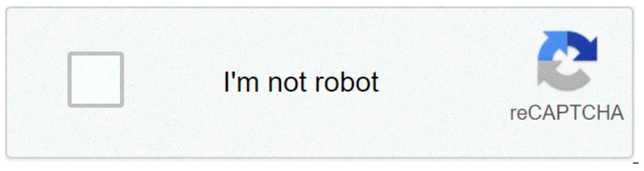

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Chapter 1 Problems 1-1 through 1-6 are for student research. No standard solutions are provided. 1-7 From Fig. 1-2, cost of grinding to 0.0005 in is 270%. Cost of turning to 0.003 in is 60%. Relative cost of grinding vs. turning = 270/60 = 4.5 times Ans. _____ 1-8 CA = CB, 10 + 0.8 P = 60 + 0.8 P 0.005 P 2 P 2 = 50/0.005 P = 100 parts Ans. _____ 1-9 Max. load = 1.10 P Min. area = (0.95)2A Min. strength = 0.85 S To offset the absolute uncertainties, the design factor, from Eq. (1-1) should be 21.10 1.43 .0.85 0.95dn A ns_____ 1-10 (a) X1 + X2: 1 2 1 1 2 21 2 1 21 2error .x x X e X ee x x X Xe e Ans (b) X1 X2: 1 2 1 1 2 21 2 1 2 1 2 .x x X e X ee x x X X e e Ans (c) X1 X2: 1 2 1 1 2 21 2 1 2 1 2 2 1 1 21 21 2 2 1 1 21 2 .x x X e X ee x x X X X e X e e ee eX e X e X X AnsX XChapter 1 Solutions - Rev. B, Page 1/6 (d) X1/X2: 1 1 1 1 1 12 2 2 2 212 2 1 1 1 2 12 2 2 2 1 2 11 1 1 1 22 2 2 1 21111 1 then 1 1 11Thus, .x X e X e Xx X e X e Xe e e X e e e 22eX X e X X X Xx X X e ee Ansx X X X XX _____ 1-11 (a) x1 = 7 = 2.645 751 311 1 X1 = 2.64 (3 correct digits) x2 = 8 = 2.828 427 124 7 X2 = 2.82 (3 correct digits) x1 + x2 = 5.474 178 435 8 e1 = x1 X1 = 0.005 751 311 1 e2 = x2 X2 = 0.008 427 124 7 e = e1 + e2 = 0.014 178 435 8 Sum = x1 + x2 = X1 + X2 + e = 2.64 + 2.82 + 0.014 178 435 8 = 5.474 178 435 8 Checks (b) X1 = 2.65, X2 = 2.83 (3 digit significant numbers) e1 = x1 X1 = 0.004 248 688 9 e2 = x2 X2 = 0.001 572 875 3 e = e1 + e2 = 0.005 821 564 2 Sum = x1 + x2 = X1 + X2 + e = 2.65 +2.83 0.001 572 875 3 = 5.474 178 435 8 Checks _____ 1-12 3325 1016 10000.799 in .2.5dS d An d ns Table A-17: d = 78in Ans. Factor of safety: 337825 103.29 .16 1000Sn A ns _____ 1-13 Eq. (1-5): R =1niiR = 0.98(0.96)0.94 = 0.88 Overall reliability = 88 percent Ans. _____ Chapter 1 Solutions - Rev. B, Page 2/6 1-14 a = 1.500 0.001 in b = 2.000 0.003 in c = 3.000 0.004 in d = 6.520 0.010 in (a) d a b c w = 6.520 1.5 2 3 = 0.020 in = 0.001 + 0.003 + 0.004 +0.010 = 0.018 allt w t w = 0.020 0.018 in Ans. (b) From part (a), wmin = 0.002 in. Thus, must add 0.008 in to d . Therefore, d = 6.520 + 0.008 = 6.528 in Ans. _____ 1-15 V = xyz, and x = a a, y = b b, z = c c, V abc V a a b b c cabc bc a ac b ab c a b c b c a c a b a b c The higher order terms in are negligible. Thus, V bc a ac b ab c and, .V bc a ac b ab c a b c a b c AnsV abc a b c a b c For the numerical values given, 31.500 1.875 3.000 8.4375 inV 30.002 0.003 0.004 0.00427 0.00427 8.4375 0.036 in1.500 1.875 3.000V VV = 8.438 0.036 in3 Ans. _____ Chapter 1 Solutions - Rev. B, Page 3/6 1-16 wmax = 0.05 in, wmin = 0.004 in 0.05 0.004 0.027 in2w = Thus, w = 0.05 0.027 = 0.023 in, and then, w = 0.027 0.023 in. 0.027 0.042 1.51.569 ina b caaw = tw = 0.023 = tallt a + 0.002 + 0.005 ta = 0.016 in Thus, a = 1.569 0.016 in Ans. _____ 1-17 2 3.734 2 0.139 4.012 ino iD D d all 0.028 2 0.004 0.036 inoDt t Do = 4.012 0.036 in Ans. _____ 1-18 From O-Rings, Inc. (oringsusa.com), Di = 9.19 0.13 mm, d = 2.62 0.08 mm 2 9.19 2 2.62 14.43 mmo iD D d all 0.13 2 0.08 0.29 mmoDt t Do = 14.43 0.29 mm Ans. _____ 1-19 From O-Rings, Inc. (oringsusa.com), Di = 34.52 0.30 mm, d = 3.53 0.10 mm 2 34.52 2 3.53 41.58 mmo iD D d all 0.30 2 0.10 0.50 mmoDt t Do = 41.58 0.50 mm Ans. _____ Chapter 1 Solutions - Rev. B, Page 4/6 1-20 From O-Rings, Inc. (oringsusa.com), Di = 5.237 0.035 in, d = 0.103 0.003 in 2 5.237 2 0.103 5.443 ino iD D d all 0.035 2 0.003 0.041 inoDt t Do = 5.443 0.041 in Ans. _____ 1-21 From O-Rings, Inc. (oringsusa.com), Di = 1.100 0.012 in, d = 0.210 0.005 in 2 1.100 2 0.210 1.520 ino iD D d all 0.012 2 0.005 0.022 inoDt t Do = 1.520 0.022 in Ans. _____ 1-22 From Table A-2, (a) = 150/6.89 = 21.8 kpsi Ans. (b) F = 2 /4.45 = 0.449 kip = 449 lbf Ans. (c) M = 150/0.113 = 1330 lbf in = 1.33 kip in Ans. (d) A = 1500/ 25.42 = 2.33 in2 Ans. (e) I = 750/2.544 = 18.0 in4 Ans. (f) E = 145/6.89 = 21.0 Mpsi Ans. (g) v = 75/1.61 = 46.6 mi/h Ans. (h) V = 1000/946 = 1.06 qt Ans. _____ 1-23 From Table A-2, (a) I = 5(0.305) = 1.53 m Ans. (b) = 90(6.89) = 620 MPa Ans. (c) p = 25(6.89) = 172 kPa Ans. Chapter 1 Solutions - Rev. B, Page 5/6 Chapter 1 Solutions - Rev. B, Page 6/6 (d) Z =12(16.4) = 197 cm3 Ans. (e) w = 0.208(175) = 36.4 N/m Ans. (f) = 0.001 89(25.4) = 0.0480 mm Ans. (g) v = 1200(0.0051) = 6.12 m/s Ans. (h) = 0.002 15(1) = 0.002 15 mm/mm Ans. (i) V = 1830(25.43) = 30.0 (106) mm3 Ans. _____ 1-24 (a) = M /Z = 1770/0.934 = 1895 psi = 1.90 kpsi Ans. (b) = F /A = 9440/23.8 = 397 psi Ans. (c) y =Fl3/3EI = 270(31.5)3/[3(30)106(0.154)] = 0.609 in Ans. (d) = Tl /GJ = 9740(9.85)/[11.3(106)(/32)1.004] = 8.648(102) rad = 4.95 Ans. _____ 1-25 (a) =F / wt = 1000/[25(5)] = 8 MPa Ans. (b) I = bh3 /12 = 10(25)3/12 = 13.0(103) mm4 Ans. (c) I = d4/64 = (25.4)4/64 = 20.4(103) mm4 Ans. (d) =16T / d 3 = 16(25)103/[(12.7)3] = 62.2 MPa Ans. _____ 1-26 (a) =F /A = 2 700/[(0.750)2/4] = 6110 psi = 6.11 kpsi Ans. (b) = 32Fa/ d 3 = 32(180)31.5/[(1.25)3] = 29 570 psi = 29.6 kpsi Ans. (c) Z = (do4 di4)/(32 do) = (1.504 1.004)/[32(1.50)] = 0.266 in3 Ans. (d) k = (d 4G)/(8D 3 N) = 0.06254(11.3)106/[8(0.760)3 32] = 1.53 lbf/in Ans. _____ Chapter 2 2-1 From Tables A-20, A-21, A-22, and A-24c, (a) UNS G10200 HR: Sut = 380 (55) MPa (kpsi), Syt = 210 (30) Mpa (kpsi) Ans. (b) SAE 1050 CD: Sut = 690 (100) MPa (kpsi), Syt = 580 (84) Mpa (kpsi) Ans. (c) AISI 1141 Q&T at 540C (1000F): Sut = 896 (130) MPa (kpsi), Syt = 765 (111) Mpa (kpsi) Ans. (d) 2024-T4: Sut = 446 (64.8) MPa (kpsi), Syt = 296 (43.0) Mpa (kpsi) Ans. (e) Ti-6Al-4V annealed: Sut = 900 (130) MPa (kpsi), Syt = 830 (120) Mpa (kpsi) Ans. _____ 2-2 (a) Maximize yield strength: Q&T at 425C (800F) Ans. (b)Maximize elongation: Q&T at 650C (1200F) Ans. _____ 2-3 Conversion of kN/m3 to kg/ m3 multiply by 1(103) / 9.81 = 102 AISI 1018 CD steel: Tables A-20 and A-5 3370 1047.4 kN m/kg .76.5 102yS Ans 2011-T6 aluminum: Tables A-22 and A-5 3169 1062.3 kN m/kg .26.6 102yS Ans Ti-6Al-4V titanium: Tables A-24c and A-5 3830 10187 kN m/kg .43.4 102yS Ans ASTM No. 40 cast iron: Tables A-24a and A-5.Does not have a yield strength. Using the ultimate strength in tension 342.5 6.89 1040.7 kN m/kg70.6 102utS Ans_____ 2-4 AISI 1018 CD steel: Table A-5 6630.0 10106 10 in .0.282E Ans 2011-T6 aluminum: Table A-5 6610.4 10106 10 in .0.098E Ans Ti-6Al-6V titanium: Table A-5 Chapter 2 - Rev. D, Page 1/19 6616.5 10103 10 in .0.160E Ans No. 40 cast iron: Table A-5 6614.5 1055.8 10 in .0.260E Ans _____ 2-5 22 (1)2E G shigley's mechanical engineering design 9th edition solutions manual. shigley's mechanical engineering design 9th edition solutions manual chapter 7. shigley's mechanical engineering design 9th edition solutions manual pdf. shigley's mechanical engineering design 9th edition solutions pdf free. shigley's mechanical engineering design 9th edition solutions manual chapter 5. shigley's mechanical engineering design 9th edition solutions manual chapter 3. shigley's mechanical engineering design 9th edition solutions manual chapter 13. shigley's mechanical engineering design 9th edition solutions manual chapter 6

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