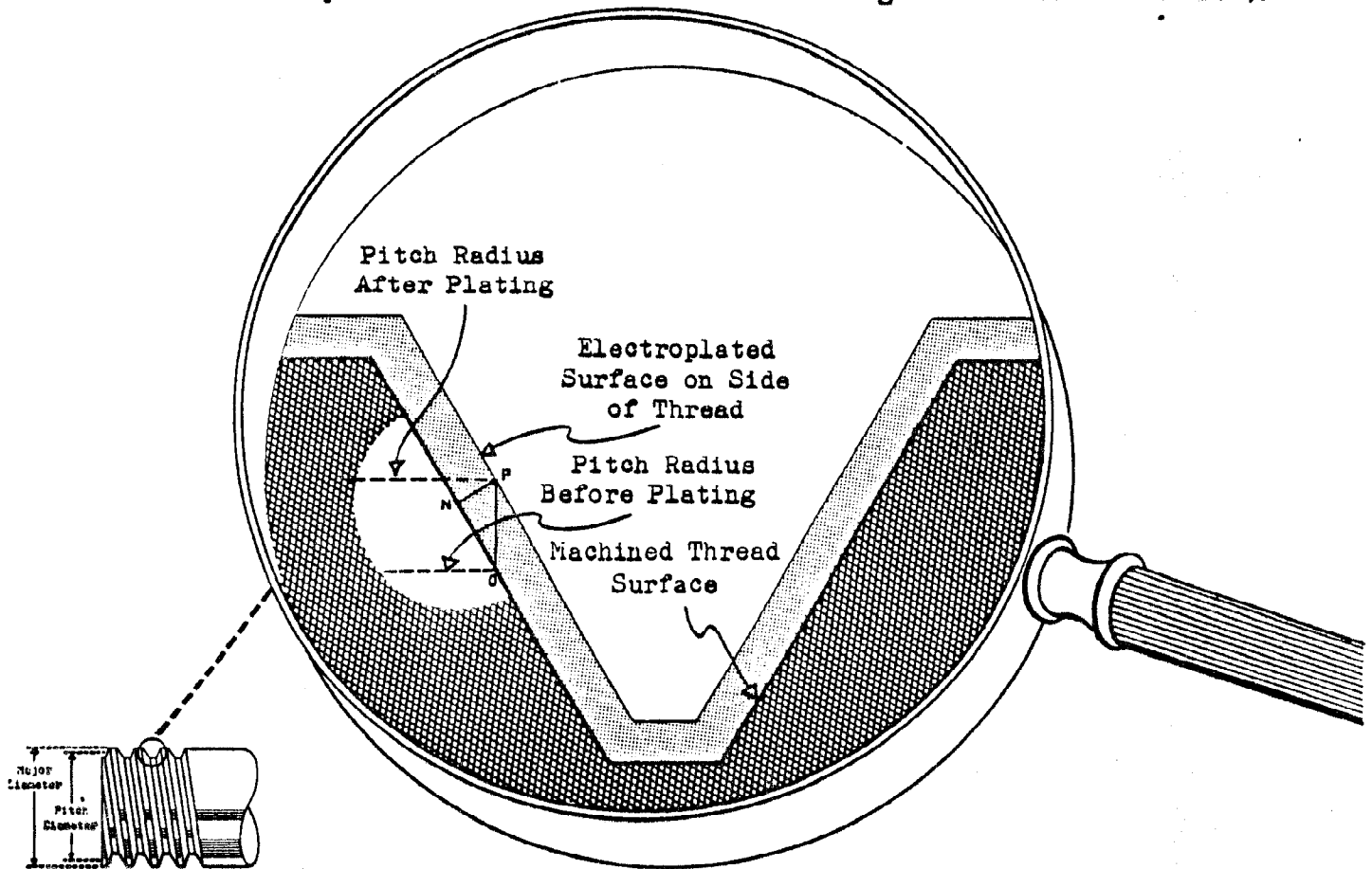


The Effect of Electroplating on Thread Dimension

Very often when specifying the plating thickness on screw threads, no allowance is made for the fact that the pitch diameter of an American Standard thread is increased by four times the thickness of the plating deposit, measured on the side of the thread at the pitch diameter. (The plating thickness is measured at right angle to the surface while the increase in pitch diameter is measured at an angle of 30° to the surface).



Enlarged cross section

O = point on pitch radius before plating
 P = same point as O after plating side of thread
 NP = Thickness of plating deposit

$\angle NOP = 30^\circ$
 $\sin 30^\circ = 0.5$

Assuming, NP = 0.001"
 Then, $\sin \angle NOP = \frac{NP}{OP}$

$$0.5 = \frac{0.001}{OP}$$

$$OP = \frac{0.001}{0.5} = 0.002"$$

Since OP, the increase in pitch radius, is shown to be double NP, the plating thickness, the increase in pitch diameter is four times the thickness of the plating deposit.

COMPARISON OF ELECTROLESS VS. ELECTROLYTIC NICKEL DEPOSITS

<u>Nickel Properties</u>	<u>Electrolytic</u>	<u>Electroless</u>
Composition	99 + % Ni	Avg. 92% Ni 8% P
Appearance	Dull to bright	Semibright
Structure	Crystalline	Amorphous
Density	8.9	Avg. 7.9
Thickness uniformity	Varies	± 10%
Melting Point	1455 C	890 C (apprx)
Hardness, as plated	150- 400 VHN	500-600 VHN
Heat Hardning	No effect	To 1000 VHN
Wear Resistance	Fair	Excellent
Magnetic Properties	Susceptible	Non-Suscep.
Electrical resistivity	7 micro/ohm/cm	60-100 m/ohm/cm
Thermal conductivity	0.16 cal/cm/sec/C	0.01-0.02
Coefficient of expansion	7.5 in/in./F x 10	7.8
Elongation	6-30%	2%
Internal Stress	±10 ksi	±10 ksi
Friction coefficient vs. steel		
Unlubricated	Galling	0.38
Lubricated	0.2	0.2



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