SURFACE ROUGHNESS VALUE CONVERSIONS

Surface texture is comprised of three components: **roughness, waviness and form. Roughness** is a function of the machining process; **waviness** is the component that is superimposed by roughness; and **form** is the overall shape of the surface minus contributions from roughness and waviness.

Roughness Average can be measured and interpreted using various mathematical models, the most common being **Ra** or **Roughness Average** (also known as **CLA and AA**). **Roughness** is measured in microns, µm or micro inches, µ". **Ra** measurement for a sample length "L" is the mean height of the surface profile (peaks and inverted valleys). **Ra** is the arithmetic average value of the departure from profile from the center line. So, for four values:

$$\textbf{Ra / CLA / AA} = \frac{W + X + Y + Z}{4}$$

Root Mean Square or RMS Roughness (Rq / RMS / Rs), is another averaging measurement well known in statistics as the **Root Mean Square** value. For example, the arithmetic average (AA) of four values, W, X, Y, Z is:

$$\textbf{AA} = \frac{W + X + Y + Z}{4}$$

Whereas **RMS** value = $\sqrt{\frac{W^2 + X^2 + Y^2 + Z^2}{4}}$

For statistical measurements, **RMS** values are the preferred measure.

Rt is the maximum peak-to-valley height in the sampling length.

Rz / Rtm: **Rz** is the (ISO) ten-point height measurement and, in the USA, is known as **Rtm** which is (RzDIN) mean peak-to-valley height.

A comprehensive explanation of surface texture and measurement can be found in "Exploring Surface Texture" by H. Dagnall (ISBN 0 901920 07 X) published by Rank Taylor Hobson Ltd., U.K."

SURFACE ROUGHNESS VALUE CONVERSIONS					
Rt	Rz*	Ra / CLA / AA		Rq / RMS / Rs	
µm	µm	µm	µ"	µm	µ"
0.06	0.03	0.006	0.2	0.007	0.2
0.08	0.04	0.008	0.3	0.009	0.3
0.1	0.05	0.01	0.4	0.011	0.4
0.12	0.06	0.012	0.5	0.013	0.5
0.15	0.08	0.015	0.6	0.018	0.7
0.2	0.1	0.02	0.08	0.022	0.9
0.25	0.12	0.025	1.0	0.027	1.1
0.3	0.15	0.03	1.2	0.033	1.3
0.4	0.2	0.04	1.6	0.044	1.8
0.5	0.25	0.05	2.0	0.055	2.2
0.6	0.3	0.06	2.4	0.066	2.6
0.8	0.4	0.08	3.2	0.088	3.5
0.9	0.5	0.10	4.0	0.11	4.4
1.0	0.6	0.12	4.8	0.13	5.2
1.2	0.8	0.15	6.0	0.18	7.2
1.6	1.0	0.20	8.0	0.22	8.8
2.0	1.2	0.25	10.0	0.27	10.8
2.5	1.6	0.3	12.0	0.33	13.2
3.0	2.0	0.4	16.0	0.44	17.6
4.0	2.5	0.5	20.0	0.55	22.0
5.0	3.0	0.6	24.0	0.66	26.0
10.0	6.0	1.2	48.0	1.3	52.0
15.0	10.0	2.5	100.0	2.7	108.0

Comparison values may vary by up to 25% • 1µm=.001 mm=40. µ" or 1 Micron=.00004" • 1µ"=.0254µm or .001"=.0254mm
* Same as Rtm is U.S.

INNOVATIVE ORGANICS

4905 East Hunter Ave. • Anaheim, CA 92807 USA
Tel: 714-701-3900 • www.InnovativeOrganics.com