SNS COLLEGE OF TECHNOLOGY
(AN AUTONOMOUS INSTITUTION)

Department of Mechanical Engineering

CAD/CAM and Automation

Unit – II

CMM- TYPES OF PROBES

https://tinyurl.com/y934hzdw

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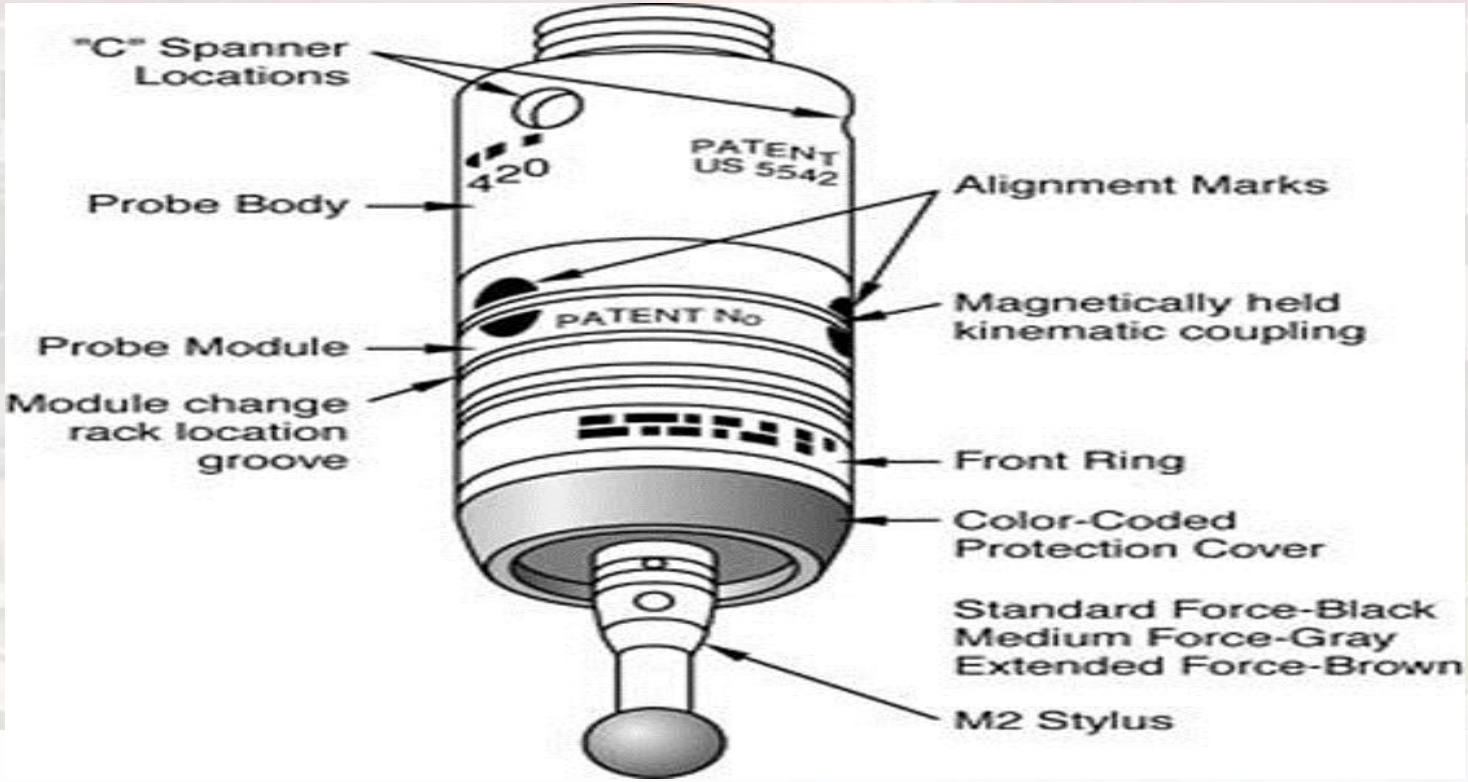
TYPES OF PROBES

Two general categories

1. Contact (see figure)
   - Touch-trigger probe
   - Analog scanning probe
2. Noncontact

   For inspection of printed circuit board, measuring a clay of wax model, when the object being measured would be deformed by the for of stylus
   - laser probes
   - video probes

Measuring using CMM



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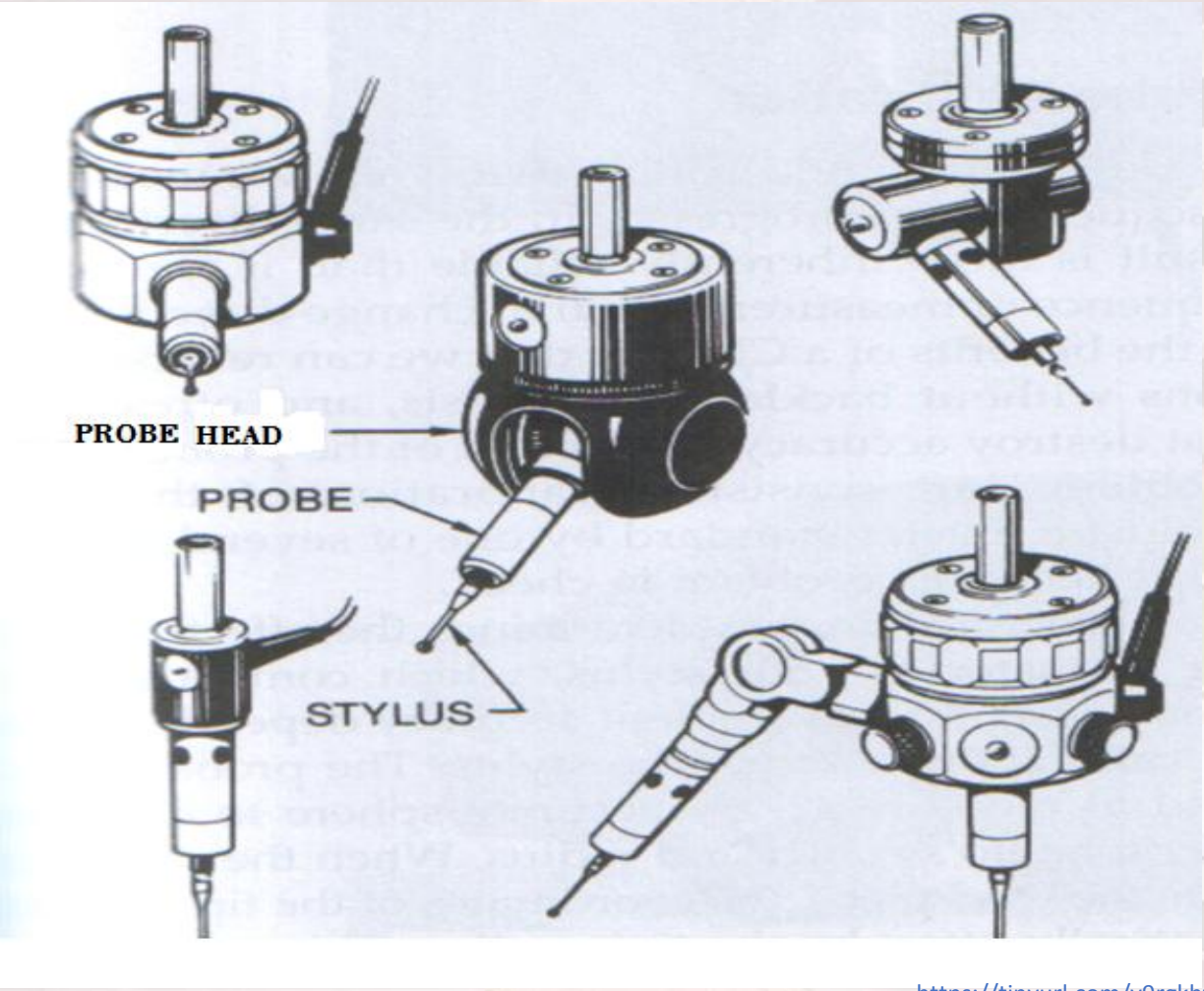
Contact probes

1. Touch trigger probe
   - As the sensor makes contact with the part, the difference in contact resistance indicates that the probe has been deflected
   - The computer records this contact point coordinate space
   - An LED light and an audible signal usually indicate contact
   - Touch probe assemblies consist of three components; probe head, probe and stylus
2. Analog scanning probe
   - Use to measure contour surfaces, complex, irregular Remains in contact with the surface of the part as it moves
   - Improve the speed and accuracy

Non-contact probe

1. Laser scanning probe
   - Laser probes project a light beam onto the surface of a part
   - When the light beam is triggered, the position of beam is read by triangulation through a lens in the probe receptor
   - Laser tool have a high degree of speed and accuracy
2. Video probe
   - The feature are measured by computer ‘count’ of the pixels of the electronic image
   - The camera is capable of generating multitude of measurements points within a single video frame

Probe head, probes and stylus



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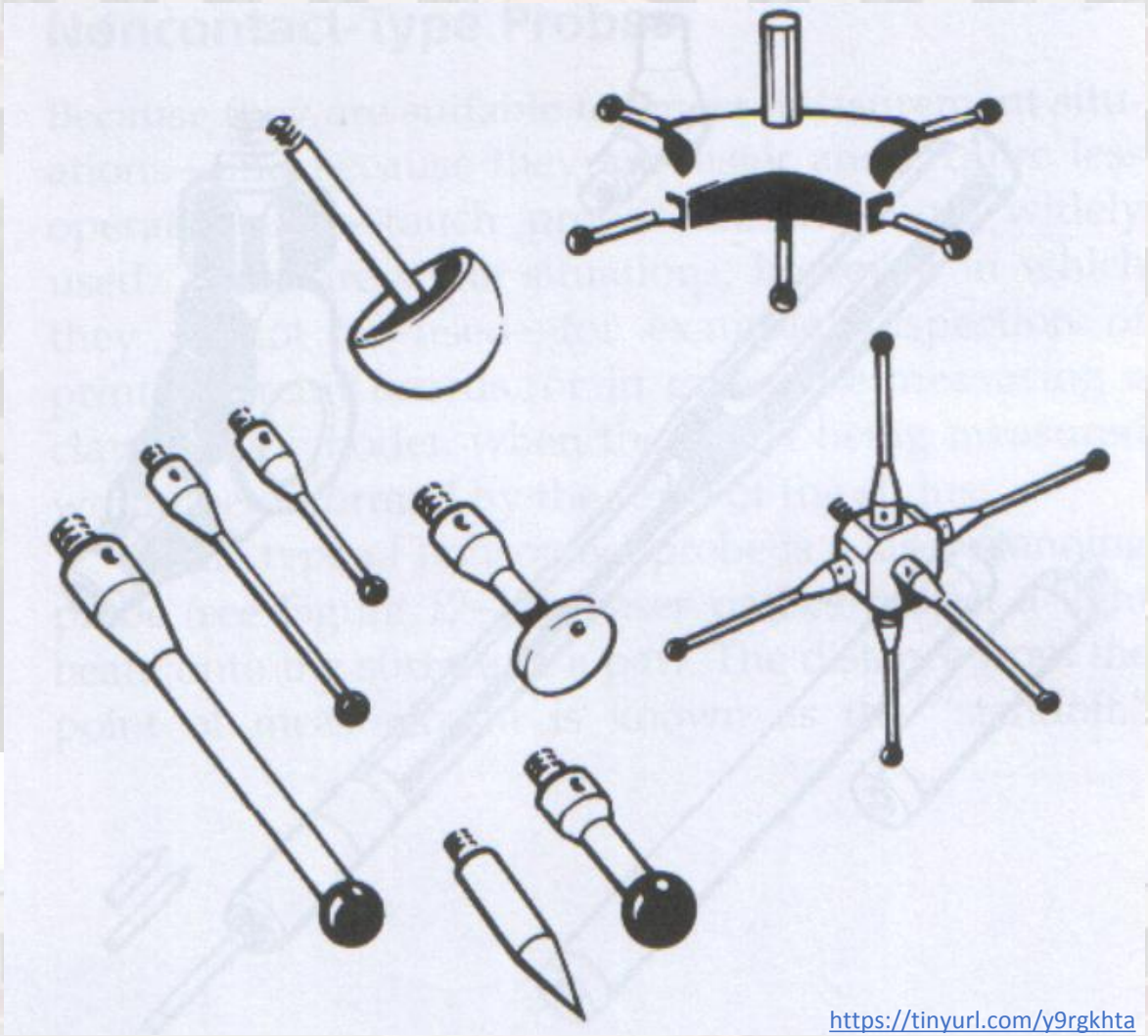
Multiple shapes of sylus



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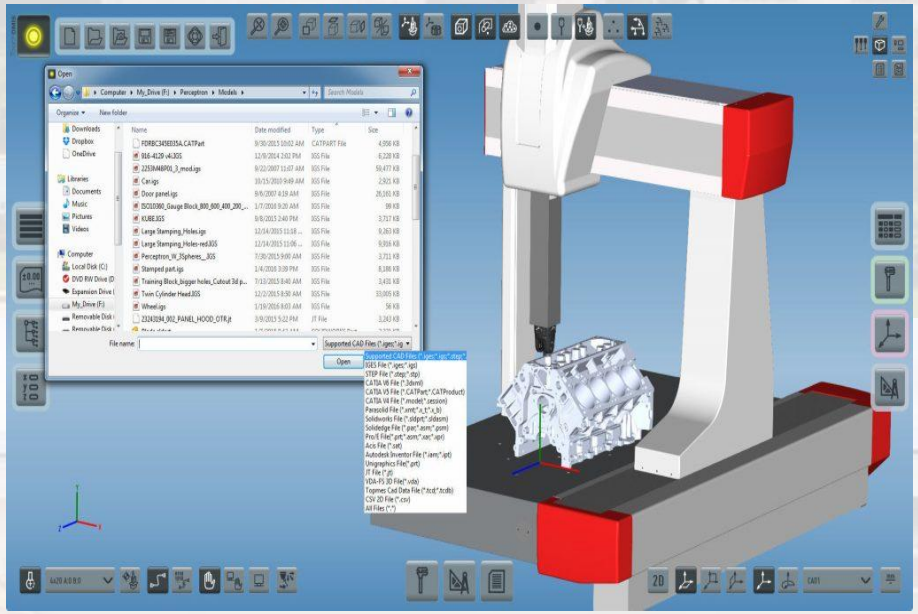
CMM software

- The programming of the machine or the software of the system enables the CMM to reach its full potential for accuracy, precision and speed
- Contour programs allow the CMM to quickly define detailed, complex non-geometric shapes such as gear, cams, and injection molds
- These programs also can be used to compare the measurement data with a computer assisted drafting (CAD) model

CMM software (Cont..)

Generally software packages contains some or all of the following capabilities:

- Resolution selection
- Conversion between SI and English (mm and inch)
- Conversion of rectangular coordinates to polar coordinates
- Axis scaling
- Datum selection and reset
- Circle center and diameter solution
- Bolt-circle center and diameter
- Save and recall previous datum
- Nominal and tolerance entry
- Out-of tolerance computation



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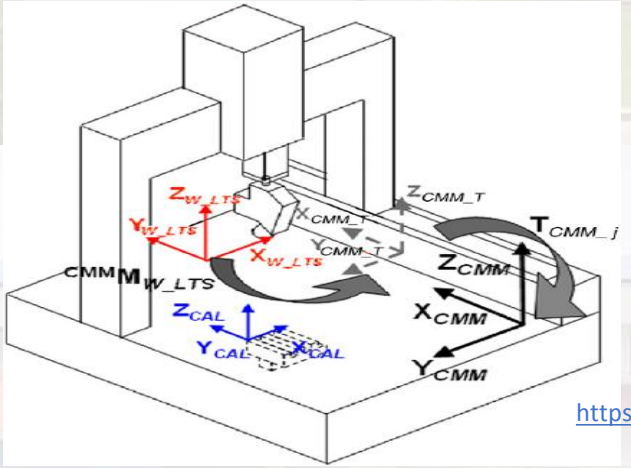
Coordinate System

- A coordinate allows the CMM to locate features on a workpiece relative to other features
- The coordinate system is similar to a three-dimensional map, providing direction and location
- Each machine has a ‘home’ position (an origin) and x, y and z axes identify location that represents the machine coordinate system (MCS)
- A manufactured past can also have a part coordinate system (PCS)



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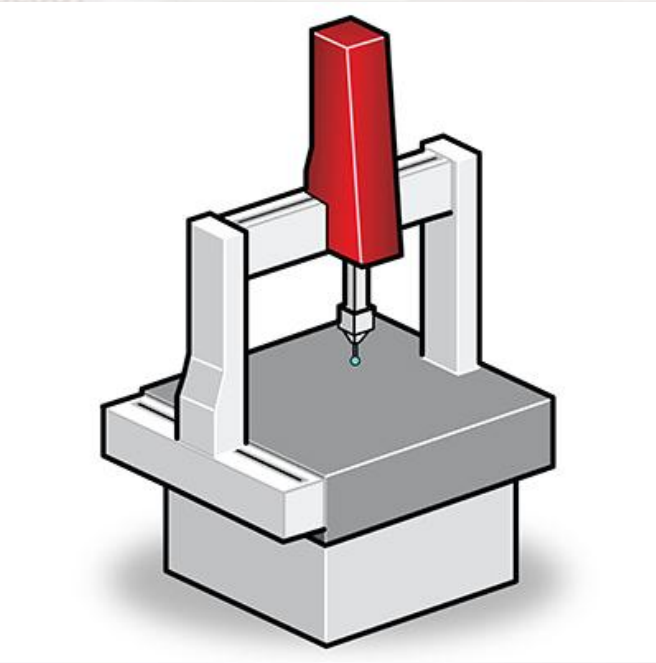
The Role of Coordinate Measuring Machines

CMMs are particularly suited for the following conditions:

- Short runs
- Multiple features
- Flexibility
- High unit cost
- Production interruption



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The Role of Coordinate Measuring Machines

- **Short runs**

  We may be producing hundreds or even thousands of part, but the production run is not sufficient to justify the cost of production inspection tooling

- **Multiple features**

  When we have a number of features- both dimensional and geometric- to control, CMM is the instrument that makes control easy and economical

The Role of Coordinate Measuring Machines (Cont..)

- **Flexibility**

  Because we can choose the application of the CMM system, we can also do short runs and measure multiple features

- **High unit cost**

  Because reworking or scrapping is costly, CMM systems significantly increase the production of acceptable parts

The Role of Coordinate Measuring Machines (Cont..)

- **Production interruption**

  Whenever you have to inspect and pass one part before you can start machining on the next part, a machining center may actually be able to help a manufacturer save more money by reducing downtime than would be save by inspection

Assessment Questions

1. Distinguish between absolute and incremental coordinate system.

2. What precise movement does CMM have?
   a) Precise movement in x coordinate
   b) Precise movement in x and y coordinates
   c) Precise movement in y and z coordinates
   d) Precise movement in x, y and z coordinates

3. Which of the following is true for trigger type probe system used in computer controlled CMM?
   a) Bucking mechanism is a 2 point bearing
   b) Current coordinate position stored when circuit is close
   c) Contacts of point bearing arranged at 90 degree
   d) Contacts of point bearing act as electrical micro switches

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THANK YOU