

Instruction  
Hardware Engineering

No. LMS 6-1

**Subject:** Surface Roughness


**APPROVED BY** Manager, Hardware Engineering

**STATUS** Maintenance Revision

**PURPOSE** Relates to the interpretation and measuring of Roughness Average values for surface roughness. L-3 Communications Corporation, Link Simulation & Training Division (hereafter referred to as Link) personnel shall use this instruction for interpretation and measuring of surface roughness.

**AFFECTED FUNCTIONS** Hardware Engineering  
Manufacturing


**REFERENCES** ANSI Y14.36-1978 Surface Texture Symbols

**DEFINITIONS** “” Basic Surface Texture Symbol. This symbol is used to designate control of surface irregularities.

Microinch. A microinch is equal to .000001 inch.

Micrometer. A micrometer is equal to 0.000001 meter.

## INSTRUCTION

1. Requirements
  - 1.1 Surface roughness values are applicable to surfaces produced by such means as machining, abrading, extruding, casting, molding, forging, rolling, coating, plating, blasting, or burnishing.
  - 1.2 Surface roughness values of only one rating shall indicate the maximum value and any lesser value shall be acceptable. Values are in microinch (micrometer).
  - 1.3 Surface Roughness values such as  indicate the maximum acceptable roughness (larger No. and rougher) over the minimum acceptable roughness (smaller No. and smoother). Values are in microinch (micrometer).

- 1.4 Unless specified on the drawing, surface roughness requirements do not apply to the following features:
- a. Tapped holes
  - b. Drilled holes
  - c. Counterbored holes
  - d. Countersunk holes
  - e. Broached holes
  - f. Splines, unless important
  - g. Ends of bolts, screws, studs, or dowels
  - h. Threads
  - i. Thread reliefs for undercuts
  - j. Keyways, unless important
  - k. Screw driver slots
  - l. Heads of bolts, screws, etc.
  - m. Spotfaces
  - n. Sawed or sheared surfaces
  - o. Forged surfaces
  - p. Sintered metal bearings
  - q. Nuts.
- 1.5 When a specific surface roughness value is not specified on the drawing, the applicable surface roughness value will be governed by the total tolerance in accordance with Table I of this instruction, excepting features noted in paragraph 1.4 above.

**Table I Surface Roughness Values**

RANGE OF TOTAL TOLERANCE VALUES IN. (mm)	ROUGHNESS AVERAGE VALUES μIN. (μm)	TYPICAL MACHINE OPERATIONS
Over .010 (0.254)	500 (12.5)	Hand grind, disc grind, file, lathe, shaper, mill.
Over .005 to .010 incl (over 0.127 to 0.254)	250 (6.3)	Disc grind, file, lathe, shaper, mill, bore, drill, radial cut off saw.
Over .002 to .005 incl (over 0.051 to 0.127)	125 (3.2)	Lathe, shaper, mill, bore, ream, surface grind, cylindrical grind.
Over .0005 to .002 incl (over 0.013 to 0.051)	63 (1.6)	Bore, ream, surface grind, cylindrical grind.
.0002 to .0005 incl (0.005 to 0.013)	32 (0.80)	Hone or lap, polish or buff.
Below .0002 (0.005)	32 (0.80)	Hone or lap, polish or buff, superfinish.

- 1.6 On plated or coated parts, the surface roughness value applies after plating or coating. On painted parts the surface roughness value applies before painting.
2. Quality Assurance Provisions
  - 2.1 Visual inspection. Surfaces shall be checked with General Electric comparison blocks or measured with a Precision Profilometer Microinch Amplimeter by the Quality Assurance Organization.