Measurement, Inspection and Testing

Seven Standards of Measurement

❖ Provide the basics for all other units of measurement

- Length
- Time
- Mass
- Temperature
- Ampere
- Candela
- Mole

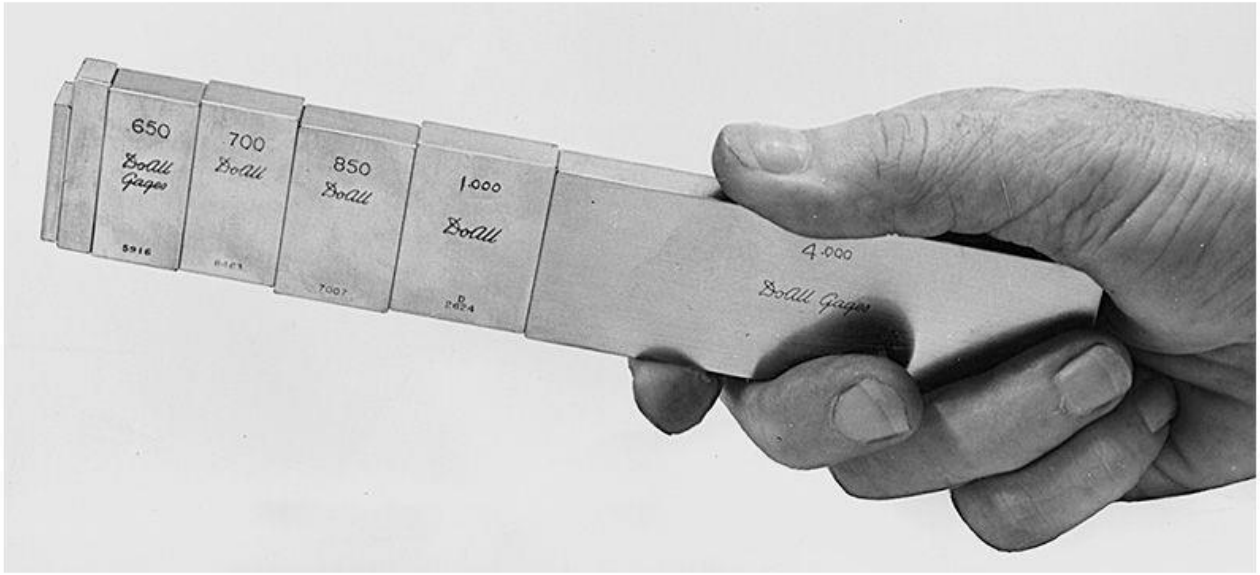
Gage Blocks

What's in the box

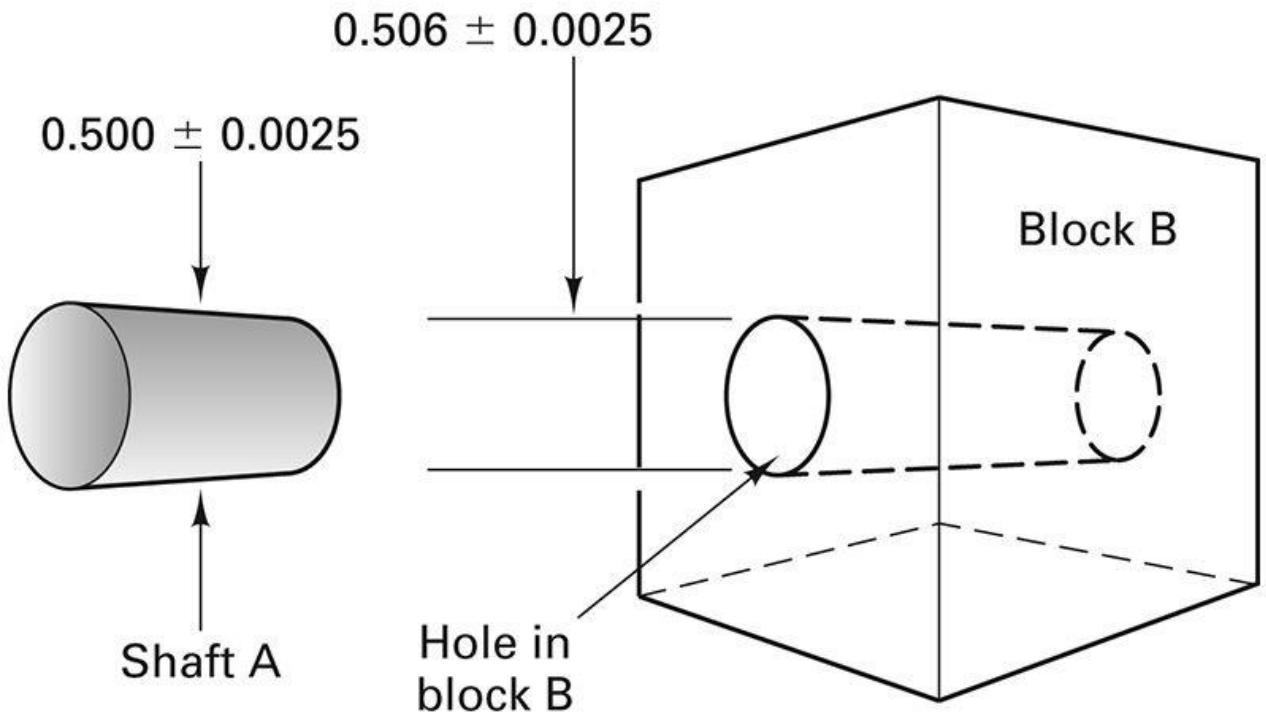
9 Blocks	0.1001	through 0.1009 in.		in steps of 0.0001 in.
49 Blocks	0.101	through 0.149	in.	in steps of 0.001 in.
19 Blocks	0.050	through 0.950	in.	in steps of 0.050 in.
4 Blocks	1.000	through 4.000	in.	in steps of 1.000 in.


Watch Video Here

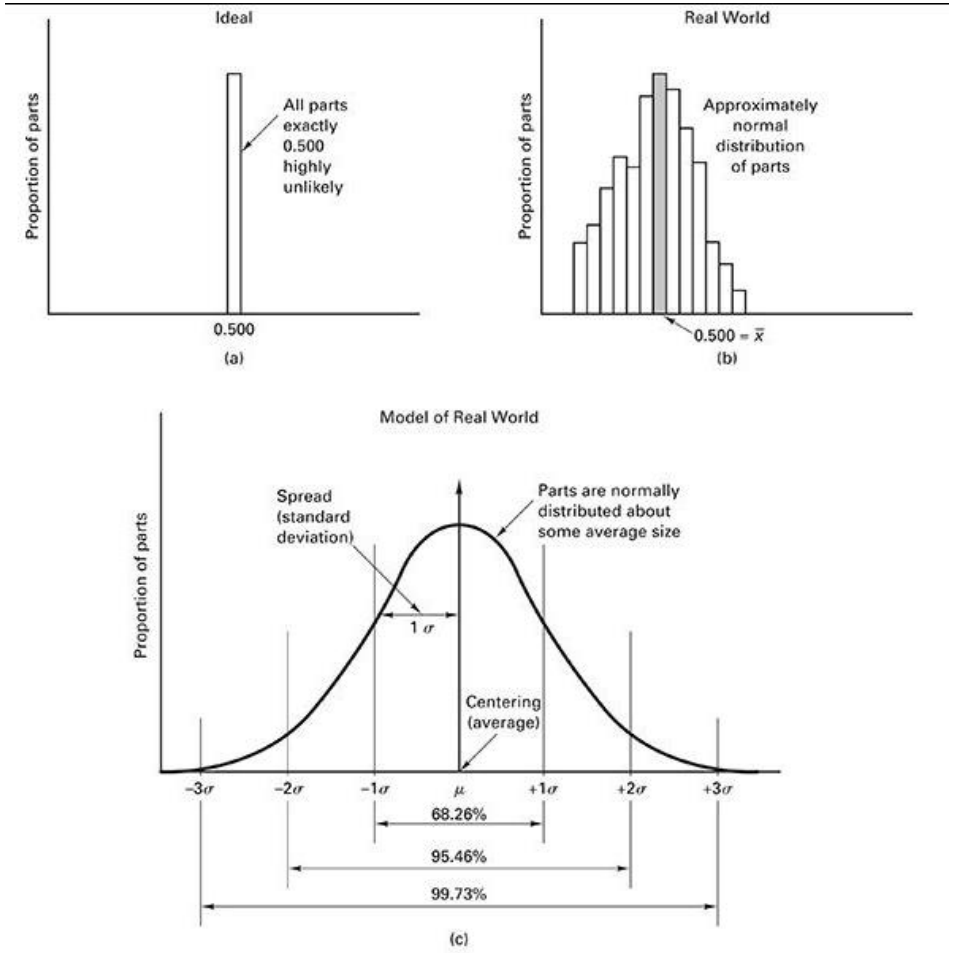
Gage Blocks wrung together



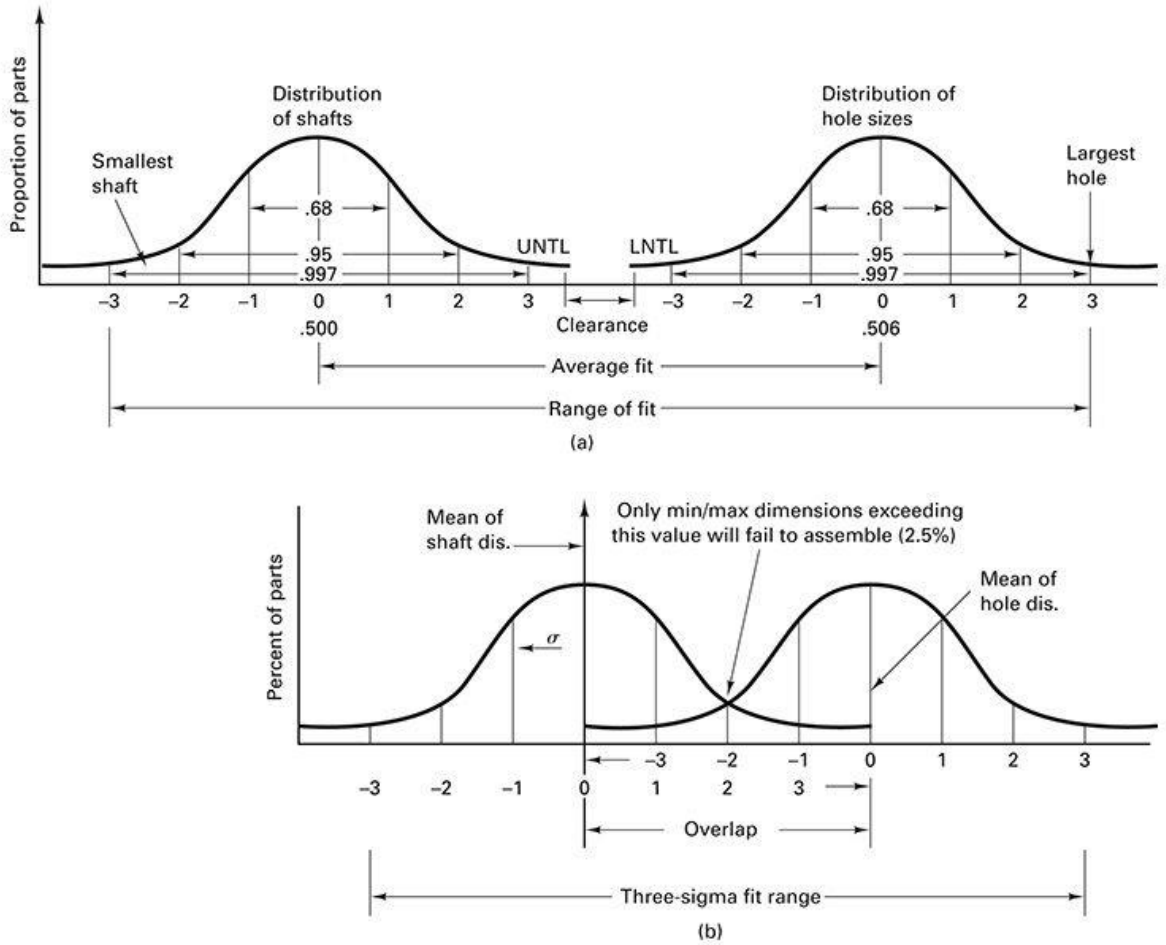
Mated Parts



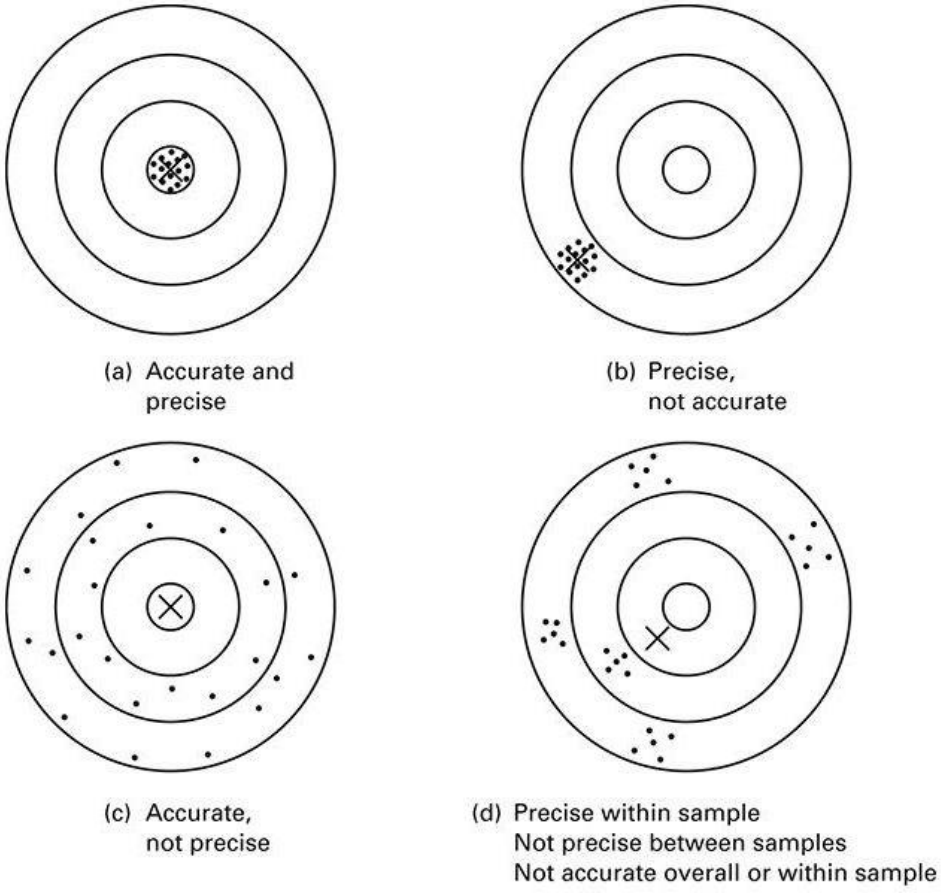
Normal Distribution



Distributions of Mating Parts



Accuracy Versus Precision



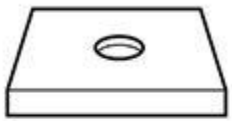
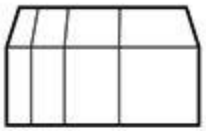
(a) Accurate and precise

(b) Precise, not accurate

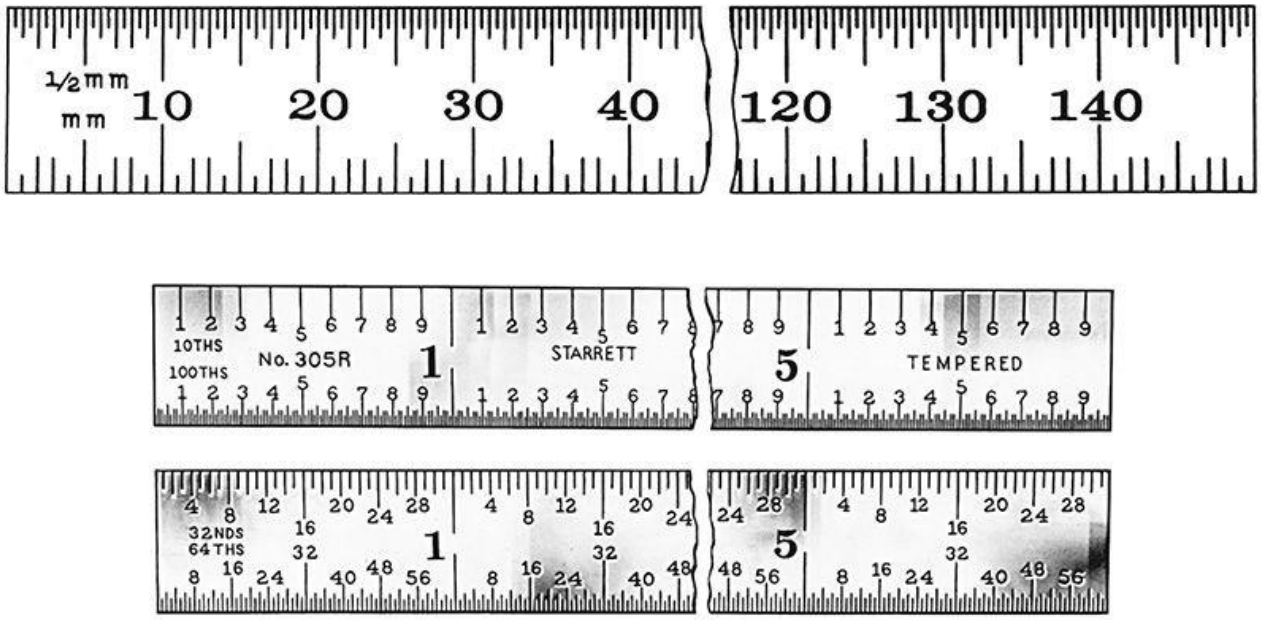
(c) Accurate, not precise

(d) Precise within sample
Not precise between samples
Not accurate overall or within sample

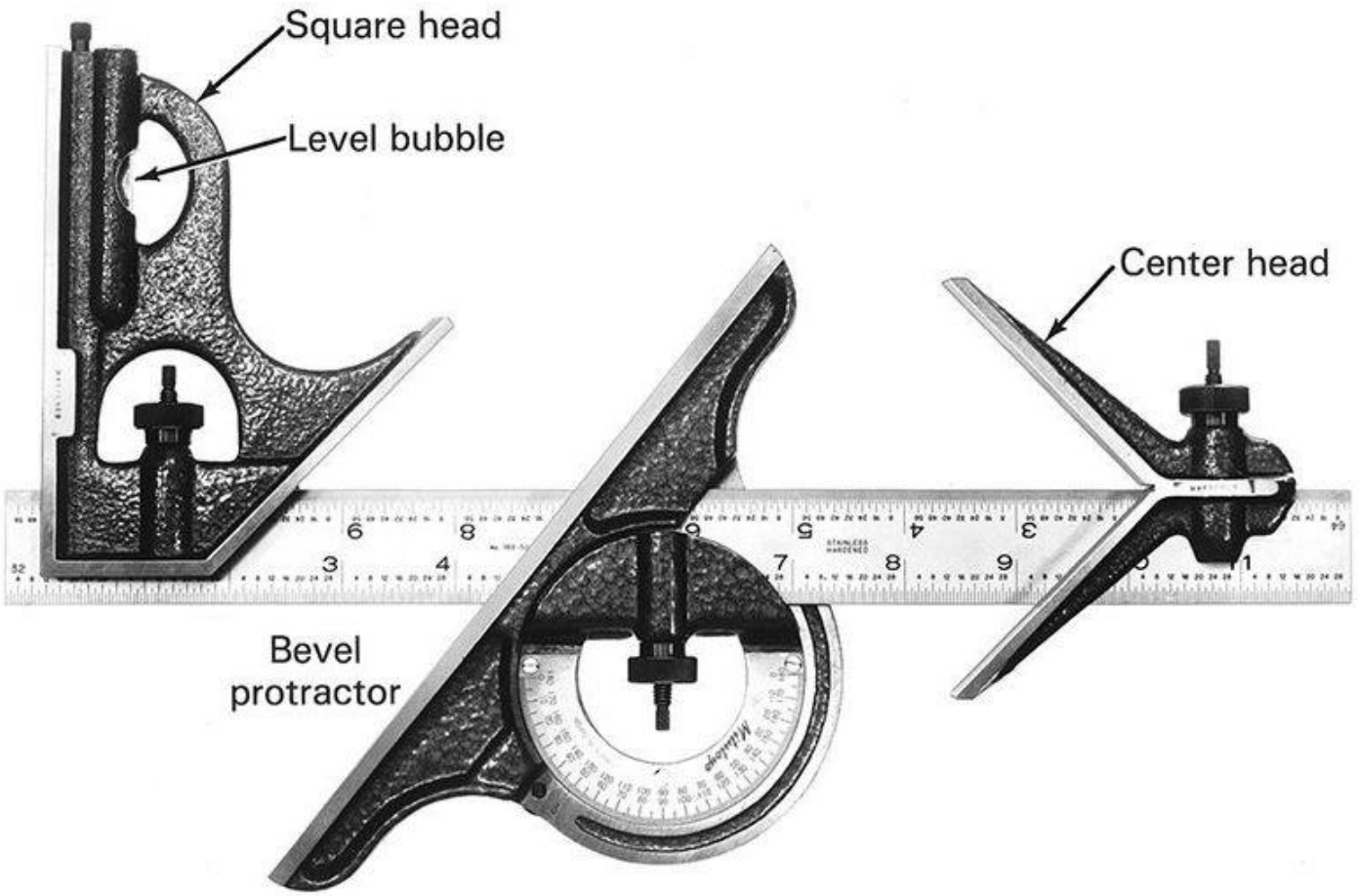
Rule of 10 for Inspection

 Tolerance needed on part ± 0.001 on hole diameter	 Precision needed on gage ± 0.0001 in.	 To check and set the air gage, needs to be ± 0.00001 in.	 In the manufacture of the master gage, a standard of precision of at least ± 0.000001 in. is needed
Workpiece	Air gage or working gage	Master gage	Reference end standard

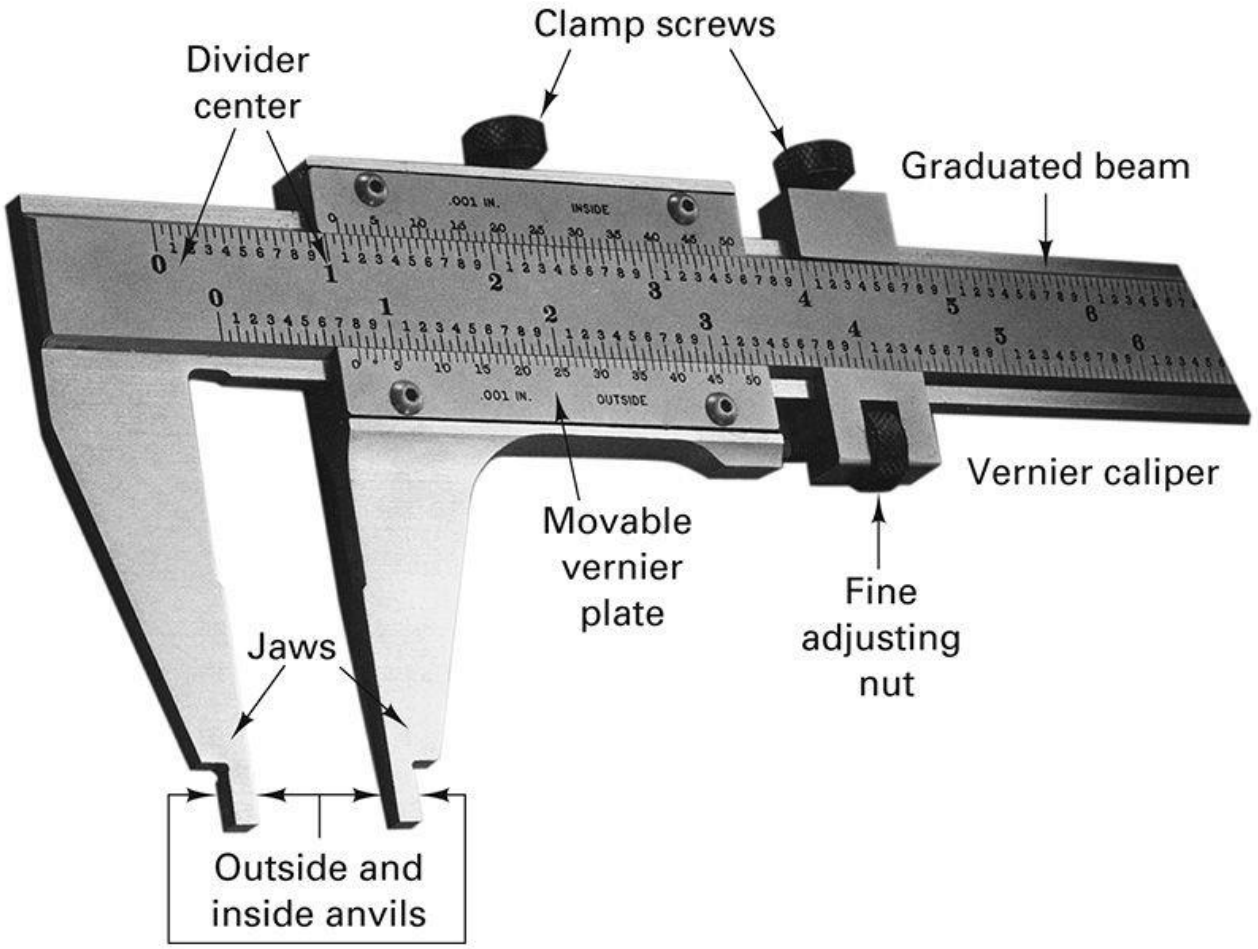
Machinist’s Rules



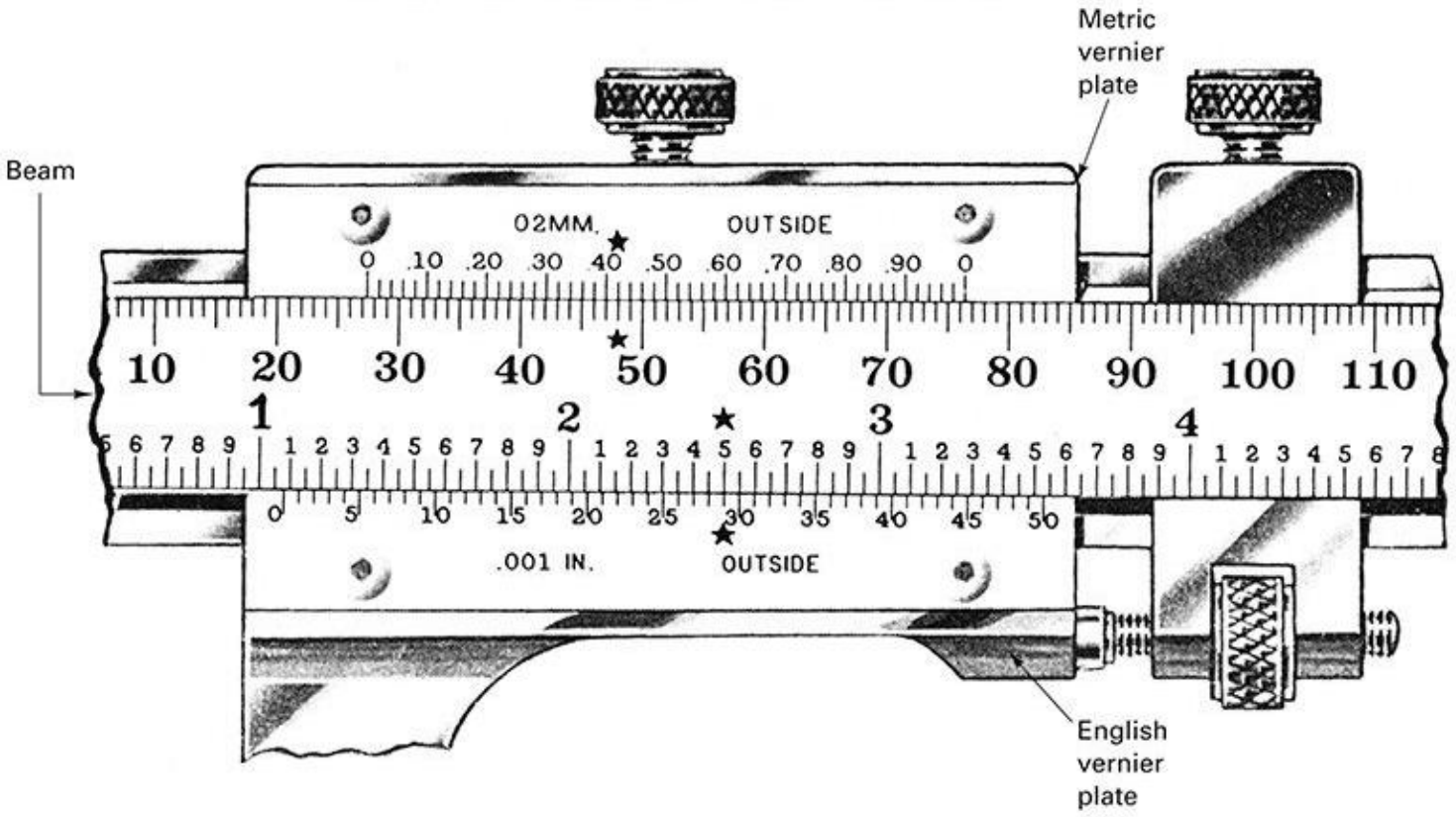
Combination Set



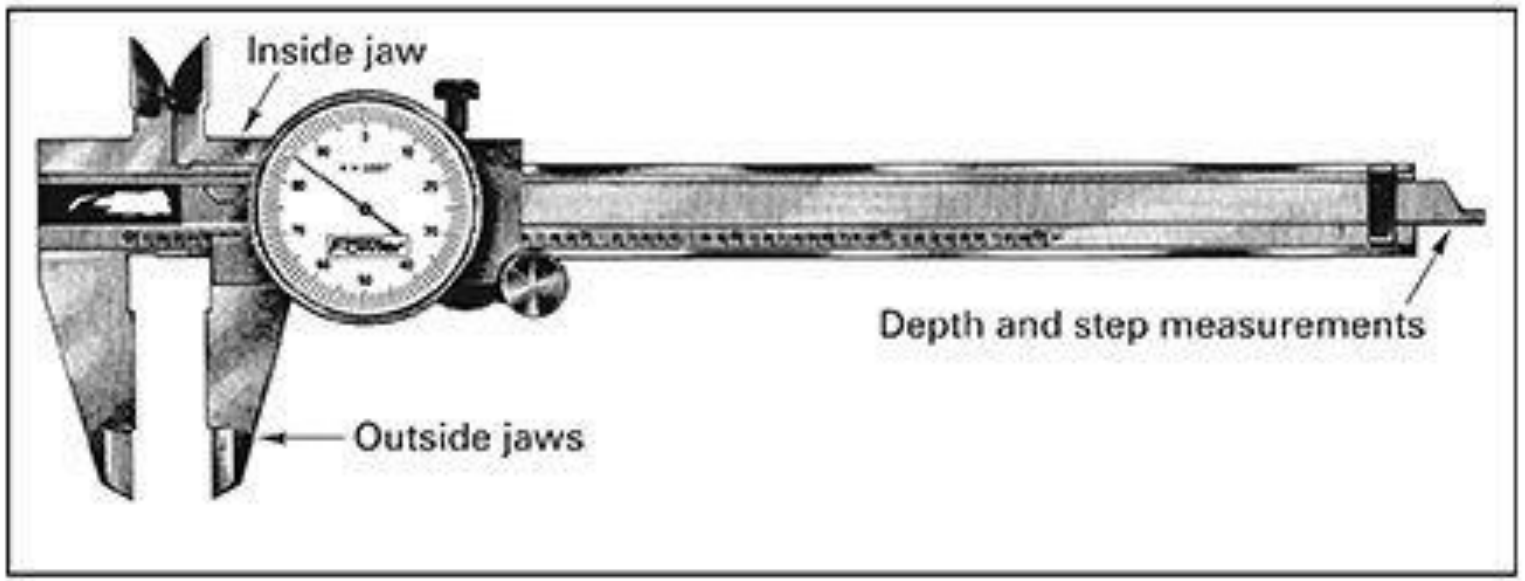
Vernier Caliper



Vernier Caliper Scale



Dial Caliper



Dial caliper with 0.001-in. accuracy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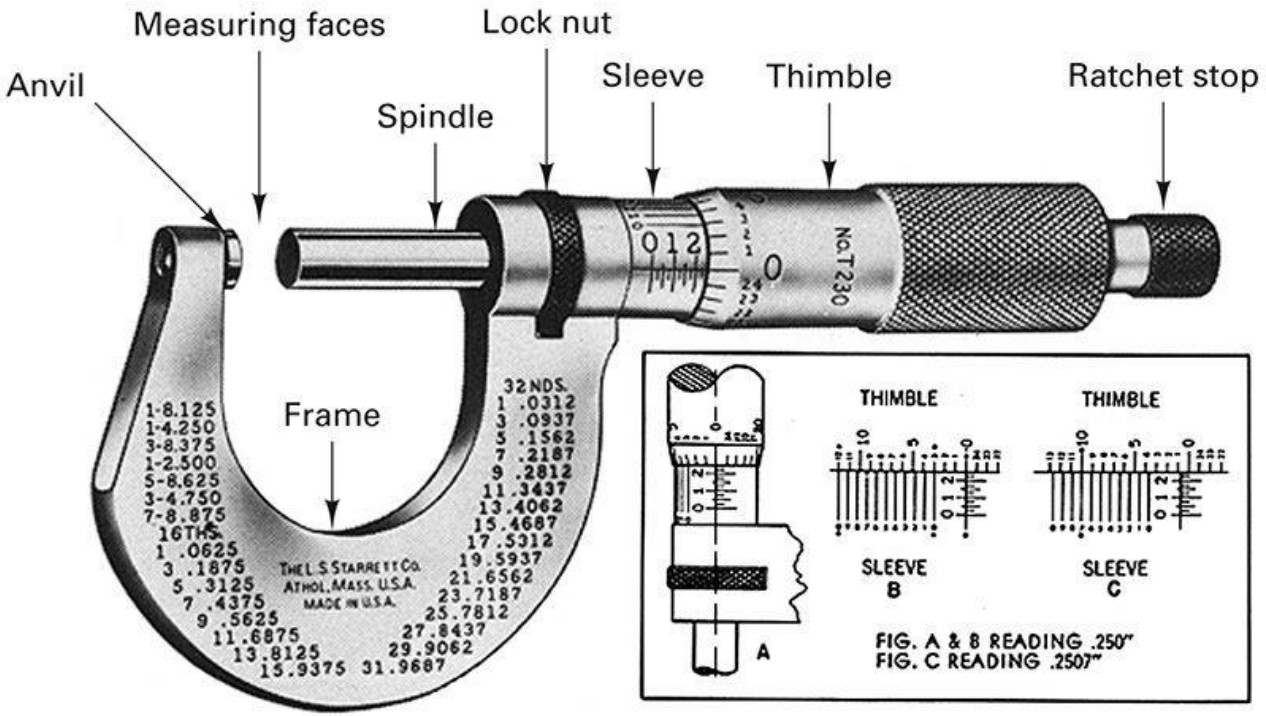
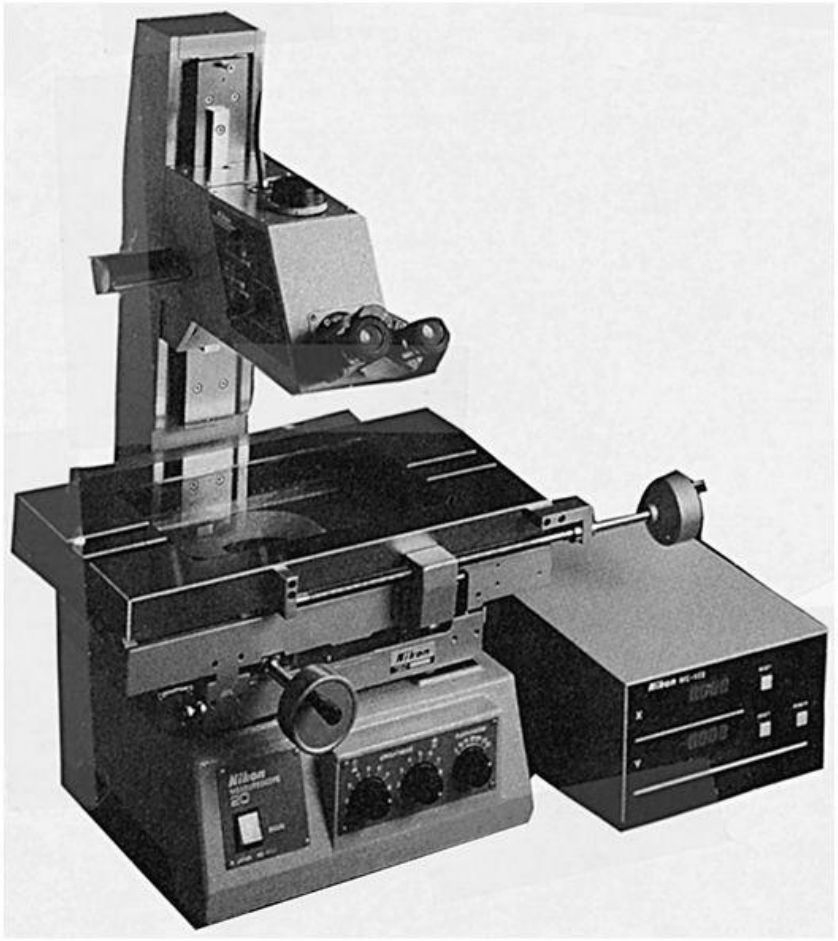
Micrometer

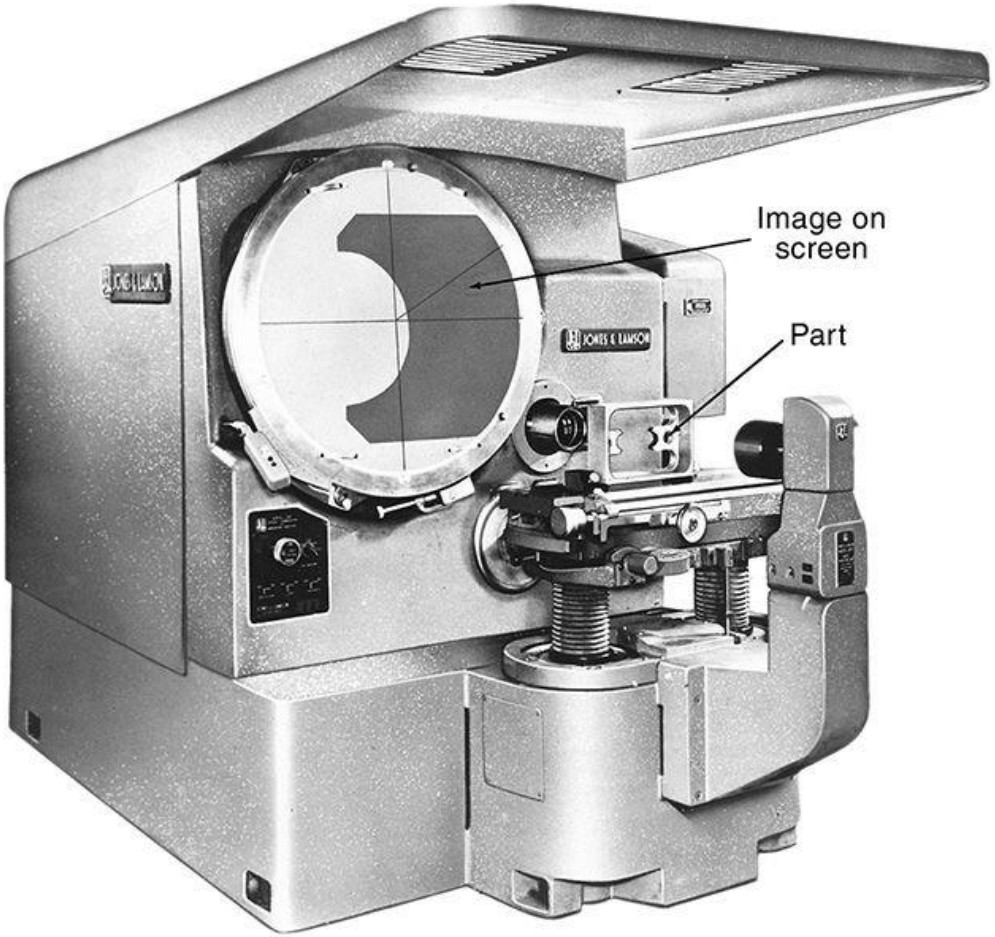

Measuring faces
Lock nut
Anvil
Spindle
Sleeve
Thimble
Ratchet stop
Frame
THE L.S.STARRETT CO.
ATHOL, MASS. U.S.A.
MADE IN U.S.A.
No. T 230
THIMBLE
THIMBLE
SLEEVE
B
SLEEVE
C
A
FIG. A & B READING .250"
FIG. C READING .2507"

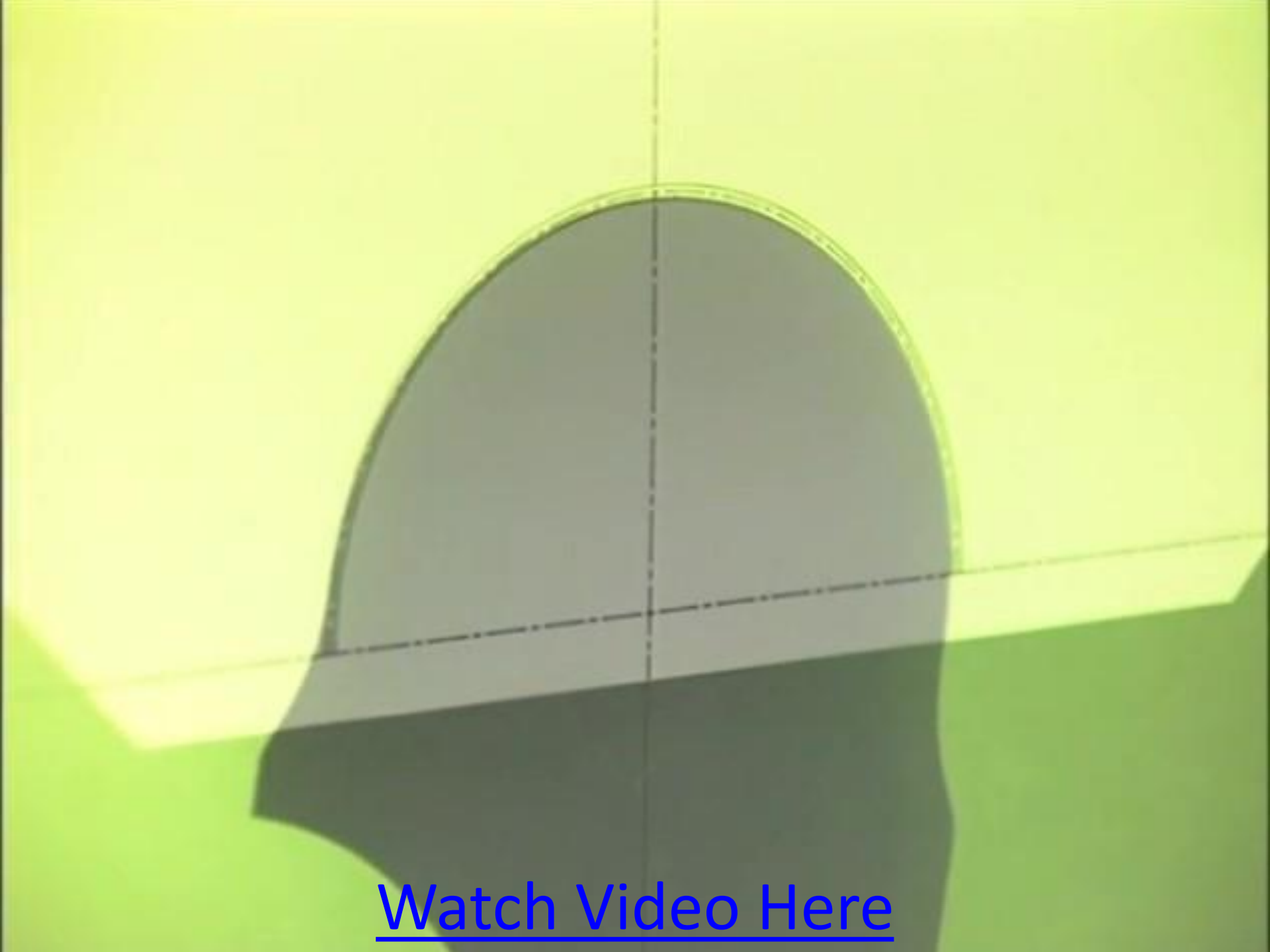

Watch Video Here

Toolmaker’s Microscope

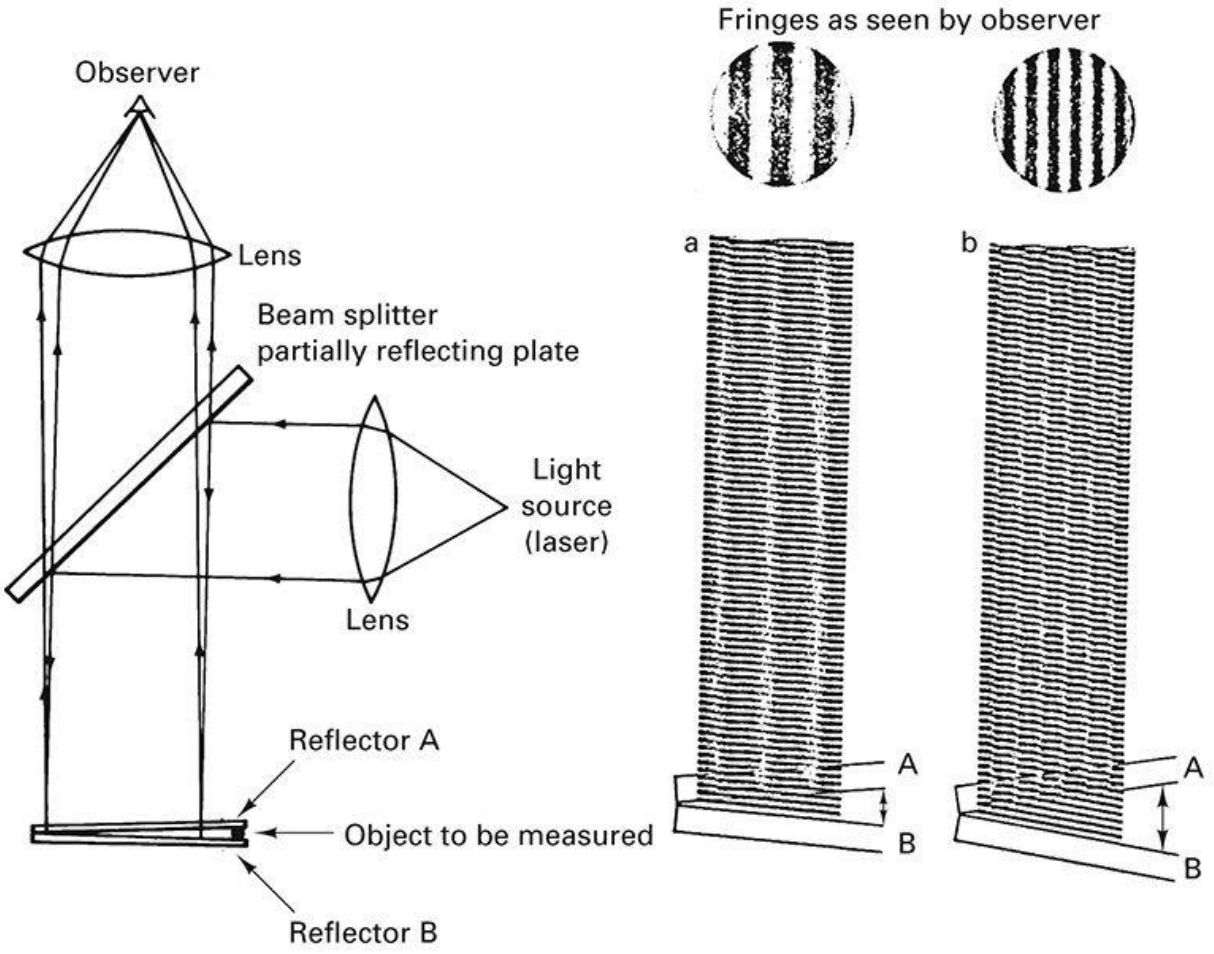


Optical Comparator

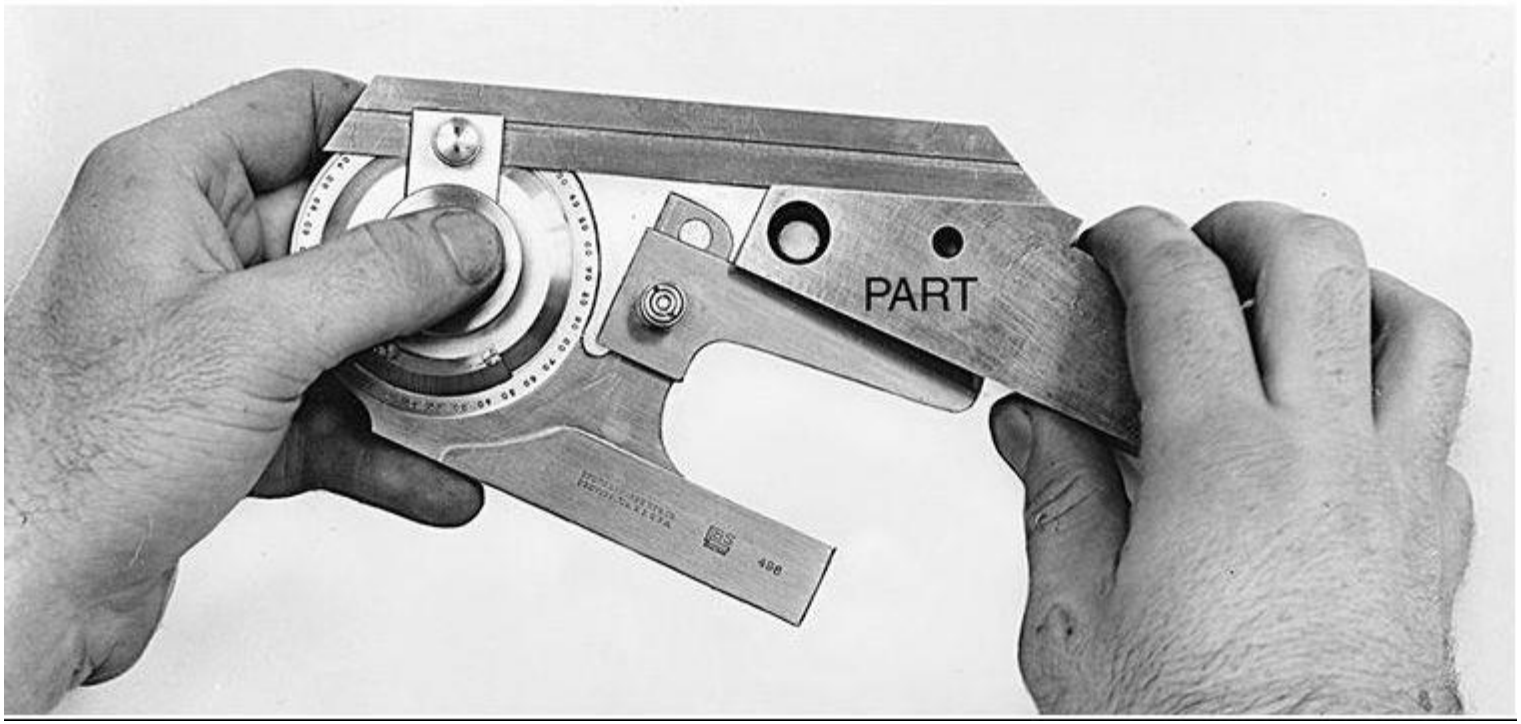



Watch Video Here

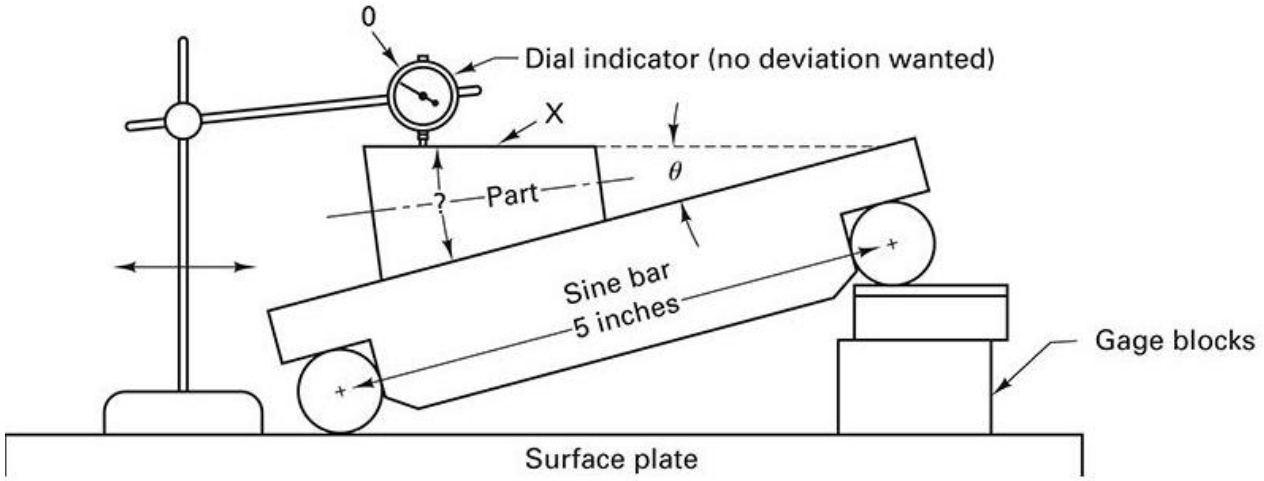
Interferometry



Bevel Protractor

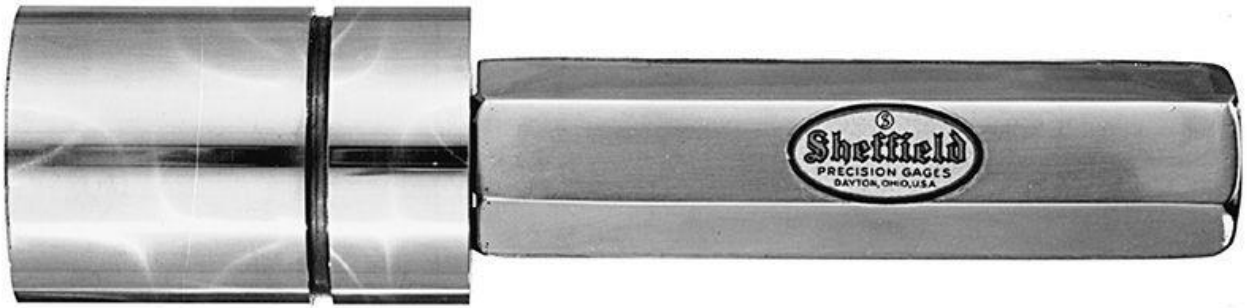


Sine Bar


0
Dial indicator (no deviation wanted)
X
θ
?
Part
Sine bar
5 inches
Gage blocks
Surface plate

Double-Ended Plug Gage
Go/No-Go

Step-type Plug Gage

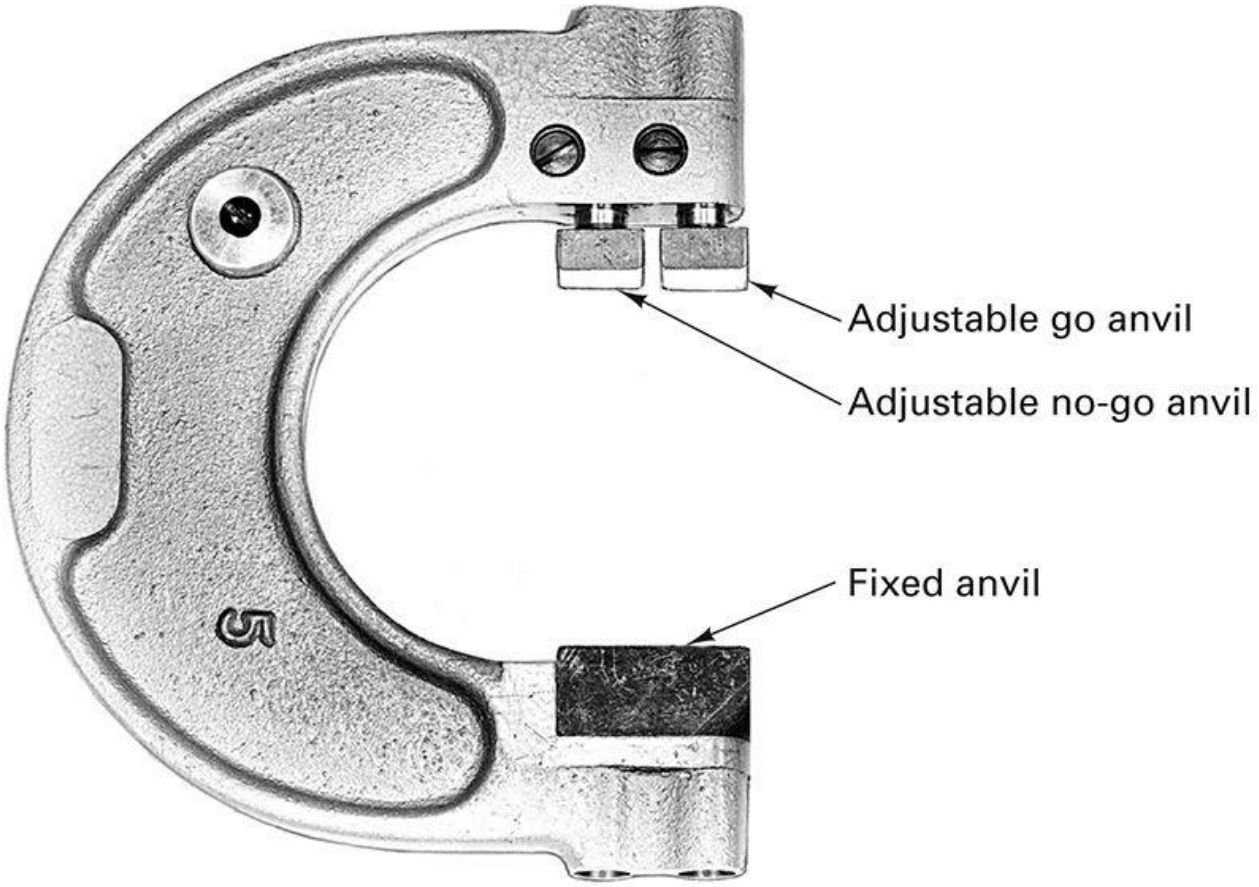


Ring Gages

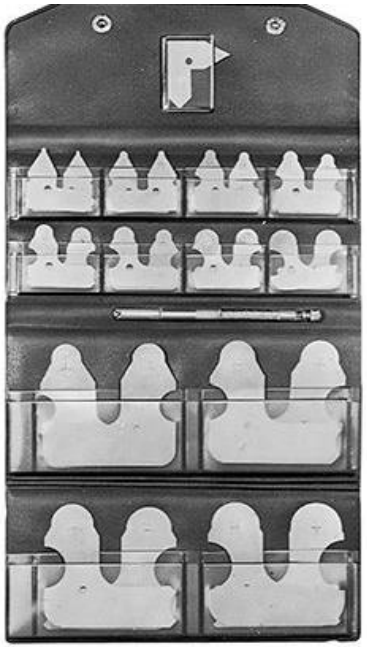
No-Go (max) on left, with knurling groove.

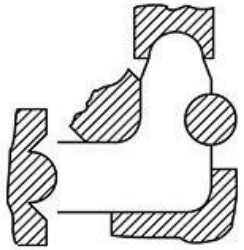
Go (min)on right, without groove

Adjustable Snap Gage

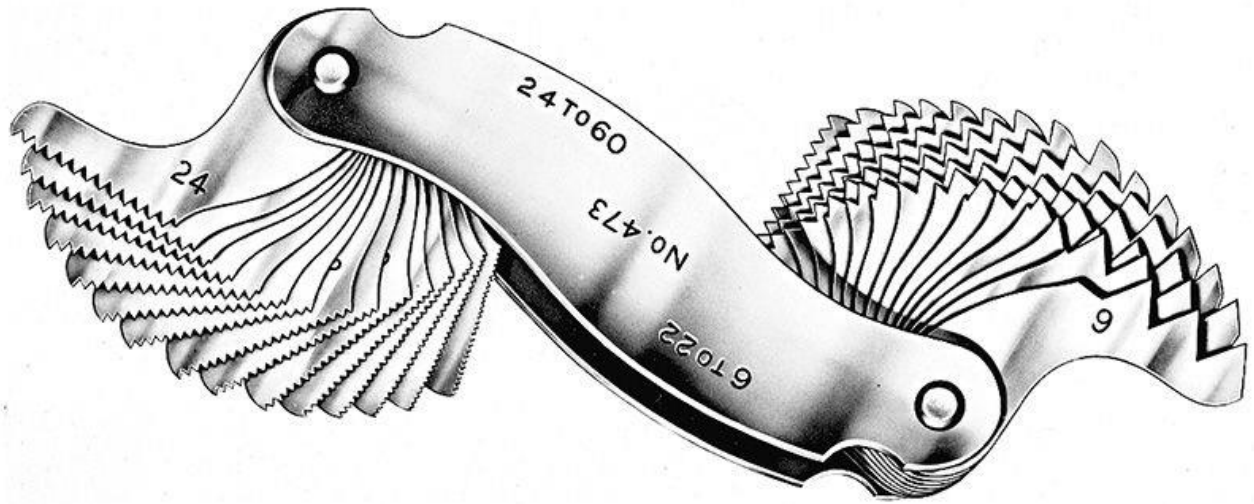


Radius Gages

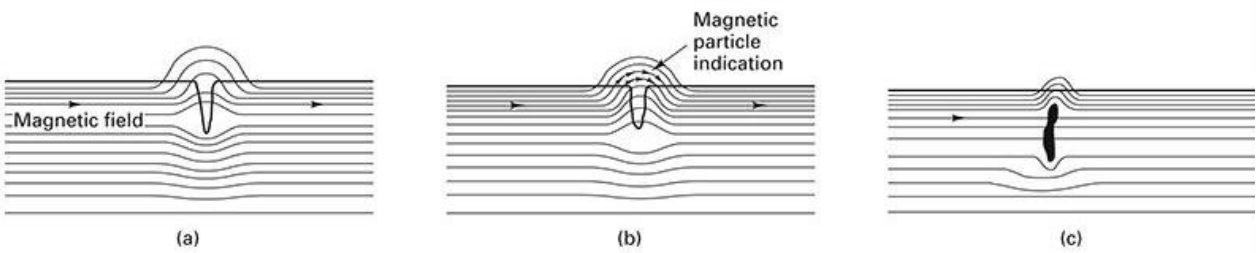




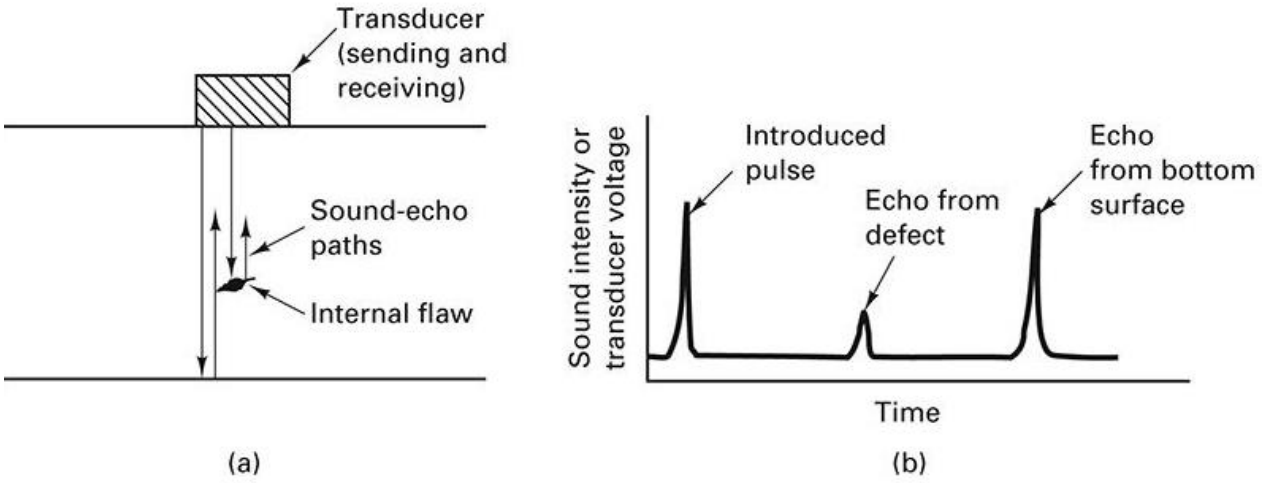
Thread Pitch Gages



Magnetic Particle Inspection



Ultrasonic Inspection



Radiography
X-Ray Inspection