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Global Engineering Solutions presents,

introduction to :

SURFACE FINISH AND MACHINING SYMBOLS

WHAT IS SURFACE FINISH/ ROUGHNESS?

'SURFACE FINISH / ROUGHNESS' is a process which comprises the quality of a surface on a object ,in terms of its roughness, microscopic pattern(lay), macroscopic pattern (waviness) for the purpose of enhancing its appearance or functional properties.

*In short it means the small , local deviations of a **surface** from the perfectly **flat ideal** (a true plane)*

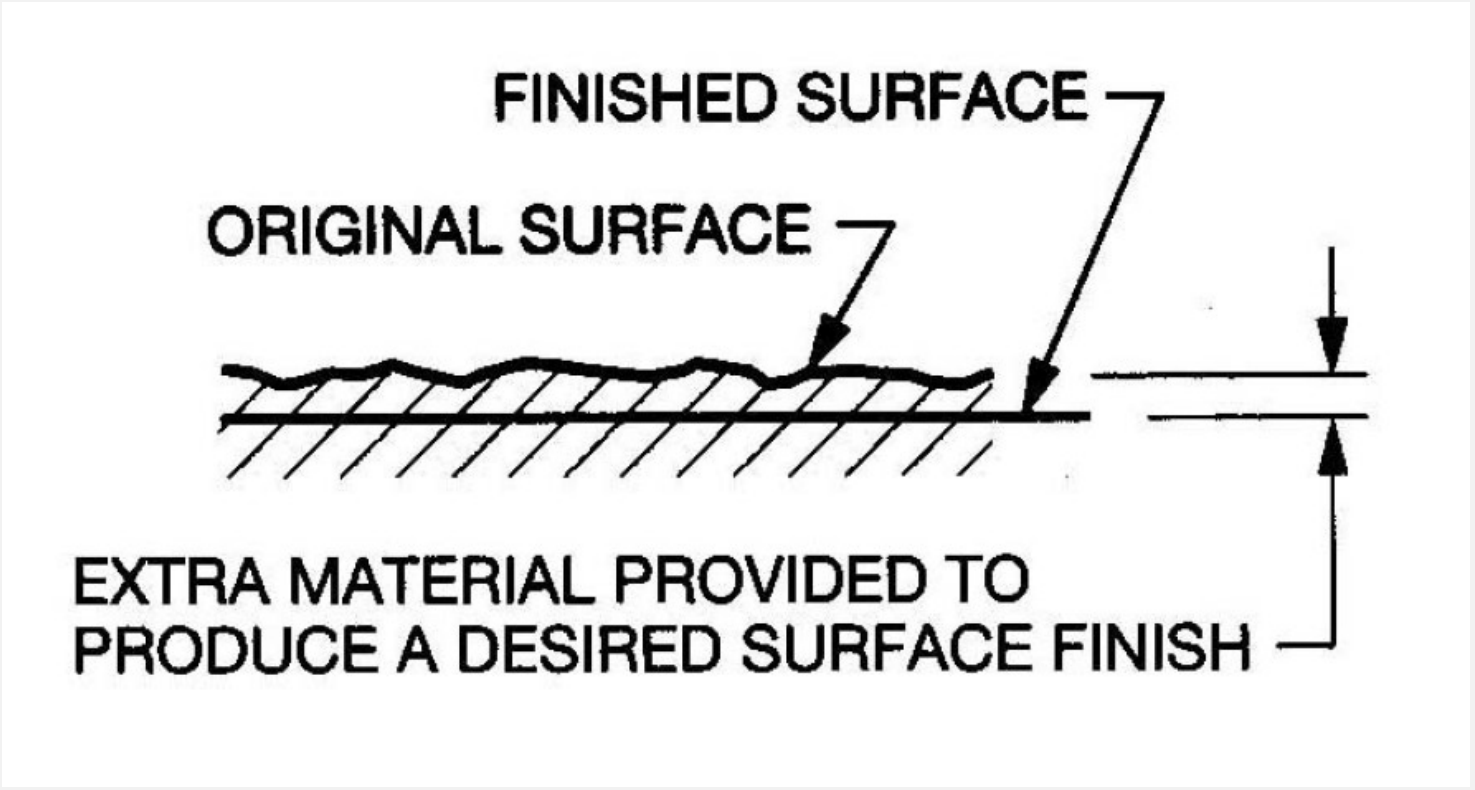
SURFACE CONDITIONS VARY

As different types of machinings on the parts vary, Surface conditions also vary

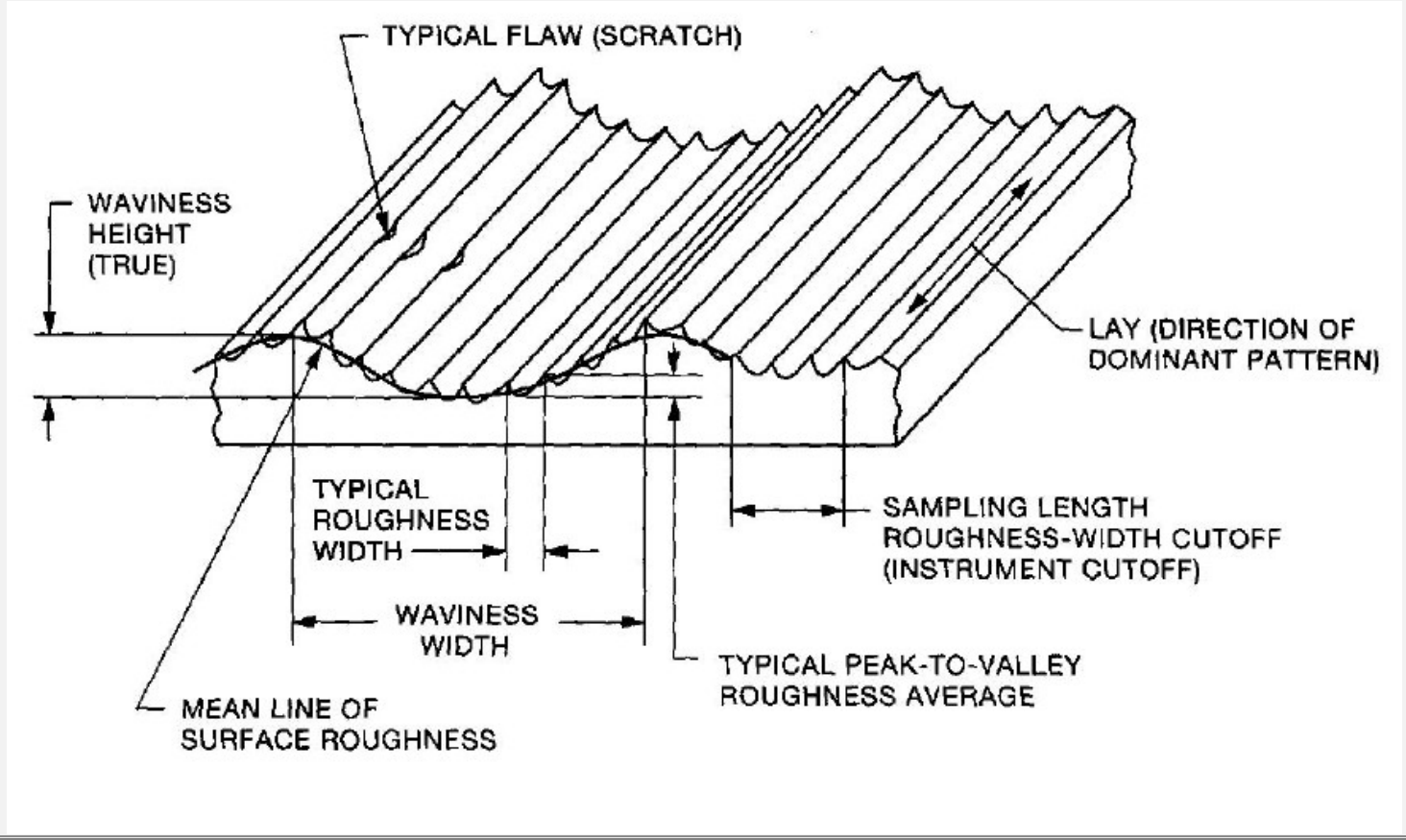
- Machined
- Cast
- Forged

EXTRA STOCK FOR CASTINGS

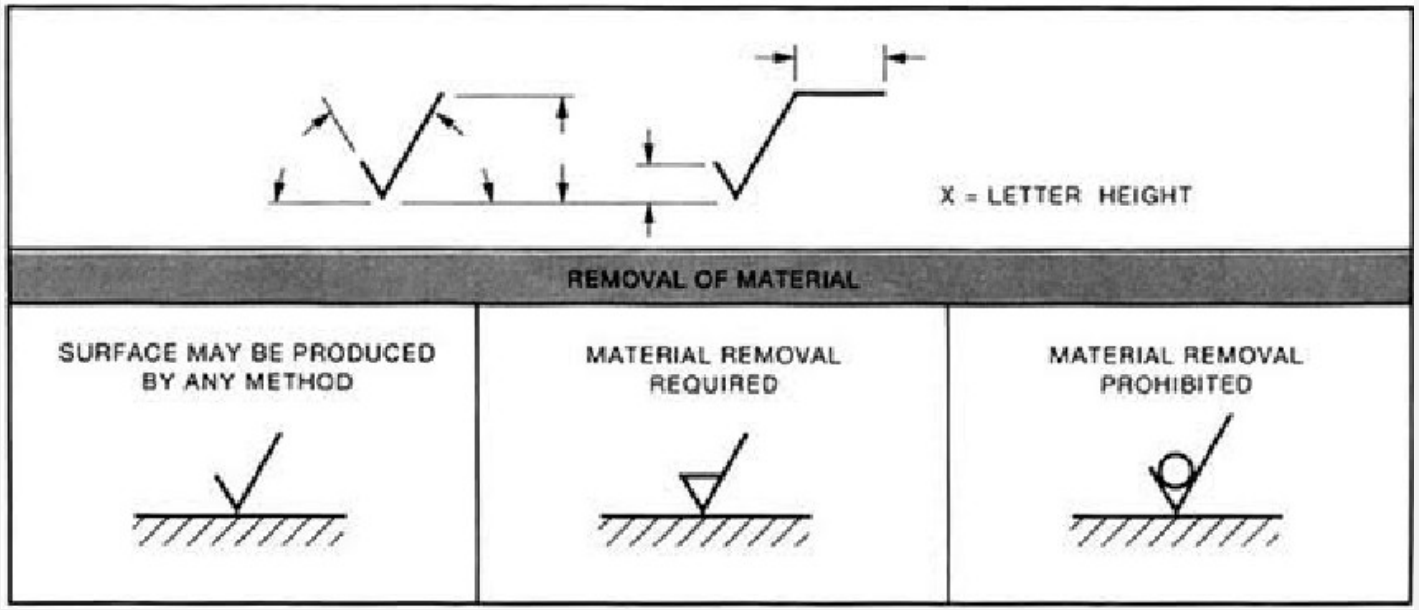
Example of Grinding process , here extra material is provided to produce a desired surface finish



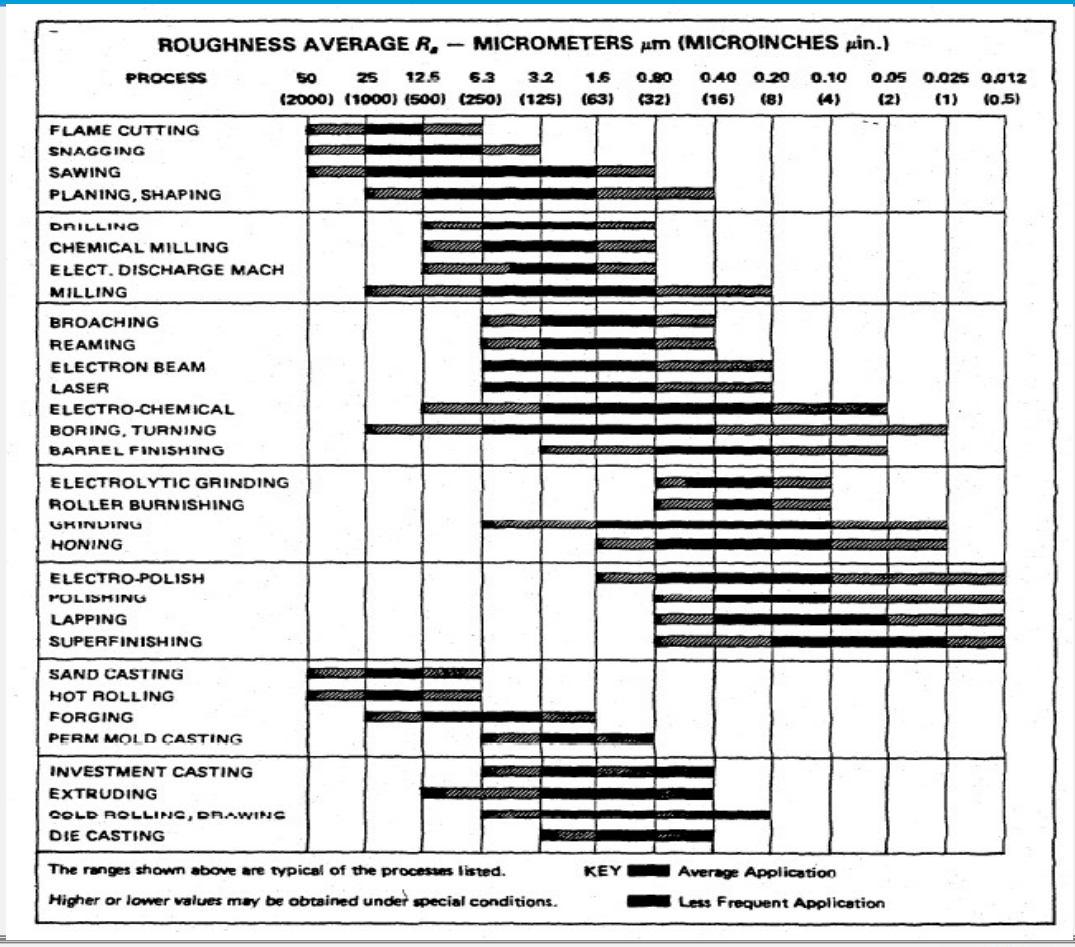
MACHINED SURFACES



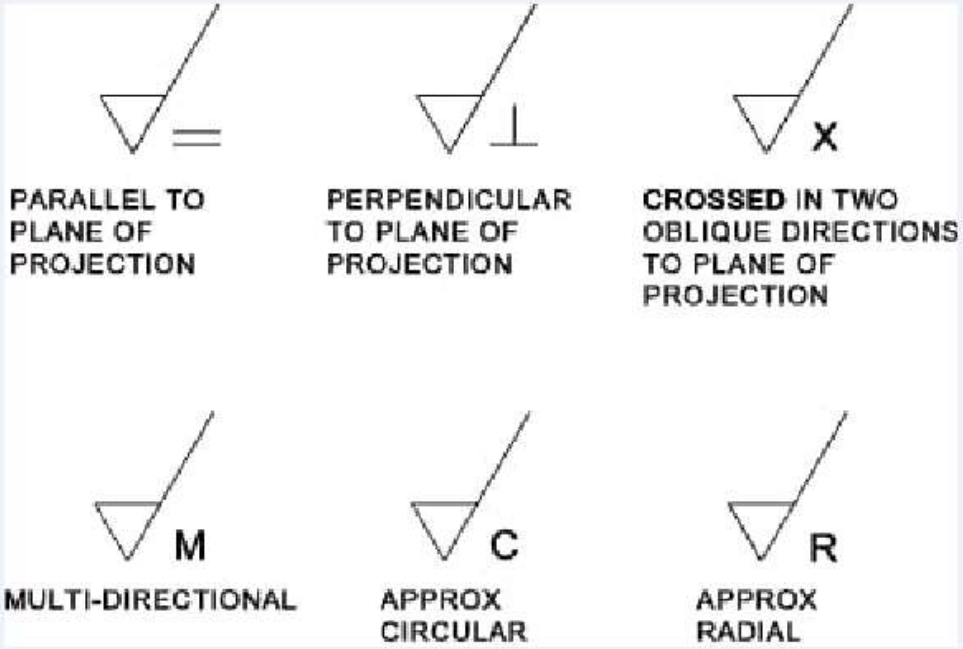
SYMBOLS


X = LETTER HEIGHT
REMOVAL OF MATERIAL
SURFACE MAY BE PRODUCED BY ANY METHOD
MATERIAL REMOVAL REQUIRED
MATERIAL REMOVAL PROHIBITED

SURFACE ROUGHNESS BY PROCESS



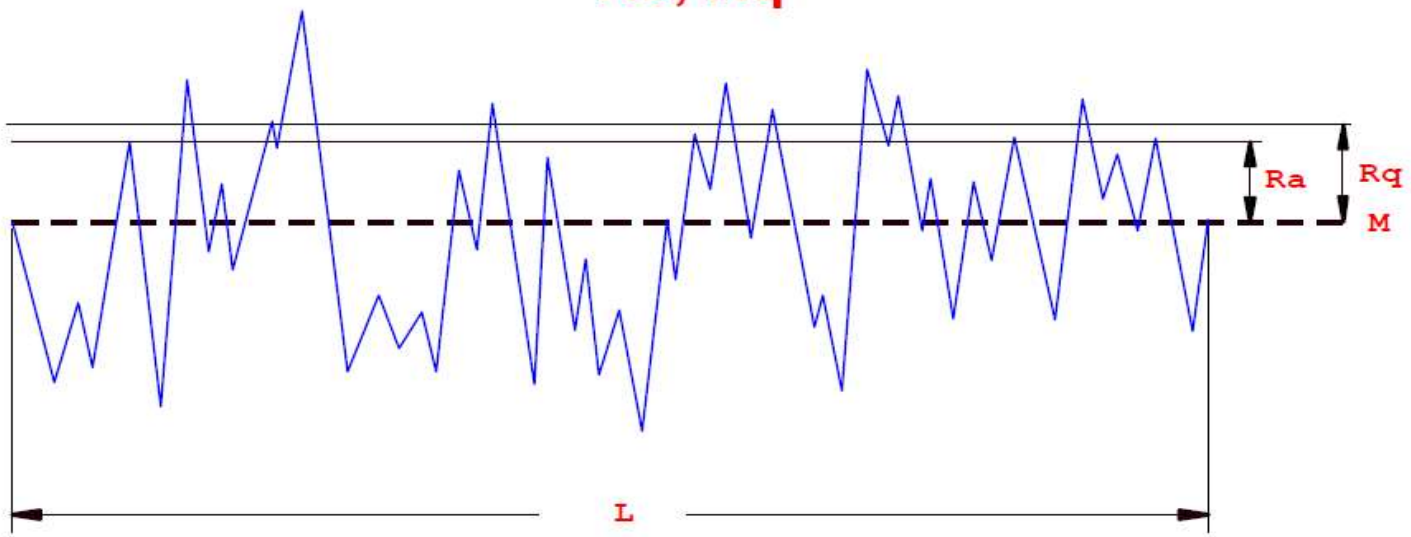
SURFACE ROUGHNESS BY PROCESS -SYMBOLS



Surface finish symbols

Roughness values R_a *µm*	*Roughness grade number*	*Roughness grade symbol*
50	N12	
25	N11	
12.5	N10	
6.3	N9	
3.2	N8	
1.6	N7	
0.8	N6	
0.4	N5	
0.2	N4	
0.1	N3	
0.05	N2	
0.025	N1	

WHAT IS Ra, AND Rq

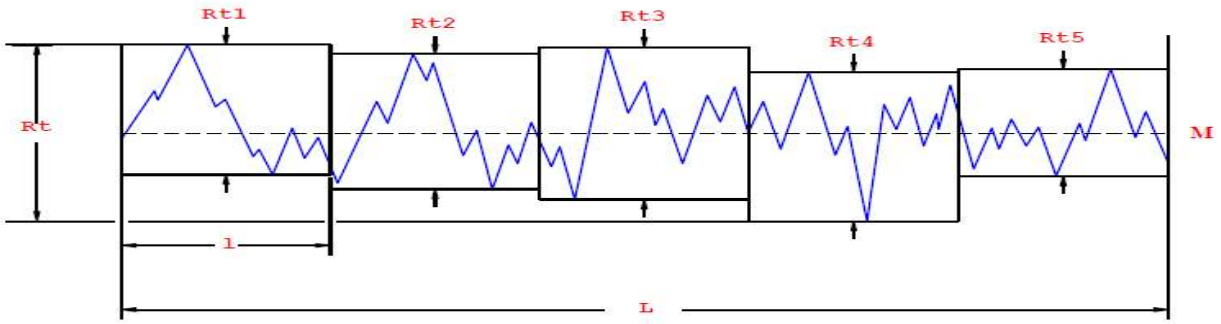


Roughness Average, *Ra*, is the arithmetic average of the absolute values of the profile heights over the evaluation length.

RMS Roughness, *Rq*, is the root mean square average of the profile heights over the evaluation length

WHAT IS Rt, Rti, Rz, Rmax

Rt, Rti, Rz, Rz(DIN), Rmax



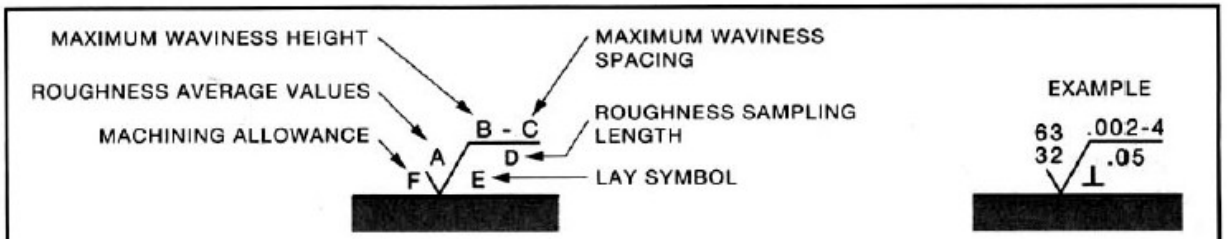
Maximum Height of the Profile, *Rt,* the vertical distance between the highest and lowest points of the profile within the evaluation length.

Maximum Heights within a Sampling Length, *Rti,* the vertical distance between the highest and lowest points of the profile within a sampling length.

Average Maximum Height of the Profile, *Rz,* is the average of the successive values of Rti calculated over the evaluation length. This parameter is the same as Rz(DIN) when there are five sampling lengths within the evaluation length.

Maximum Roughness Depth, *Rmax,* is the largest of the successive values of Rti calculated over the evaluation length.

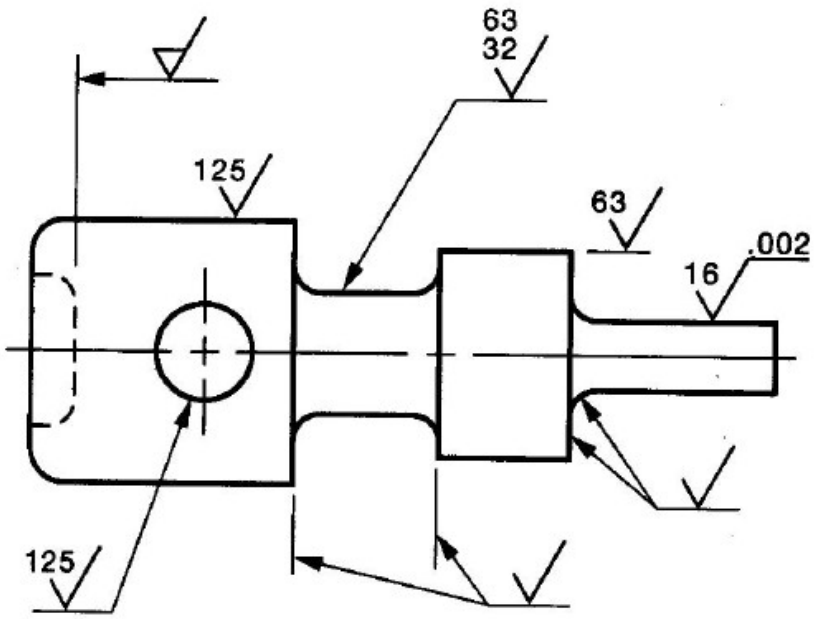
SURFACE FINISH COMPLETE SYMBOLS



BASIC SURFACE TEXTURE SYMBOL	MAXIMUM WAVINESS SPACING RATING (C). SPECIFY IN INCHES OR MILLIMETERS. HORIZONTAL BAR ADDED TO BASIC SYMBOL. .002-4
ROUGHNESS AVERAGE VALUES (A). SPECIFY IN MICROINCHES, MICROMETERS, OR ROUGHNESS GRADE NUMBERS. 63 N7	LAY SYMBOL (E)
MAXIMUM AND MINIMUM ROUGHNESS AVERAGE VALUES (A), SPECIFY IN MICROINCHES, MICROMETERS, OR ROUGHNESS GRADE NUMBERS. 63 N7 32 N6	ROUGHNESS SAMPLING LENGTH OR CUTOFF RATING (D). WHEN NO VALUE IS SHOWN USE .03 INCH (0.8 MILLIMETERS. .05
MAXIMUM WAVINESS HEIGHT RATING (B) SPECIFY IN INCHES OR MILLIMETERS. HORIZONTAL BAR ADDED TO BASIC SYMBOL. .002	MACHINING ALLOWANCE (F). SPECIFY IN INCHES OR MILLIMETERS. .06

NOTE: WAVINESS IS NOT USED IN ISO STANDARDS.

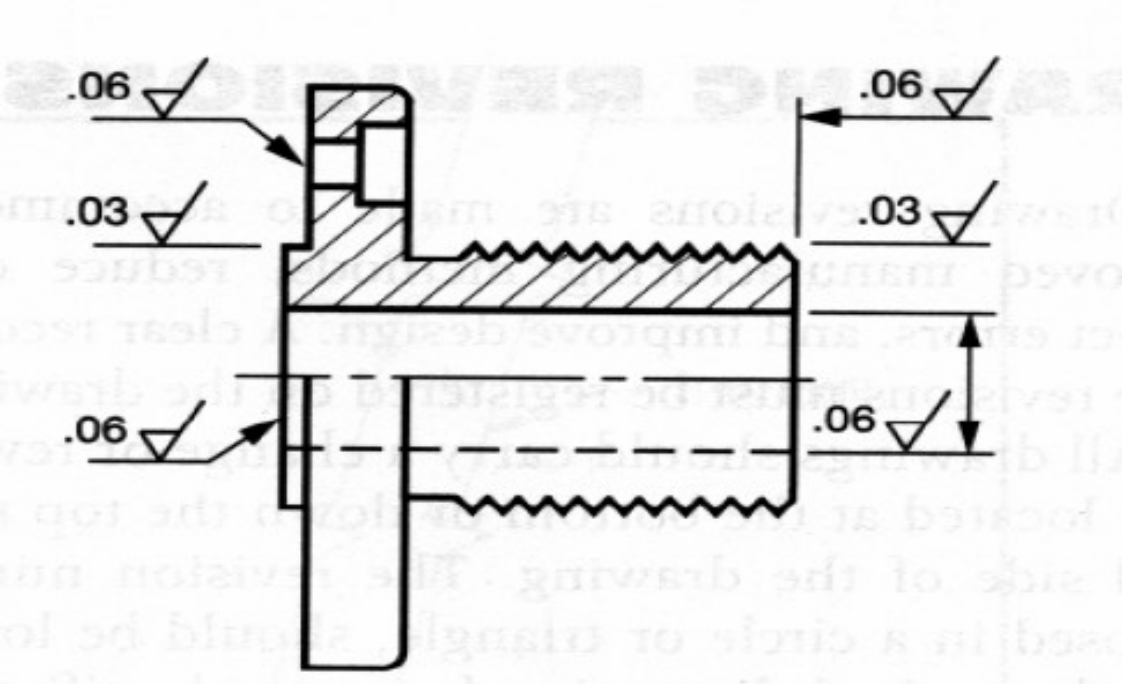
EXAMPLE OF SURFACE ROUGHNESS SYMBOLS



ALL SURFACES $\sqrt{250}$ UNLESS OTHERWISE SPECIFIED.

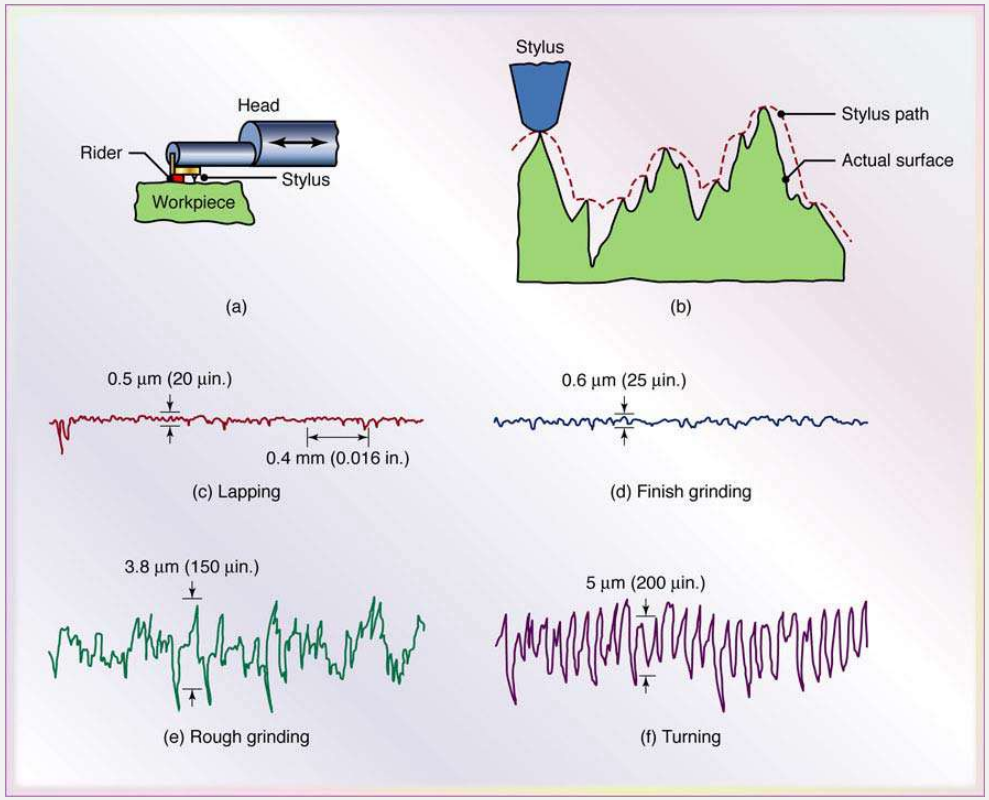
NOTE: VALUES SHOWN ARE IN MICROINCHES.

INDICATING MACHINING ALLOWANCE



VARIOUS SURFACE FINISH TESTER

Topography read by Surface Finish Tester



THANK YOU FOR YOUR ATTENTION....

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