertical probe moves in the z-axis
- Carried by a cantilevered arm that moves in the y-axis
- This arm also moves laterally through the x-axis
- Advantage- a fixed table allows good accessibility to the work piece
- Disadvantage- the bending caused by the cantilever design
- The cantilever design offers a long table with relatively small measuring ranges in the other two axis
- Suitable for measuring long, thin part



A. MOVING TABLE CANTILEVER ARM TYPE

Moving bridge type

- Most widely used
- Has stationary table to support work piece to be measured and a moving bridge
- Disadvantage- with this design, the phenomenon of yawing (sometimes called walking) can occur- affect the accuracy
- Advantage- reduce bending effect



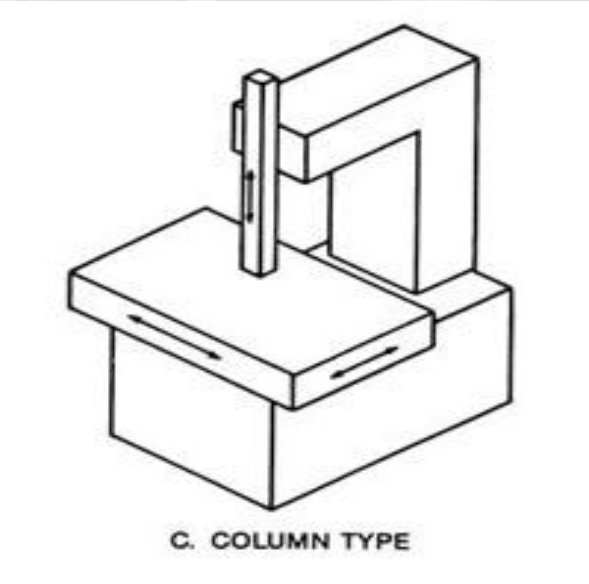
B. MOVING BRIDGE TYPE

Fixed bridge type

- In the fixed bridge configuration, the bridge is rigidly attached to the machine bed
- This design eliminates the phenomenon of walking and provides high rigidity

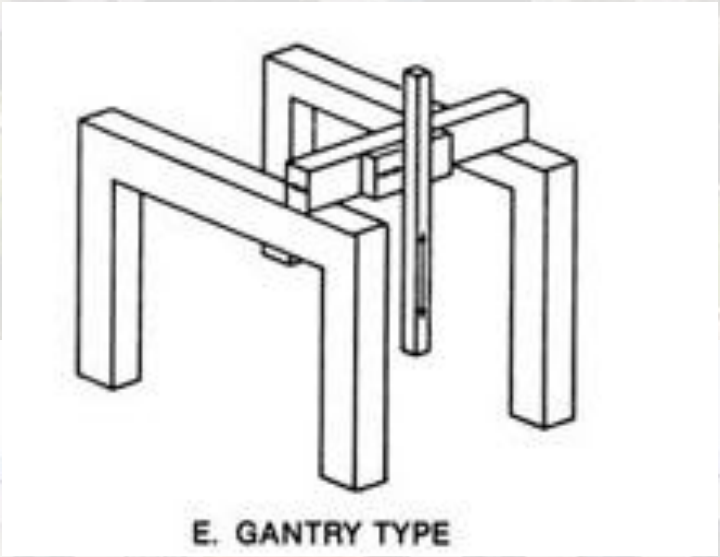
Column type

- Often referred to as universal measuring machine instead of CMM
- The column type CMM construction provides exceptional rigidity and accuracy
- These machines are usually reserved for gage rooms rather than inspection



Gantry type

- The support of workpiece is independent of the x and y axes, both are overhead, supported by four vertical columns rising from the floor
- This setup allows you to walk along the workpiece with the probe, which is helpful for extremely large pieces



Gantry configuration with dual linear motor drives, laser scales an online compensation

https://tinyurl.com/y934hzdw

MODES OF OPERATION- CMM

- Manual
- Manual computer assisted
- Motorized computer assisted
- Direct computer controlled

Cont…..

Manual

- CMM has a free floating probe that operator move along the machine's three axes to establish contact with the part feature that accessing
- The differences among the contact positions are the measurements

Cont…..

Manual computer assisted

- Add electronic digital displays for these machines, making zero setting, changing sign, converting unit, and printing out data easy and practical
- Advantage- save time, minimize calculation, reduce error

Cont…..

Motorized computer assisted

- Uses a joystick to drive the machine axes
- The operator manipulates the joysticks to bring the probe sensor into contact with the work piece

Direct computer controlled (DCC)

- Fully programmable
- Use CAD data to determine where the probe sensor contacts the workpiece, collecting measurement data
- The fully automated CMM allows operator to place the workpiece in a fixture/ worktable, run a stored program, collect the data points and generate the output report

Assessment Questions

1. What is so Special about this CMM Machine?
2. How accurate is CMM?
3. How can the accuracy of the CMM Machine be Verified?
4. Does CMM offer an Automatic Change of Objective Lenses?
5. Which Surfaces and Materials can be Measured with the Optical CMM Machine?

https://www.alicona.com/en/10-questions-about-the-ucmm/

THANK YOU