

Tool & Die Helper for AutoCAD LT

Version 2.5
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By
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INTRODUCTION:

Tool & Die Helper for AutoCAD LT (and Windows versions of AutoCAD) is a program that allows the user to parametrically draw some commonly used components used for tool & die/mold drawings. It consists of a menu file to be added to AutoCAD LT and a separate program to generate script files.

FEATURES:

Tool & Die Helper for AutoCAD LT will draw ejector pin holes, counterbored holes for common screw sizes, tapped holes, core pins/holes, threads, insert core notes and optionally do initial drawing setup. All cores are based on DME standard sizes. Tool & Die Helper for AutoCAD LT can be customized to add additional cores or threads.

NEW IN VERSION 2.5:

New objects in version 2.5 of Tool & Die Helper for AutoCAD LT are slot/slotted holes, simple cam shapes, keyways in shafts and hubs, taper pins, combination drill countersinks, shafts, and drilled holes with and without countersinks.

REQUIREMENTS:

Tool & Die Helper for AutoCAD LT requires AutoCAD LT Release 2, 3 (95) or 4 (97) and runs under Windows 95 or 98.

INSTALLATION:

Install Tool & Die Helper for AutoCAD LT using the following steps:

- 1 Unzip to temporary folder.
- 2 From start menu, select Run, type <drive>:\<folder>\Setup.exe
- 3 Follow instructions in setup program.

Install AutoCAD LT support files using the following steps:

AutoCAD LT Release 2:

- 1 Using Explorer drag folder Tool_Die to AutoCAD LT folder.
- 2 Open R12 folder and copy all files to Tool_Die folder.
- 3 Copy Actl.Mnu to ACLTWIN directory or if your mnu file has been customized edit your existing Actl.mnu file by adding section POP9 (required) and optionally POP10 - POP11 from supplied Actl.mnu file.

- 4 Start AutoCAD LT.
- 5 From File pull down menu select Preferences.
- 6 In Environment section select Browse under Support Dirs.
- 7 Select Tool_Die directory of AutoCAD LT.
- 8 Click Add, Close, Ok.

Tool & Die Helper for AutoCAD LT is now installed.

AutoCAD LT Release 3 (95):

- 1 Using Explorer drag folder Tool_Die to AutoCAD LT folder.
- 2 Open R13 folder and copy all files to Tool_Die folder.
- 3 Start AutoCAD LT.
- 4 From Tools pull down menu select Customize Menu.
- 5 Click on Browse.
- 6 Find Tool_Die.mnu in Tool_Die directory of AutoCAD LT and click on open.
- 7 Click on Load.
- 8 Highlight Tool_Die in Menu Groups and click on Menu Bar tab.
- 9 In menus highlight setup, in Menu Bar highlight Help.
- 10 Click on insert, this adds Setup menu to AutoCAD LT Menu (optional).
- 11 In menus highlight External, in Menu Bar highlight Help.
- 10 Click on insert, this adds External menu to AutoCAD LT Menu (required).
- 12 Click Close.
- 13 From Tools menu select Preferences.
- 14 Click File System tab.
- 15 Select Browse under Support Dirs.
- 16 Select Tool_Die directory of AutoCAD LT.
- 17 Click Add, Close, Ok.

Tool & Die Helper for AutoCAD LT is now installed.

AutoCAD LT Release 4 (97):

- 1 Using Explorer drag folder Tool_Die to AutoCAD LT folder.
- 2 Open R14 folder and copy all files to Tool_Die folder.
- 3 Start AutoCAD LT.
- 4 From Tools pull down menu select Customize Menu.
- 5 Click on Browse.
- 6 Find Tool_Die.mnu in Tool_Die directory of AutoCAD LT and click on open.
- 7 Click on Load.
- 8 Highlight Tool_Die in Menu Groups and click on Menu Bar tab.
- 9 In menus highlight setup, in Menu Bar highlight Help.
- 10 Click on insert, this adds Setup menu to AutoCAD LT Menu (optional).
- 11 In menus highlight External, in Menu Bar highlight Help.
- 10 Click on insert, this adds External menu to AutoCAD LT Menu (required).

- 12 Click Close.
- 13 From Tools menu select Preferences.
- 14 Click Files tab.
- 15 Double click Support File Search Path.
- 16 Click Add.
- 17 Click Browse.
- 18 Select Tool_Die directory of AutoCAD LT.
- 19 Click Ok.
- 20 Click Ok.

Tool & Die Helper for AutoCAD LT is now installed.

OBJECTS AND ORIENTATION:

COUNTERBORES:

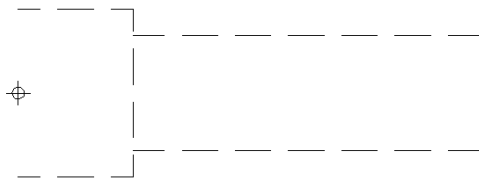


Figure 1 illustrates a side view of a counterbore for a 3/8" diameter socket head cap screw. Insertion point is the center of the head diameter. Orientation is at zero degrees.

Face view has insertion point at center of diameters.

CORE PIN/CORE HOLE:

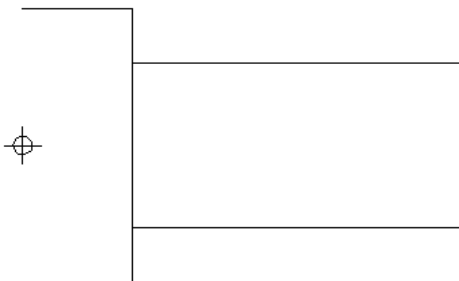


Figure 2 illustrates a side view of a 3/8" diameter core pin or core hole. Insertion point is the center of the head diameter. Orientation is at zero degrees.

Face view has insertion point at center of diameters.

EJECTOR PIN HOLE:

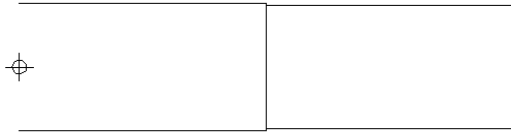


Figure 3 illustrates a side view of a 3/8" diameter ejector pinhole with a clearance depth of 0.75 ". Insertion point is the center of the clearance diameter. Clearance diameter is drawn at the default of 0.015 larger than pin diameter. Orientation is at zero degrees.

Face view has insertion point at center of diameters.

TAPPED HOLE:

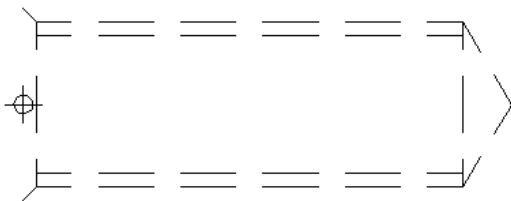


Figure 4 illustrates a side view of a 3/8-16 x 1.00" deep tapped hole. Insertion point is the center of the body diameter. Orientation is at zero degrees.

Face view has insertion point at center of diameters.

THREAD:

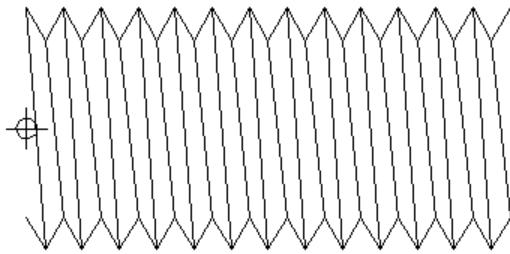


Figure 5 illustrates a side view of a 1/2-13 x 1.00" long thread. Insertion point is the center of the body diameter. Orientation is at zero degrees.

Face view not available, use tapped hole.

CORE NOTE:

MADE FROM DME CX-25
OR EQUIVALENT CORE PIN

Figure 6 illustrates a core note for a DME 3/8" diameter hard core pin.

SLOT/SLOTTED HOLE:

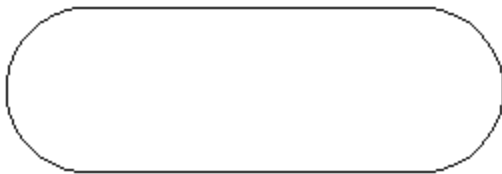


Figure 7 illustrates a 1/4" wide slot with 1" between radius centers. End view not available. Insertion point is the center of the pick point radius. Orientation is at zero degrees.

SIMPLE CAM:

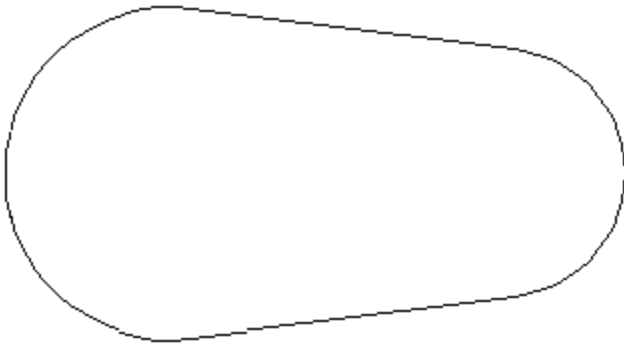


Figure 8 illustrates a cam shape with a 1/2" radius and a 3/8" radius with 1" between radius centers. End view not available. Insertion point is the center of the pick point radius. Orientation is at zero degrees.

KEYWAYS:

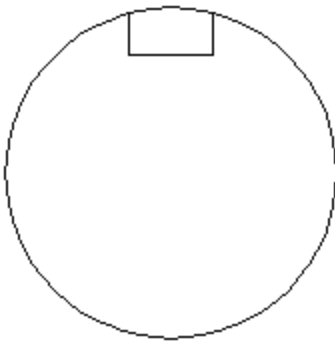


Figure 9 illustrates a 1/4" wide keyway in a 1" O.D. shaft. Side view not available. Insertion point is the center of the shaft diameter. Tool & Die Helper For AutoCAD LT will draw shaft diameter.

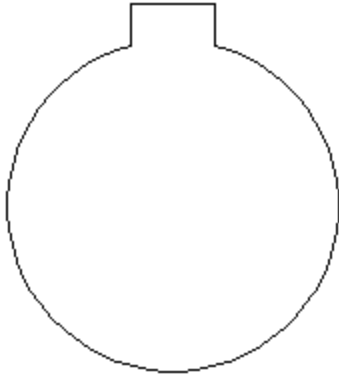


Figure 10 illustrates a 1/4" wide keyway in a 1" I.D. hub. Side view not available. Insertion point is the center of the hub diameter. Tool & Die Helper For AutoCAD LT will draw hub diameter.

Depth of key in shaft is based on one half the key width AFTER obtaining full width. As an example a 1/4" wide key in a 1" diameter shaft will need to enter shaft approximately 0.015 (chord height) before obtaining full width. Hub keyways are also based on this dimension so when assembled with shaft half of key will be in each part.

TAPER PIN:



Figure 11 illustrates a #4 (1/4" diameter) taper pin 2.000" long. End view not available. Insertion point is the mid point of the pins basic diameter. Orientation is at zero degrees.

Taper pins drawn by Tool & Die Helper For AutoCAD LT are based on ANSI/ASME B18.8.2 1978 standards.

COMBINATION DRILL COUNTERSINK/CENTERDRILL:

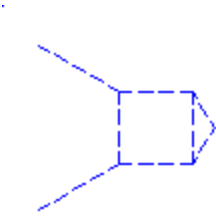


Figure 12 illustrates a #6 (1/2" diameter) plain centerdrill. Insertion point is the center of the drill body diameter. Orientation is at zero degrees.

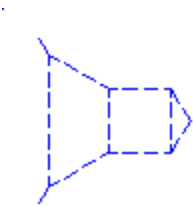


Figure 13 illustrates a #16 (1/2" diameter) bell centerdrill. Insertion point is the center of the drill body diameter. Orientation is at zero degrees.

Tool & Die Helper For AutoCAD LT draws depth based on full body diameter.

Face view insertion point is the center of the drill body diameter.

SHAFT:

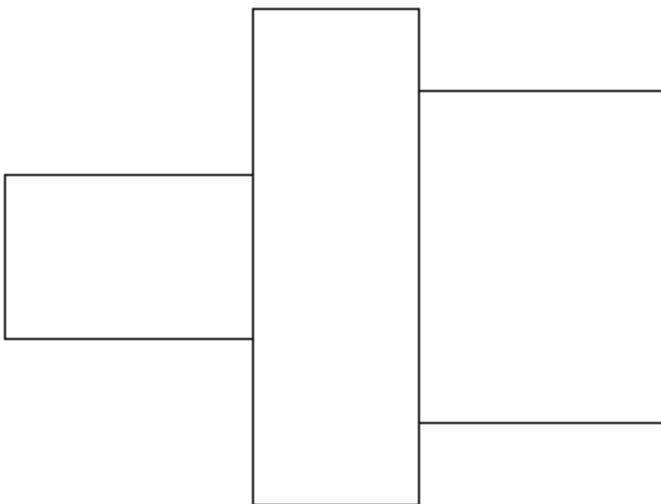


Figure 14 illustrates a three-segment shaft. Segment one is 0.500" diameter X 0.750" long. Segment two is 1.500" diameter X 0.500" long. Segment three is 1.000" diameter X 0.750" long. Insertion point is the mid point of the shafts first segments diameter. Orientation is at zero degrees.

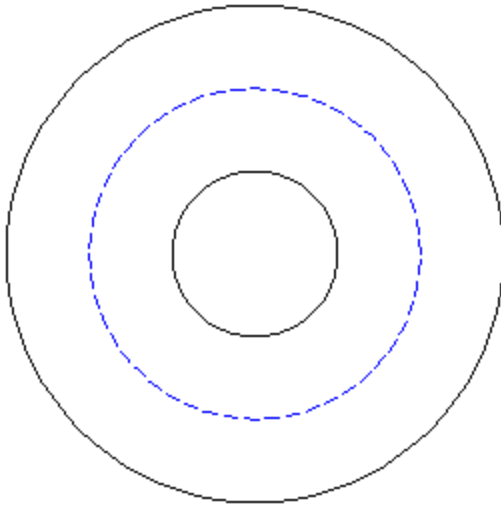


Figure 15 illustrates face/end view of the above shaft looking at origin point. Insertion point is the center of the shaft diameter. Tool & Die Helper For AutoCAD LT will automatically draw hidden shaft diameters on user specified hidden line layer.

DRILLED HOLES:



Figure 16 illustrates a side view of a 3/8" diameter X 1" deep drilled hole. Insertion point is the center of the drill diameter. Orientation is at zero degrees.

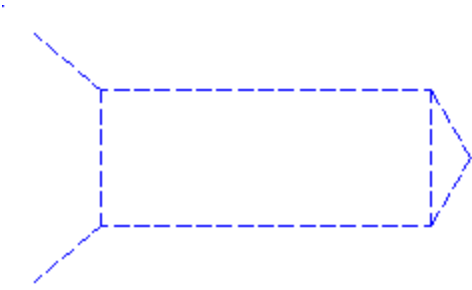


Figure 17 illustrates a side view of a 13/32" diameter X 1" deep drilled hole with a 3/4" diameter x 82-degree countersink. Insertion point is the center of the countersink diameter. Orientation is at zero degrees.

Face view insertion point is the center of the drill/countersink diameter.

USING TOOL & DIE HELPER FOR AutoCAD LT:

BASICS:

Tool & Die Helper for AutoCAD LT and AutoCAD LT must both be running. (When first using Tool & Die Helper for AutoCAD LT dialogs will appear asking for location of AutoCAD LT and where drawing is being created). From External menu in AutoCAD LT select Set Tool_Die Point. This is the insertion point of part created by Tool & Die Helper for AutoCAD LT. Click where you want object drawn. On Task Bar (LT Release 2 users must resize window to expose task bar) click Tool & Die Helper for AutoCAD LT icon. Tool & Die Helper for AutoCAD LT will now be visible. Select the object you want to draw and after making selections press Ok. Tool & Die Helper for AutoCAD LT program will then minimize and you can return to AutoCAD LT by clicking on it's icon on Task Bar. From External menu select Run Tool_Die Script. AutoCAD LT will read a script file created by Tool & Die Helper for AutoCAD LT and your part will be drawn.

If you have previously set an insertion point and have not generated and run script file created by Tool & Die Helper for AutoCAD LT a message will appear on the AutoCAD LT command line saying "A file with this name already exists. Do you want to replace it? <N>". Type y and press return.

IN DEPTH:

Tool & Die Helper for AutoCAD LT was designed to be easy and quick to use. Objects to be drawn are selected by clicking on that object's tab. This brings you to the options and values that need to be inputted for that particular object. Clicking the mouse on an option or value makes most selections simple.

Some objects need such a wide range of values that you must type in the numbers yourself. Simple cam shapes is an example. When possible, a list will be available where you can click on a value and then DOUBLE click in the appropriate entry field.

The shaft object requires that you specify how many segments are needed. The segments are then displayed in a spreadsheet type grid where you must first pick diameter or length. The value for that section will then appear in a separate entry field for editing/inputting.

The drilled and countersunk hole object has a separate list displaying common screw sizes that when clicked on will automatically enter the correct values. After being drawn the drill point can be erased and the body diameter trimmed or extended.

MORE:

If you plan to use the supplied Set Up menu and Title blocks (see below) when creating a new drawing in AutoCAD LT select start drawing from scratch when the set up wizard appears. Then when you run Set Up menu command you will be working in model space and drawing at full scale. When plotting/printing the drawing it can be plotted to the appropriate scale.

TOOL & DIE HELPER FOR AutoCAD LT MENU FILE:

The Tool_Die.mnu file supplied with Tool & Die Helper for AutoCAD LT contains additional menus.

Setup will allow you to insert a title block at a given scale, set variables and preferences based on that scale and may be customized if desired. The setup menu inserts a title block and then runs a script file called actsetv.scr. This script file is an ASCII file that contains AutoCAD commands (as if typed on the command line) that set variables to your personal preferences and may be edited if desired. The supplied title blocks are modified versions of the standard blocks supplied with AutoCAD LT. They are slightly smaller so they will plot correctly on my antique CalComp 1023 pen plotter. If using title blocks of your own design some requirements are:

- Some object (I used a point on layer storage) MUST be placed at 0,0 as setup routine uses this location to explode title block when inserted.
- The layer names and text styles used in the title block MUST match those used in the Set Up and Extras menu sections. Either rename your layers (tough to do if you have a standard already established) or edit menu file to match your current layer names.

Note: The title texts on supplied blocks are attributes that can be edited with the DDATE command.

The Extras menu section of supplied Tool_Die.mnu file will allow you to move objects and contains routines that make using AutoCAD LT easier or faster to use. The Extras menu can be anything you want or not loaded at all. If using the supplied Extras menu LT 95 and LT 97 users must also load the supplied DimPre.mnu menu file.

The External menu section of supplied Tool_Die.mnu file is required to use the Tool & Die Helper for AutoCAD LT program. It should NOT be edited.

HINTS ON ORGANIZATION OF FILES:

When doing production drawing it is important to be organized and have a system in place (documented on paper). This way everyone involved knows what to expect. I offer the following suggestions:

- Maintain a drawing naming convention based on customer or product type. For example "ByeEye Tool & Die" needs some parts/tools drawn. You may want to name the CAD file "BETD001_.DWG". The first four characters represent the customer, the next three digits increment per drawing created, and the underscore position represents the revision.
- Maintain a log file where you keep track of your drawings. It can be a spreadsheet or word processor file where you enter information such as Customer, File name, Part Number, Date created, Description, etc.
- Create and use a working Directory/Folder where the drawing you are creating or revising resides. Mine is named "WORKDWG".
- When drawings are completed move them to a directory/folder where they can be easily back up and it is known that they are the latest revision. Mine is named "DRAWINGS".
- Create a "OLDREVS" directory/folder where you can copy a file before it is edited to a new revision level for archival purposes.
- When drawing, use layers to your advantage. Put center lines on a center line layer, dimensions on a dimension layer, hidden lines on a hidden line layer and so on. Nothing is more frustrating then editing a drawing created by someone who changes line types and colors on a whim. You don't know what is what. Keeping like objects on their own layers makes life a lot easier when you want to turn off the hidden line layer to do a BHATCH (the people who do this are usually the same ones who turn BLIPMODE on, ugh).
- Back up your drawing files to tape or diskette. This information is valuable, you spent many hours creating it, and your customers rely on it. If you're a gambler who doesn't back up your files, save your luck for Las Vegas, you will experience a hard drive failure eventually.

For an example, Joe, the owner of ByeEye Tool & Die calls and says that the dingus needs to be changed from 2.00 inches long to 2.250 inches long.

Not knowing what a "dingus" is I open the log file and search for "dingus". Sure enough, four years ago (no wonder I didn't remember) a drawing was created for Joe's company and the file name is BETD087_.DWG.

I copy BETD087_.DWG drawing to my work directory, rename it to BETD087A.DWG and edit it to change the 2.000 feature/dimension to 2.250.

I then move BETD087_.DWG to the "OLDREVS" directory where it will be safe and after plotting and inspecting the BETD087A.DWG move it to the "DRAWINGS" directory.

Joe at ByeEye Tool & Die then gets the newest revision and all is well.

But wait, Joe looks at drawing and says "I'm sorry, but it wasn't the 2.000 dimension that needed to be changed. It was the 4.500 dimension in the other view".

No problem, I just copy the original BETD087_.DWG from the "OLDREVS" directory, rename it BETD087B.DWG, edit the drawing to reflect the changes to the 4.500 dimension and go through the same filing procedures.

The above scenario has actually happened and more than once. If I had been working on "live" data I would have spent as much time undoing the first revision as it took to do it. Worse yet, what if Joe called two months later and I didn't remember what the original was before revision and no paper copy existed?

TOOL & DIE HELPER FOR AutoCAD LT DATA FILES:

The user may customize only data files with the extension of ".Dat". If you wish to edit Tool & Die Helper for AutoCAD LT data files be sure to make a backup of original file first. Use a text editor that saves files in plain ASCII format such as notepad to make changes. These files contain a description field that will be shown in the list boxes for that particular object. The files supplied use a mix of descriptions that sometimes show decimals, fractions, both or a size number. You may change description field to suit your preference.

The formats of the data files are as follows.

Core Pins:

Data file name: Corepin.Dat

Format:

17
"0.0938",0.09375,0.250,0.125
"0.125",0.125,0.250,0.125

.....

Where 17 is number of entries in file.

"0.0938" is description string shown in list box (may be edited).

0.09375 is pin diameter (used for calculations).

0.250 is head diameter (used for calculations).

0.125 is head thickness (used for calculations).

These values are based on dimensions of DME core pins.

Counterbores:

Data file name: Cbore.Dat

Format:

13
"#4",0.140625,0.21875
"#5",0.15625,0.250

.....

Where 13 is number of entries in file.

#4" is screw size (description string).

0.140625 is clearance hole diameter (used for calculations).

0.21875 is counterbore diameter (used for calculations).

These values are based on screw head diameter plus 0.0625 and
body diameter plus 0.03125.

Tapped Holes:

Data file name: Tap.Dat

Format:

26
"#4-40",0.112,0.089
"#4-48",0.112,0.0935

.....

18

"0.125",0.125

"0.1875",0.1875

.....

Where 26 is number of thread sizes in file.

"#4-40" is screw size (description string).

0.112 is body diameter (used for calculations).

0.089 is tap drill diameter (used for calculations).

.....

18 is number of depths.
"0.125" is description string.
0.125 is first depth (used for calculations).
"0.1875" is description string.
0.1875 is second depth (used for calculations).

The values for the tap drill diameter are based on 75 percent thread.

Ejector Pin Holes:

Data file name: Ejector.Dat

Format:

17
"0.0938",0.09375
"0.125",0.12500

.....

29
"0.10",0.10
"0.15",0.15

.....

Where 17 is number of pin diameters in file.
"0.0938" is description string.
0.09375 is pin diameter (used for calculations).

.....

29 is number of depths.
"0.10" is description string.
0.10 is first depth (used for calculations).
"0.15" is description string.
0.15 is second depth (used for calculations).

Core Notes:

Data file name: Corenum.Dat

Format:

17
"0.0938",7
"0.125",9

.....

Where 17 is number of core pins in file.
"0.0938" is description string.
7 is DME number (used by program).

.....

Threads:

Data file name: Thread.Dat

Format:

26
"4-40",0.112,40
"4-48",0.112,48

.....
25
"0.125",0.125
"0.1875",0.1875

.....
Where 26 is number of threads in file.
"#4-40" is description string.
0.112 is outside diameter (used for calculations).
40 is number of threads per inch (used for calculations).

.....
25 is number of lengths.
"0.125" is description string.
0.125 is first length (used for calculations).
"0.1875" is description string.
0.1875 is second length (used for calculations).

.....

Slots/Slotted holes:

Data file name: Slot.Dat

Format:

33
"3/32 [0.0938]",0.09375
"7/64 [0.1094]",0.109375

.....
28
"0.250",0.250
"0.500",0.500

.....
Where 33 is number of slot widths in file.
"3/32 [0.0938]" is description string.
0.09375 is slot width (used for calculations).

.....
28 is number of slot center distances in file.
"0.250" is description string.
0.250 is center distance (used for calculations).

.....

Keyways:

Data file name: Keyway.Dat

Format:

12
"1/8 [0.125]",0.125
"3/16 [0.1875]",0.1875

.....

17
"0.500",0.500
"0.750",0.750

.....

Where 12 is number of Key widths in file.

"1/8 [0.125]" is description string.

0.125 is key width (used for calculations).

.....

17 is number of shaft diameters in file.

"0.500" is description string.

0.500 is shaft diameter (used for calculations).

.....

Drilled holes:

Data file name: Drill.Dat

Format:

64
"1/64 [.01563]", 0.015625
"1/32 [.03125]", 0.03125

.....

Where 64 is number of entries in file.

"1/64 [.01563]" is description string.

0.015625 is value (used for calculations).

.....

Drilled/countersunk holes:

Data file name: Csink.Dat

Format:

14
"#4",0.140625,0.255
"#5",0.15625,0.281

.....

Where 14 is number of entries in file.

"#4" is description string.

0.0140625 is drill diameter(used for calculations).

0.255 is countersink diameter(used for calculations).

.....

The drill diameter is based on screws body size plus 0.03125. The countersink diameter is based on the theoretical sharp maximum diameter of that size socket flat countersunk head cap screw as defined in ANSI/ASME B18.3 1986.

Note: Taper pin and Center drill files are not user editable.

Revision History:

Version 1.0:

General Release. Tested on all versions of LT up to and including LT97.

Version 2.0:

Moved all program options to single form. User specified hidden line layer and ejector pinhole clearance. Thread routine now allows left-hand threads. All data files allow for user description field.

Version 2.5:

Added slots, simple cam shapes, keyways in shafts/hubs, taper pins, combination drill countersink holes, shafts, and drilled holes with countersink option.

Future enhancement plans:

Version 2.5 added some objects that venture into the area of general machine shop/machine design. Next version will get back to basics, drawing dowel pins, cap screws etc.

IMPORTANT INFORMATION:

Tool & Die Helper for AutoCAD LT is Copyrighted 1997-1999 by:

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