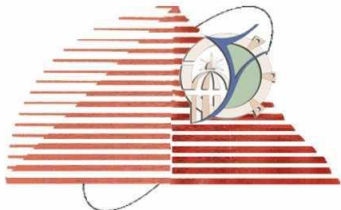


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

*Measurements
and
Metrology*



Fayoum University



**Faculty of Engineering
Industrial Engineering Dept.**

*Lecture (5)
on*

*Geometric Form and Deviation
Measurements*

By

Dr. Emad M. Saad

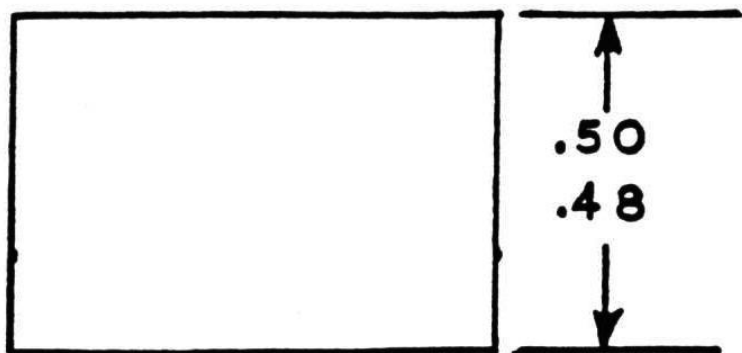
*Industrial Engineering Dept.
Faculty of Engineering
Fayoum University*

2015 - 2016

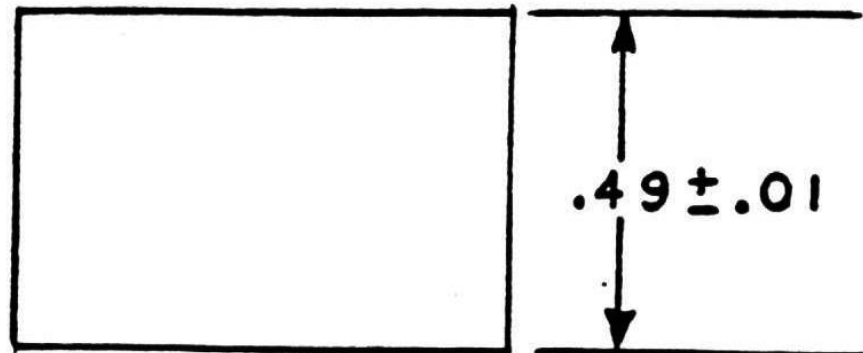


Specification of Linear Tolerances

3



New Standard



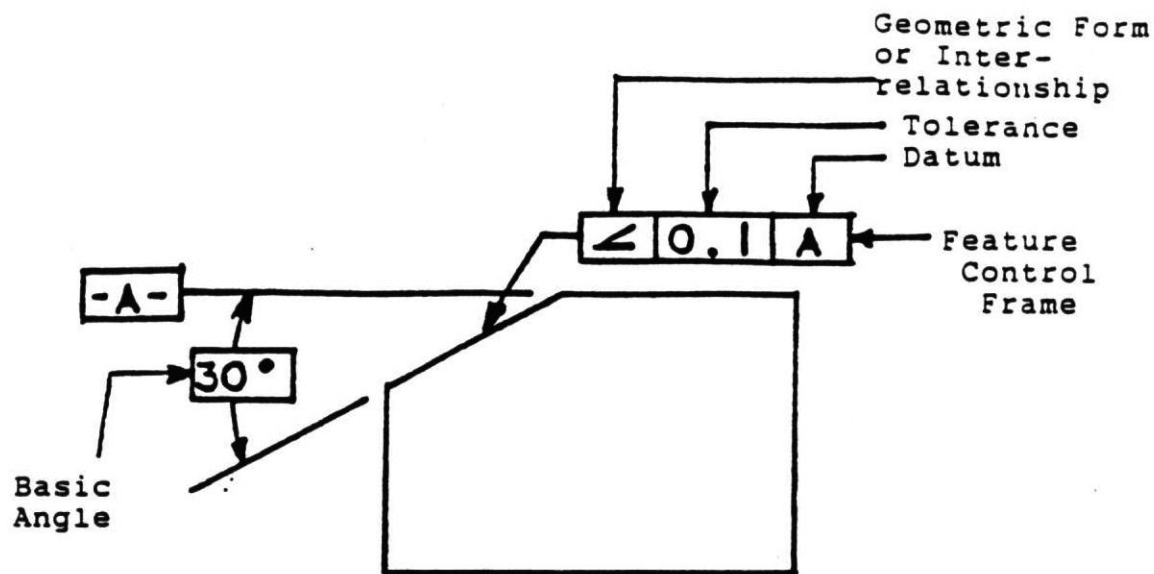
Old Standard





Angular Specifications

4



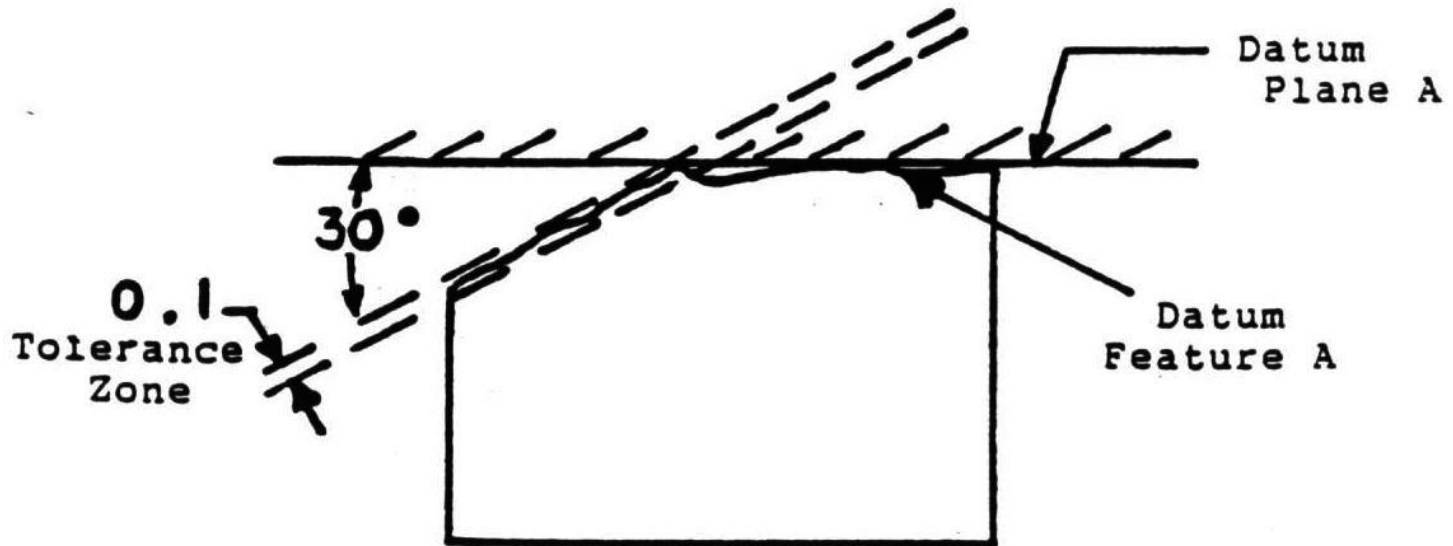
The Specification





Angular Tolerances

5



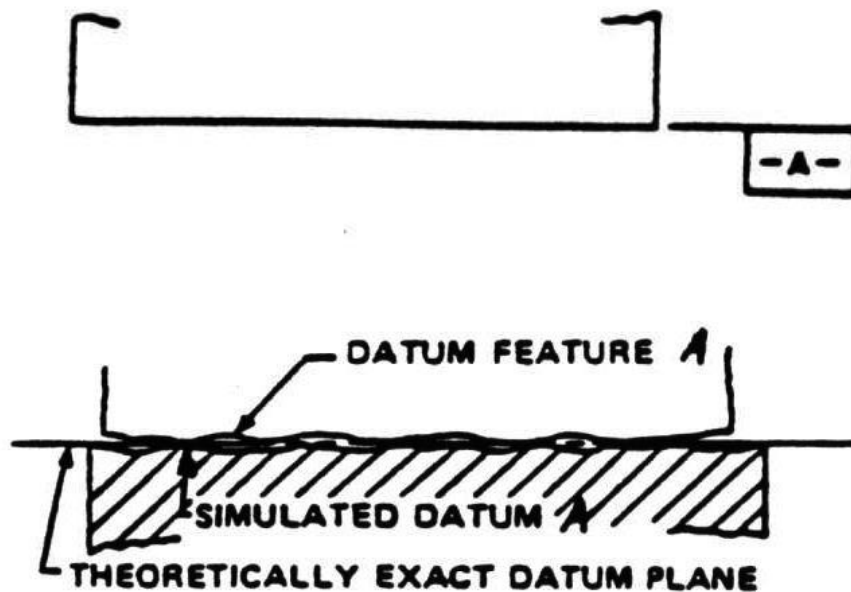
The Tolerance Zone
(Area between two parallel planes)





Simulated Datum

6



Interpretation

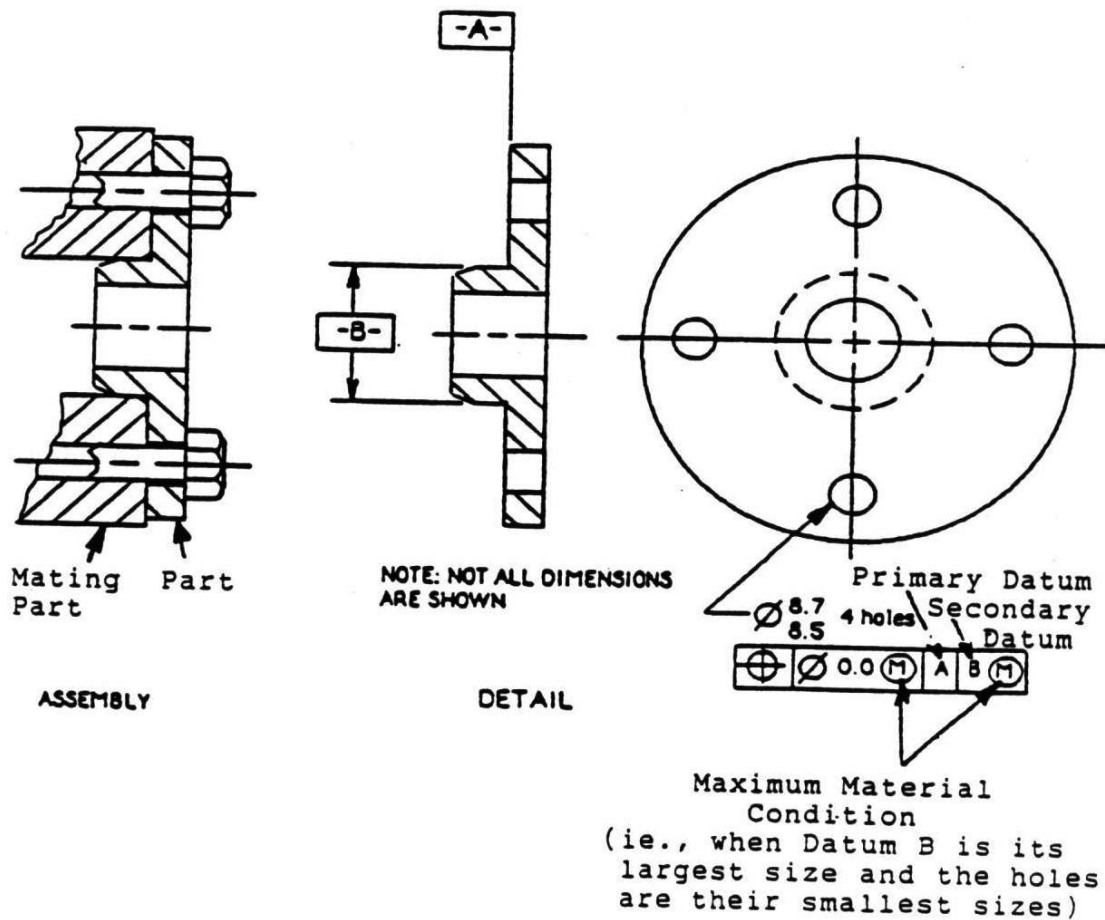
(The datum feature is on the part; the simulated datum is on a gage or surface plate.)





Datum Selection

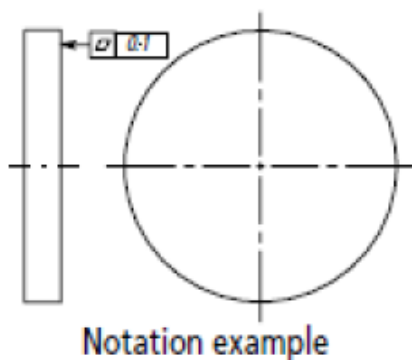
7



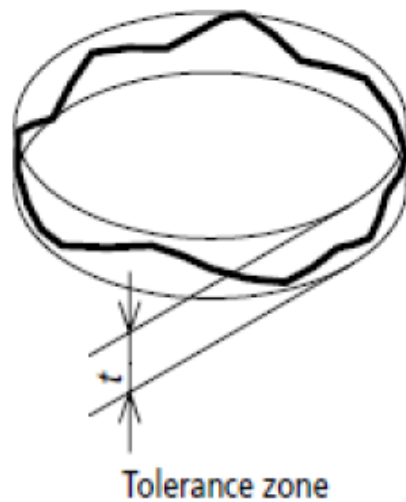


Flatness Measurement

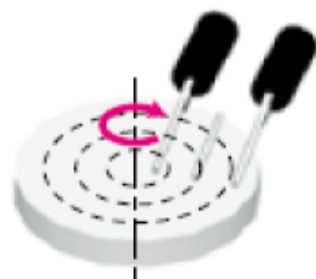
8



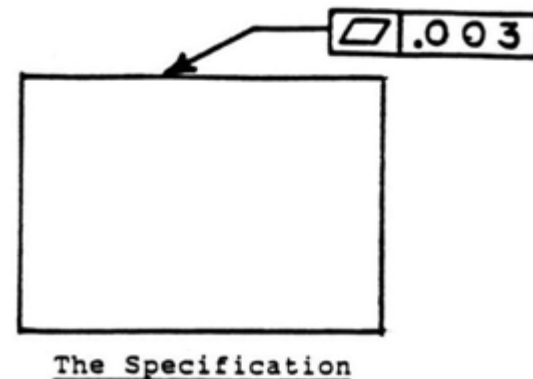
Notation example



Tolerance zone



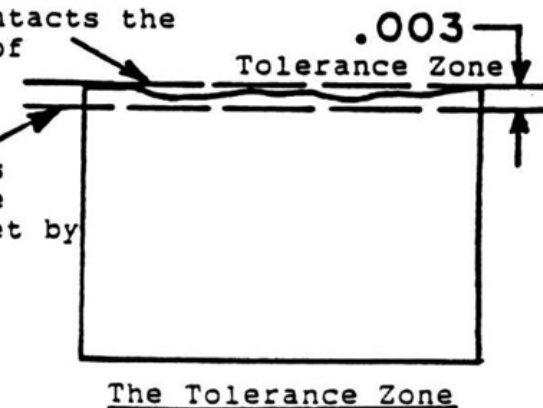
Inspection example



The Specification

First plane contacts the 3 high points of the surface.

Second plane is parallel to the first and offset by the tolerance.



The Tolerance Zone

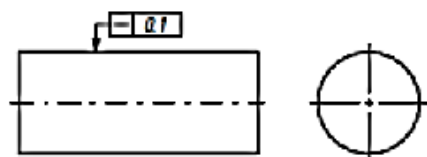
Flatness: the surface must be contained within the tolerance zone formed between two parallel planes a distance t apart



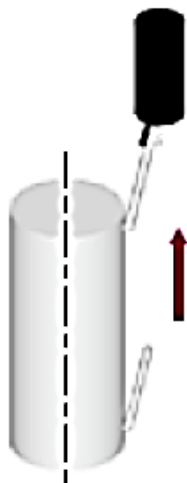


Straightness Measurement

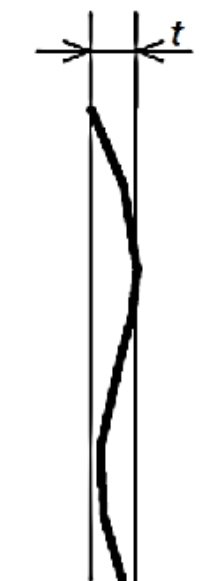
9



Notation example

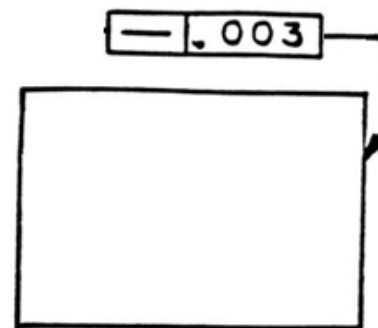


Inspection example

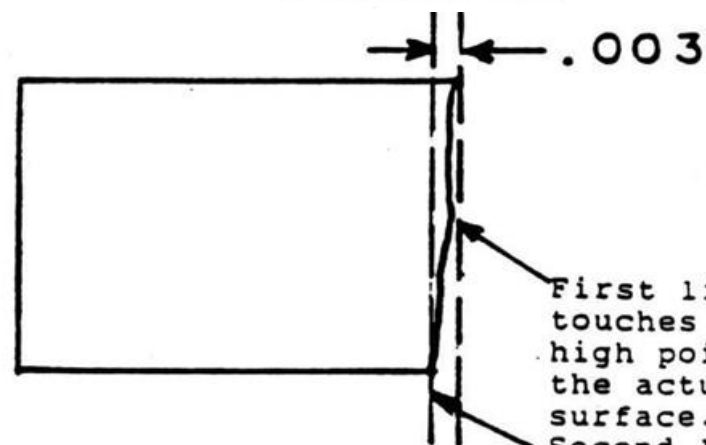


Tolerance zone

Straightness: any line of the surface must lie within the tolerance zone formed between two parallel straight lines a distance t apart and in the direction specified



The Specification



The Tolerance Zone

First line touches the high points of the actual surface.
Second line is parallel to the first and offset by the tolerance.





Straightness Measurement

10

The equation of the mean line $\rightarrow y' = mx + c$

Where,

$$m = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{n \sum x_i^2 - (\sum x_i)^2}$$

$$c = \frac{\sum y_i \sum x_i^2 - \sum x_i \sum x_i y_i}{n \sum x_i^2 - (\sum x_i)^2}$$

Out of straightness $\rightarrow \delta_i = y_i - y'_i$

Maximum out of straightness = $|\max + \delta| + |\max - \delta|$

