Introduction

When we are producing components by various methods of manufacturing process it is not possible to produce perfectly smooth surface and some irregularities are formed. These irregularities are causes some serious difficulties in using the components. So it is very important to correct the surfaces before use. The factors which are affecting surface roughness are

1. Work piece material
2. Vibrations
3. Machining type
4. Tool and fixtures

The geometrical irregularities can be classified as

1. First order
2. Second order
3 Third order
4. Fourth order

1. First order irregularities

These are caused by lack of straightness of guide ways on which tool must move.

2. Second order irregularities

These are caused by vibrations

3. Third order irregularities

These are caused by machining.

4. Fourth order irregularities

These are caused by improper handling machines and equipments.

Elements of surface texture

1. **Profile**: - Contour of any section through a surface.
2. **Lay**: - Direction of the 'predominate surface pattern'
3. **Flaws**: - Surface irregularities or imperfection, which occur at infrequent intervals.
4. **Actual surface**: - Surface of a part which is actually obtained,
5. **Roughness**: - Finely spaced irregularities. It is also called primary texture.
6. **Sampling lengths**: - Length of profile necessary for the evaluation of the irregularities.
7. **Waviness**: - Surface irregularities which are of greater spacing than roughness.

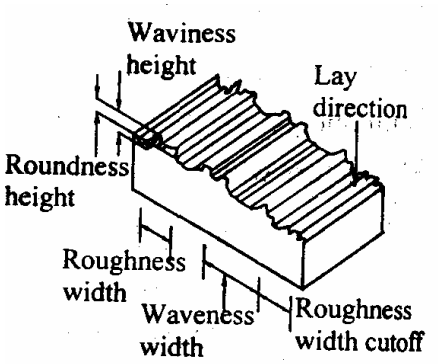


Fig 3.22 Surface Texture

8. **Roughness height**: - Rated as the arithmetical average deviation.
9. **Roughness width**: - Distance parallel to the normal surface between successive peaks.
10. **Mean line of profile**: - Line dividing the effective profile such that within the sampling length.
11. **Centre line of profile**: - Line dividing the effectiveness profile such that the areas embraced b profile above and below the line are equal.

Analysis of surface finish

The analyses of surface finish being carried out by

1. The average roughness method.
2. Peak to valley height method
3. From factor

1. Average roughness measurement

The assessment of average roughness is carried out by

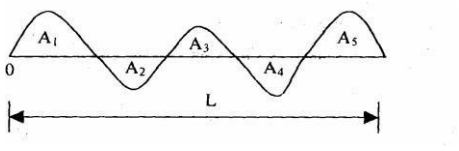
a Centre line average (CLA).

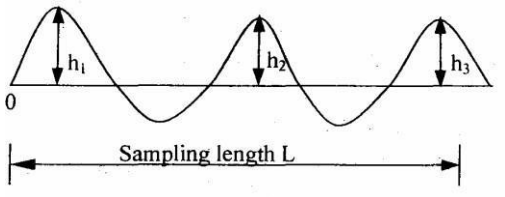
b Root mean square (RMS)

c Ten point method

a. C.L.A. method

The surface roughness is measured as the average deviation from the nominal surface.





$$\text{C. L. A. Value} = \frac{A_1 + A_2 + A_3 + \ldots A_n}{L}$$

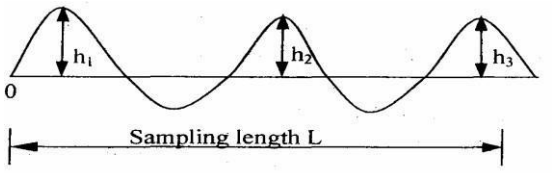
$$\boxed{\text{C. L. A.} = \frac{\sum A}{L}}$$

Where, $\sum A$ = Average area

L = Total length

b. R.M.S. method

The roughness is measured as the average deviation from the nominal surface. Let, h1,h2, ... are the heights of the ordinates and L is the sampling length

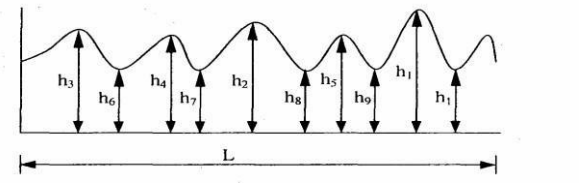


$$\text{R.M.S. average} = \frac{\sqrt{h_1^2 + h_2^2 + h_3^2 + \ldots + h_n^2}}{n}$$

c. Ten point height method

The average difference between five highest peaks and five lowest valleys of surface is taken and irregularities are calculated by

$$S_2 = \frac{1}{5}\left(h_1 + h_2 + h_3 + h_4 + h_5\right) - \left(h_6 + h_7 + h_8 + h_9 + h_{10}\right)$$



2. Peak to valley height method

Peak to valley height measures the maximum depth of the surface irregularities over a given sample length and largest value of the depth is accepted for the measurement.

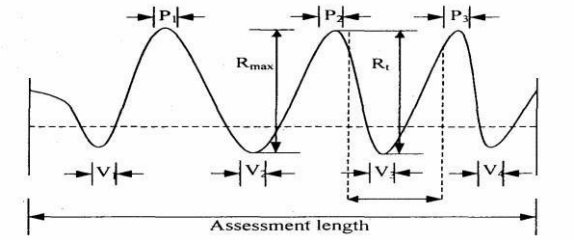
Here, = Maximum peak to valley height in one sampling lengths.

R = Maximum peak to valley height

V=Valley

P = Peak

Here, R is the maximum peak to valley height within the assessment length and the disadvantages of R, and is only a single peak or valley which gives the value is not a true picture of the actual profile of the surface



3. Form factor

It is obtained by measuring the area of material above the arbitrarily chosen base line in the section and the area of the enveloping rectangle.

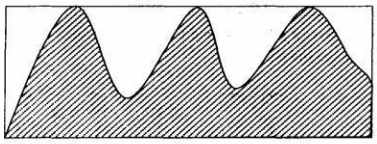


Fig 3.23 Form factor

$$\text{Degree of fullness } (F) = \frac{\textit{Metal Area}}{\textit{Enveloping rec}\,\text{tan}\,\textit{gle Area}}$$

$$\boxed{\text{Degree of emptiness, } (E_1) = 1 - F}$$