



ROHINI

COLLEGE OF ENGINEERING AND TECHNOLOGY

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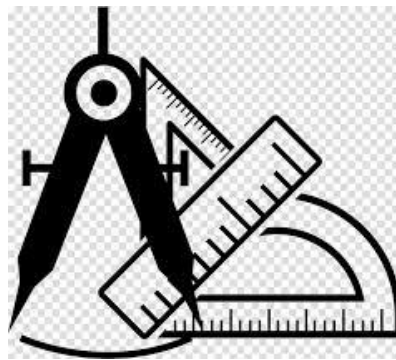
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DEPARTMENT OF MECHANICAL ENGINEERING

24ME403 - METROLOGY & MEASUREMENTS

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24ME403 - METROLOGY & MEASUREMENTS

2) Define straightness. Describe any two methods of measuring straightness of a surface.

Straightness:

* It is a condition that ensures a part's element is in a straight line.

* Representation: (—)

* This symbol is used to indicate that the feature or axis should not deviate from a perfectly straight line by more than the specified value within the defined tolerance zone.

Methods of measuring straightness:

- i) Using straight Edge
- ii) Using Spirit Level and Autocollimator

iii) using laser interferometer

iv) straightness measurement of machine tool guide way using Autocollimator.

(i) Straightness Testing using Straight Edge:

* A straight edge is a long, flat tool used to assess the straightness of a surface.

* It is placed along the feature to check if any gap appears between the straightedge and the surface.

* The amount of gap, if any, will indicate how much the surface deviates from straightness.

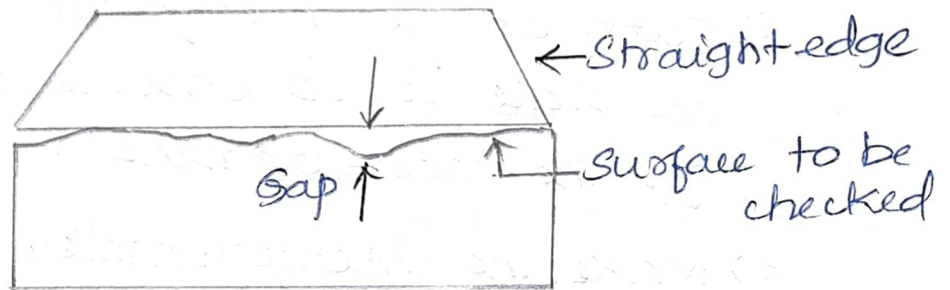
Steps:

a) the straightedge is placed on the surface to be checked.

b) The gap between the straight edge and the surface to be checked is viewed against a bright and direct light (such as LED light).

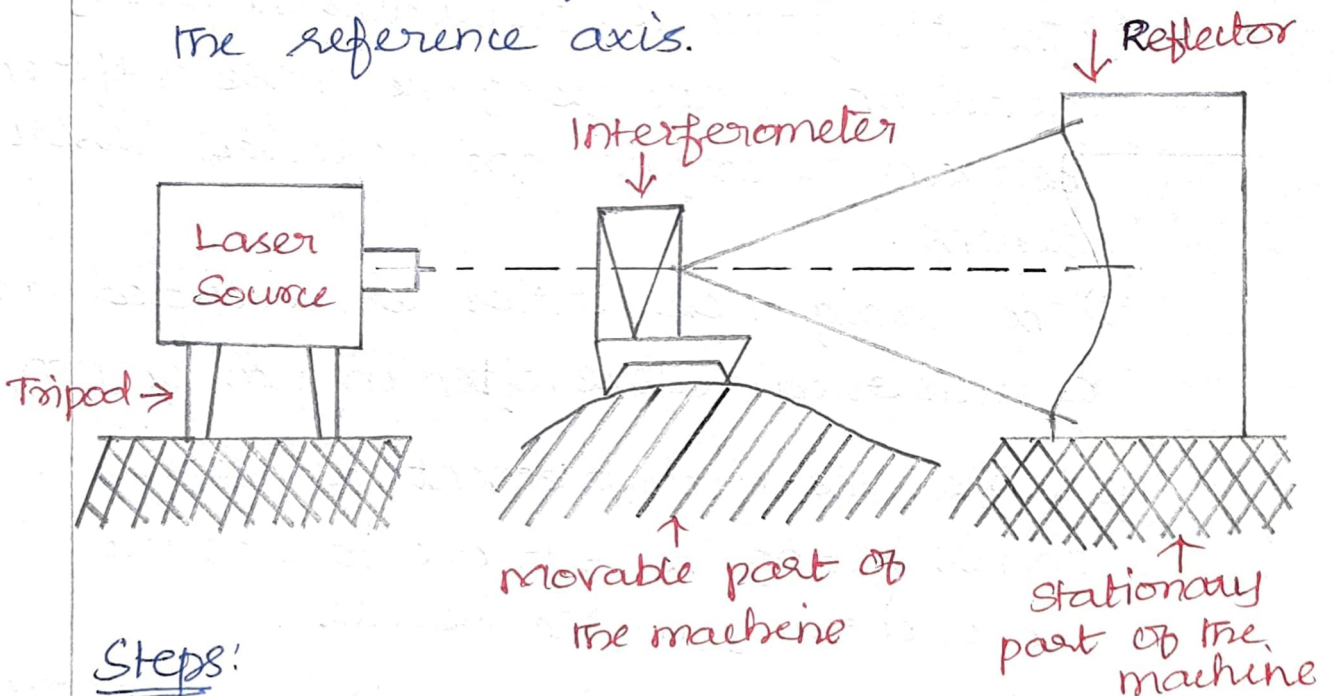
c) Straightness is measured by observing the colour of light by diffraction while passing through a small gap.

d) If the colour of the passed light is red, it will indicate the gap of 0.0012 mm to 0.0015 mm.



(ii) Straightness Testing using Laser Interferometer:

* Laser interferometer measures the straightness of surfaces by measuring the deviation of target points from the reference axis.



Steps:

a) position the laser interferometer so that its beam is directed at the surface whose straightness needs to be measured.

- b) Attach a reflector to the surface to bounce the laser beam back to the interferometer.
- c) Turn on the interferometer and calibrate it to ensure its readiness for the measurement.
- d) Make the interferometer to send a laser beam to the surface, and the beam is reflected back to the interferometer.
- e) The interferometer detects any phase shift in the reflected laser beam, caused by deviations from straightness.
- f) The interferometer calculates the straightness deviation by analyzing the phase difference between the original and reflected laser beams.
- g) The straightness error is recorded as a numerical value, often in μm or nm .
- h) Repeat the measurement at various points along the surface to ensure the accuracy in the results.
- i) Analyze the data to check if the surface meets the required straightness tolerance.