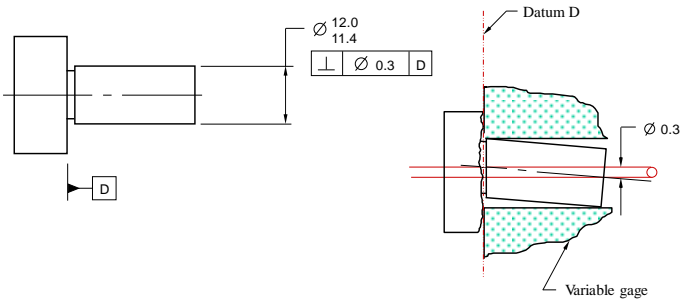
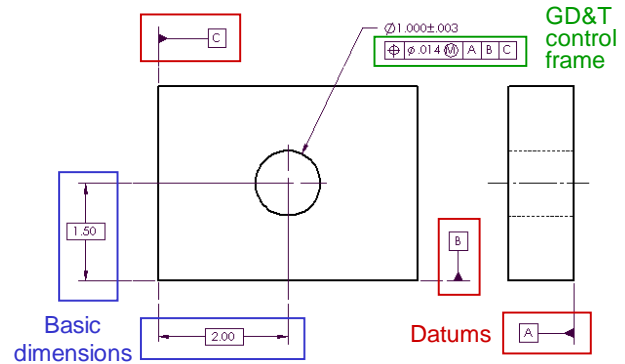


"...Because of its benefits, GDTP Certification... is now a long term requirement for Intel Design Group members."

## GD&T 2 Datums



## GD&T Dimensioning



CAD/Fab

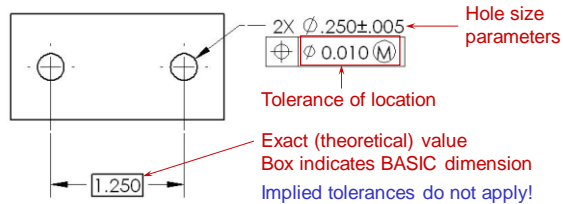
GD&T 2 - Datums

2

## BASIC Dimension

A numerical value used to describe the **theoretically exact** size, profile, orientation or location of a feature or datum target

A BASIC dimension *must* have an associated tolerance stating maximum permissible variation



CAD/Fab

GD&T 2 - Datums

3

## Datum

A theoretically exact *point, axis or plane* derived from the true geometric counterpart of a specified datum feature

**A** Datum feature symbol

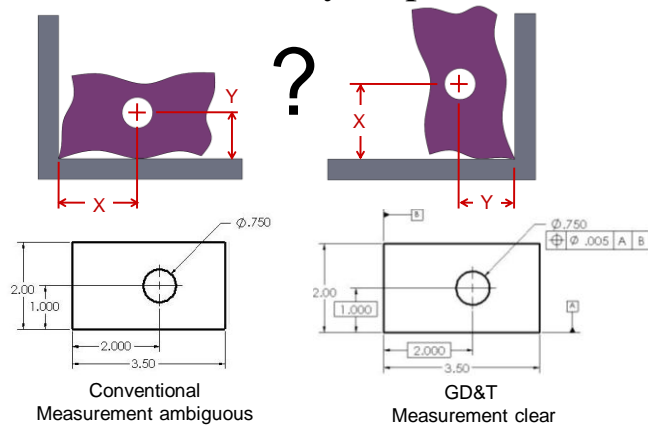
A datum is the origin from which the location or geometric characteristics of features of a part are established

CAD/Fab

GD&T 2 - Datums

4

## Datums Clarify Inspection

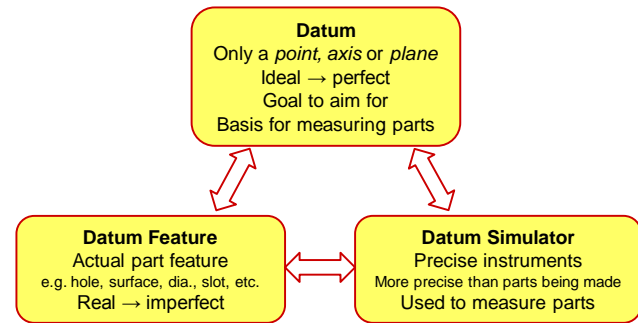


CAD/Fab

GD&T 2 - Datums

5

## Datums



CAD/Fab

GD&T 2 - Datums

6

## Datum Simulators

High precision surfaces and gages are used to *simulate* theoretically perfect datums, and therefore allow accurate measurement



Surface plate  
Ground flat and highly polished – simulates datum plane

CAD/Fab

GD&T 2 - Datums

7

## Planar Datum Example



Datum plane A is bottom plane of a perfect part

CAD/Fab

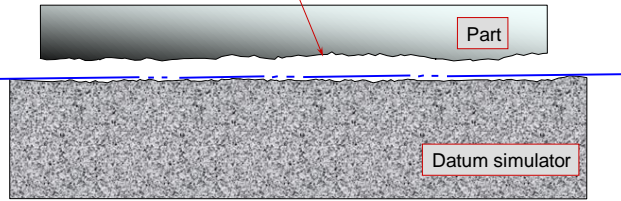
GD&T 2 - Datums

8

## Planar Datum Example

Neither the part nor the datum simulator are perfectly smooth

Datum feature  
(roughness exaggerated)



Simulated datum plane A  
Rests on 3 highest points of datum simulator

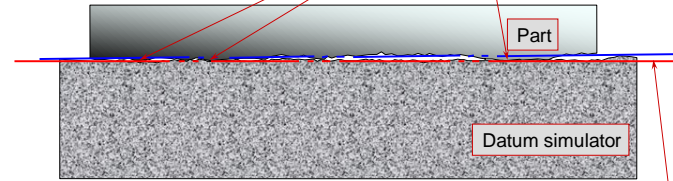
CAD/Fab

GD&T 2 - Datums

9

## Planar Datum Example

- When the part touches the datum simulator, they only contact at a few points
- These points of actual contact establish theoretical datum plane A



Datum plane A  
(Theoretical)

CAD/Fab

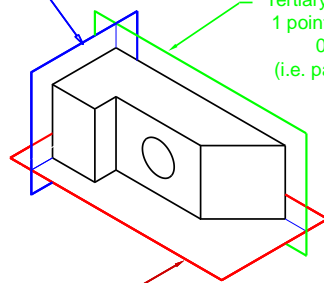
GD&T 2 - Datums

10

## Orthogonal Datum Planes

Secondary Datum Plane  
2 points of contact  
1 d.o.f.

Tertiary Datum Plane  
1 point of contact  
0 d.o.f.  
(i.e. part is fixed)



Primary Datum Plane  
3 points of contact  
3 degrees of freedom

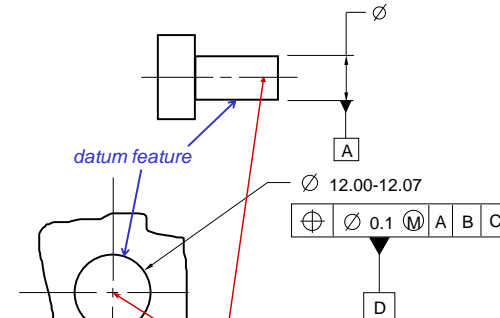
"3-2-1" Rule

CAD/Fab

GD&T 2 - Datums

11

## Indicating Datum Features - Axes



In each case, the datum is the axis of the hole or cylindrical datum feature

CAD/Fab

GD&T 2 - Datums

12

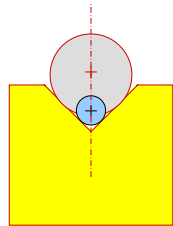
## Verifying Form

Gages are used to measure feature variation



V-blocks are used with cylindrical shapes

V aligns centers of circular objects, regardless of size

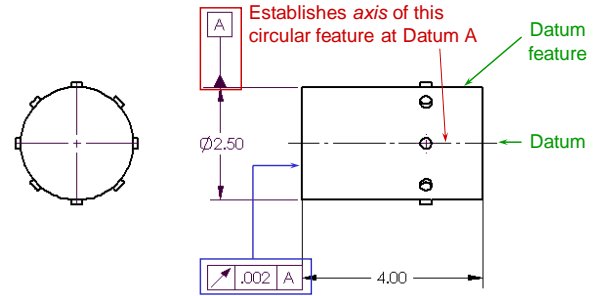


CAD/Fab

GD&T 2 - Datums

13

## Controlling Runout



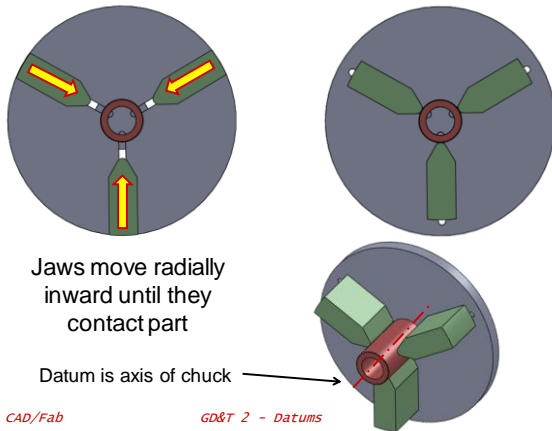
Specifies the allowable runout of this surface with respect to Datum A

CAD/Fab

GD&T 2 - Datums

14

## Three-Jaw Chuck



Jaws move radially inward until they contact part

Datum is axis of chuck

CAD/Fab

GD&T 2 - Datums

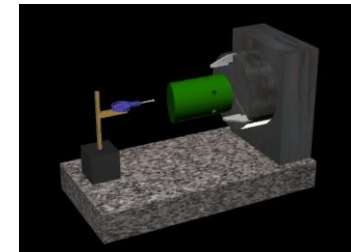
15

## Verifying Form

Gages are used to measure variation - e.g. "runout"



Dial indicator



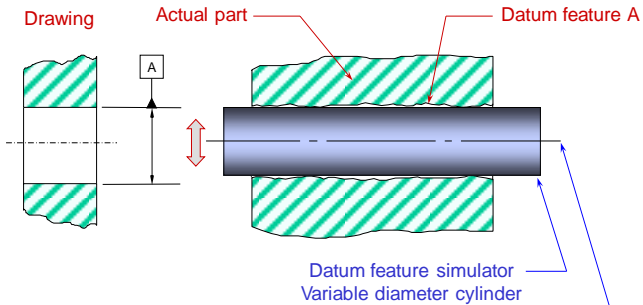
Motion of tip is displayed to 0.001" precision

CAD/Fab

GD&T 2 - Datums

16

## Internal Cylindrical Datum - RFS



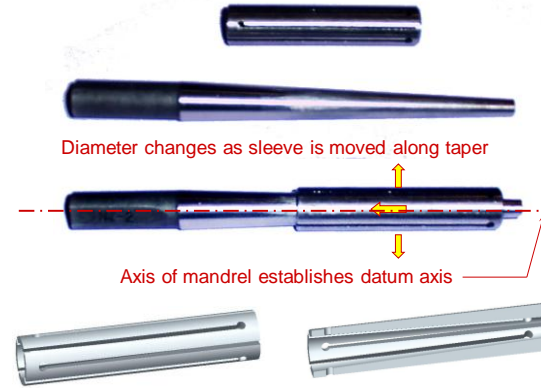
- The gage is expanded until it contacts the high points of the hole
  - The axis of the gage at that point becomes Datum Axis A
  - The material condition is "regardless of feature size" (RFS)

CAD/Fab

GD&T 2 - Datums

17

## Expanding Mandrel Gage

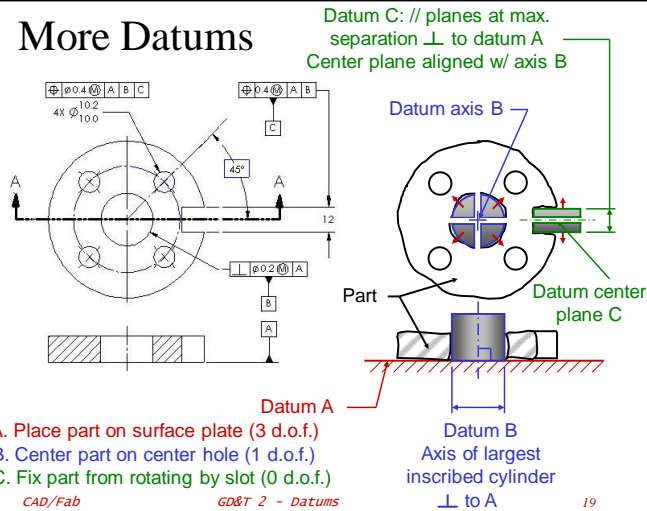


CAD/Fab

GD&T 2 - Datums

18

## More Datums



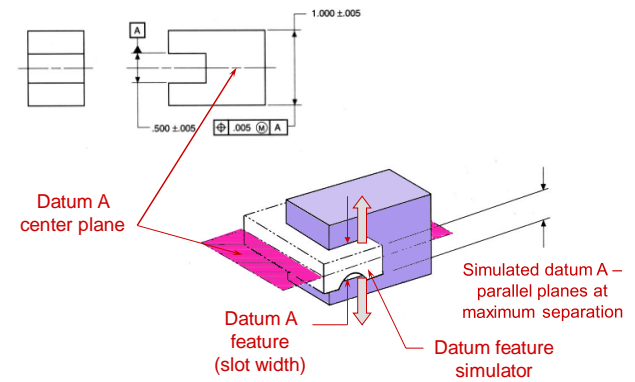
- Place part on surface plate (3 d.o.f.)
- Center part on center hole (1 d.o.f.)
- Fix part from rotating by slot (0 d.o.f.)

CAD/Fab

GD&T 2 - Datums

19

## Datum Center Plane (Internal)

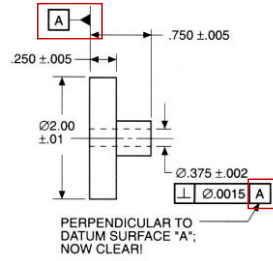
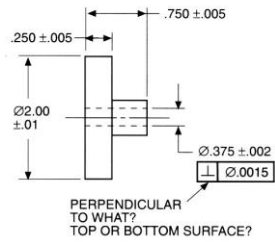


CAD/Fab

GD&T 2 - Datums

20

# Example



CAD/Fab

GD&T 2 - Datums

21