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Shaft in Torsion Reliability Design Calculator		
Input cells shown as blue		
Transmitted horsepower *hp* =	9.6	hp
Shaft *N* =	1500.0	rpm
Shaft diameter *d* =	1.250	in
Materials tensile strength T_S =	36.00	kpsi
operating temperature T_{AT} =	90.00	F
Modulus of elasticity E =	46,000.0	lbs/in^2
Fluid radial unbalance force / load weight, F =	0.320	lbs/in2
Specified shaft deflection, b =	0.008	in
Shaft length X =	2.000	in
Diameter D_x =	6.000	in
Shaft length L =	0.000	in
Diameter D_L =	0.000	in
Shaft length M =	0.000	in
Diameter D_M =	0.000	in
Shaft length N =	0.000	in
Diameter D_N =	0.000	in
Calculated Results		
Eq. 1, Torque *T* =	305.58	in-lbs
Eq. 2, Shear stress S_S =	796.82	lbs/in^2
Eq. 6, Area moment of inertia I_x =	63.62	in^4
Eq. 6, Area moment of inertia I_L =	0.00	in^4
Eq. 6, Area moment of inertia I_M =	0.00	in^4
Eq. 6, Area moment of inertia I_N =	0.00	in^4
Shaft Reliability Calculations		
Number of cycles to failure N_f =	1.40e+007	#
Base failure rate for shaft, $\lambda_{SH,B}$ =	7.142857142857	failures/mil.
Eq. 7 Multiplying factor C_f =	0.913	Machined / Cold Dra
Material temperature multiplying factor C_T =	1.000	-
Shaft displacement multiplying factor C_{DY} =	4.702e-7	-
Initial shaft diameter D =	1.235	in
Transitioned shaft diameter, d =	1.000	in
Radius of fillet r =	0.063	in
Groove depth h =	0.070	in
Table 2 data h/r=	1.111	-
Taw 2 data h/D =	0.057	-
Stress concentration factor Table 2 $C_{SC,G}$ =	1.100	-
Stress concentration factor due to transition between shaft sections $C_{SC,R}$ =	1.665	-
Stress conc. factor shaft discontinuities C_{SC} =	2.765	
Calculated Results		
Shaft failure rate, λ_{SH} =	8.482e-14	failures/million cycles