

Author: David N. Lambeth N430_1600 "TPI Many Lathes Rev1"

****Foreword:** All of the text of this document should be in the lines of the A Column. This document will be easier to read if you copy and paste the "A" column into a simple text editor (NotePad, NotePad++, etc.) and then turn on word wrapping. You might even find it easier to repeat this Copy/Paste process into Word, but Word has not been as useful for me due to difficulties of editing the file and then putting it back into the Excel ReadMe sheet.

****The motivation for making this workbook was twofold:** 1) I wished to have a list of all of the possible Threading values for the PM1440GT lathe. 2) While I have written a lot of computer code over the years I had little experience doing so for MS vba (MicroSoft Visual Basic for Applications). Hence this has been a "teach myself code" project. I still have a long way to go to be proficient, but at least now I have somewhat of an understanding of what is going on with Macros. If you want to understand any particular command that I have placed in the macros, I suggest you simply google the phrase "Excel vba" plus the command phrase you are seeking. There is a lot of info on the web. Hence, I hope this workbook has value to the general Lathe using community! Please feel free to share it and to give me feedback or ask questions. If I can help I will try to do so. If your lathe gearing is different from those I have already incorporated into the workbook and you need assistance to get yours setup I will be happy to try to help.

_This ReadMe sheet describes the various parts of the Workbook, in particular the layout of the Lathe Sheets. It goes on to describe the functionality and some details of the Macros I have written to enable you to manipulate the Table, AllTPI, sheet of the various TPI settings.

_If you have questions or comments, please let me know. I would like to hear from folks. This a working document which will be altered as knowledge about the kinds of lathes grows.

Workbook and Macro Revisions:

N424: Some relevant revisions were made to the Lathe sheet(s) layout. Of these, the most important was making the columns of the 120/127 gears on the axle adjacent.

N424: Most of the Macros are new or were somewhat rewritten. See comments below.

N424: Revisions were written to remove redundancies in the table AllTPI. The PM1440GT TPI list went from 32,000 rows to 21,840 when the duplications were removed.

N424: New Macro was written to: Allow searches with TPI approximations not only above but also below the target value.

N424: New Macro was written: This allows accumulative searches from a User defined LIST (uwSrchList) of search targets, such as the TPI Standard thread values. It generates a concise table of Standard settings.

N424: New Macros were written: Allows Hiding and UnHiding columns automatically or by manual choices.

N424: New Macro was written: Allows very quick erasure of past searches at the top of the AllTPI table.

N424: New Macro was written: Allows quick Copy/Paste of past searches at the top of the AllTPI table to a new sheet.

N424: New Macros were written: Allows eye guiding AllTPI table underlines to be inserted and removed.

N424: uwReadme was revised extensively to incorporate these changes.

N424: Currently available, modified, LatheModel sheets: PM1440GT, PM1440HD, PM1340GT_PM1236T, PM1236_1236M, JET-BD1340, Atlas618, MMLB-Norton, MM1340LB-Lever

N424: "Cautions" were added at the end of this page.

Purpose:

_This workbook is for finding the Threading, Feeding, and X-Feeding rates for a lathe where the gear box ratios saddle gears are known and the user's available exchange gears are input variables. It is meant to be very flexible as to which lathes can be used with it. Hopefully I have achieved this, to some degree, but my knowledge of all possible lathes and their gearing is limited to what I can read from hard to find or incomplete manuals. Since I was curious about threading using the feed bar on my lathe I included it as a variable. Care must be taken at the lathe sheet to ensure that the several "IF" conditions are correct for the particular lathe model. Also, specification as to the feed and x-feed rates give by the lathe feed plate or manual are commonly inaccurate. Care must be taken to get these correct.

_In particular, I set out to design this for my Precision Matthews PM1440GT lathe, but it can be used for many lathe models. Other folks have helped me with some of these lathe descriptions. For example, the originally posted version of this Workbook provides lathe sheets for the following lathe models: PM1440GT, PM1340GT, Atlas618, JET_BDB1340A, and Metal Max: MM1340LB_Norton and MM1340LB_Lever. Additional ones have been and are being added. However, I fully expect there to be some inaccuracies in some of lathe descriptions... I am pretty sure that the PM1440GT and the PM1340GT are correct. With the possible exception of some of the feed rates, most of the others currently included should be correct.. Please provide feedback on the others and we can correct them If needed. Please suggest other lathes and provide any template and manual information for other lathe models. Perhaps this can become a useful tool for many lathes. Even though some lathes have a similar or identical model number, they are not always the same. For example, PM sells both a PM1236T and a PM1236, but their gearing is significantly different.

_The lathe model template sheet layout has been designed to be flexible so as to accommodate many lathe models. It allows for up to 6 possible internal gear box variables: 4 gear levers, 1 lever/knob implicitly for factors of 2x multipliers and 1 lever/knob to select the Leadscrew or the Feed condition and rates. It allows for upto 3 external movable gear axles with each holding two possible exchange gears on it, plus the gears at the spindle and the gear box. This then represents 3×2 plus 2=8 possible places for mountable external or external exchange gear values (tooth numbers). The layout is such that when two gears are on the same axis they should be at adjacent column in the generator sheet table.

_To make it as useful to all authors as possible, no cells or sheets in this workbook are hidden nor protected. So take care not to destroy it by changing something you do not understand. The workbook contains these lathe sheets for each lathe model, but additional lathe models can be added, but copying one of these to a new sheet and then making changes. Hopefully, a description of how to do this will be contained in this Readme note.

uw Sheet Protection!

_The lathe sheets are named with the starting letters "uw" followed by a model shorthand name. The starting "uw" is a code to prevent these sheets, and any other sheet the user wants to save, from being erased during some macro operations. If you have some sheet you wish to NOT have erased by the built in macro programs you should name it with the starting "uw" letters. Of course you can always delete any sheet manually. You can also copy a sheet, insert a new sheet and then paste the copied sheet into the workbook. You can then add the "uw" in front of the sheet name and it will not be erased.

_All of the lathe template sheets are laid out in the same format and contain some reference cells in them that should not be changed. It is important for any new lathe sheets to be of the same format so that the macros will operate correctly. Some of the cells in the lathe sheet and the AllTPI sheet are important NOT to be changed. For the most part these reference cells are used by the macros to tell them where to find things, but there are also places set aside to allow the lathe template designer to add lines to the sheets. That is, in these particular specific locations if need be. The reference cell values should change if certain rows are added or deleted. These reference cells are marked by color of

the cell and the font color. I recommend that you do not mess with them or insert columns or rows as this may cause some macros to fail. There are several blank lines (i.e. very small row heights) in the lathe sheet provided where new materials can be added without screwing up the cell locations of the referenced cells. More about some of these locations will be explained in the description of the lathe sheet format.

_PS. The "uw" flag was chosen as the beginning letters for tab names as I know of no commonly used words or names that start with these letters.

So let's get started! Lathe Sheets (TPI generating "engine"):

_The Lathe Sheets provide the TPI, Feed, and X-Feed values (Imperial and Metric) for a given gear box setting and a given set of external gears.

_Quick Start: Click on the tab labeled uwPM1440GT to view my lathe's sheet layout. (All other lathe sheets are laid out with the same general format; however some of the built-in equations must differ to correspond to the lathe functionality!) The computed TPI, Feed, and X-Feed values are in BOLD RED font at cells F24-F28. (Metric values are at cells W24-W28.)

_Now click on the pull down (drop down) menus located at the cells to the right of the words in the orange filled box: "Gear Drop Down Choices" (row 30) ==> For example, at the pull down menu of cell "I30", select a gear box lever letter, say "T". (You can do this as well with the cells to the right of this.) Changing one of these pull down menu values will cause a change in the TPI value.

_That is all there is to using the lathe sheet! Change a pull down menu value and you get the TPI, Feed, and X-Feed value.

_Hopefully, more details the lathe sheet's format will be explained later in this ReadMe file. But for now just note that is one pull down menu associated for each gear box knob/lever, one pull down menu for the incoming gear box axle, one pull down menu for the axle at the spindle and two pull down menus for each external gear axle which allows two gears on it at one time. Changing any of these pull down menus that are used for a given lathe model results in a new set of final TPI, Feed, and X-Feed values.

MACRO LIST (Short):

| | | |
|-------------------------|-------------------------|--|
| GenAllTPI_14V2.bas | Keystroke: Ctrl+Shift+G | Function: Automatically generates the AllTPI table sheet |
| HideAuto.bas | Keystroke: Ctrl+Shift+H | Function: Automatically Hides unused or redundant AllTPI sheet columns |
| HideUN_N_Col_AllTPI.bas | Keystroke: Ctrl+Shift+C | Function: UnHides ALL columns in the AllTPI sheet table |
| Hide_N_Col_AllTPI.bas | Keystroke: Ctrl+Shift+N | Function: UnHides AllTPI sheet columns of your choice |
| Srch_Any_Aprox.bas | Keystroke: Ctrl+Shift+A | Function: Performs exact or approximate AllTPI value search (Any column) including Wild Cards |
| SrchList_W_WCs.bas | Keystroke: Ctrl+Shift+L | Function: Generates a table of Imperial and Metric TPI value table from searches based upon User provided search value list, "uwSrchrList" |
| DeleteSrchrTopRowsQ.bas | Keystroke: Ctrl+Shift+D | Function: Deletes previous searches listed at the top of the AllTPI sheet. |
| Sort_BySingleCol.bas | Keystroke: Ctrl+Shift+B | Function: Sorts the AllTPI table based upon a single column input from the User. |
| Sort-Multi_Colmns.bas | Keystroke: Ctrl+Shift+S | Function: Sorts the AllTPI table based upon multiple column input from the User |

Sort_Undo_Sort.bas Keystroke: Ctrl+Shift+U Function: Unsorts the AllTPI table back to its original generation order

UnderLines_Insert.bas Keystroke: Ctrl+Shift+I Function: Inserts eye guiding underlines in the AllTPI table

Underlines_Remove.bas Keystroke: Ctrl+Shift+R Function: Removes eye guiding underlines in the AllTPI table

CopyPasteTPIsrch2List.bas Keystroke: Ctrl+Shift+C Function: Copies the searches listed at the top of the AllTPI table and Pastes them into a new sheet.

Comment: There is no macro for deleting columns from the AllTPI table. While it might be nice to do this for printing, the Hide columns macro provides for this. Deleting columns from the AllTPI table will prevent some of macros from functioning properly. Hence, I do not recommend this as most likely it will break other macros. However, if a user really needs to add this it can probably be done with a new macro copied from the either of the Hide macros at the command that cause the column to be hidden. Again, I do not recommend this, but change it to a delete command. To find this line of code do a word search on "hidden" or "Selection.EntireColumn.Hidden = True" and change this to "delete".

MACRO ENABLEMENT and SECURITY:

_To use the macros one must allow them to be active. Commonly, when the Excel Program is first started a head line asks if you want to do so. If you say no then you cannot use the macros. If your Excel program does not show a tab at the top ribbon called "Developer" you will want to add it. To do so: On the File tab, go to Options > Customize Ribbon> on the left and right columns pull down Main Tabs > Select Developer on the left and "Add>>" at the center to copy it into the right column window >select OK. The Developer Tap should now show in the Excel Ribbon. Click the Developer tab to show the Visual Basic, Macros, Record Macro etc. buttons (usually at the far left side of the command choices). Depending upon the Security settings for Excel the macros may now be available to you. If not you may wish to visit the Macro Security button.

_Click on the Macros button to open a window to see what macro programs are available. From there you can run a macro, choose the Options button to change the Keystrokes used to invoke a macro etc., Clicking Edit will open the Editor. Also, selecting the Visual Basic button allows editing and running the macros. Do so and then expand the Modules(+) to see a list of the available ones. Double clicking on any of these will open it at the right to allow you to view the code and edit it (not recommended without having saved your work.) However, with some experience you can read this code to see the operations it performs. At this page you can also run the macros etc. If some how you ever create a situation in the program where a macro fails it is here that corrections are made.

_Keystrokes to invoke a macro are optional. You can also chose and run the macro from either the Macro button or the Visual Basic window. At either of these you will see, for example, a macro titled "GenAllTPI...". This particular macro will use a lathe sheet of your choice to generate a table of all possible threads and feeds using the gear settings available in the lathe sheet.

_Security: While they are very useful, there is legitimate concern about using macros for any program, not just Excel. Microsoft makes them available in several of there Office products. The concern is that someone may have embedded software in a macro that takes over control of the computer. So only enable macros from a trusted source. I have not taken macros or pieces of macros from anyone else so I can assure you that each of the ones used here were written entirely by me and contain no malicious code. However, if someone has picked up my Excel program, altered it and then reposted it you must ask if it is still safe. If you are reading this you have opened the program, but have not necessarily enabled the macros. Or perhaps you have opened the version which has no macros. If you inspect the macros with a text editor you can look at the code and determine if it is safe before importing it into Excel. There is a feature in in the Visual Basic button which will allow you to import a macro or just start

a new one and then past in a text file to create a macro. When they are imported the Keystroke short cut is imported. If you create a new one it will have no Keystroke short cut until you define it at the Macros>Options button.

MACRO LIST (Longer Descriptions):

_Here, macros are built in programs written to perform automated functions on the data that is in the Excel Workbook. (You can write your own. If you have not done so before, there is a button that will copy your sequential key strokes and create a macro which will execute these same key strokes when ever you execute the macro.) Below a few more words are provided describing the macros listed above.

_The number of macros provided in this workbook is a compromise between additional features and having so many macros that the choices become confusing. Hopefully, by applying macros in specific sequences, sorts and searches, you can get a final format of results that you want.

MACRO: GenAllTPI_14V2.bas Keystroke: Ctrl+Shift+G

_This, "Generates ALL (possible) TPI, Feed, and X-Feed values (Imperial and Metric)," macro will create a spread sheet called AllTPI in which these are listed along with the gear values used. Running this Macro will delete any sheet which name does not begin with "uw...". It then generate a new sheet (table) called "AllTPI." This table will contain the TPI etc. data for all the gear ratios and gear teeth values you have chosen to have available in the lathe sheet of your choice. First, the macro asks for the lathe sheet name which you wish to use to generate the table. You must type the template sheet name EXACTLY as it appears in the lathe sheet tab (bottom of the workbook). For example: "uwPM1440GT". It will then create the AllTPI spreadsheet. If you have a lot of possible external gears and gear box levers/knob choices running this macro can take while to compute ...so be patient. Every so often in the process it should ask if you want to continue. If you choose "No" the table will be incomplete, but can still be worked with. With the 127/120 exchange gear and the 10 other external gears that usually comes with the PM1440GT there are 32,000 possible combinations of gear settings. Of these, some are redundant and in this new version of this macro have been eliminated to yield only 21,840 combinations! It then asks you if you would like to provide eye guidance underlines and how often. This is your choice. (A couple of new macros have been added which will allow you to add or delete these underlines later.)

_When invoked this macro checks all of the workbook sheet names, deleting any sheet that does not start with "uw... ". This cleans up the workbook of what ever temporary sheets might be being used. So if you want to keep a sheet be sure to name it starting with the letters "uw". More importantly, it deletes the old AllTIP sheet so that it can start fresh. If you have already created an AllTPI table sheet and want to keep it just rename it starting with the "uw" letters.

_This macro operates by sweeping through ALL of the pull down cell menu possible gear setting options from the lathe sheet, one at a time, until it works its way through all of the possibilities. At each pull down cell the "Zzz" flag will signal to the macro that this set of gear choices has been completed and the program moves on to the next pull down menu. These pull down menus are in a set of nested loops and this gear selection process continues until every possible "set" of gear tooth or gear ratio combination has been exploited. Hence, if you have a lot of gears this can take a while. (Go get a cup of coffee.) The program is equivalent to the manual process of: Setting each of the gear settings to the first value. Take the resulting TPI values along with the gear settings used and arrange them in a set of rows and columns at the bottom of the lathe sheet page. Change the first gear column by one position and place the resulting values in a row just below the first set at the bottom of the page. It repeats this until this first gear column has reached the "Zzz" flag. At this point the program copies the rows at the bottom of the page and pastes them in the AllTPI sheet to be saved. Now, a second gear column is incremented to its second gear value and the first column is reset to it first gear. Again the resulting TPI values and all of

the gear values are copied to the bottom of the page. When the first column of gears have been worked through the group again these rows are then, again, copied and pasted into the AllTPI sheet. Once, the second column of gear values have been worked through, both the first and second columns of gears are reset and the third column is incremented.... so on and so forth until all of the gear column value combinations have been exhausted. In each case, the "Zzz" flags are the only thing that keeps the process from going on for too long (It may appear to be forever, however I have taken care on the supplied lathe sheets to bury an extra "Zzz flag at row 68 of the pull down menus. So hopefully this safety mechanism will eventually stop a missing Zzz error. This row height is small so it is not obviously.) So be sure to always include the "Zzz" flags. By the way if you just want to try out the macro but keep the process fast, just type in a stop flag after the first gear letter or gear tooth value in each or some of columns of pull down values.

_How long does the macro take to run? It depends upon your computer speed and how many gears you choose to investigate. No one says you are restricted from adding more external gears. The number of gear combinations is only limited by the number of rows available in the lathe sheet. For my computer, which has reasonably decent speed, it takes approximately 3 minutes to generate about 6400 gear combinations. The macro name has "..._14..." in it because it has 14 columns of possible different gears or levers. However, depending upon your lathe sheet not all of these columns maybe used. The lathe sheet format is constructed this way to enable many lathe designs to be able to utilize the workbook. You take any of the lathe sheets and copy it into a new sheet and then modify it to suit a different lathe model. (Remember to rename the new sheet to "uw....." so that it will not be deleted by this macro.)

_You can hand calculate how many possible combinations there are by multiplying the number of gears in each of the pull down windows into one product. However, as mentioned in this new version of the macro the redundancies in these have been eliminated.

_For example, the exchange gear has two gears on one axle. Two pull down menus (two columns) are provided for this and so $2 \times 2 = 4$ possible combinations: 120/120, 120/127, 127/120, and 127/127. However, since 120/120 and 127/127 yield the same ratio, 1, they would yield the same final TPI value. So the new program version only uses one of these combinations and at the final AllTPI table these entries are labeled "S & T" in both columns "S" and "T" where the two gears are the same, but can be any value. The lathe operator then knows that the "two" gears on this axle, these columns, must simply have the same number of teeth. In the case of the exchange gear this means the gear from the prior driving axle and the gear from the next axle are simply connected to the same gear at the exchange gear axle. (They do not have to be 120 or 127, it could be any value. Hence, this would free up the 120 and 127 gears to be used on some other axle. Provided they will physically fit.) If the lathe has multiple two gear exchange axles then the same logic would apply, along with the same column letter notation. So in this case, there are only three choices for these two columns: 120/127, 127/120, and "S&T"/"S&T". Obviously, going from 4 to 3 choices reduced the number of possible gear combinations by 25%. The number of AllTIP table entries generated is then 75% of the maximum possible, but redundant, combinations. In a similar, manner, if the gear attached to the spindle (one spread sheet column) and the gear attached to the gear box (one column) are the same number of teeth, the actual number of teeth on these axles is unimportant to the operation. They can be any gear. The gear ratio from these two positions is again 1. Hence, when this occurs the table entry is "N & U" corresponding to the column numbers of these axle positions in the AllTPI table. However, here since there are more than two possible gears that can be considered for installation the reduction in the total number of entries is slightly more complicated. Without removing there dundancies the total number of combinations would be " $n \times m$ " where there are " n " possible gears at one position (spindle) and " m " possible gear values at the other position (gear box). In the PM1440GT case, $n=m=10$ and the gear values are identical, so $n \times m=100$ and n of them have the number of teeth values being equal. We only need to keep one of these. We can eliminate not n , but $n-1$. If $n=m$, and the sets are identical, then the number of possible

combinations is given by $n*n-(n-1)$ or $n*(n-1)+1$. So the reduction of entries is $n*n-(n*(n-1)+1)$ or $n-1$. The same would be true at the exchange axis if the user were to choose to add more possible gear teeth values. The formula is conceptually slightly more complex if n is not equal to m or if some of the gear tooth values do not match. However, hopefully, the program now takes care of even those cases as it simply compares the gears being used to see if they are identical and if so simply does not include any of them, but one case. (The equation for this unequal, $n < m$, case can be visualized by looking at a matrix with n rows and m column values in the matrix of gear values and the ratios are just the ratios of the values for each case of n and m . Let the increasing m tooth value sequence be the same as the n tooth value sequence as long as m is changing. Then when the values for n and m rows and columns match ... the diagonal of the matrix.... will yield ratio of 1 and all but one of these can be eliminated. That then means that the smaller number of identical tooth gears, n , determines the number of redundancies. The number of diagonal elements in the matrix is n . Keeping one to represent them all means that the number removed from the matrix is simply $n-1$. When $n=m=10$ and the values are equal, as in the PM1440GT gear set, number of gear combinations removed are $10-1=9$, the remaining possible gear ratios is $100-(10-1)=91$. So the number of gears ratios kept are 91%. For the PM1440GT, by eliminating the redundancies, the new number of possible combinations: $0.75*0.91*32,000 = 21,840$ AllTPI table entries.

_While the macro is running, at the left side, bottom line of the Excel program window is shown a task status message. Approximately how many gear combinations have already been generated is displayed. This message command is buried inside one of the nested loops of the macro and so does not update at ever gear combination. Updating the screen at each change would significantly slow the program down and so in general the screen appears to be inactive during the operation. Also, if there are a lot of possible gear combinations the program will ask you if you wish to continue to calculate the rest of them. A value determining how often the question is ask is placed in the lathe sheet and can be altered by the user. (See the lathe sheet format detailed description below.) This is just an escape clause to allow you to stop the calculations if need be. But if you do not wish to be bothered you can turn it off by making the interval of messages long. The way it currently functions is that the the number of rows calculated between notifications grows after each time you tell it to continue.

_Warning: The lathe sheet active columns are limited. On theTPI table, AllTPI, the number of columns is limited to being only 26, from A to Z. The macros probably will not work if more columns are inserted. At least on search macro will delete what is put into columns to the right of column Z as it uses the area as a scratch pad and then cleans it up.

_Layout of the generated AllTPI table: The Excel column "A" is simply a count of the row numbers. The column "B" is simply a count of the number of gear sets. They are useful in restoring the order to the table if it is sorted on via another column. See the macro used for unsorting.

MACRO: HideAuto.bas Keystroke: Ctrl+Shift+H

This macro is new and will automatically hide the columns of the AllTPI sheet, which are either unused by the lathe or which are totally unchanging. It should be useful in making it easier to view and print AllTPI data, without having the wasted column space.

MACRO: HideUN_N_Col_AllTPI.bas Keystroke: Ctrl+Shift+C

This macro is new and Unhides all of the columns of the AllTPI sheet.

MACRO: Hide_N_Col_AllTPI.bas Keystroke: Ctrl+Shift+N

This macro is new and ask you for a list of columns you might wish to hide in the AllTPI sheet. Perhaps you do not need to see or print all of the FEED or X-FEED rates.

MACRO: Srch_Any_Aprox.bas Keystroke: Ctrl+Shift+A

_This macro is essentially completely new. It allows you to search the AllTPI sheet for any value, at any column, and then copies and pastes this to the top of the AllTPI sheet. It allows considerable versatility of the value input format as well as allows for wild cards for approximate searches. A new feature in the approximate values is that it looks for values both greater than and less than the wild card notation might suggest.

_To see the possible input formats review the new sheet called "uwSrchList". The wild card feature is very handy in finding TPI values which are close but not exact. Sometimes it is possible to find a TPI value that is practically the same as an exact value, but enables the lathe operator to not having to change external gears!

MACRO: SrchList_W_WCs.bas Keystroke: Ctrl+Shift+L

_This macro performs searches much as the Srch_Any_Aprox macro, but works from the first column list of a sheet called "uwSrchList" to determine what searches will be made. It steps through the list in Column A until it reaches the value 9999 and then quits. "METRIC" and "IMPERIAL" flags are placed in the same column A just prior to the requested search values to indicate that the search will be conducted in column V or C, respectively. Hence, it does multiple searches without the need to constantly interacting with the macro. Having generated a number of searches where the results are located in the rows above the AllTPI table, it copies these to a new sheet without all of the title lines. If some of the columns of the AllTPI sheet have already been hidden then the new succinct table of found TPI values will also have the columns hidden. It leaves the search results at the top of the AllTPI table should you wish to use it for something else. The results are placed in a new sheet called "SrchrTPI" (unprotected by a starting "uw"), which will be deleted if you run the macro again. It also displays in the "uwSrchList" sheet a summary of the search results in columns next to each requested search TPI value. Should you find that your lathe gears to not yield a search result you might want to change the input by adding or modifying a Wild Card.

_The final can be in a given order, just sort the AllTPI prior to running this macro. Also, place the values in uwSrchList in the order you would like to find them in the final page. This list can be added to by doing additional searches and then using the CopyPasteTPISrch2List.bas macro.

MACRO: DeleteSrchTopRowsQ.bas Keystroke: Ctrl+Shift+D

This macro quickly deletes the rows above the AllTPI table which were generated by previous searches. This process and other are based upon the "DELETE FLAG" phrase which has been inserted in column 2 of a row following each of the search results. This new version is significantly faster than a previous version and the code uses very few lines.

MACRO: Sort_BySingleCol.bas Keystroke: Ctrl+Shift+B

This macro allows one to sort the order of the AllTPI table by increasing or decreasing values of the users column of choice. Its default value is the TPI column and sorts in increasing value. Sometimes it is useful to sort the order prior to making a search so that any tables that are then generated are in the same order.

MACRO: Sort-Multi_Colmns.bas Keystroke: Ctrl+Shift+S

This macro is similar to the other search, but allows the user to sort on multiple columns, each either increasing or decreasing. The sort column order is requested at the top and defaults to a value that can be kept in the lathe sheet at cell "A4" which initially is the generated order, but can be changed by the user.

MACRO: Sort_Undo_Sort.bas Keystroke: Ctrl+Shift+U

This macro restores the sort order to that which was initially generated. It uses the sequential numbers at the left most column to sort on.

MACRO: UnderLines_Insert.bas Keystroke: Ctrl+Shift+I

This macro maybe used to insert underlines in the AllTPI table. It request the user to tell it how often an underline should be placed. The underlines can make it easier to read across the table. However, they can appear messy in a search result.

MACRO: Underlines_Remove.bas Keystroke: Ctrl+Shift+R

This macro maybe used to remove underlines in the AllTPI table and to resort its original appearance.

MACRO: CopyPasteTPISrcH2List.bas Keystroke: Ctrl+Shift+C

This macro will copy/paste the current search results from the top of the AllTPI table and paste it to the sheet called "SrcHdTPI" in the same concise format as did the SrcHList_W_WCs generated. It first deletes the sheet so if you had things there you wish to keep you should rename it before running the macro. Since the top row search results at AllTPI can be accumulated this macro can be used to essentially update the "SrcHdTPI" sheet to contain all previous searches.

Description of a Lathe Sheet Layout: The Lathe TPI Engine

_To follow along in this description, choose a Lathe sheet (spread sheet tab) to view. For example: uwPM1440GT.

_There are two ways to utilize this Lathe Sheet, by manually changing the gear settings or by running the automated "GenAllTPI_14V2" macro.

_The heart of the overall Workbook is the lathe sheets in combination with the macro called "GenAllTPI_14V2". If your lathe is not listed on one of the workbook sheet tabs you can copy one of these sheets and paste it into a fresh sheet. Then modify it to conform to your lathe. If you need help with this please ask.

_A Lathe sheet, "lathe engine," is designed to allow the user to manually select gear lever positions or external gears (via tooth number) via the pull down menus and it will then yield the TPI etc. in the RED BOLD font cells.

_This is done via the pull down menus which are indicated in the center of the lathe template. Different lathes will be designed slightly different in these area, but in general are pretty much similar.

_Using the pull down menus to select a lever position or gear tooth number and the TPI etc. will be changed. (Red Font entries, above and to the right or left of the pull down menus)

_As described above in the short description about the lathe sheet and about the macros the "GenAllTPI_14V2" macro basically runs through all possible combinations of gearing by selecting these pull down menus one by one until completely exhausting all combinations.

_At the top left, and side left, of the sheet are some entries in light blue on yellow background. These are simply reference points in the on the sheet...either row or column numbers via formula, providing information to the macros as to where to find information.

_They are set up in this manner, as formula rather than just a number, so that if at some point one needs to add a new row or column in the sheet the locations for the information will be preserved even though the location may be shifted by the addition.

_They should not be changed as the addresses are used in the macros in various places.

_Note that cell A1 contains the line number of the location where other reference numbers begin currently this is row 22. Likewise cell A2 points to the column number where other references begin.

_Note that cell A3 is in black font (not light blue) so is a value the user is allowed to change. This is a counter maximum (MaxCnt) that determines how many lines of TPI table are generated before asking the user to continue. Note that a negative number causes the initial maximum number of lines in the TPI table to be 128 (2^7). However, once the generator gets to about 128 it will ask for permission to continue. However, if the user changes cell A3 to a positive number then this MaxCnt will be the number of rows where the question is first ask. After this initial count number is reached the MaxCnt number will be increased by a factor of 8 before the question is ask again. This process occurs again and again until the GenAllTPI macro is finished running through all of the possibilities, but this incrementing of the MaxCnt number limits the occurrence of the message screen popping up. During much of this process the screen update is turned off, but will return at the end of the generation. This is to speed up the calculations. At the bottom left corner of the workbook, the macro provides a status message that is updated even while the screen is off. The macro outputs a number here corresponding to how many rows in the AllTPI sheet have been generated so far.

_Cells A4 is in black font and deals with a proposed user sort order via Column letter and sign. This cell is used as default value in the initial query put to the user by the macro. The initial value typed here was suppose to be the original sort order of the "GenAllTPI_14V2" macro. This too can be altered by the user, but initially is pretty much the same for all lathe sheets.

_Cells A5 is in black font and is just informative as to how the last sort was performed. The ALLTPI sorts Macros or UnSort macro writes the last sort order info here.

_Cell A6 provides information about which columns in the AllTPI table should be hidden. Note that the letters refer to the columns in the AllTPI sheet not the letters of the lathe sheet.

_Cells A7-A19 are for future needs.

_The remainder of the entries in the columns to the right, rows 1 through 6, provide no real functionality other than to allow a designer to have some notations of column numbers etc. They may be cleared if one wants to. However, they show that the lathe gear pull down menus for the gears are shifted by one column between the AllTPI sheet and this lathe sheet.

_The short height blank lines, both here and lower in the sheet, are provided in case a user wishes to expand them to change the program or to make notes or to add other things. Inside these regions new lines may also be added to the sheet without messing up the macro references.

_The cells to the right of the words in the orange filled box: "Gear Drop Down Choices" (row 30) ==>" are pull down menus for selecting gear box levers of for selecting values for the external gears. For example, at the pull down menu of cell "I30", select a gear box lever letter, say "T". (You can do this as well with the cells to the right of this.) Changing one of these pull down menu values will cause a change in the TPI, FEED, and X-FEED values.

_Above the pull down menus, lines/rows 23-28 (current values) are where the chosen gear ratios are computed and multiplied to yield the IMPERIAL and METRIC threads and rates. These formula, immediately above the pull down menus reference, the values in the pull down menu cells.

_A different lathe model might require that these formulas in the 23-28 rows be altered a bit as all lathe gear boxes do not function quite the same. (Likewise, different lathe models will require that the pull down menu values for the gear box be modified.) The entries to the left of these formula cells of rows 23-28 (i.e. cells F24-28) yield the final TPI, Feed etc (BOLD RED fonts). In particular F24 is the product of the values in the cells to the right and along this same row, but you will see that it also contains a condition to alter its results when the Feed knob is selected. You can explore these formula more to see how they function and there will be more said about the formula/equations at columns I-N, their functionality and operation later in this section of ReadMe. Immediately to the left of the product producing cells are cells E24-E28. The values in these are the same values is in the neighboring F cells, but are formatted into text with a finite number of characters to the right of the decimal point. This is done so that they can be copied and placed in the TPI table.

_Likewise, for the similar metric entries just to the right of, and above, the pull down menus at cells W24-28. You can figure out how all of these are related by placing the cursor on the cells and reading the formulas.

_Note that the LeadScrew pitch is located at cell H24. For the PM1440GT this value is suppose to be 8TPI. However, in this sheet is shows as 4. This is probably because the values at the pull down menu representing factors of 2, column N should all be scaled down by 1/2.

_Note, in general, the pull down menu for the gear position where factors of 2 occur should be at column N. Likewise, the ordering of things in the macro for generating the AllTPI seems to work best if the LeadScrew/FEED choice lever is at column "M".

_There are two types of occurrence in the pull down menus. In the left pull down area they reference the lathe levers as these entries are gear ratios of the gear boxes. On the right half of the sheet the pull down menus are for the external gear tooth numbers.

_Hence for these gear tooth numbers, ratios must be calculated and this is done in the lines at the top of the calculation lines, i.e. see the light blue Row 23 entries around columns O-V.

_Aside: I have kept the number of active columns to 26 (letters in the alphabet) or less in order for the macros to be coded a little easier.

_To understand how the pull down menus information is transferred; consider an example, say Cell N30, the AB-CD gear box knob. This gear box provides 4 possible positions yielding 4 factors of 2 in gear ratios.

_As the pull down menu choices are A_D, B_D, etc. The formula located in the cells above the pull down cell contains an IF function (currently cell N24) where the results are based upon the pull down values (letters) and the numbers in the rows, 69-109. This IF formula, selects one of the numerical values located below the pull down menu list. For example, choosing "A-D" in the pull down causes the value in cell N69 to appear at N24. The value is 0.25 for selecting A_D. Likewise, the B_C selection yields a value of 2 at cell N24. _The other pull down menus work in a similar manor but since the gear box lever labeling is different then so are the choices in the pull down menu. For example, consider the WXYZ gear box handle or the PQR(I)T handle.

_The IF equations at row 24 and columns I-N are pretty much all the same, but sometimes it is convenient to modify them to suit the lathe. Basically, the results, just like the N24 example discussed above, look to the resulting letter or phrase from the pull down menus, and then select a value from the list below the pull down list option. It is pretty easy to add or modify an IF statement via the letters or phrases. To better understand this, look at cell J24 (uwPM1440GT). Here you will see the IF function being used with multiple IF functions embedded it the first. This allows the choice of multiple results based upon the letter or phrase that might appear at the pull down menu. This function is limited to 5 IF functions and so it is limited to 6 choices. However, there is no reason this cannot contain many more choices/embedded IF functions.

_Now look to I24, this function has 6 embedded IF functions and there are 7 possibilities. It refers to the pull down menu at I30 where, there are two choices which are red font for T and R. These cells I31 and I30, have their own formulas built into them. This is due to the functionality of the "I" lathe lever position being used for Feed rather than TPI. Note that I31 becomes and End of gears flag Zzz when the feed is chosen in pull down menu M30.

_At the IF function, I24, these choices are reflected in the last embedded IF function of the formula.... one looks for the phrases "Any" or "Feed" and when these happen the value becomes 1. The pull down menu at I30 becomes "Any" when the pull down menu at M30 becomes "Feed" because the gear choice is non-functional. Hence the gear ratio appearing at I24 becomes 1. Hence, when the Feed is chosen at pull down menu M30, the gear ratios are just passed along to F24 by the value 1, as the overall gear ratio for the lathe is the product of the values in row 24. This was a little tricky, but is one way to take care of the lathe's specific functionality, especially around how it operates with respect to a feed knob

and a power bar to drive the feed function. Anyway, if you decide to build your own lathe sheet you can steel these features (equations) from another sheet. A longer embedded IF functions example is at I24 for either the uwPM1440HD or the uwPM1340-PM1236T, where there are 8 gear knob positions and so 9 choices. If you need one of these copying one of them can save you some typing. There could be much longer generic version of the embedded IF functions, but then typo errors would become more difficult to debug! Anyway, if you have extra IF functions and possible phrases, but you never put them in the pull down menu then they will never happen in the TPI generator.

_In some cases the equations in rows 26-27 have similar functionality to the IF functions of row 24. But a much simpler equation is all that is needed.

_The table of possible TPI includes the TPI that would be obtained even if the Feed position was selected at pull down M30 cell and this is noted in the table by the term "Feed" or "Leadscrew". It is not obvious how this work unless you study the lathe configuration.

_Different lathes seem to gear the feed bar differently so this is somewhat unique for each lathe. Even more importantly, is the fact that some lathe put tables on their lathe for the feed rates, which are dubious at best. If you want to get these right I suggest you either measure them very carefully to yield a feed rate ratio of the saddle gears or that you actually try to figure out the gear arrangements between and in the saddle and the feed bar and leadscrew. However, again be aware that many of the manuals do not provide one or if they do the gear diagram for the saddle is incorrect or incomplete. In the case of the panel and manual for the PM1440GT the numbers provided for the feed rates were pretty good, but the X-Feed rates were completely wrong. The panel showed a simple factor of 2x between the X-feed rate and the feed rate. When I measured it very accurately I found it to be 3.13541 by what we deduced to be the gearing and when I measured both rates I found this ratio to be very accurate.

_You may note that the pull down menus for the external gears do not reference cells below the gear tooth numbers. This info and gear ratios are determined as ratios via computation and this depends on which external gears touch each other.

_Hence, these are set up as the axles or gear shaft(s) noted. See the descriptions in the cells immediately above the pull down menus, in particular at row 23 where ratios are computed for a given axle (composed to two columns with two pull down menus).

_Some pull down menus are not being used so the entries are noted as NA. Just as at the gear box, these extra columns are for those folks who may have a more complex lathe gear box or external gear arrangement, which they may need to customize.

_If after you run your lathe engine to generate the TPI tables, there is a macro which allows you to hide these unused columns. That way you can print to a narrower table page.

_That is pretty much it and all that you need to know to run this lathe sheet by hand. The lines near the bottom (rows 109-113) of the sheet are used for titles in the TPI tables and are used by the macro.

_The lines at the bottom of the lathe sheet are a temporary scratch pad where the various numbers are placed before being copied to the AllTPI sheet table. However, there is cell formula copying from the gear table etc. above and showing up down at the bottom. If you mess around with these the materials being copied to the AllTPI thread chart will be incorrect. Also, the layout of the titles that also appear here are used in some of the other macros. If they are changed then the macros may not work properly. So tread softly.

_If you have questions, please ask. This a working document which will be altered as knowledge about the kinds of lathes grows.

Cautions:

_If too many possible external gears are added to the lathe table the Generate ALLTPI macro can not only take a long time and this time depends upon the computer resources. The program might even fail. If you try to use the computer for other applications during this time it is unlikely that the macros will work correctly.

_External Gears. Since no knowledge of the physical geometry of the lathe is assumed in this TPI generation it is plausible that the gear choices at the various external axles will become non-physical. For example if only very small gears sizes were used at all axles then the gears could not be made to reach each other. Likewise, very large gears might not fit in the space provided.

_False Gear box settings: The Author does not have access to all of the lathes listed and so lacks knowledge as to exactly how the gear boxes function. This is especially true for the FEED and X-FEED numbers. Likewise, it may be possible in the program to have gear box setting which are not allowed or are in conflict with the FEED operations when there is a FEED power bar separate from the Lead Screw. Some of these situations can be handled via various IF conditions in the lathe sheet.

_Using a power bar which is commonly used for the FEED and X-FEED rates obviously can be used to also cut threads, but how good these are depends upon the actual lathe and the FEED rate errors. The Author has found that the lathe plates and manuals are not always accurate as to feed and x-feed rates. (If you actually know the internal gearing you can make these far more precise.) Hence, the values inserted into the lathe sheets may be of limited accuracy or actually be wrong. The user is encouraged to measure the FEED rates and then use these in the lathe table.