























Flatness	Straightness (of an axis)	Straightness (surface element)	Circularity (roundness)	Cylindricity
				
Perpendicularity	Angularity	Parallelism	Profile (of a line)	Profile (of a surface)
				
Runout (circular)	Runout (total)	Concentricity	True Position	

SYMBOL	CHARACTERISTICS	CATEGORY
	Straightness	Form
	Flatness	
	Circularity	
	Cylindricity	
	Profile of a Line	Profile
	Profile of Surface	
	Angularity	Orientation
	Perpendicularity	
	Parallelism	
	Position	Location
	Concentricity	
	Symmetry	
	Circular Runout	Runout
	Total Runout	
www.enggwave.com		

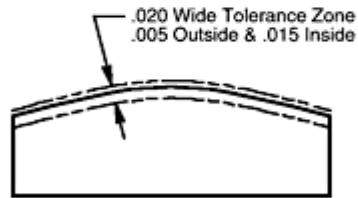
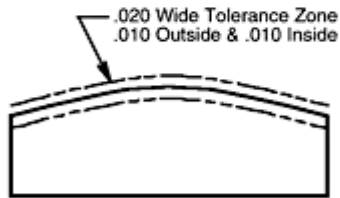
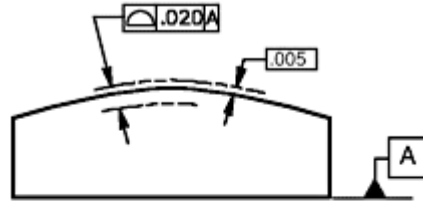
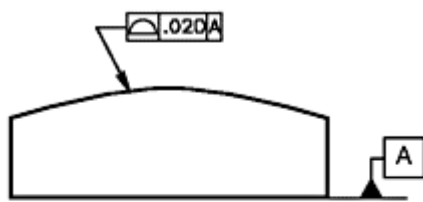
Position (true)		Flatness	
Concentricity		Circularity	
Symmetry		Straightness	
Parallelism		Profile of a surface	
Perpendicularity		Profile of a line	
Angularity		Circular runout	
Cylindricity		Total runout	

Unrelated geometrical tolerances (form tolerances)				
Profile (form) of lines (line profile)*	Straightness			
	Roundness			
	Profile (form) of surfaces (surface profile)*			
Profile (form) of surfaces (surface profile)*	Flatness			
	Cylindricity			
Related geometrical tolerances				
Orientation	Angularity			
	Parallelism			
	Perpendicularity			
Location	Position			
	Coaxiality			
	Symmetry			
Run-out	Circular run-out	Circular radial run-out Circular axial run-out		
		Total run-out Total radial run-out Total axial run-out		

* The tolerances of profile of lines and of profile of surfaces may also be related to datums (Figs 4.2 and 4.4).

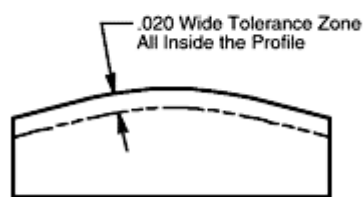
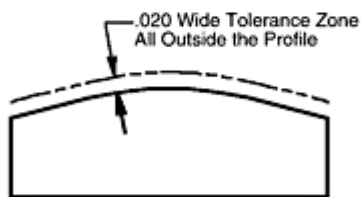
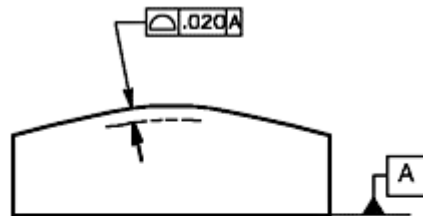
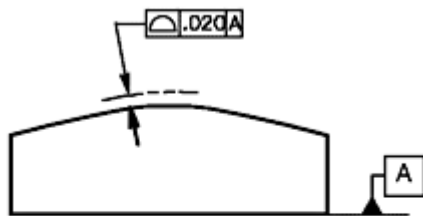
Symbol	Description	Geometry
	ANGULARITY	ORIENTATION
	CONCENTRICITY	LOCATION
	CYLINDRICITY	FORM
	FLATNESS	FORM
	PARALLELISM	ORIENTATION
	PERPENDICULARITY	ORIENTATION
	POSITION	LOCATION
	PROFILE	PROFILE
	PROFILE OF A LINE	PROFILE
	CIRCULARITY	FORM
	RUNOUT	RUNOUT
	STRAIGHTNESS	FORM
	SYMMETRY	LOCATION
	TOTAL RUNOUT	RUNOUT

Symbol	Modifier
	FREE STATE
	LEAST MATERIAL CONDITION
	MAXIMUM MATERIAL CONDITION
	PROJECTED TOLERANCE ZONE
	REGARDLESS OF FEATURE SIZE
	TANGENT PLANE
	UNILATERAL



A. Bilateral Tolerance

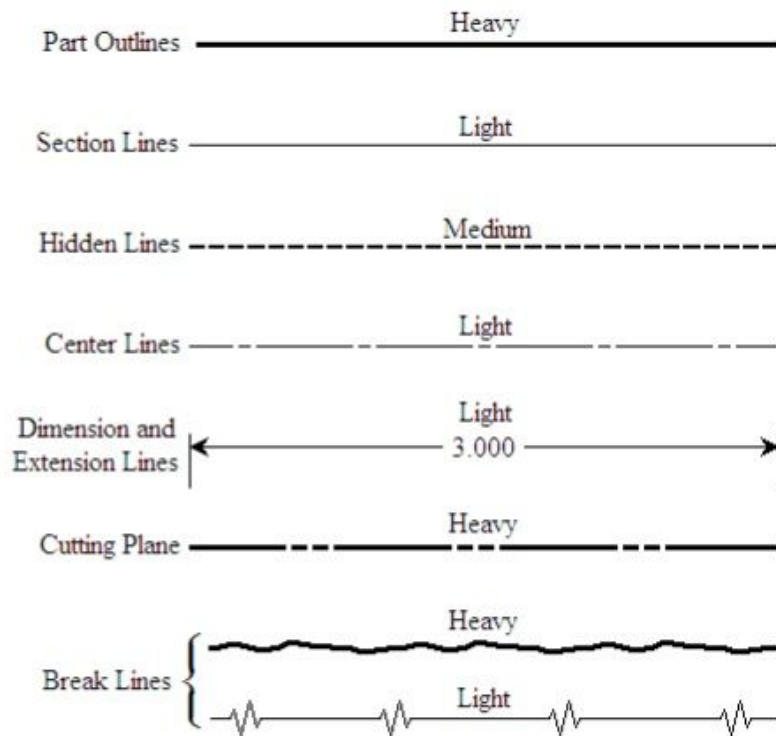
B. Unequally Distributed Bilateral Tolerance



C. Unilateral Tolerance Outside

D. Unilateral Tolerance Inside

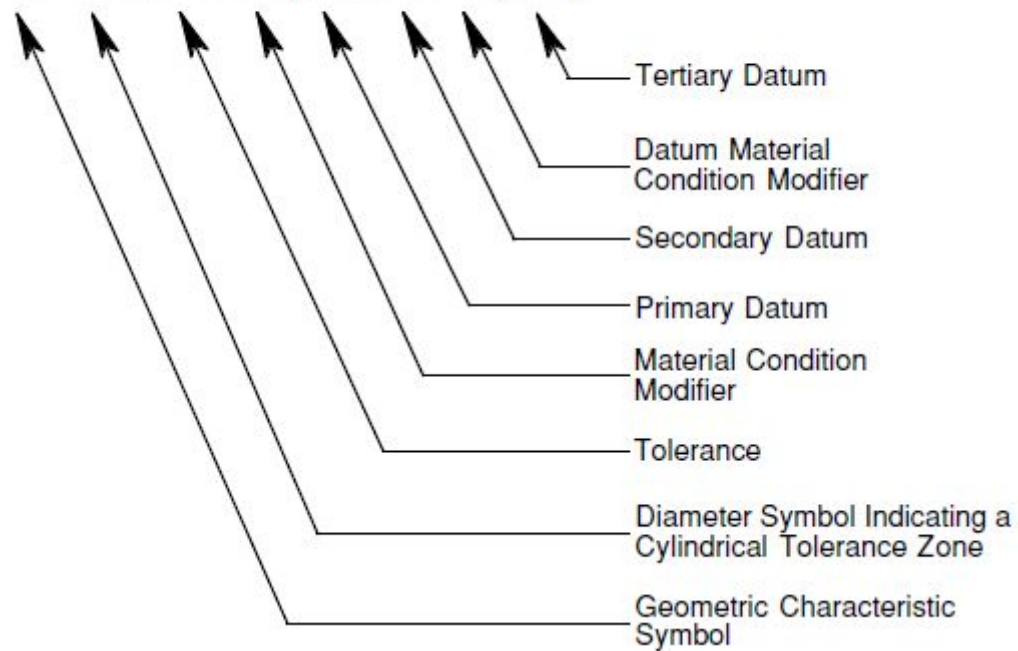
Types of Line

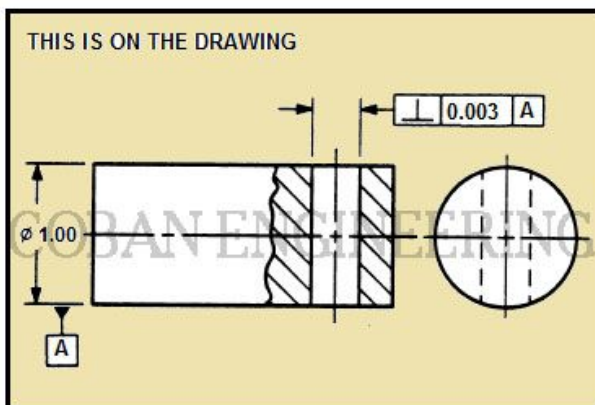
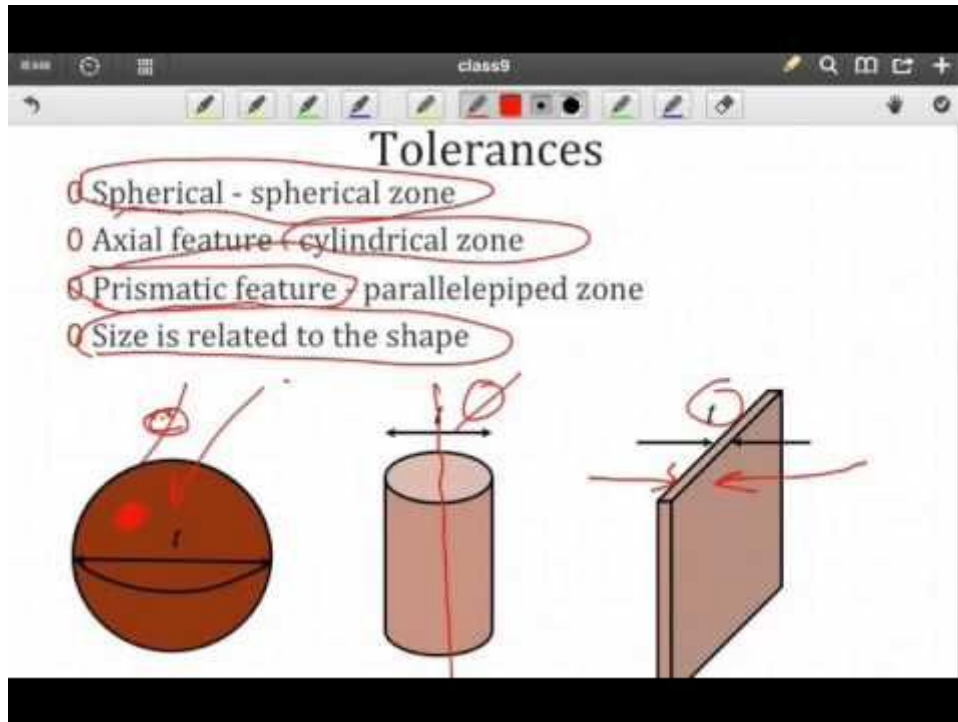


Lec. Bhuiyan Shameem Mahmood

74

Ø.505-.525





MEANS

