UNIT 5

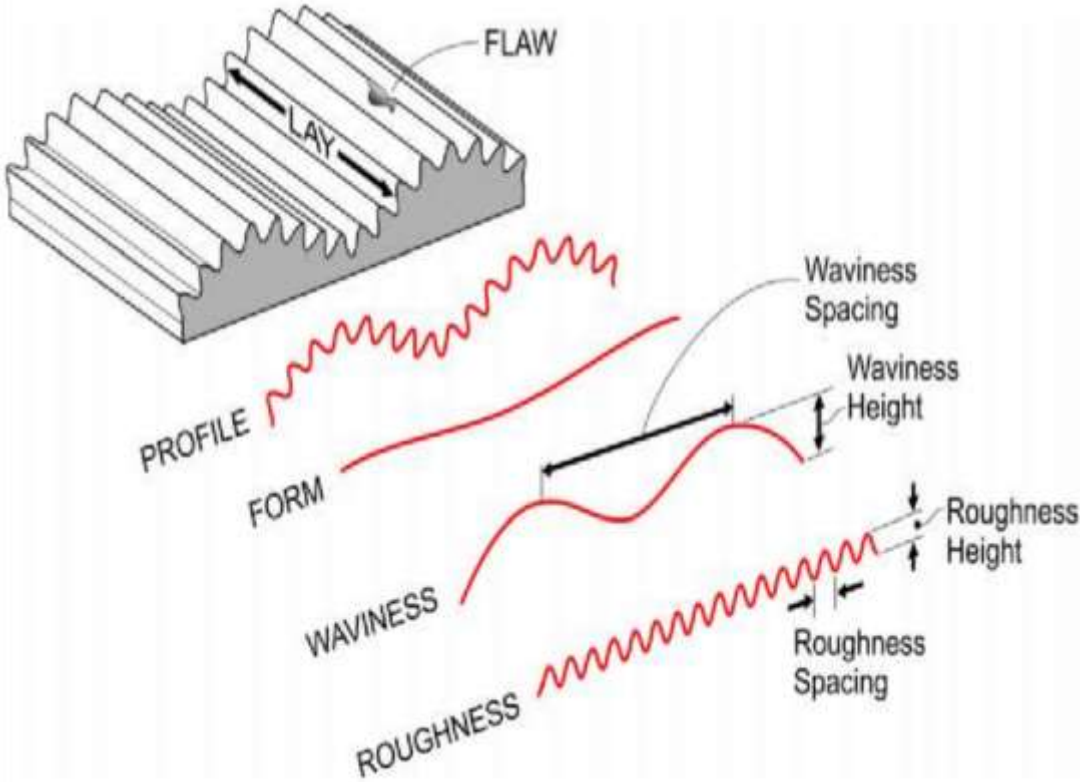
SURFACE ROUGHNESS MEASUREMENT

INTRODUCTION:

Surface roughness measurement is a value calculated by measuring the average of heights and depths across a processed surface. Measuring surface roughness is integral to determining the compliance of equipment and products with industry regulations

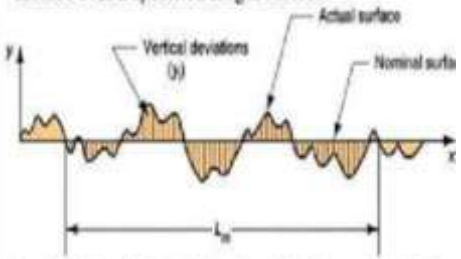
s**urface roughness** or **roughness** is defined as the irregularities which are inherent in the production process (e.g. cutting tool or abrasive grit).
Surface **roughness** is quantified by the deviations in the direction of the normal vector of a real surface from its ideal **form**. If these deviations are large, the surface is rough; if they are small, the surface is smooth.

Roughness: includes the finest (shortest wavelength) irregularities of a surface. Roughness generally results from a production process or material condition.
Ra (way to define roughness) – Average Roughness Also known as Arithmetic Average (AA), Center Line Average (CLA), Arithmetical Mean Deviation of the profile. The average roughness is the area between the roughness profile and its mean line, or the integral of the absolute value of the roughness profile height over the evaluation length.


FLAW
LAY
PROFILE
FORM
WAVINESS
ROUGHNESS
Waviness
Spacing
Waviness
Height
Roughness
Height
Roughness
Spacing

Surface Roughness

Average of vertical deviations from nominal surface over a specified length surface.



Sampling Length: It is the length of Profile necessary for the evaluation of irregularities to be taken in account. Also called as

Mean line of the Profile: It is the line that divides t
profile such that, within sampling length the sum of
vertical ordinates (y1,y2...) between effective profile poi
line is minimum or

Center line of the Profile: It is the line that divides t
profile such that, the area contained by the profile abo
the line are equal.

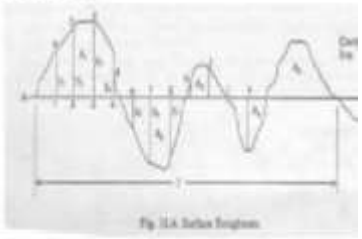
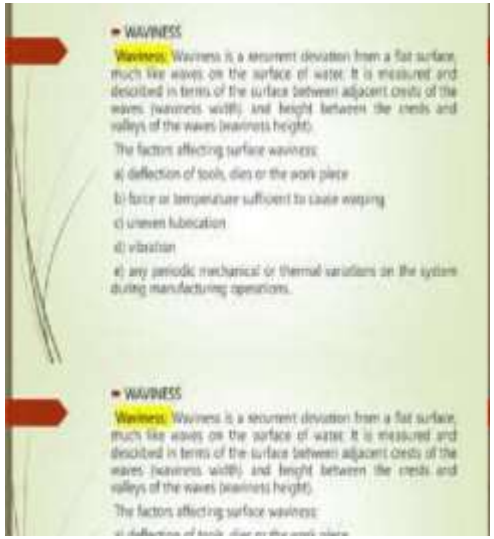


Fig. 3.6 Surface Roughness

Mean line of the Profile: It is the line that divides t


WAVINESS
Waviness: Waviness is a recurrent deviation from a flat surface, much like waves on the surface of water. It is measured and described in terms of the surface between adjacent crests of the waves (waviness width) and height between the crests and valleys of the waves (waviness height).
The factors affecting surface waviness:
a) deflection of tools, dies or the work piece
b) force or temperature sufficient to cause warping
c) uneven lubrication
d) vibration
e) any periodic mechanical or thermal variations on the system during manufacturing operations.
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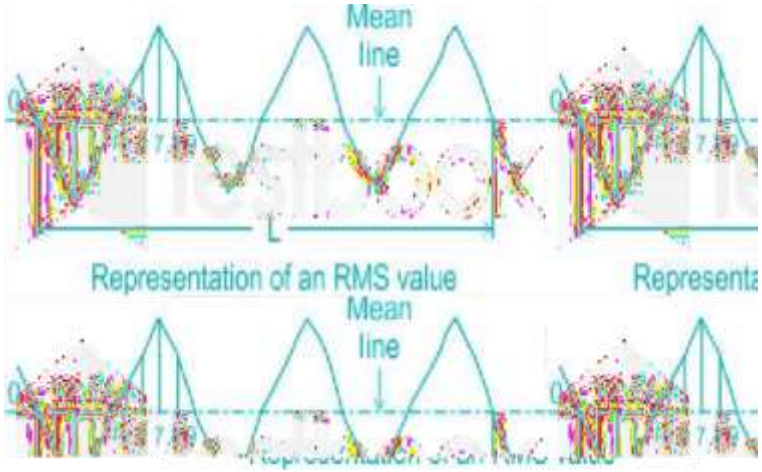
The factors affecting surface waviness:

Representation of an rms value:



Defi nitio n

- THE RMS VALUES POPULAR CHOICE FOR QUANTIFY SURFACE ROUGHNESS THIS HAS
- BEEN SUPESTED by the centre line the average values the rms values defined as been square root of the mean square of the orientation of the surface measurement from the line

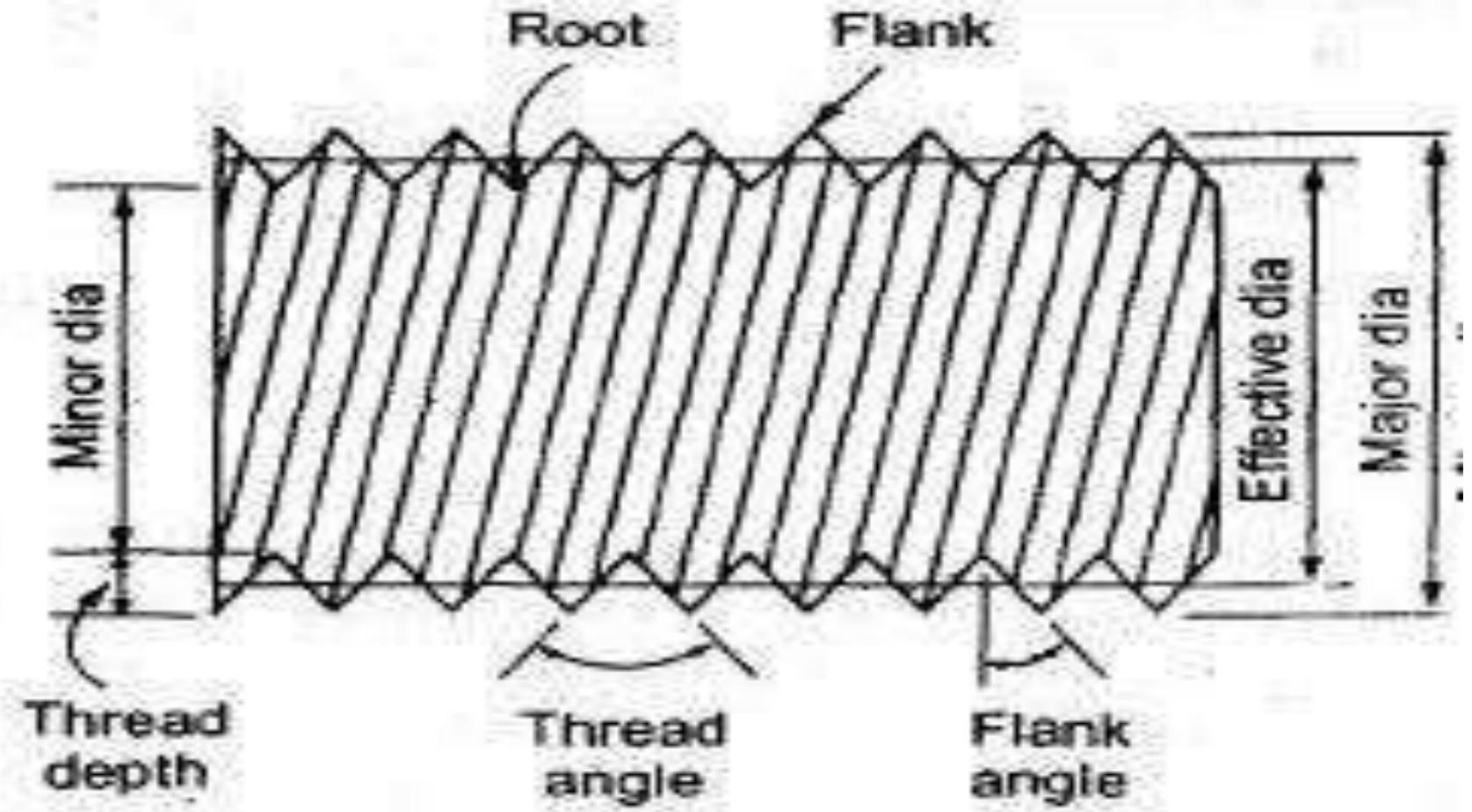
SCREW THREAD MEASUREMENT

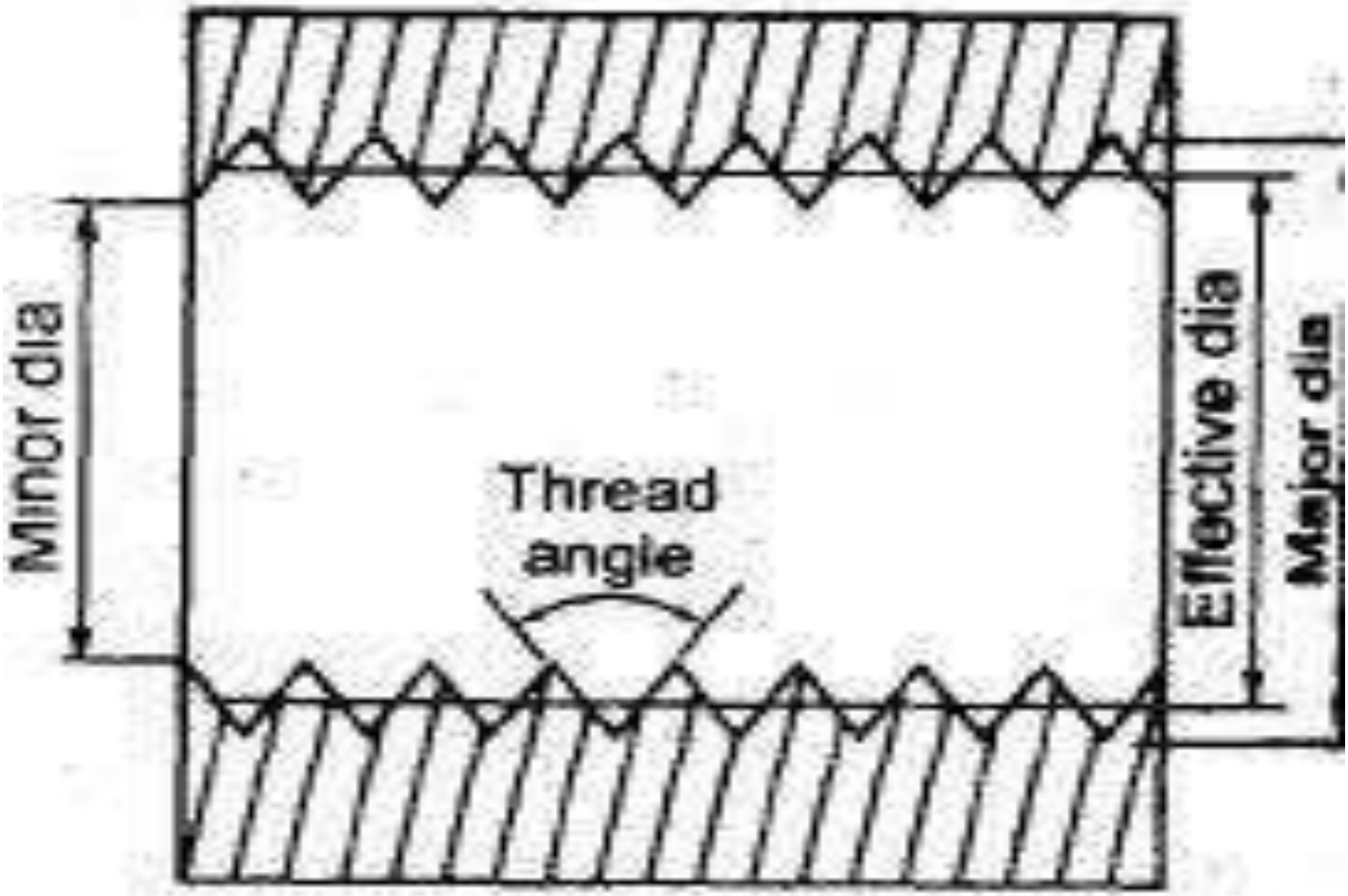
➢ Screw threads are used to transmit the power and motion, and also used to fasten
two components with the help of nuts, bolts and. studs.

➢ There is a large variety of screw threads
varying in their form, by included angle,
head angle, helix angle etc.

The screw threads are mainly classified into

1) External thread
2) Internal thread




Minor dia
Thread
angle
Effective dia
Major dia

Gear Measurement

1. Gear Runout Measurement

It means eccentricity in the pitch circle. It will give periodic vibration during each revolution of the gear. This will give the tooth failure in gears. The run out is measured by means of eccentricity meters.

In the testing the gears are placed in the mandrel and the dial indicator of the tester possesses special tip depending upon the module of the gear and the tips inserted between the tooth spaces and the gears are rotated tooth by tooth and the variation is noted from the dial indicator.