Thread strength calculator for aluminum

Roymech Processing Screws and Fastenings Index Screw Thread Calculations These pages include different standards. To confirm the status of any standard, identify the replacement standard if it is obsolete and/or use standard purchases please. It is also possible to become a BSI member and to obtain copies of standards at very low prices. Screws Index Page... Screw tension area introduction Important areas of tension of mating screw thread are effective cross section area of external thread, or tensile area. The shear area of the outer thread which depends on the slight diameter of the tapped hole is the shear area of the internal thread which depends on the key diameter of the outer thread Acceptable tension and the method of applying force in screw end force and calculation are not considered on this page of tensile tension, but tables are more importantly addressed at this site by referenced links if a screw-thread threaded fastener fails to thwart it better that the screw instead of internal or external thread strips. The length of screw engagement should therefore be sufficient to carry the full load required to break the screw without stripping the thread. The size of a faulty fastener is first installed by calculating the tensile load to tackle the screw and select a suitable screw to withstand the tensile load with the appropriate factor of safety or preload. If the joint is fixed using a nut and bolt then assuming the nut is chosen from the same grade as the bolt there needs to be slightly nut size. Fastener construction will fail before screw nut to ensure nut length size. If the screw fastens into a tape hole then the thread requires checking the depth of engagement. For female and male threads of the same material in general, female thread is stronger than male threads in shear for the same length of engagement The following rules of thumb are suggested to reach the proper length of the thread for steel screws used with bad holes in the weak material. Thread engagement aluminum, thread engagement of at least 1 x nominal diameter of cast iron or thread for brass or brass for steel There should be at least 1,5 x nominal diya of thread engagement at least 2 x nominal diya should be threaded for a quality secure connection, when the tapped material has significantly less final tensile strength than the screw material, - it is better to use suitable rated nuts or engineered thread inserts to ensure that the screw will fail to stress before the female. Ref thread inserts important note for some notes on thread inserts: Various studies on thread loading have established that shear tension is not evenly distributed in threads. at first Tolerating the load is the most stressed and the next one is much less stressed and so on. . Almost all loads can be tolerated if the thread materials were too hard and didn't yield the first thread. However, there is some distribution of load due to material yield. A study (see link 2 below) has established that the percentage of load taken by consecutive threads for a typical Grade 8 nut is approximately 34%, 23%, 16%, 11%, 9%, 7%. This effect can be eliminated by using very precise threads and using ductile material for components. It has been established that, for carbon steel, there has been no increase in thread shear strength by having a thread engagement length in excess of screw diameter. It is normal practice to use tapped hole depth of about 1,5 x nominal diameter - it allows at least 1 diameter good thread engagement. A very simple rule that can be applied to the vast majority of applications is that a thread length of 80% of screw diameter (standard nut height) is enough to ensure that the screw will fail to stress before the female thread (nut) fails to stripping the thread (assuming that the screw and nut are similar ingredients). The equations below indicate how to make adjustments if the tape is lower than the metal (nut) strength screw/screw. Tension area formula D = basic diameter. P = Screw Thread Pitch Le = Thread Engagement Length A T = Screw Thread Tensile Tension Area DP = Pitch Circle Diameter Threads An SS = Thread Shear Area (Male) The following formula for tensile tension area of the screw is based on it's ISO 898 Part 1. See calculations below.. d p = diameter of pitch circle thread DP = (D - 0.64952.p) thread shear area = ass when female and male threads are the same material. Ass = 0.5. π DP. 100 π (D - 0.64952.p).p) It is necessary to take the shear area at least 2 times the tensile area to ensure that the screw thread fails before the strips. i.e. take (minimum) = 2. A T/[0.5.π.(D - 0.64952.p)] assumes that male and female thread materials have the same strength. If female material power is low i.e. to increase the length of engagement if the value of J is greater than 1 if the value of J is greater then the length of engagement should be increased at least for more detailed notes the above formulas are sufficient to calculate tensile strength and allow the depth of the thread to be confirmed for tapped holes the following equations are to provide a more accurate evaluation of the shear strength of the thread. These are equations derived from the Fed-STD-H28/2B, 1991 and machinery handbook eighteenth edition. They strictly apply to un thread series, but if relevent metric screw thread dimensions are used they will give Results. In practice when values are calculated the value for screw shear strength is similar to the very convenient formula provided above. These equations are only of the maximum slight diameter of the theoretical value screw shear area count K nmax = internal thread. E-smin = minimum pitch diameter of external thread. E nmax = maximum pitch diameter of internal thread. D smin = minimum major diameter of external thread. n = 1/p = Thread the minimum length of the thread per unit (mm) (male and female are the content of the same power as handling the thread). Screw shear area for female thread if the material in which female threads are used is weak enough that screw material should then be evaluated J. If the value of J is greater than 1 then the length of engagement should be increased to the least stress area - ISO 898 Note: A brief derivative of the nominal stress area formula from the information in BSN ISO 898. Some compute stress zones for ISO metric threads.. Medium Fit (6H/6g) The purpose of this table is to show the results of the above formula. It is evident from this table that there is no major advantage in using the detailed formula above. The projected formula for screw thread shear tension zone (an SS) is generally sufficiently accurate and there is no need to use the more detailed formula for as. Formulas for size below the M6 yield very similar values. The size provides a slightly more conservative result above the value for the M6 and ass (20% margin in the M36) I have gained thread dimensions on tables in the machinery handbook 27 ed. If you intend to use this information please check it against a reliable source (ref disclaimer above) All dimensions in mm Size M3 M4 M5 M6 M8 M10 M12 M14 M16 M20 M22 M24 M30 M36 Basic Dia D (mm) 3.00 4.00 5.00 6.00 8.00 10.00 12.00 14.00 16.00 20.00 22.00 24.00 30.00 36.00 Pitch p 0.50 0.70 0.80 1.00 1.25 1.50 1.75 2.00 2.00 2.50 2.50 3.00 3.50 4.00 1/p n 2.0000 1.4286 1.2500 1.0000 0.8000 0.6667 0.5714 0.5000 0.5000 0.4000 0.4000 0.3333 0.2857 0.2500 Stress Dia D s 2.5309 3.3433 4.2494 5.0618 6.8273 8.5927 10.3582 12.1236 14.1236 17.6545 19.6545 21.1854 26.7163 32.2472 Tensile Stress Area A t 5.0308 8.7787 14.1825 20.1234 36.6085 57.9896 84.2665 115.4394 156.6684 244.7944 303.3993 352.5039 560.5872 816.7226 Pitch circle dia. d p 2.6752 3.5453 4.4804 5.3505 7.1881 9.0257 10.8633 12.7010 14.7010 18.3762 20.3762 22.0514 27.7267 33.4019 Method Approximate Shear Area/unit Length Ass/mm 4.2023 5.5690 7.0378 8.4045 11.2910 14.1776 17.0641 19.950 6 23.0922 28.8653 32.0069 34.6383 43.5530 52.4676 SHEAR Assm =2. On 10.0616 17.5574 28.3650 40.2468 73.217 115.9792 168.533 230.1 8788 313.33568 489.5888 606.79 86 705.078 1121.1744 1633.4452 Thread length (ass = 2* on) take = ass/an ss/mm 2.3944 3.1527 4.0304 4.7887 6.4845 8.1805 9.. 8765 11.5725 13.5689 16.9612 18.9584 20.3534 25.7428 31.1324 Accurate Method Max.Minor Dia (nut) Knmax 2.5990 3.4220 4.3340 5.1530 6.9120 8.6760 10.4410

12.2100 14.2100 17.7440 19.7440 21.2520 26.7710 32.2700 Min Pitch Dia (Screw) E smin 2.5800 3.4330 4.3610 5.2120 7.0420 8.8620 10.6790 12.5030 14.5030 18.1640 20.1640 21.8030 27.4620 33.1180 Max Pitch dia (Nut) E sub>nmax 2.7750 3.6630 4.6050 5.5000 7.3480 9.2060 11.0630 12.9130 14.9130 18.6000 20.6000 22.3160 28.0070 33.7020 Min Major dia (Screw) D smin 2.8740 3.8380 4.8260 5.7940 7.7600 9.7320 11.7010 13.6820 15.6820 19.6230 21.6230 23.5770 29.5220 35.4650 Shear Area/unit length (Screw) A s /mm 3.9034 5.4728 7.0731 8.6458 12.1612 15.5796 18.9762 22.4239 26.0969 33.2791 37.0302 40.4623 51.6384 63.0982 Shear Area /mm length (Nut) A n/mm 5.5466 7.7691 9.9988 12.1909 16.8285 21.4769 26.1173 31.0335 35.5699 45.3881 50.0141 55.0098 69.5512 84.0601 Length of Thread (As= 2*At) Le 2.5777 3.2081 4.0103 4.6551 6.0206 7.4443 8.8813 10.2961 12.0067 14.7116 16.3866 17.4238 21.7120 25.8873 Screws Index Page... Please send comments to Roy Beardmore 58berlyl (Mechanical) (Op) 24 Sep 01 10:29 I have a large 6061-T6 mold made of aluminum and need to be able to pull the mold apart. I will hold sure the bolt needs to make the amount I'm putting in the back of the mold. How can I calculate the strength of threads of threads put in aluminum blocks? Thanks for helping keep Eng-Tips forums free from inappropriate positions. England - Tips staff will examine it and take appropriate action. Page 2 White Paper - Process Comparison: SLA vs DLP vs Micro SLA In this whitepaper, we will compare laser-based stereolithography (SLA), digital light processing (DLP), and projection micro stereolithography (PÂµSL) and examine how each performs against? Download Now White Paper – Applying an architecture-driven approach to onboard software design This white paper reviews market trends that are transforming embedded software development in the automotive industry. This digital transformation requires various processes and dedicated process support tooling. This white paper describes the digital transformation challenge and suggests an architecture-driven approach to developing on-board software in a rapidly evolving industry. Download White Paper Now – Meeting degraded visual environment (DVE) challenge solutions that allow aircraft crews to navigate in DVE is an important need and are a key area of interest for military and commercial applications. This white paper examines common DVE challenges and some promising solutions. Download Now White Paper - Test reuse in MIL TIL HIL in a development workflow in this white paper Learn how a standard-based, systematic MDD/XIL workflow helps automotive engineers develop their production ECU verification and validation (V&V) suites early during software modeling, and fill them throughout. Holistic System Engineering Project. Download the Page 3 White Paper now - Process Comparison: SLA vs DLP vs Micro SLA In this whitepaper, we will compare laser-based stereolithography (SLA), digital light processing (DLP), and projection micro stereolithography (PµSL) and check how each?ve performs against factors. Download Now White Paper – Applying an architecture-driven approach to onboard software design This white paper reviews market trends that are transforming embedded software development in the automotive industry. This digital transformation requires various processes and dedicated process support tooling. This white paper describes the digital transformation challenge and suggests an architecture-driven approach to developing on-board software in a rapidly evolving industry. Download White Paper Now – Meeting degraded visual environment (DVE) challenge solutions that allow aircraft crews to navigate in DVE is an important need and are a key area of interest for military and commercial applications. This white paper examines common DVE challenges and some promising solutions. Now Download White Paper - Test reuse in MIL TIL HIL in a development workflow in this white paper Learn how a standard-based, systematic MDD/XIL workflow helps automotive engineers develop their production ECU verification and validation (V&V) suites early during software modeling, and reuse them in the overall system engineering project. Download Now