Guide to GD&T

(Global Dimensioning and Tolerancing)

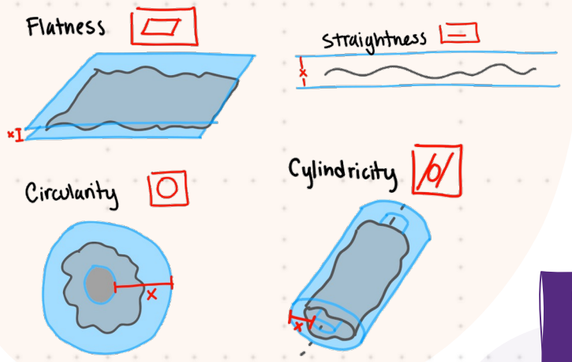
PLMC
PRODUCT LIFECYCLE MANAGEMENT CENTER
AT CLEMSON UNIVERSITY

GEOMETRIC SYMBOLS

Type	Name	Icon	Description
Form	Flatness	▱	Surface deviation from plane
	Straightness	—	Edge deviation from line
	Circularity	○	Shaft deviation from circle
	Cylindricity	⌭	Shaft deviation from cylinder
Orientation	Perpendicularity	⊥	Feature deviation from perpendicular
	Angularity	∠	Orientation deviation from datum
	Parallelism	//	Feature deviation from offset line
Profile	Profile (Line)	⌒	Line deviation from nominal
	Profile (Surface)	⌓	Surface deviation from nominal
	Symmetry	⌯	Feature deviation across plane
Location	Concentricity	◎	Point deviation from circle center
	Position	⌖	Point deviation from datum
Runout	Runout	↗	Circularity and concentricity deviation
	Total Runout	⌰	Runout + straightness about coaxial datum

FORM

Form with no datum reference

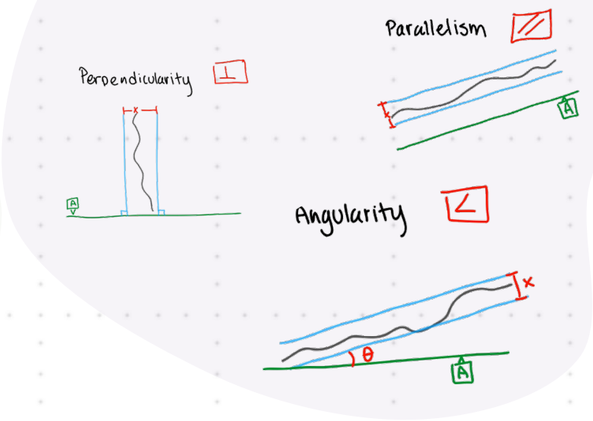


PROFILE

Form by reference to a feature

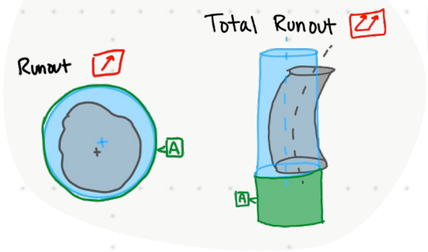
ORIENTATION

Form compared to datum reference



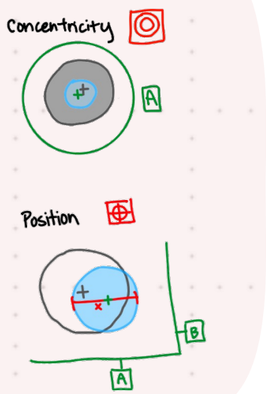
RUNOUT

Controls surface coaxiality



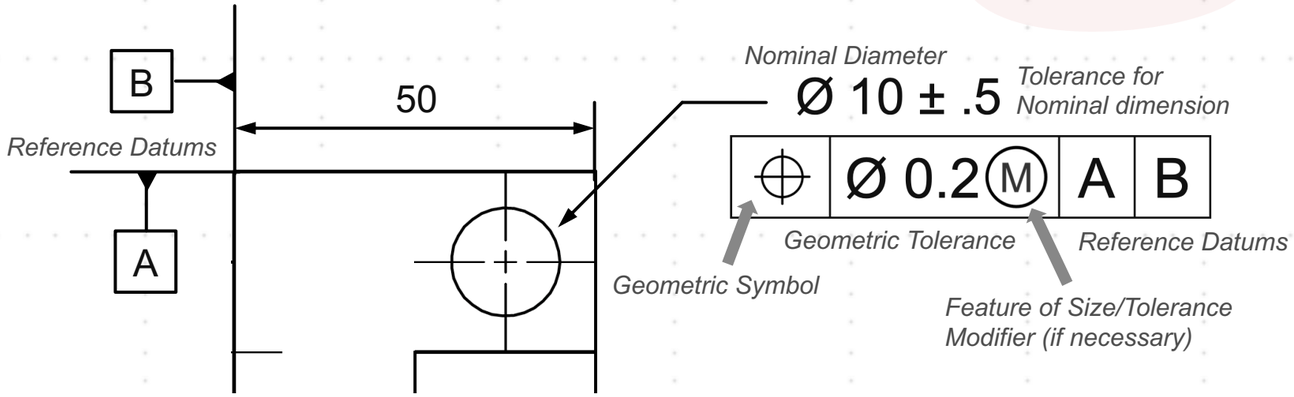
LOCATION

Point position by reference to datum



FITS AND CLEARANCES

Icon	Name	Description
RC	Running/Sliding Fit	Parts can move freely
LC	Locational Clearance Fit	Parts don't move, but can be disassembled
LT	Locational Transition Fit	Compromise between LC and LN
LN	Location Interference Fit	Accurate locating, no force transmission
FN	Force Interference/Shrink Fit	Rigid and permanent bonds
Ⓜ	Maximum Material Condition	Largest shaft, smallest hole
Ⓛ	Least Material Condition	Smallest shaft, largest hole



Read as: *the shaft has a nominal diameter of 10mm, with a tolerance of ± .5mm. The position of the hole is to vary from its nominal position (referenced from datums A and B) by no more than 0.2mm at the Maximum Material Condition (MMC)—it's smallest permissible diameter.*

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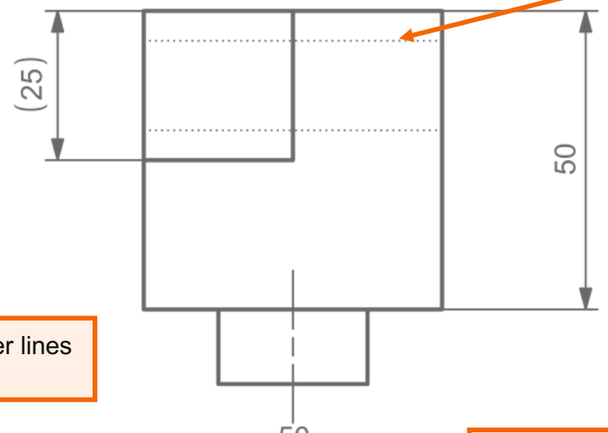
Reference dimensions provide clarity but are not driving

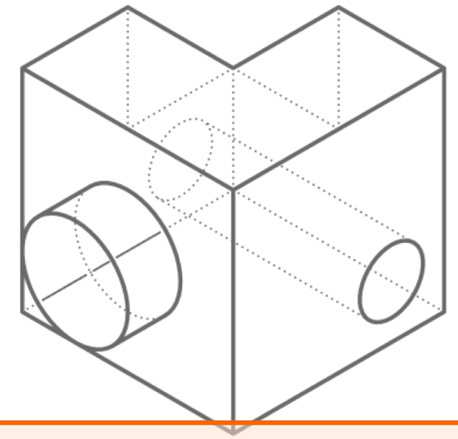
Group similar dimensions on the same view

Use new views to break up complicated dimensioning

Show dashed hidden lines unless they obscure the view

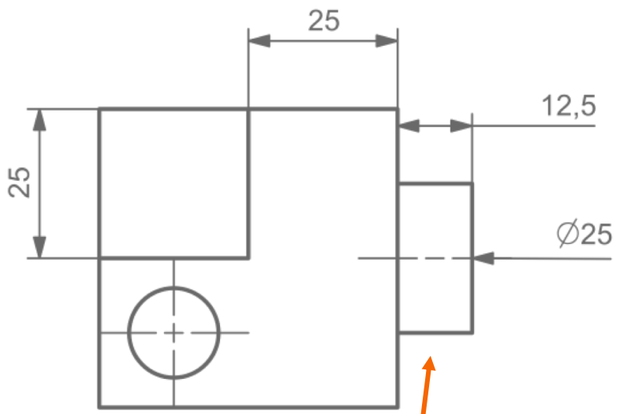


Miscellaneous:
1. Use ordinate dimensioning for linear callouts
2. Only show symbolic threads
3. Don't dimension hidden lines, dimension them on a breakout view if necessary
4. Assembly drawings: Only provide a few reference dimensions--all parts should be dimensioned in their individual part drawings



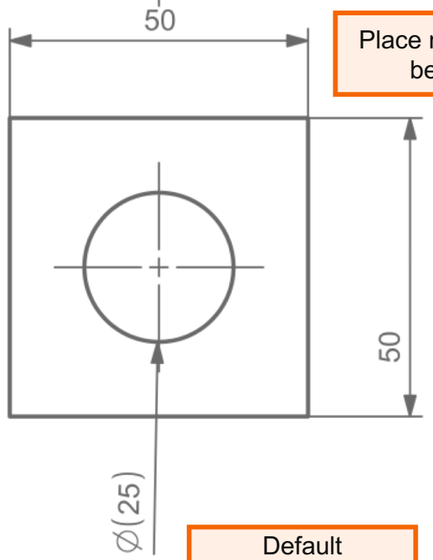
Views:
A normal layout is 3 dimensioned, orthographic projections (Front, Left, Top) as well as a non-dimensioned isometric view in the NE corner. You can add other views as necessary to show features.

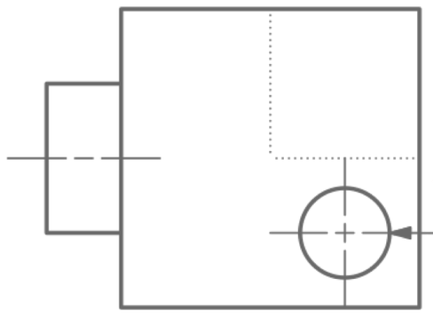
Don't let dimension leader lines cross



Dimension shafts from side (appear as rectangles)

Place major dimensions between views





Dimension holes from front (appear as circles)

∅15 THRU

List all notes in a single location

1. Polish all surfaces smooth
2. All edges have machine given radii unless otherwise specified

Engineering Drawings: Best Practices

Default tolerances

Unless Otherwise Stated		
Tolerances	(in)	(mm)
.0	±0.05	±.5
.00	±0.01	±.1
.000	±0.005	±.05

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Draftsperson trace

Ownership		
Task	Author	Date
Initial:	G. GALLILEI	15 FEB 1564
Drawn:	I. NEWTON	4 JAN 1643
Checked:	J. WATT	19 JAN 1736
Approved:	A. LOVELACE	10 DEC 1815
Part Information		
Material:	AL 6061	
Weight:	.2892 KG	

Drawing info (Scale, size, projection)

Scale: 1 : 1
Size: B

PLMC

REV: A

Title: Cuboid Object

Name of Part

Release: 1.0

Product: PLMC Examples

Name of Product or Assembly

Release: 1.0

Part ID: EX001 | Units: MM | Sheet: 1 of 1

279.4 x 431.8