

## Program Description

This program calculates the true position information on a set of measurements and accounts for the material condition modifiers. (True position is a geometric control from the Geometric Dimensioning and Tolerancing standards. It is assumed the user understands GD&T, as this is not the forum for a lesson). The program returns useful numeric information and can also sketch the location of the point relative to the nominal position to help visualize the error. This program is useful to anyone who needs to evaluate geometric position callouts, typically found on manufacturing blueprints.

## Program Requirements

The program "truepos" and the function "tpmod" must be in a directory named "ZPROGS". I put my programs in this directory so it sorts at the end of the list in the VAR-LINK menus. If you want to place them in another directory, you will have to edit "truepos" and change the paths in the calls to "tpmod".

## Operation

Run the program. It will create variables in your current folder. The main screen looks like this image. It is displaying values in the example, all of which will be zero the first time you execute.



Meas Pt. Are the coordinates of the feature that has been measured (where it actually is).

Meas Diam. is the diameter of the measured feature.

Basic Pt are the nominal coordinates of the feature (where it should be).

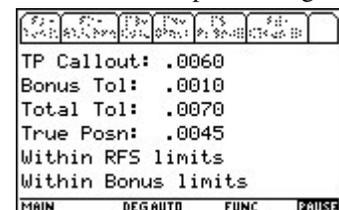
Nom D is the nominal diameter (with tolerance) of the feature as an upper and lower limit. Note that this expects the MMC condition first and the LMC condition second. If the feature is a hole, the MMC will be smaller than the LMC. If the feature is a peg, the reverse will be true.

Callout is the geometric tolerance (including the modifier).

All of this information is entered using the **F1 Data** menu and it is pretty self explanatory.

Once the data is entered, it is stored in several variables in the folder that was active when the program was executed. This is done to prevent you from having to enter it all in again if you exit the program to do something else and want to come back. When the data entry is done, simply run the calculation. The **F2 Calc** menu has three options: 1:Numbers, 2:Plot, 3:Exit

The 1:Numbers option will give you the following screens. For the first screen



TP Callout: is the specified callout from the data entry.

Bonus Tol: is the bonus tolerance based on the material condition, it will be 0 for RFS.

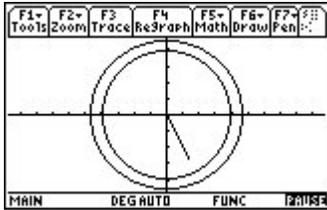
Total Tol: is the sum of the TP Callout and the Bonus Tolerance.

True Posn: is the calculated true position of the feature in question. In words, this is "the diameter of the circle that is centered where the feature should be that the feature is actually on."

The next two lines indicate if the feature is within the positional limits. This feature is. If it were not, it would say "Past RFS by:" and "Past bonus by:" and list the amount the location of the feature exceeds the tolerance circles. NOTE: THIS WILL NOT BE "Total Tol" - "True Posn" SINCE THESE ARE DIAMETRICAL MEASUREMENTS. IT WILL BE HALF THIS VALUE (RADIAL) SINCE THAT REPRESENTS THE AMOUNT OUTSIDE THE LIMITS. Think of it this way, if the true position circle is a target that you have missed. This number will represent how far from the edge of the target you are.



For the second screen, it reports two vectors. Both are the vectors from where the feature should be to where the feature actually is. One is in polar format, the other is in rectangular. (Reversing the direction of these is how you have to move the feature to get it to the nominal position).



The 2:Plot option gives you this screen. The center of the graph is the nominal location of the feature. The endpoint of the line is where the feature actually is. The inner ring is the RFS (nominal) position tolerance. The outer circle (if there is one) represents the bonus tolerance.

### Special Notes and Limitations

The “tpmod” function can be used as needed and it returns the amount of bonus tolerance. It is of the form:

*tpmod(arg1, arg2, arg3)*

where arg1 is the modifier code: 1=RFS, 2=MMC, 3=LMC. Arg2 is the actual diameter as measured. Arg3 is a list element containing the nominal diameter at MMC and LMC in this order. Again, for a hole the MMC will be less than the LMC. The reverse is true for a peg.

Datum modifiers are not currently supported.