Thread Calculator, version 1

By Mark Cason with Introduction by R. G. Sparber

Introduction

My good friend, Mark Cason, developed a thread calculating spreadsheet able to take any diameter cylinder and calculate the thread parameters for the 2A and 2B class of threads.

I have reproduced his ReadMe file starting on the next page.

The spreadsheet was given to me in LibreOffice which is a free application. You will find this spreadsheet on my website along with a version converted to Excel 2007.

The ReadMe does a fine job of explaining how to use the three pages of spreadsheets as intended. But you can also use the ASME B1.1 Inch Threads page to calculate threads for any arbitrary diameter. Refer to this spreadsheet for the following discussion.

Say you want to set the Maximum Major Diameter, cell B19, to 1.2345". Input this number into cell B2. You will find that the Maximum Major Diameter, cell B19 is 1.2329" which is 1.2345" - 1.2329" = 0.0016" . Add this value to 1.2345" to get 1.2361". Then put the 1.2361" into cell B2. The result, shown in B19 is 1.2345" which is what I wanted. If the result is not close enough, again take the difference, add it to the value in B2, and check the result in B19. Be mindful of the sign of the error because there may be times when you are adding a negative number.

Thanks to Mark for developing such a useful set of spreadsheets!

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[1] You are free to copy and distribute this document but not change it.

ReadMe - Page 1

All calculations are performed via the tabs on the bottom. You may have to scroll the tabs to see each one.

I've tried to keep each of the tabs fitted to a single letter sized sheet of paper. So, due to the lack of space on the various tabs, special instructions for each of the tabs are noted below.

All Sheets:

To calculate Pitch Diameter from Measurement over Wires:

$$d_2 = M_w+(0.866025*P)-(3*W)$$

To calculate Measurement over Wires from Pitch Diameter:

$$Mw = d2-(0.866025*P)+(3*W)$$

If you are cutting a thread to fit a high quality nut/bolt, give yourself about a 0.001” to 0.002” allowance on all dimensions, otherwise the fit of the nut/bolt will be extremely tight. “Store Bought” nuts/bolts, are hit and miss. I've found some cheap nuts/bolts that even cutting to the minimum size for nuts, or maximum size for bolts, they were still loose, because their tolerances were already maxed out. Your experience may be different, but measuring with a good set of thread wires will give you a good idea what's going on.

ASME-2A and 2B Threads sheet:

The value for **UNC**, **UNF**, **UNEF**, or **UN** needs to be set, because this affects how the External Pitch Diameter Tolerance is set. If unknown, use **UN**, as you won't be off more than a couple of tenths.

* External cutter tip width rounded to external thread root (F_{rs}). Internal cutter tip width rounded to internal thread root (F_{rn}).

ASME 2A and 2B Machine Screw Threads sheet:

* External cutter tip width rounded to external thread root (F_{rs}). Internal cutter tip width rounded to internal thread root (F_{rn}).

USS and SAE Threads sheet:

** External, and Internal cutter tip width rounded to flat (F_c/F_r)

ReadMe - Page 2

The information in this spreadsheet came from many sources. The bulk of the information on the USS, and SAE Threads, came out of the Machineries Handbook, 12th ed., and the Screw Thread Production for Close Limits PDF file, located on Google Books: http://books.google.com The information for the ASME threads came mostly from ASME-B1.1-2003, and The Machineries Handbook, 27th ed.

The information on using the 3-wire measuring system, came from the Machineries Handbook, 27th ed., and were tested using Pee Dee Thread Measuring Wires: http://www.fishermachine.com/ (no association)

So far, all of the threads that I've calculated for the ASME threads, were within 0.0002” of the actual measurements listed in the Machineries Handbook, 27th ed..

The Pitch Diameter Tolerance for the USS/SAE threads were a pain to get right. Anyway, they seem to be good now. I had to “Adjust” a couple of formulas, so that they followed the thread specs. All of the threads are within 0.0003” of the Actual measurements listed in the Screw Thread Production for Close Limits PDF.

All of the threads, both ASME, and USS/SAE, that have subsequently been cut, were well within 0.001” of the actual standards. More than adequate for my use.

This spreadsheet has protection turned on for everything but the light gray boxes at the top of each sheet. There is no password for the protection, so you can modify it as you see fit. It's only there to prevent accidental changes occurring to the math calculations, which, were difficult enough to do the first time.

If you do modify this spreadsheet, let me know. My email is: farmerboy1967@yahoo.com.

NOTE: I removed the specs for creating a machine screw tap, due to using two conflicting standards. I will add it back again, when I can get hold of a copy of ASME B94.9

20131221

ChangeLog

20120516 Why, oh why, did I not put this in earlier?

20120516 Modified the Thread_Passes tab. It now looks, and functions much better.

20120519 Minor Cleanup.

20131221 Modified scripts to use ^1/3 instead of ^0.333. This is to conform with cube root standard. Minor text changes / cleanup

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These generous people again demonstrate that “all of us are smarter than any one of us”.

I welcome your comments and questions.

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