Layout and Scaling Threads for SketchUp
Four Helix Deformation
One-half inch Diameter 13 TPI UNC—26-count Coarse Threads
One-half inch Diameter 20 TPI UNF—40-count Fine Threads

By Tom Bolton 12/12/2022

Coarse Thread Dimensions (Scale: 4800mm = 1 inch):

Crest Diameter:	CD = 2400mm (using 24 line segment circle)
Pitch:	P = 369.2307692307mm (4800 / 13 rounded to 10 decimal places)
	P_1 = P/2 = 184.6153846154mm
	P_2= P_1 x .625 = 115.384615384625mm
Crest:	C = P x .125 = 46.15384615mm
Root:	R = C x 2 = 92.3076923mm (unused value for calculation)
Thread Depth:	TD = P_2 x 1.732051 = 199.8520384616mm
	(1.732051 derived from a 100,000mm rectangular measurement at 30 Degrees)
Root Diameter:	RD = CD – (TD x 2) = 2,000.2959230768mm. Used to Calculate Thread Scaling*
Thread Profile Info.	
Helixes:	H1 = 0.0mm
	H2 = P_2 Duplicate and move beneath H1
	H3 = C Duplicate and move beneath H2
	H4 = P_2 Duplicate and move beneath H3
	R = Area Beneath H4 (Selected area to be Scaled/Deformed)
*Scaling the Root:	Apply Pythagorean Theorem

Hypotenuse (Scaling Value) = $\frac{\sqrt{RD^2+RD^2}}{2}$ = 1,414.4228mm

Fine Thread Dimensions (Scale: 4800mm = 1 inch):

Crest Diameter:	CD = 2400mm (using 24 line segment circle)
Pitch:	P = 240mm (4800 / 20)
	P_1 = P/2 = 120mm
	P_2= P_1 x .625 = 75mm
Crest:	C = P x .125 = 30mm
Root:	R = C x 2 = 60mm (unused value for calculation)
Thread Depth:	TD = P_2 x 1.732051 = 129.903825mm
	(1.732051 derived from a 100,000mm rectangular measurement at 30 Degrees)
Root Diameter:	RD = CD – (TD x 2) = 2,140.19235. Used to Calculate Thread Scaling*
Thread Profile Info.	
Helixes:	H1 = 0.0mm
	H2 = P_2 Duplicate and move beneath H1
	H3 = C Duplicate and move beneath H2
	H4 = P_2 Duplicate and move beneath H3
	R = Area Beneath H4 (Selected area to be Scaled/Deformed)
*Scaling the Root:	Apply Pythagorean Theorem

Hypotenuse (Scaling Value) = $\frac{\sqrt{RD^2+RD^2}}{2}$ = 1,513.4452mm