4.0 SCREENS – MENUS - TOOLBAR BUTTONS – STATUS BAR

4.1 MAIN SCREEN

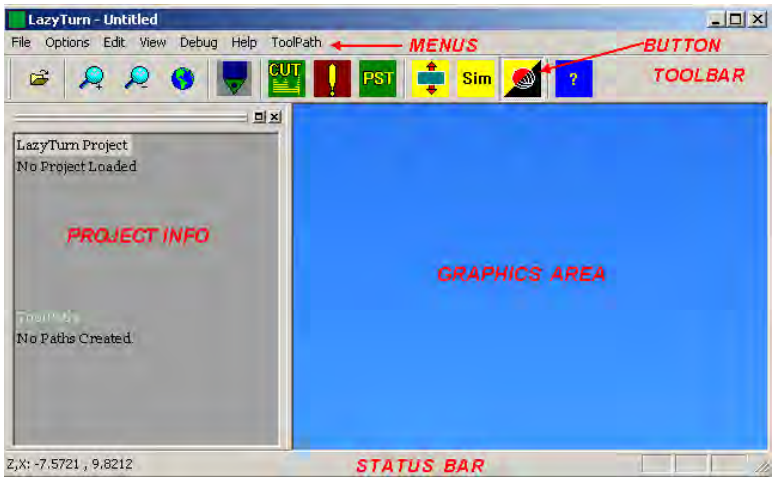


FIGURE 4.1

4.1.1. Figure 4.1 above is the main screen which you will see when LazyTurn is opened. The screen provides different pull down menus as shown in Figure 4.2 below and behaves just like any other screen in a Windows environment.

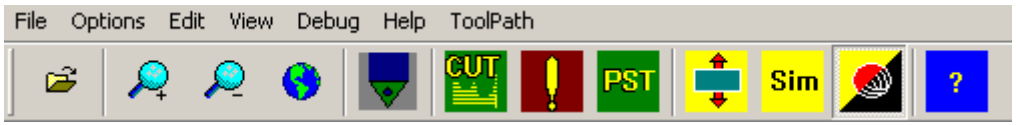


FIGURE 4.2

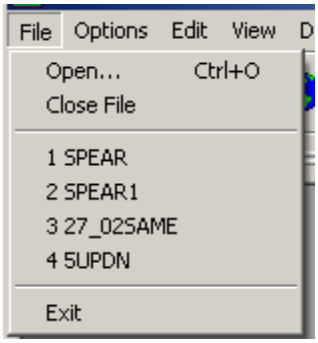
The button functions are included in the menus but differ by providing access to more frequently used selections in the program. Left mouse click to open a menu or a button.

Additional you can use the keyboard to select a menu as follows:

Alt key with individual **letter** F,O,E,V,D,H,T will open associated menu.
Alt key with + will toggle the crosshair back to Window's default pointer.

Note the coordinates in the lower left of the status bar will change as you move about with the crosshair pointer.

4.2 FILE MENU



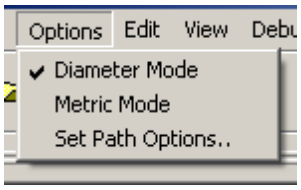
Open – Opens a windows dialogue box for loading of a file

NOTE ON PROGRAM READING OF A FILE:
The program "AutoTolerates" so that lines that don't join, automatically stitch together as long as it doesn't create discontinuities in the math functions. This means the program will try a tolerance of .1 for example, and if it finds that this creates a conflict, it will jump back and set the toleance to .01 and try again, then .001 etc. until it either solves the problem, or rejects the file. (SEE APPENDIX "B")

Close File – Closes the current loaded file
Exit – Use to exit LazyTurn

You can also use the keyboard as follows:
Ctrl with **O** - opens Window's directory dialogue for selection of a file
Ctrl with **C** - opens Window's directory dialogue for saving of a file

4.3 OPTIONS MENU

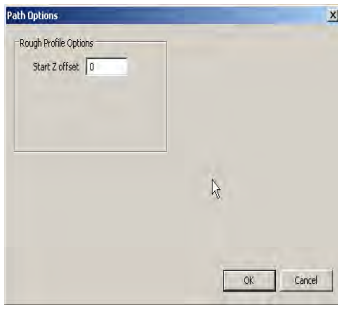


The options menu provides initial setup information about the file you will import and the settings are saved when you exit the program.

The default values are Radius Mode, Imperial Units

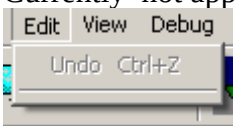
You can select diameter mode or metric units by clicking on the text and a tick mark will be left along side text.

Clicking the Set Path Options provides additional initial setup to LazyTurn. Currently this is limited to having a Z offset. The start Z offset is how far the tool starts from end of the stock.

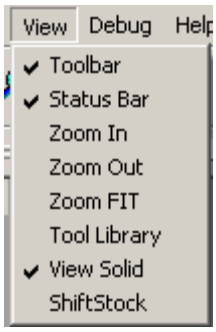


4.4 EDIT MENU

Currently not applicable.



4.5 VIEW MENU



Toolbar –Turns the top TOOLBAR on or off

Status Bar – Turns the lower STATUS BAR on or off. This status bar provides Z,X coordinates along with other prompts.

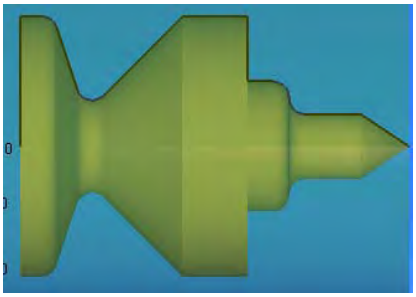
Zoom In – Increases viewed size in the graphics screen

Zoom out – Decreases viewed size in the graphics screen

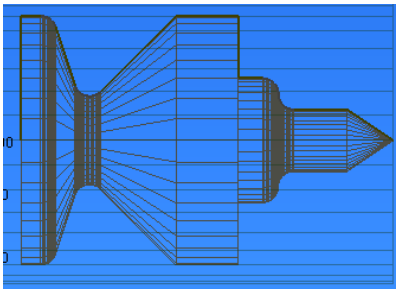
Zoom Fit – Restores the graphics back to the way they were when loaded

Tool Library – Invokes the tool library tab to open. (see Section 4.? Lathe Tools Dialogue for detailed information on use of the dialogue)

View Solid – toggles between wire frame or solid display of the profile as shown below.

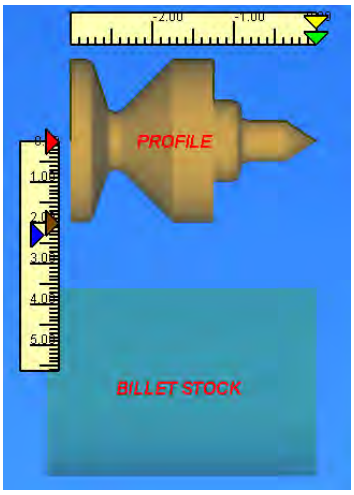


SOLID



WIRE FRAME

Shift Stock – moves overlay of the billet stock used for the turning to a position below the profile as shown below.



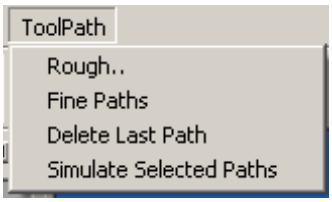
4.6 DEBUG Menu

Currently not applicable

4.7 HELP MENU

Provides preface about the program. For help with LazyTurn you need to refer to this manual.

4.8 TOOLPATH MENU



This tab provides choice of a rough or fine path generation and clicking on either will invoke specific menus for input. Fine Paths are not functional yet. (See Section xx for a detailed explanation.)

Delete Last Path – will delete the last created path. The created passes are show in the PROJECT INFO box. See Section xx for a detailed explanation.

Simulate Selected Paths – simulates the created paths. The tool will be shown moving along the paths in the Graphics Area.

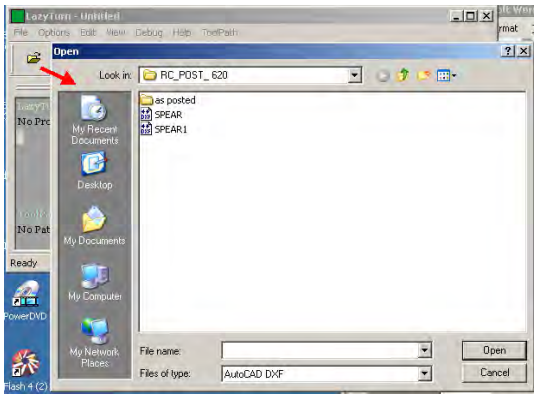
NOTE:
TO Simulate the cut in realtime (showing true feedrate of the tool), make sure the paths are expanded in the tree (collapsing a path de-selects it),and hit the SIM button, it will show you what the path is calling for and gives a more visual clue about the path to be cut. The speed of the display is the feedrate you commanded in the tool selection, so its a bit of a visual clue about if you screwed up the feedrate, I will add a way to change that quickly soon.Clicking the right mouse button will cancel a simulation display. All expanded paths are simulated one by one when SIM is selected. Rapid speed is loosely defined as 10 times the feedrate, (just so you dont have to watch all the rapids in slow motion.)

The following parts of *SECTION 4* pertains to the **BUTTONS** available in the TOOLBAR. A prompt for any selected button appears in the status bar.

4.9 FILE FOLDER BUTTON

This file open button automatically opens a Windows screen for a file search on your computer.

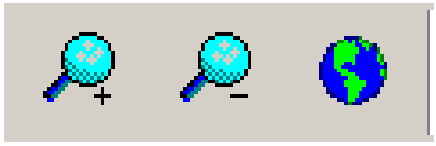
Ctrl with **O** - opens Window's directory dialogue for selection of a file



4.10 ZOOM & FIT BUTTONS

These buttons allow for increasing or decreasing the magnification of the displayed profile via left mouse clicking. Selecting the world globe button will fit the profile back to it's originally imported size.

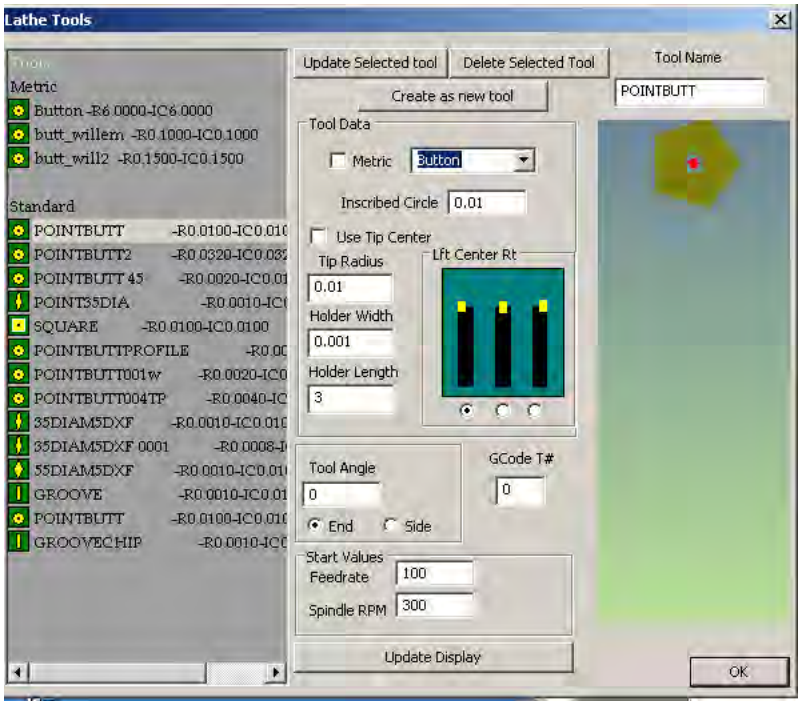
Ctrl with **R** - will fit the profile as it was originally imported also



4.11 SELECT TOOL BUTTON

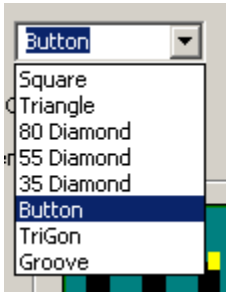
This button opens the lathe tool dialog screen.

4.12 LATHE TOOLS DIALOG



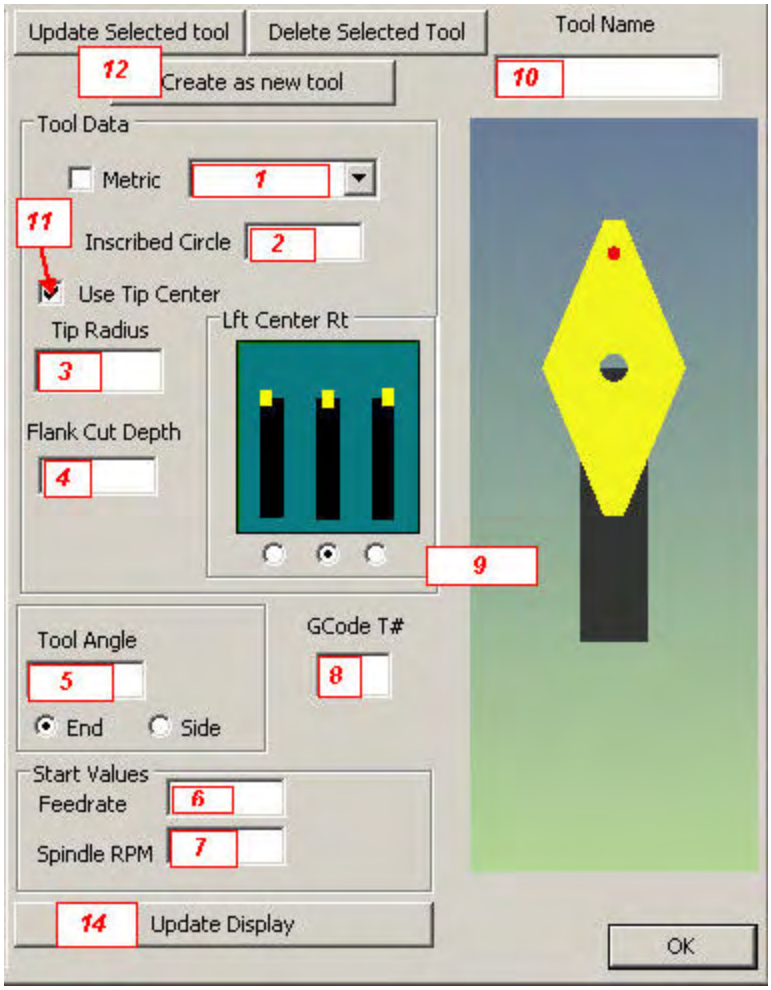
The Lathe Tools dialog provides for creating, defining, selecting, updating a lathe tool which will be used in the various tool path generations.

You will need to create a tool suitable for the desired machining operation.
The screen will show the created tool on the left side along with description.
The description will be posted along with the generated gcode when posted.
A choice of common lathe tools can be selected by clicking on the box and then selecting the desired tool.



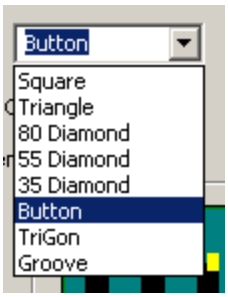
See Appendix “E” PRACTICAL MACHINING CONSIDERATIONS for information relative to tool use when creating a cutting path for a profile.

4.12.1 DESCRIPTION OF INPUT BOXES FOR LATHE TOOLS



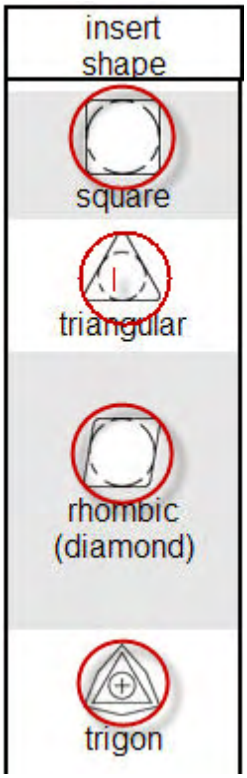
Note that multiple tools can be used for a project. All the tools can be used for the different paths that you will create. Common sense dictates you should use the correct tool for the intended path.

1. **Tool selection** - opens the flyout shown below for selection of a tool. Note that by clicking the box to the left (show in the above figure) all input values will default to metric.



2. **Inscribed Circle** - Defines a circle, which when drawn about the center of the tool insert, will include the entire tool insert. For example in a triangle insert, the inscribed circle is the size of a circle placed in the center of the triangle with the diameter including the complete tip.

   The program will not allow you to use a value which is mathematically less than the above definition and will provide a default value in the input box.
   The figure below shows different inserts provided by a manufacturer.
   Note that the manufacturer specifies the inscribed circle which is shown inside the insert shape by a dashed black line. Inscribed circle <u>as defined in LazyTurn</u> is represented by the <u>RED</u> circle. Do not confuse the two.

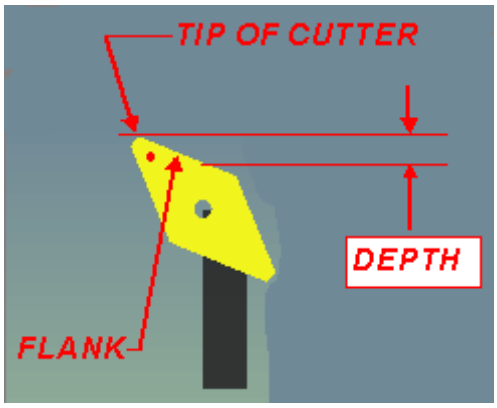


NOTE:

A square tool with an inscribed circle of .01 cannot physically have a tool tip radius of .01, they cannot fit in the equation for a square. Hence, the tip is impossible by physical definition, and the tip will not be created. This will cause a fault when the program tries to match a collisions. The fault will generate a "tip failure". If you were to try to create the tip with above radius, the tool looks round since its trying to fit the .01 tip raduis on each of the 4 corners of a tool which has an incribed radius of only .01.The tool generator tell you its impossible.

3. **Tip Radius** – actual radius on the tip end of the tool cutter. Min value is 0.0005”

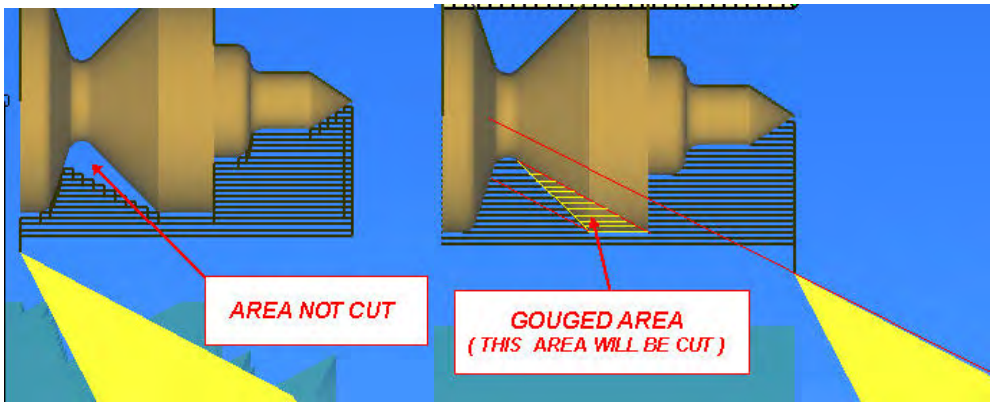
4. **Flank Cut Depth** – defines how much of the flank side of the cutter can actually cut based on a depth setting. The input value should be from the tip of cutter to the furthest away point along the flank. It should not be as what is deliberately shown in the figure below (although you can if so desired).



This depth setting can greatly affect your end tool path.
- depth too small and the tool will gouge
- depth too large and the programmed generated path to actual paths will not reflect actual or true cutting edges of the tool.

Gouging occurs when a part of the tool not intended to cut the billet actually does. See the following figure.

NOTE:
LazyTurn uses the tip information to compare the tip cutting edges to the current shape and will prevent gouging if proper tip information is provided.



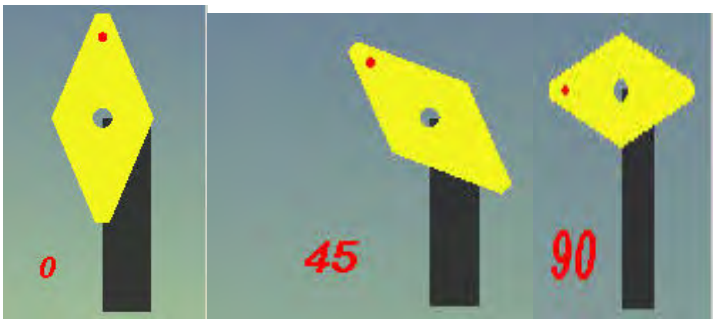
GOUGE ON GOUGE OFF (zero depth setting)

You can use the center tool post or use a value of zero if you do not care about stock gouging.

5. **Tool Angle** – This is the angle of the insert about it's center and **not** the angle of the complete tool including the holder. For a button tool the angle means nothing and is internally set to zero degrees.

   Click the End or Side circular box to rotate the tool 90 degrees.

   Examples of tool bit orientation about the left tool holder:



   Note that only a left or right facing tool can be angled in a tool holder.

6. **Feed Rate** - Enter your desired cutting axis feed rate. The feed rate value "F" is include in the Gcode when posted. Note that the F is restricted to the slowest axis F in actual machining as configured in MACH3 Turn. Consult the Using Mach3 Turn manual Section 10 for additional information .

   Different values can be used for the rough and finish paths.

7. Enter the **Spindle RPM**

8. **GCode T# -** Enter a defined tool number. The tool number but should not conflict with a same tool number defined in MACH3 Turn.
   Consult the Using Mach3 Turn manual Section 7-9 for information.

9. **Tool Holder** – Three choices of tool holder positions are provided namely left, center, and right. As noted before, the cutter bit attaches to the tool holder and it's orientation changes accordingly.

10 . Tool Name - This box allows you to name the tool you are creating or rename / update an existing name. The name, tip radius, inscribed circle are shown under standard listing.

11. **Use Tip Center** - when selected will discriminate between using Mach3's offset registers with compensation, or just to create the code as pre-compensated using the tip radius as that compensation from tip center. Consult Mach3 manual for use of offsets?.

12. To **Update** a tool simply select the tool on the left by clicking the left mouse button, modify an input and click the "Update Selected Tool box".

    To **Delete** a tool simply select the tool on the left by clicking the left mouse button and click the "Delete Selected Tool" box.

    To **Create** a tool simply fill in all the inputs, update the display if you so desire to see what it looks like, type a name in box and then click the "Create as new tool" box.

13. ------oops---- no number in the figure

14. **Update Display** – clicking this button will update the graphic display of the tool.

5.0 **GRAPHICS AREA**

This section will provide a general overview of the Graphics Area. An understanding of the graphic display and manipulation of the profile is required prior to reading Section 6 of the manual. That section defines how the tools you have created will be used to create Gcode paths.

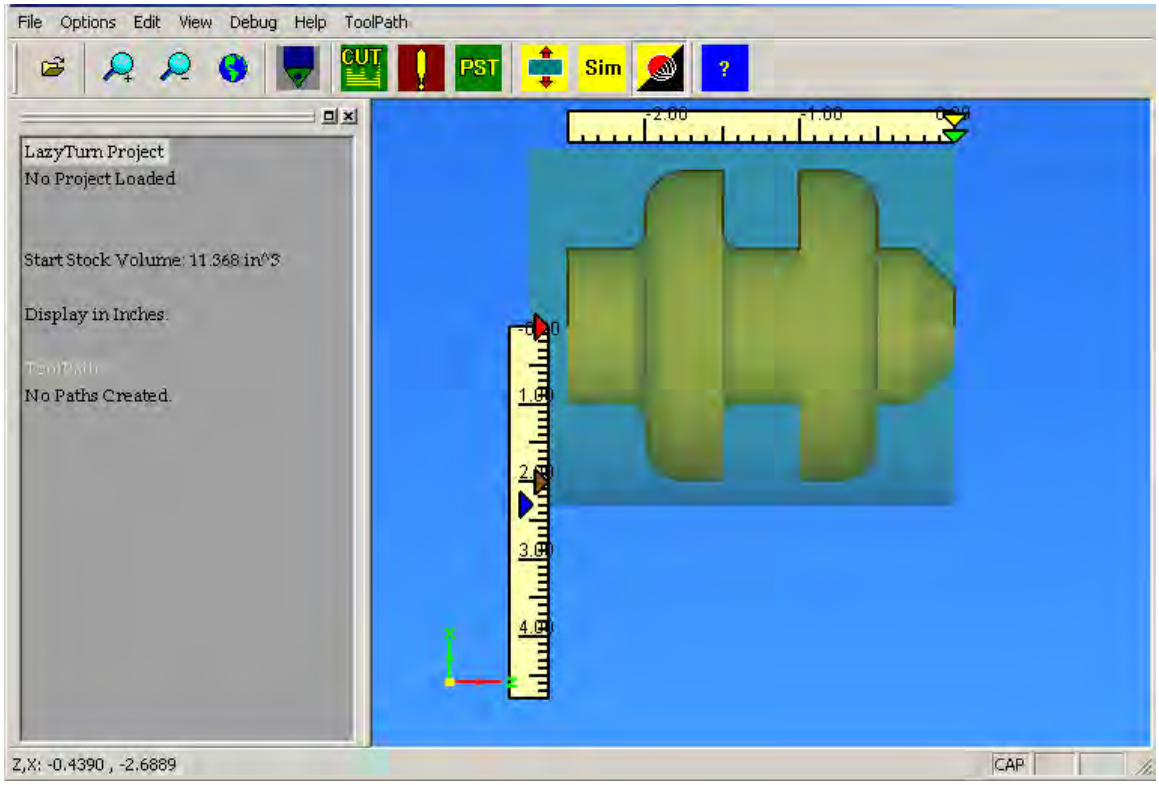
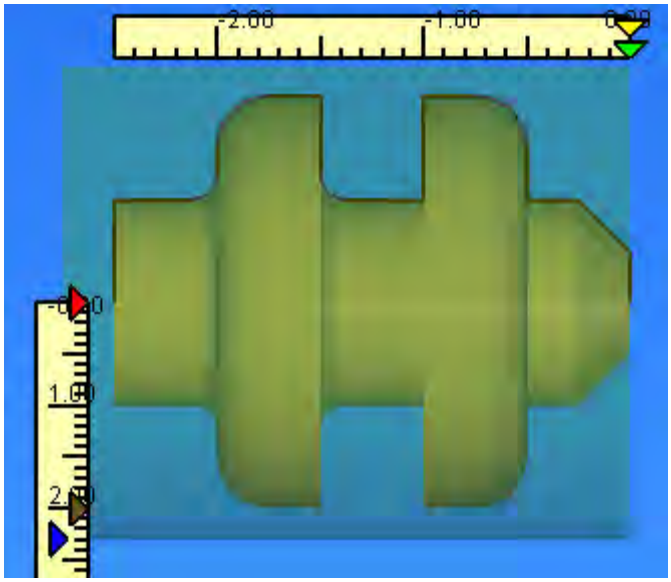


FIGURE 5.1

The graphics part of the main screen, delineated by the blue background, provides a plan view of the imported DXF file. Colors are program defaults and can't be changed. The turn object is three dimensional and object manipulation is covered in 5.5.

Menus and buttons were already discussed and are not repeated here.

5.1 **PROFILE and RULERS**



The black line above the profile delineates the single connected group of entities you created in a CAD program. LazyTurn will swap around and reconnect as it sees fit, so your drawing order can be as arbitrary as you like. In the end though, it must all connect to a single chain. See Appendix “B” and “C” for specific information.

The shaded object represents a 2D view of the profile to be turned. The shaded cylinder around the turn object represents an uncut stock size of diameter or radius (a default setting) and length. The change stock shading is the center of the stock.You can change the program generated stock / billet size by using the scale pentagons on the ruler.

5.2 **RULERS**

The rulers above and along side of the stock are smart, zoom and pan with you, and are programmed to stay on the screen. The rulers divisions will change as you zoom in or out. The divisions are per your default units. The ruler is just a visual rough guide.

5.2.1 **RULER PENTAGONS**

The pentagons on the ruler indicate stock size and length as follows:

Left side ruler - Stock size (blue)
- Profile diameter (brown)
- Center of stock (red)

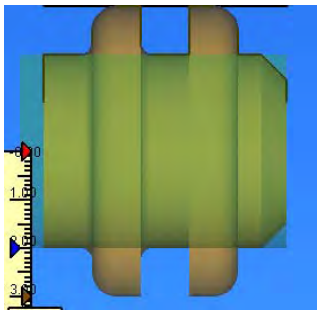
Top side ruler - Z stock location (green)
The bottom green pentagram is for setting the location of the stock Z origin. (most users prefer to have the Z start at 0) and go negative towards the chuck.
- Z start offset (yellow)

5.3 **PENTAGON VALUE INPUT**

When the mouse pointer is moved over a pentagon the actual value for the feature is displayed. Clicking on any pentagram will allow you to change the value using the flyout shown below. You can input a value other than what the program generated to set a stock size, or even the profile diameter prior to asking for a tool path generation.

The pentagon for the stock will turn brown and overlay the profile pentagon if the values are the same. You can click on the single pentagon and change the values. Note the flyout prompt informing what the change pertains to.

The stock size graphic will change relative to the profile and is a good visual indication of your values at any time. The example below shows a smaller stock than the profile.



Note:
The program automatically generates values but you have the choice to adjust the value to suite your actual stock size. Stock size should always be larger than your profile, it need not be, but any paths created will cut off part of your profile.

5.4 **CROSS HAIR**

The crosshair will move as you move your mouse and it's Z,X coardinates are actively displayed in the lower left hand corner of the status bar. Zooming in on the part allows for more precise measurement and inspection of the turn object if so desired.

5.5 **MANIPULATION OF THE GRAHIC DISPLAY**

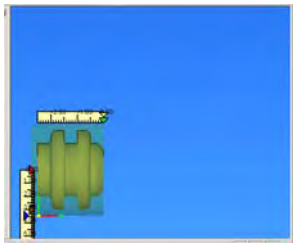
FIGURE 5.4

The three dimension turn object along with the rulers can be viewed from any angle. Note how the coordinate icon (lower left corner) also rotates.

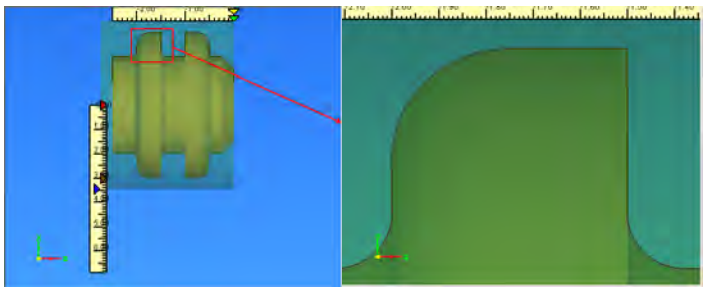
Holding the mouse wheel down while moving the mouse allows spinning the object about a point. Release the mouse wheel at any time to freeze the display at any time during rotation.

Double click the left mouse button to reset the display.

Ctrl key and **left mouse** while moving the mouse allows you to dynamically move the profile anywhere in the display area as shown below. Releasing one of them will freeze the display at any time.



Shift key and **left mouse** while moving the mouse up and down on the pad allows you to dynamically zoom in and out on the profile as shown below. Releasing one of them will freeze the display at any time.



Profile Zoom in of Profile

5.6 **BUTTONS**

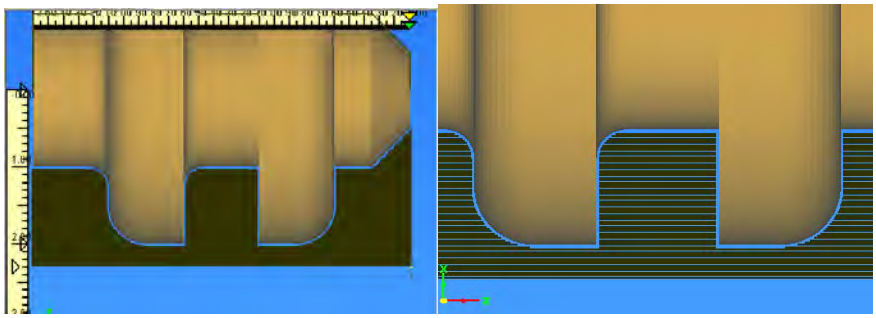
The buttons shown below are frequently used and duplicate items from the View, ToolPath, and Help menus. They were defined in Section 4. From left to right they are:

Shift Stock, Simulate, View as Solid / Wireframe (toggles), Help

5.7 **PATH PORTRAYAL**

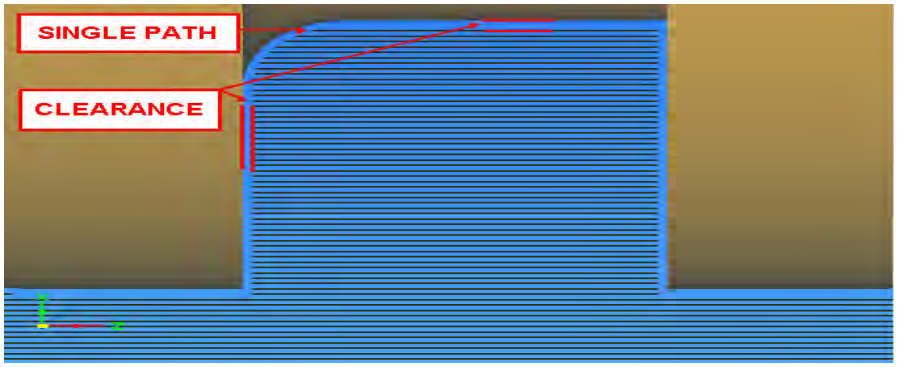
The following is provided so a you have basic understanding of what a path is, can relate to the graphic portrayal of the path, and will prepare you for Section 6 in which tool paths are actually created.

Path in LazyTurn is a simple name given to the X and Z individual or combined axis cuts made into the stock . The extent of path movement is shown as a straight black line. The gcode generated from the path will be a plus or minus direction depending on which way the tool travels. The paths don't show direction. Portrayal of the path or paths will vary depending on how the program applies the tool and cut parameters and how your viewing the display area. Below are some examples.



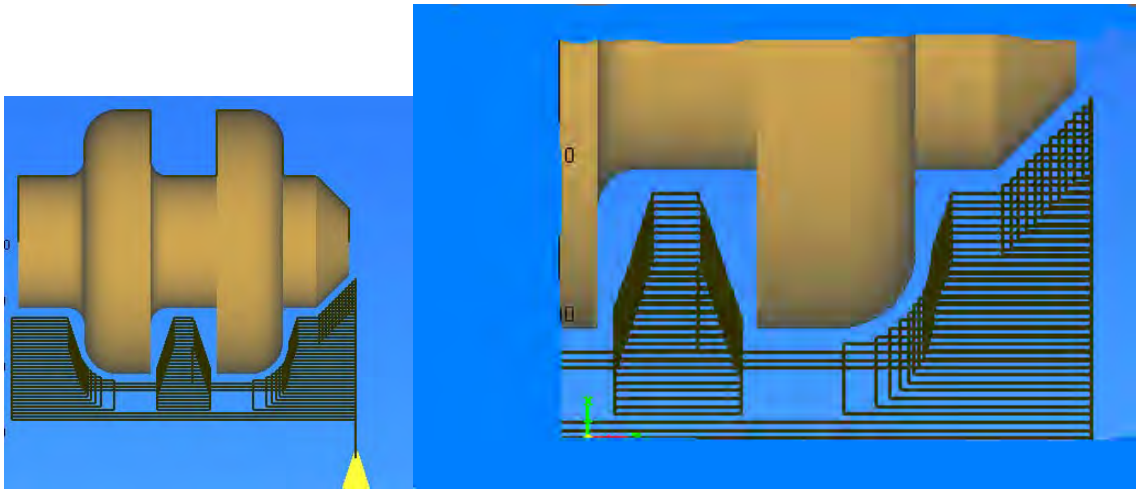
All the paths Zoom in

Zooming way in you will see the single path and any clearance left by unfinished cutting of the profile.



The following shows paths made by a different kind of tool with different cutting

parameters. LazyTurn provided single and combination paths such that the tool cuts along, retracts (moves out), back in, etc. in a continuous efficient pattern to remove stock from the profile. Additionally LT provided paths that would avoid gouging.



To dynamically watch the cutting in operation just click the “Simulate” button . You will need to create a tool and a toolpath before you can Simulate.

6.0 TOOLPATH GENERATION