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Bolt Preload Change Effects Due to Temperature Calculator		
Bolt diameter D_B =	0.750	in
Effective diameter of material thermal load D_M =	1.500	in
Bolt shank length, L_s =	1.000	in
Bolt thread length under axial tension, L_r =	0.250	in
Nut thread engagement length, L_g =	0.250	in
Minor diameter of (root) bolt thread, A_r =	0.712	in^2
Effective area material a thermal load, A_a =	1.500	in^2
Effective area material b thermal load, A_b =	1.500	in^2
Effective area material c thermal load, A_c =	1.500	in^2
Plate a thickness, t_a =	0.500	in
Plate b thickness b, t_b =	0.500	in
plate c thickness, t_c =	0.625	in
Bolt pre-load, P =	450.000	Lbs
Modulus of elasticity plate a, E_a =	4.500e+004	psi
Modulus of elasticity plate b, E_b =	4.500e+004	psi
Modulus of elasticity plate c, E_c =	4.500e+004	psi
Modulus of elasticity bolt, E_B =	4.500e+004	psi
Modulus of elasticity plate,a, b, and c, E_m =	4.500e+004	psi
plate a coefficient of thermal expansion, α_a =	0.000500	in / ˚F
plate b coefficient of thermal expansion, α_b =	0.000500	in / ˚F
plate c coefficient of thermal expansion, α_c =	0.000500	in / ˚F
bolt coefficient of thermal expansion, α_B =	0.000500	in / ˚F
coefficient of thermal expansion, α_m =	0.000500	in / ˚F
initial temperature , T_0 =	72.00	˚F
final temperature , T =	73.00	˚F
Results		
A_M =	1.325	in^2
Section area of bolt, A_s =	0.442	in^2
Effective length of bolt, L_B =	1.375	in
Eq. 1, Deformation of bolt over length, e_B =	0.0286	in
material thickness,T_M =	1.6250	in
Eq. 3, Deformation of material over thickness (L_M), e_M =	0.0286	in
Eq. 4, Preload change with temperature effects, P_T =	1.4522	Lbs
Eq. 5, Preload change Materials are same preload P_T =	1.4005	Lbs