Chapter 2

Engraving text and symbols

This chapter shows how to engrave text and symbols. It is written so that you can follow along with your MillWrite software.

Making A No Smoking Sign

Assume your customer gives you a sketch of a no-smoking sign (Figure 2-1). We will create this sign by using two tools. The circle and slash will be cut with a large end mill in one pass, and the text and cigarette will be cut with a center drill.

Job Files ᴀɴᴅ NC Pʀᴏɢʀᴀᴍ Files

In order for MillWrite to create an NC program to cut this no-smoking sign, you must specify the text and symbols you want to engrave, and you must set the engraving "parameters" for each symbol and line of text. The engraving parameters tell MillWrite what you want to engrave, how tall the letters should be, which tools to use, what the X-Y locations of the text is, etc.

The text, geometry, and their parameters can be saved on your computer's hard disk (or floppy disk). MillWrite refers to these files as "*Job Files*". A job file is *not* an **NC program file**. Rather, a job file is for MillWrite's use only. MillWrite uses the job files to create NC programs.

To summarize, there are two different types of files:

1) *Job files* that **MillWrite** uses.
2) *NC program files* that MillWrite generates from the job file.

The most important file to save on your hard disk is the *job file*, not the NC program. One reason is that you may discover a mistake in the engraving, or the customer may change the engraving, in which case you simply edit the job file and then click the NC Program page to access an updated NC program. From the NC Program page you can save the NC program to disk, or transmit it to your mill.

To summarize the steps to engrave:

- *Specify the engraving with MillWrite; ie, enter the text to engrave, the height of the letters, etc.*
- *Save those engraving specifications as a Job File.*
- *Click the NC Program page to access the NC program. (You should proof the NC program also; click the 3D Proof button along the right edge of the screen.)*
- *Send the NC program to the milling machine, either by floppy disk or serial cable. You do **not** have to save the NC program on your hard disk because MillWrite can create it any time you need it....if you saved the job file.*

Figure 2-1

The Drawing Page

After you start MillWrite, click the **Drawing** tab to get to the drawing page, as seen in Figure 2-2. The screen will be mostly empty. (If you put something in the drawing, you can clear it by pressing `Ctrl` `F4` or by clicking the File button and selecting the option to *Close And Create A New Job*).

Mouse Icons in Lower Left corner

The drawing page has three mouse icons in the lower left corner that represent the mouse buttons. Next to each icon is a brief description of what that mouse button is set to. The functions of the mouse buttons will sometimes change automatically, and you can set the functions of the left and middle buttons, so get used to looking in this area to find out what the mouse buttons are currently set to do.

Messages show in lower right corner

The lower right corner displays messages. The messages you find in this area change all the time. Sometimes the messages explain what MillWrite is waiting for you to do, and other times it shows you some of the keyboard shortcuts that are available at that particular moment.

To identify which key is a keyboard shortcut, just look to see if one of letters is a different color than the others. The colored letter is the key you can press.

The Main Menu

The "Menu" button at the upper left corner brings up the main menu for the Drawing page. This button is also seen at the other pages, but you get a different menu depending on which page you are at. You can also access this menu by pressing the `Esc` key.

Add the NO Symbol

Let's start the no smoking sign by creating the circle with a slash through it (ie, the NO symbol).

There are often several ways to accomplish something in MillWrite. You could draw a circle and then a line, but MillWrite already has this symbol in its symbol library, so let's take it from there.

Click the **Symbol** button and a list of symbol fonts appears, as seen in Figure 2-3, although you may find a different list than this image shows.

Locking the mouse to lists

Notice that mouse is *locked* in this list. To understand what this means, try to slide the mouse out of the list. You will find that the mouse moves only up and down. The advantage of locking the mouse to the list is that you don't have to worry about the mouse accidently sliding out of the list, which in "normal" programs requires you to click the button again and start over.

Click the RIGHT mouse button to get out

If you want to **cancel** a list in which the mouse is locked to it, just click the **right** mouse button, or press the `Esc` key.

Find and choose the NO Symbol

The NO symbol (ie, a circle with a slash through it) is in the font called "Symbols #1", so pick that font. If you didn't know which font it was in, you should just pick any of the fonts, and then change fonts if you don't find it.

After picking the Symbols #1 font, a page of symbols will be displayed (Figure 2-4). If you want to view the other symbol fonts, click the Change Font button and pick another font. Some fonts have more than one page of symbols, so use the `Page Up` and `Page Down` keys or click the buttons for **next** or **previous** page.

Notice that as you move the mouse around the symbols that it sometimes changes from an arrow with the word "Select" on it (this is seen in Figure 2-4) to an arrow with a NO symbol. MillWrite is letting you know when you have the mouse in the correct location for picking one of the symbols.

Each symbol is represented by a keyboard key. Each symbol also has a dotted box around it. The dotted box is shows the size of the "character box", which is usually the same size as the symbol.

You can show or hide the keys and the character boxes by checking or un-checking the boxes in the upper left corner.

Placing the symbol in the drawing

After you pick the NO symbol, MillWrite will prompt you to specify its size and place it in the drawing. You can specify its size and placement in different ways, and you can resize or move it easily later anyway, so you don't have to worry about putting it in the wrong location. Your options for placing the symbol will be listed along the right side of the screen.

Maintaining proportions

Each letter and symbol was designed with a certain proportion to its height and width. If you want to maintain that "natural" proportion, you cannot specify **both** a height and a length for the text or symbols. Rather, you specify **only** the height or **only** the length. If you specify both a height and length, you will almost always end up with dimensions that stretch or compress the text or symbol.

You can specify the height and/or the length for the NO symbol by either drawing a line or box with the mouse, or by typing values with the keyboard. If you want to type a value, MillWrite expects you to enter the height first, and then the length. If you want to specify only the height, either enter zero for the length, or don't enter anything for the length. To specify only the length, enter a zero first for the height, and then enter a length. You enter the values in a free-format manner, using blanks (ie, press the spacebar) or a comma to separate the height from the length.

For some examples on how to specify the height and length of text:

- *Type **0, 4.5** to make the symbol 4.5 inches long and leave the height whatever is natural for it.*
- *Type **1.7, 0** (or just **1.7**) to make text 1.7 inches high and leave the length natural.*

To specify the height or length with the mouse, just click the left button and draw a vertical line (to specify only the height, as
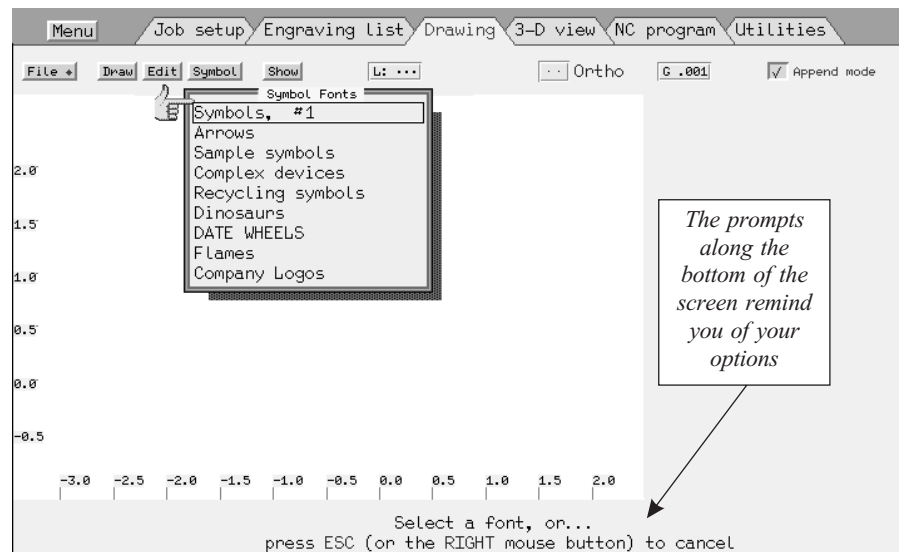
Figure 2-2

The Drawing Page, with nothing on it.

The Main Menu. This menu is different at different pages. You can access this menu by clicking it with the mouse, or by pressing Esc

MillWrite has 6 different "pages". You click one of these 6 "page tabs" to switch between them.
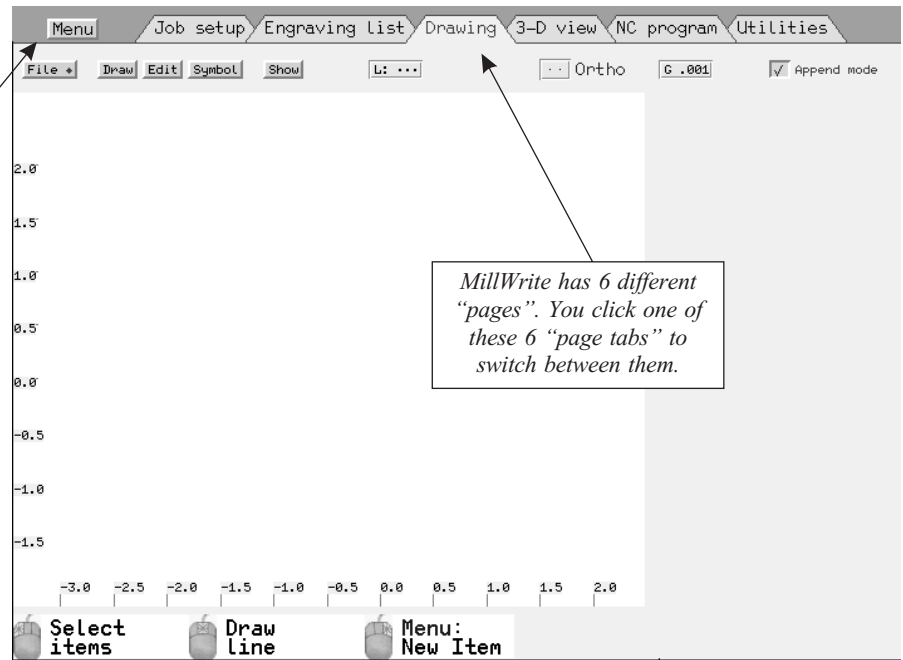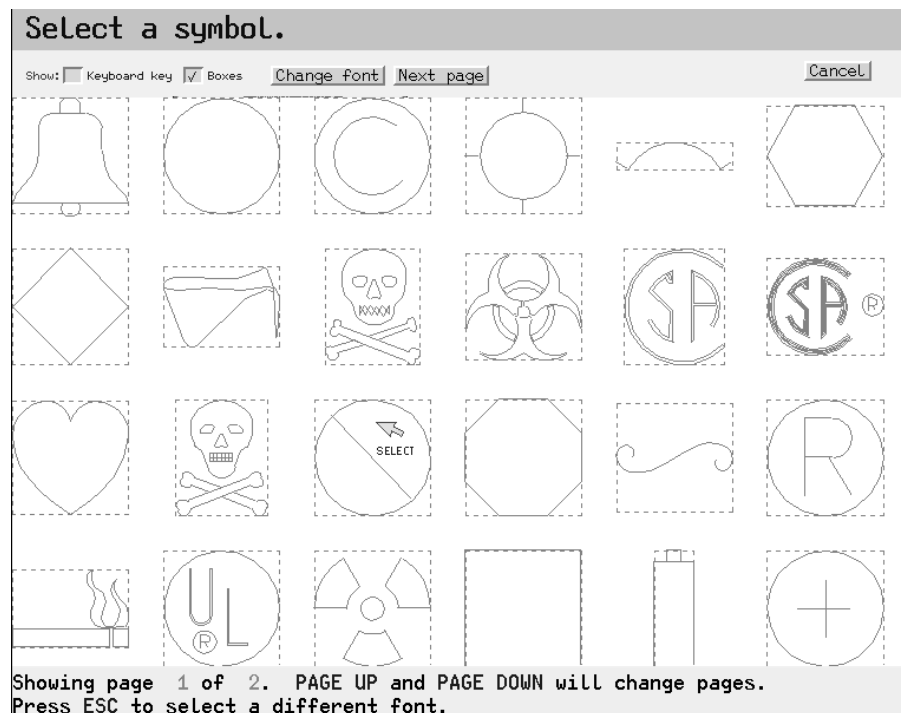
Figure 2-3

Note that the mouse is "locked" inside this list of symbol fonts.

*Click the **right mouse button** to cancel the menu, or press the* Esc *key.*

The prompts along the bottom of the screen remind you of your options

Figure 2-4

Picking a symbol to engrave. The mouse will change to show the word "Select" when it is on one of the symbols. This shows you that you can click the left button to pick that symbol.

in Figure 2-5) or draw a horizontal line (to specify only the length) or draw a box (to specify both).

When you draw a vertical or horizontal line to specify the placement of a symbol (or when placing text), the symbol will be centered on the line. Therefore, draw the line where you want the symbol to be centered.

Use two buttons to move items

A handy feature of MillWrite is being able to move items while you are doing other things to them. In the case of placing a symbol, as seen in Figure 2-5, you are drawing a vertical line. But while drawing it you may realize that you want to move the line. You can do that easily by clicking the right mouse button, as a message along the bottom of the screen will remind you. Then the message on the bottom will change to what you see in Figure 2-5, and the mouse icon will change to "Move", also as seen in Figure 2-5. Now when you move the mouse, the line moves. You can repeat this at many times as you like.

Note the rectangular, recessed, data entry box at the upper right corner. When you see a box that looks like this, it means you can type values in it. When there is only one box, MillWrite knows which box you want to type in, so you don't have to click it first, as you do with most Windows software. Rather, just start typing.

For this example, start by drawing and moving the line just to learn how to do it, but don't click the left mouse button. Rather, press the 2 key to specify 2 inches tall. The 2 will appear in the data entry box with a blinking cursor. Then press Enter↵. Since you entered only one value, MillWrite assumes you are specifying a height. The line you were drawing then becomes a 2 inch tall line, and as you move the mouse you move that line. Click either mouse button to place the symbol.

Your symbol will now appear, as seen in Figure 2-6. Unless you move the mouse off of the dotted box around the symbol, the parameters for the symbol will appear along the right side of the screen.

You can alter any of these parameters by either sliding the mouse over to that area, or by pressing the E key. If you slide the mouse over, you must move the mouse in a continuous motion -- rather than stopping along the way -- or MillWrite will assume you are merely moving the mouse rather than trying to get to the parameters area, and so MillWrite will clear the parameters area. Your motion doesn't have to be smooth or at a constant speed; rather, you just cannot stop moving the mouse for more than a fraction of a second.

If you find MillWrite is clearing the parameters area too quickly, you can adjust the time MillWrite allows the mouse to stop moving. From the *Main Menu* button, select the *Preferences* options, and then the *Timings and Cursor Style* option. The first item in the list is the value you will make larger. However, Windows 95 and 98 seem to operate on a clock that has increments of 55 milliseconds, so all values between 0 and 55 have the same effect, and all values between 56 and 110 (or 111, who knows how Windows rounds off these values) are identical, etc. Therefore, if you change the value from its default of 80, nothing will occur unless you go below 55 or above 111.

Getting back to the symbol, note that when the mouse is on the text, the bottom right corner has a prompt that mentions **"Edit this item's parameters"**, and the letter **E** in **Edit** is a different color. That different color shows that the **E** key is the key to press to edit the parameters.

Editing an item's parameters

Either slide the mouse to the parameters area, or press E when parameters are visible. The appearance of the data entry fields will change. Some will appear recessed. These recessed boxes let you know that you can type values into them. The non-recessed boxes have downward pointing arrows on them to let you know that they have a list of options when you click on them. If a field is both recessed and has an downward arrow, that means you can either enter values in it or click on it to bring up a list of options.

You can use the UP and DOWN keyboard arrows keys to move the cursor bar through these data fields. When entering a value in a field, you complete the operation by pressing the Enter↵ key or by pressing the UP or DOWN arrow key.

Notice that the tool window has an OK button but no CANCEL button. Also, if you move the mouse around, you will find the mouse is locked inside this window. When there is no CANCEL button, that means you can cancel by clicking the **right** mouse button or by pressing the Esc key.

Undoing mistakes in the parameters area

If you want to undo all the changes you made to the parameters, select the **Undo** function from the **Edit** menu, or click the mouse anywhere in the drawing to get out of the parameters area and then press Ctrl Z.

Choosing a tool

Now let's select a 1/8th diameter end mill for the *NO* symbol. Click on the **tool** field near the bottom right corner. A tool window will appear, as seen in Figure 2-7. MillWrite will give defaults for the tool, which is why you will find values already listed here.

There are several ways to change the tool to a 1/8th diameter end mill. You could click on the **Diameter** field and enter *.125*, or you could set up the most common tools you use in a tool list and then pick them from the list. There are some sample tools already set for you, so let's pick it from that list.
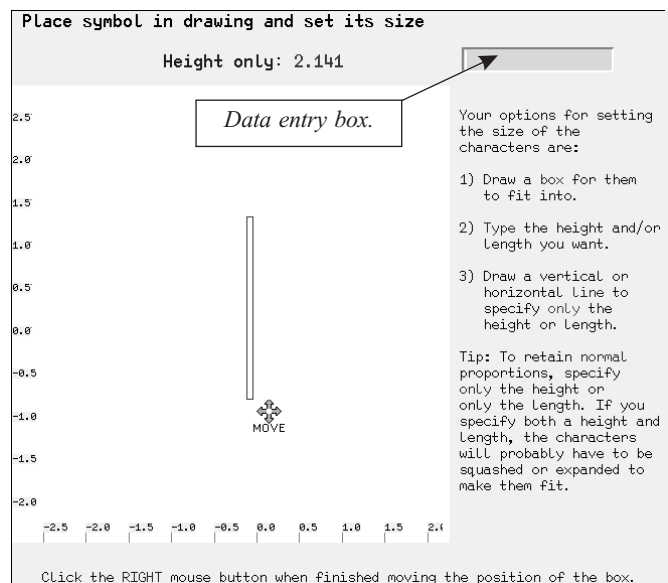


```
Place symbol in drawing and set its size
                  Height only: 2.141        [▼                    ]

2.5
                                    Your options for setting
2.0          ┌──────────────┐       the size of the
            │ Data entry box. │      characters are:
1.5          └──────────────┘
                                    1) Draw a box for them
                                       to fit into.
1.0
                                    2) Type the height and/or
0.5                                    length you want.

0.0                                 3) Draw a vertical or
                                       horizontal line to
-0.5                                   specify only the
                                       height on length.

-1.0            ✛                   Tip: To retain normal
              MOVE                    proportions, specify
-1.5                                  only the height on
                                      only the length. If you
-2.0                                  specify both a height and
     -2.5 -2.0 -1.5 -1.0 -0.5 0.0 0.5 1.0 1.5 2.(  length, the characters
                                      will probably have to be
                                      squashed or expanded to
                                      make them fit.

     Click the RIGHT mouse button when finished moving the position of the box.
```

Figure 2-5

Figure 2-6

When the mouse touches the symbol, its parameters appear on the right side of the screen.

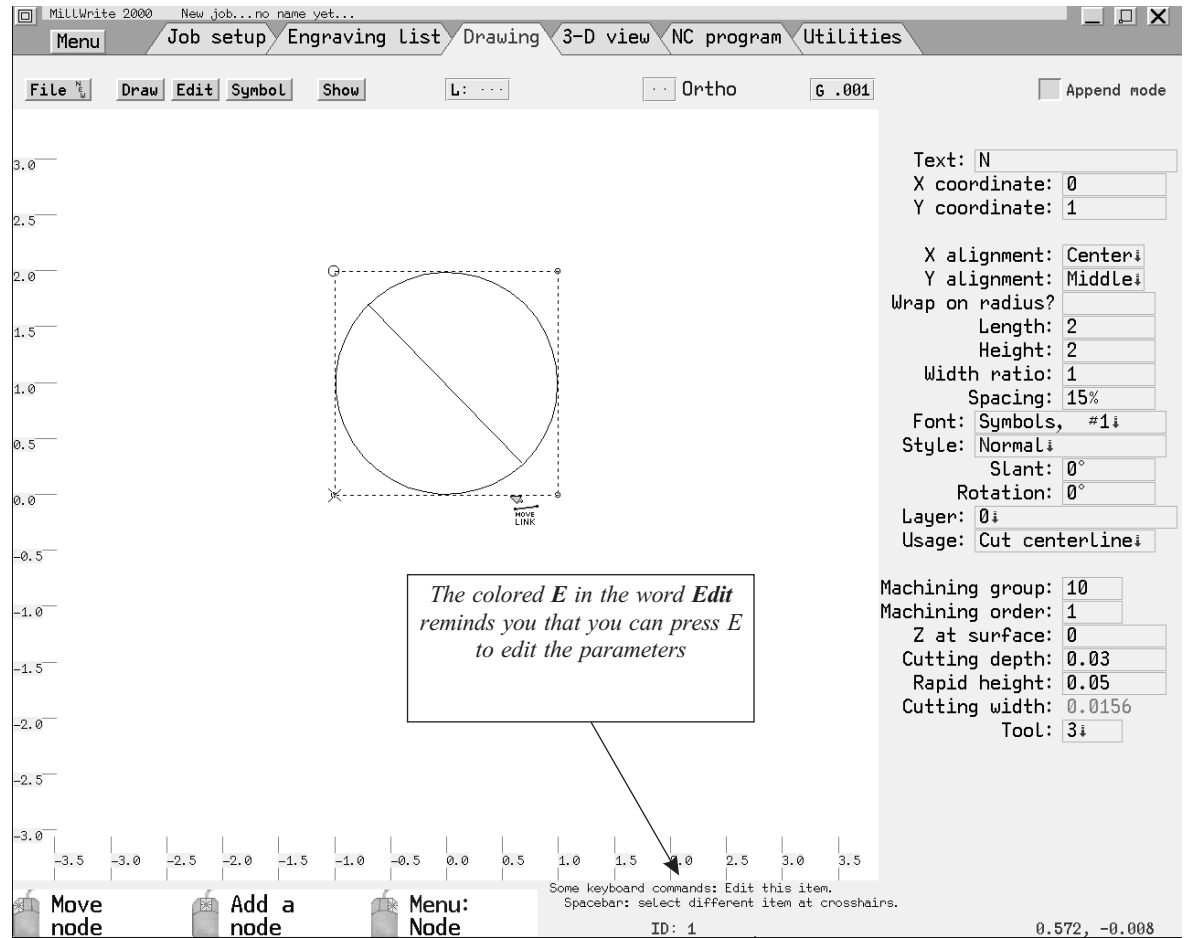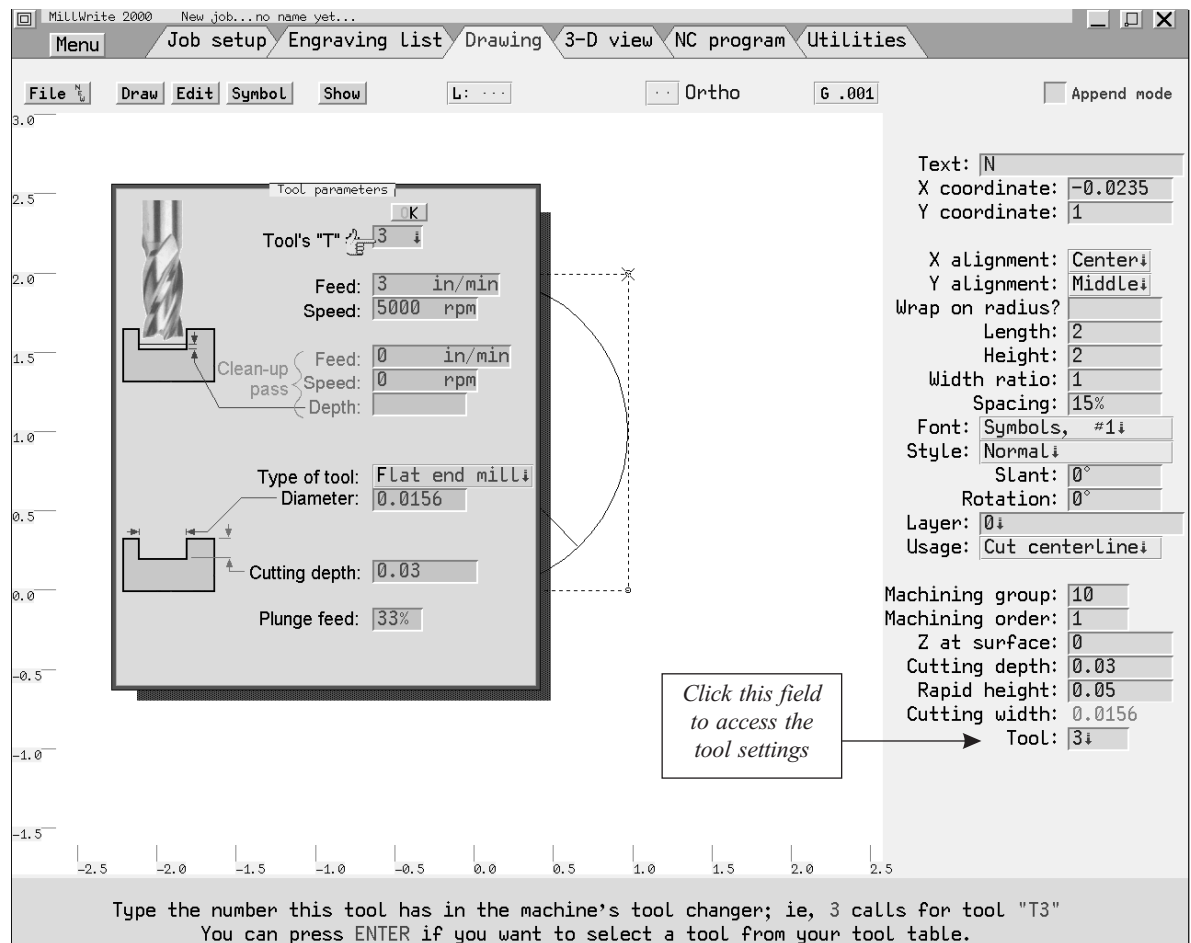The colored **E** in the word **Edit** reminds you that you can press E to edit the parameters

Figure 2-7

Click the TOOL field to bring up the tool window .

Click this field to access the tool settings

Type the number this tool has in the machine's tool changer; ie, 3 calls for tool "T3"
You can press ENTER if you want to select a tool from your tool table.
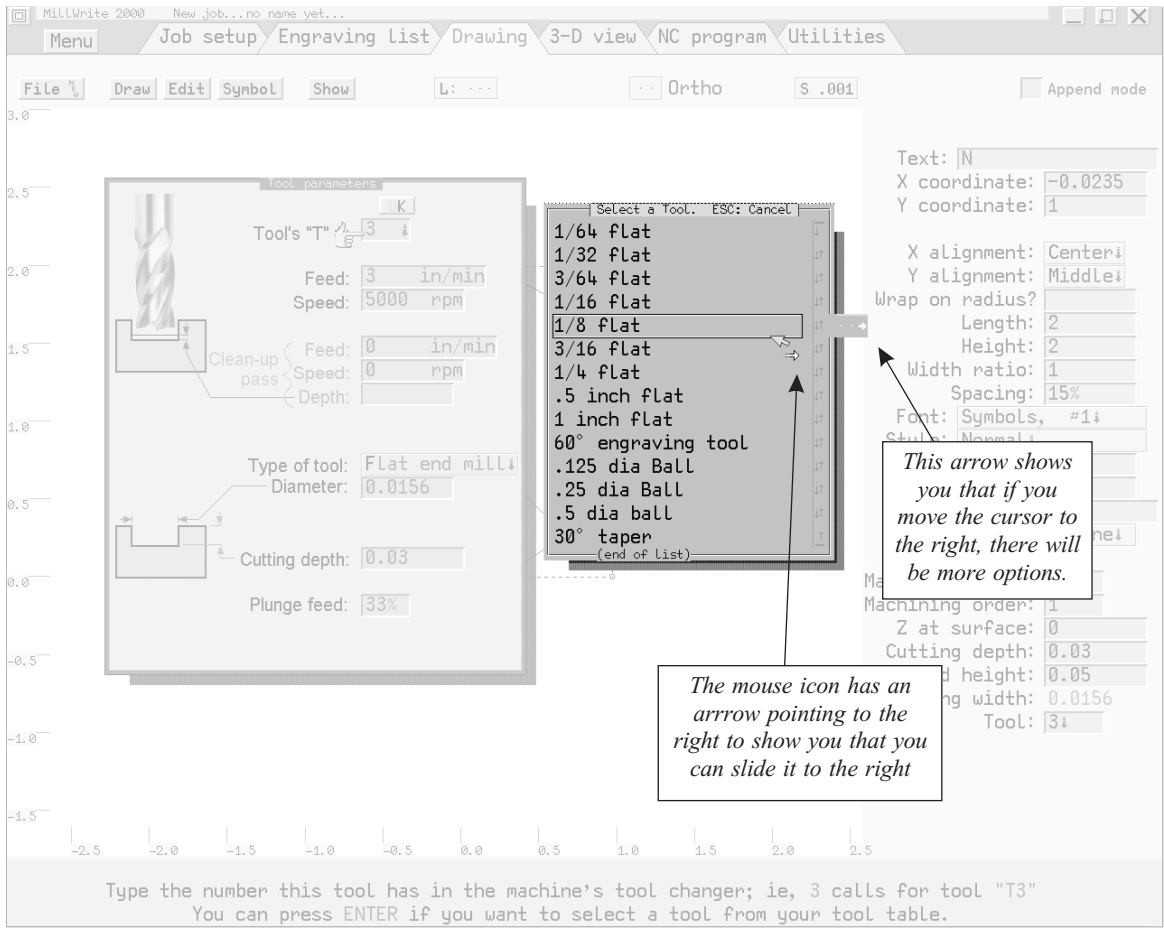
Figure 2-8

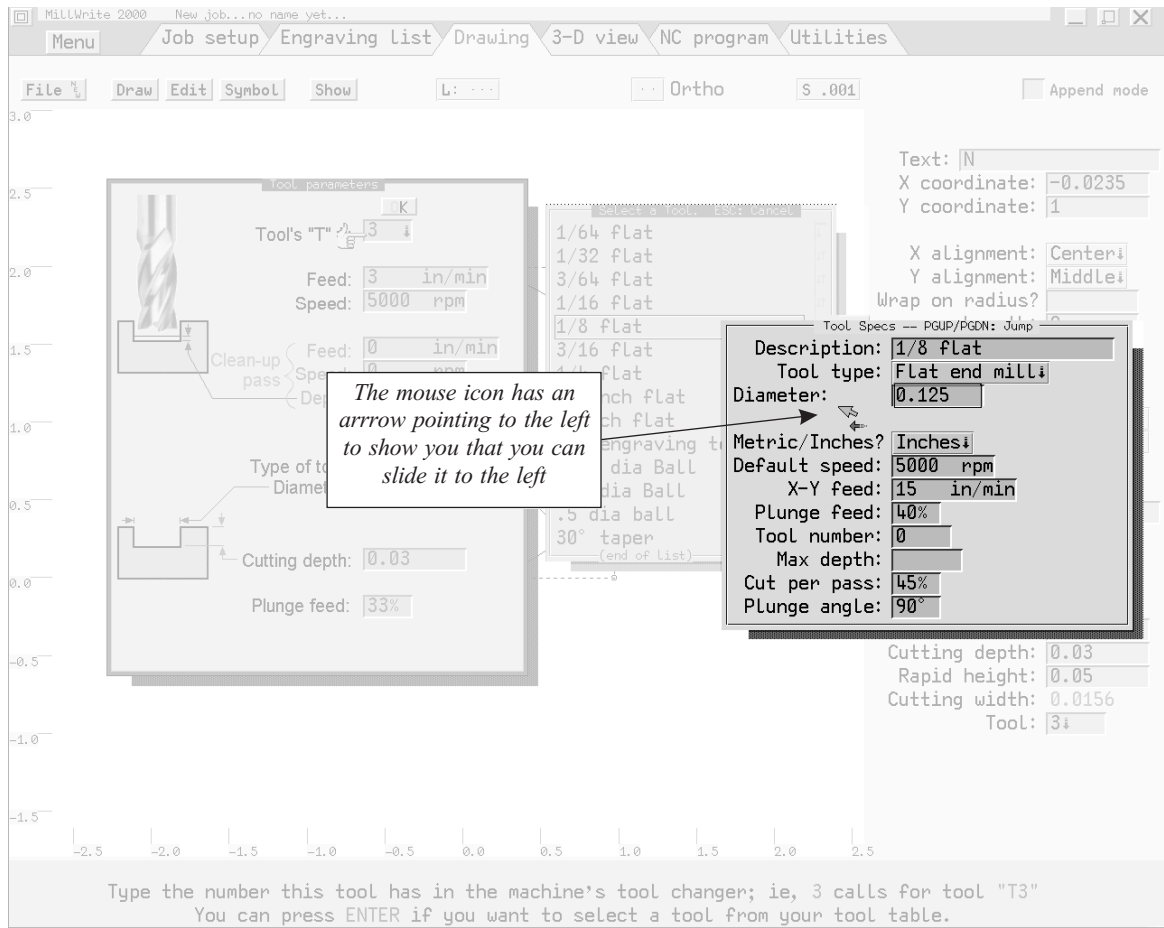*You can edit, add, and delete tools in the tool list, and give any of them default feeds, speeds, etc.*

This arrow shows you that if you move the cursor to the right, there will be more options.

The mouse icon has an arrrow pointing to the right to show you that you can slide it to the right

Type the number this tool has in the machine's tool changer; ie, 3 calls for tool "T3"
You can press ENTER if you want to select a tool from your tool table.

Figure 2-9

When you slide the mouse to the right in the tool list, the default specifications for the tool at the cursor appear.

The mouse icon has an arrrow pointing to the left to show you that you can slide it to the left

Type the number this tool has in the machine's tool changer; ie, 3 calls for tool "T3"
You can press ENTER if you want to select a tool from your tool table.

Click on the field directly under the OK button. This data field is where you enter the tool's Automatic Tool Changer number, or ATC number as MillWrite will refer to it. This data field has a recessed appearance, which shows you that you can type a value into it, and it has a downward arrow, which shows that you can click on it to bring up a list of choices. When you move the cursor bar to this field you see a prompt on the bottom of the screen to remind you of this. Click this field and a list of tools will appear, as seen in Figure 2-8.

The tool list

The tool list has a row of arrows along the right side. You can move the position of a tool in the list by moving the cursor bar to the arrow and then pressing the UP or DOWN arrow key, or you can press and hold the *left* mouse button and move the mouse up or down. This lets you put your most common tools at the top, or you might want to put similar tools together.

Note that a arrow pointing to the right appears wherever you move the cursor bar. This is to remind you that if you slide the mouse that direction you will access more parameters. You can also press the *right arrow* key on the keyboard to access the tool parameters.

Although the mouse will slide to the right, the mouse is locked in this tool list also, but this list doesn't have any buttons. You can get out of this list by clicking the *right* mouse button or by pressing the Esc key.

Editing a tool in the tool list

When you move the cursor to the right in the tool list, the specifications for the particular tool the cursor bar is on will appear, as seen in Figure 2-9. The mouse will be locked in this area also, but it will slide to the left back into the tool list. You can also click the *right* mouse button or press the Esc key to get back to the tool list.

The tool specifications menu let you set defaults for each tool. One field you may not want to set a default for is the tool's Automatic Tool Changer number. The reason is that if you set a default for this field, whenever you pick this tool you will get that ATC number. If you have a small tool changer you may move tools to different positions from one day to the next, which means the ATC numbers will be changing all the time. It might be easier in such a case to leave the default tool number at zero, which doesn't do anything.

Here is an explanation of some of the fields. Keep in mind that these fields only specify default values; ie, you can override any of these values after you pick a tool.

Max Depth: This is where you can specify the maximum depth of cut (ie, depth in the Z direction) for the tool to remove in one pass. For example, if you never want a tool to take a cut that is deeper than .5 inches, specify .5 in this field.

Cut Per Pass: This is where you specify how much each tool pass should cut (in the X-Y plane) when pocketing and contouring. You specify a percentage of the tool. For example, a cut per pass of 30% means that when you pocket an area with a 1 inch diameter tool, during each pass the tool will make a cut that is 0.3 inches wide.

Plunge Angle: If you want the tool to drop straight down into the material, enter a plunge angle of 90°. At the other extreme, an angle of 5° will make the tool spiral in at a gradual angle.

Plunge Feed: If you want the tool to plunge into the material at a reduced feed rate compared to when it is cutting in the X-Y plane, enter a value less than 100%. For example, a value of 30% will mean the tool will plunge down at 30% of whatever you set the X-Y feed rate to be.
Note that if you specify a shallow plunge angle, such as a plunge angle of 5°, the tool will move into the material so gradually that you may not need to reduce the plunge feed rate.

Showing / Hiding the cutter's width

After setting the tool to a 1/8th dia end mill, you should see the NO symbol displayed with thick black lines, as seen in Figure 2-10. The thickness of the line is the width of the cutter. This lets you see if the tool is too large or too small for the symbol (or the text, if you are engraving text).

If you cannot see the thickness of the tool, that means you turned off the display of the cutter width. You can turn it on and off either by pressing Ctrl T or by picking the **Show** button at the top of drawing window and checking or un-checking the **Cutter Width** option, as seen in Figure 2-10. The **Show** menu also provides you with other options, such as:

Text: When your engraving has both text and geometry, you might want to hide the text so that you see only the geometry.

Geometry: Same as above, but this hides/shows the geometry.

DXF Template: If you specified a DXF file to be used as a template, you can hide it when you want by un-checking this box.

Boxes around text: All text and symbols have a "character box" that is the height of the uppercase letters. If you want to hide these boxes temporarily to see your engraving more clearly, turn off the boxes. You can also press Ctrl B to hide/show the boxes.

Text when editing: When you use the mouse to alter text or symbols, MillWrite will draw the text as you alter it. This requires a fast computer. You can turn this off if you find the response is too sluggish.

Text width when editing: similar to the above, but this also shows the width of the cutter. This requires an even faster computer.

Add the No Smoking message

Now let's add the text "No Smoking" to this drawing. You can either press the D key to bring up the **Draw** Menu and then press T for **Text**, or click the **Draw** button and then click **Text**. A small window will then appear for you to type the text you want to add. After you type "No Smoking", press the Enter

key. You will then be prompted to place the text. This is the same as placing adding the NO symbol.

Since the NO symbol was specified to be 2 inches tall, make the text 2 inches long so that it fits the width of the symbol. So rather than drawing a box for the text, type *0,2* and then press ⏎. MillWrite will then draw a line that is 2 inches long and ask you to place it, just as you did with the NO symbol. Place the line under the symbol and press a mouse key. The text will be centered on that line, so put the line slightly below the symbol. Don't worry if the text is not centered correctly under the symbol; it is often easier to first place the text and symbols in the drawing and arrange them afterwards.

After you place the No Smoking text, the parameters of the text will show. As you did with the NO symbol, click the **tool** data field and pick a tool for this text. Note that when you are merely engraving single-stroke fonts, you can use tapered tools, such as a center drill, rather than flat or ball end mills. The tapered tools have the advantage of being stronger, and you can alter their cutting width simply by raising or lowering them in the Z direction.

Pick a tapered tool for this example to understand this. Then type a cutting width you want the tool to use, such as .03 inches. MillWrite will calculate the depth the cutter must reach to create a cutting width of .03. MillWrite automatically sets the depth for ball and tapered tools; all you do is specify the cutter width you want the tool to have. Or you could specify the cutting **depth** you want and MillWrite will calculate the cutting **width**.

Since the tool that cuts this text will be different from the tool that cuts the *NO* symbol, make sure you give this tool a different ATC number or else MillWrite will not generate a tool change operation. Even if your mill doesn't have a tool changer you should specify different ATC numbers for different tools so that the mill will pause for you to change tools.

Add the cigarette

This is exactly the same as adding the *NO* symbol, and you will even pick the same font (ie, Symbols #1). Draw a horizontal line when placing the cigarette to specify the length, and put it somewhere inside the *NO* symbol. Remember to click the **right** mouse button to shift the position of the line after you start to draw it.

Moving items with the mouse

Now to learn how to use the mouse to alter items. Put the mouse somewhere on the dotted box that surrounds the cigarette. The mouse icon will change to something else, such as "Move Link", as seen in Figure 2-11. Exactly which icon you see depends on what you have been setting the mouse to before doing this example.

Look at the mouse icons at the bottom left corner and you will see that the **right** mouse button is now set to **"Menu: Node"**. Whenever you touch an item in the drawing with the mouse, the right mouse button provides access to this menu.

Click the **right** button (don't hold it down) and the node menu will appear, as seen in Figure 2-12. The node menu is different when the mouse is over text than when it is over geometry. Since the mouse is over text, you will see the text version of the node menu.

This menu offers three different move functions, and two extrude functions. When you want to move text without distorting it, use the **MOVE TEXT** option. The **MOVE LINK**, **MOVE NODE**, and **EXTRUDE NODE** options let you stretch and
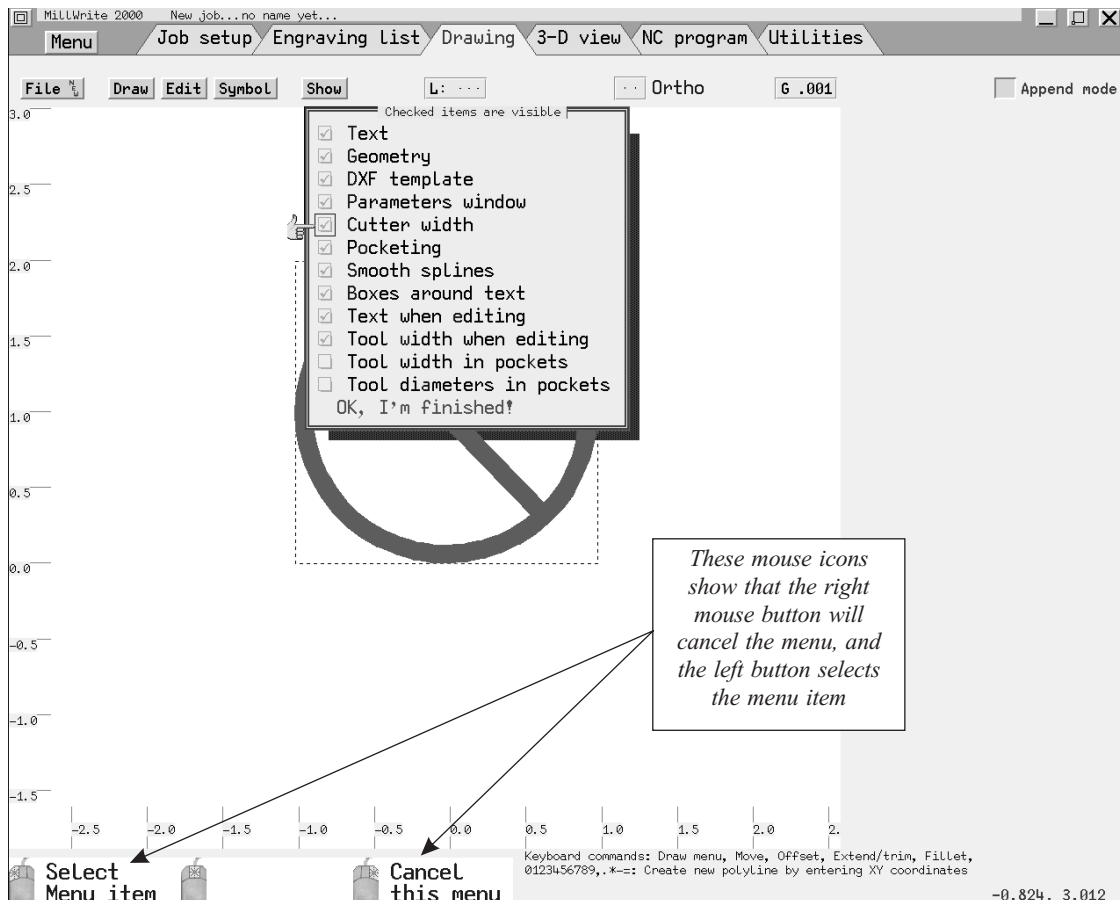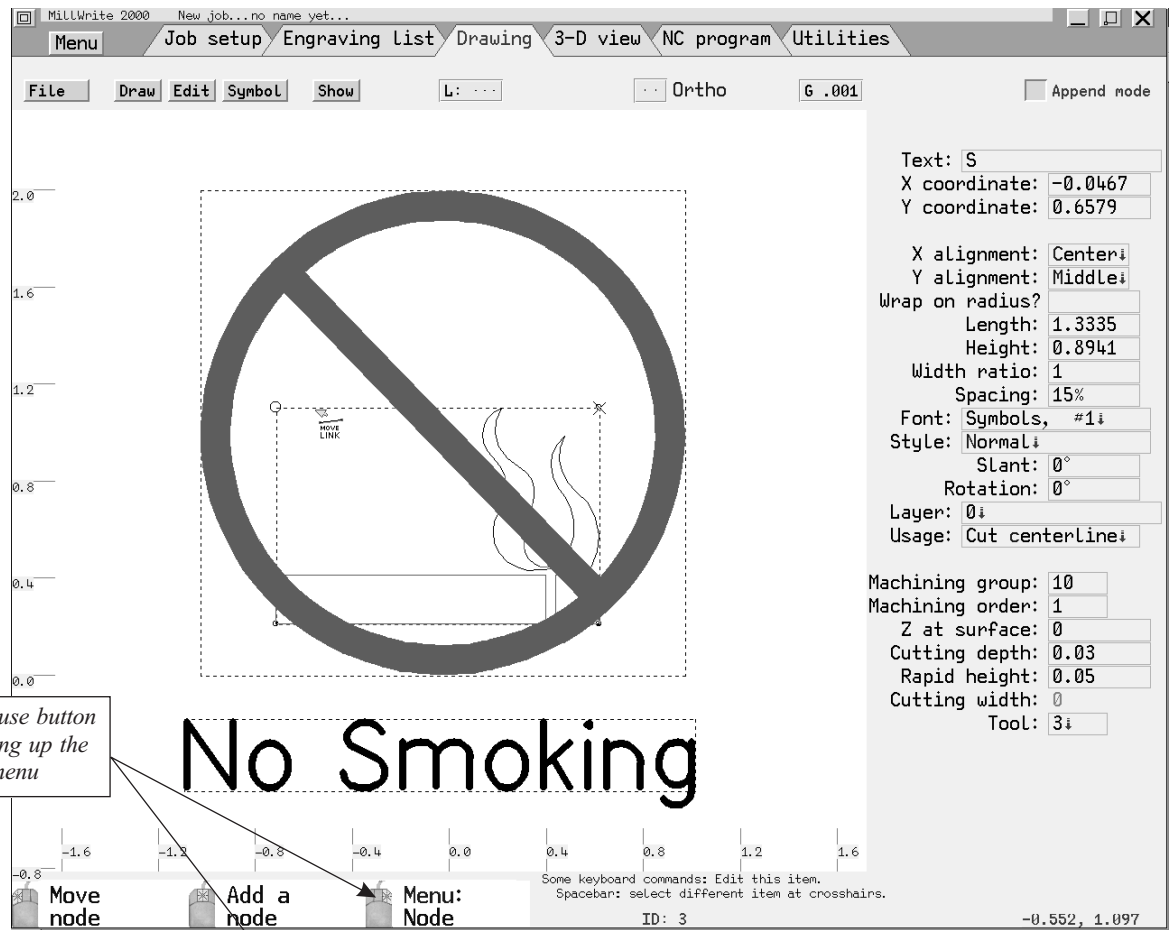
Figure 2-10

*The **Show** button lets you hide or show different things, such as the cutter width.*

You can also turn on and off some of these option with some Ctrl *key commands. Press and hold the* Ctrl *key and look at the bottom of the screen to see the control key commands.*

These mouse icons show that the right mouse button will cancel the menu, and the left button selects the menu item
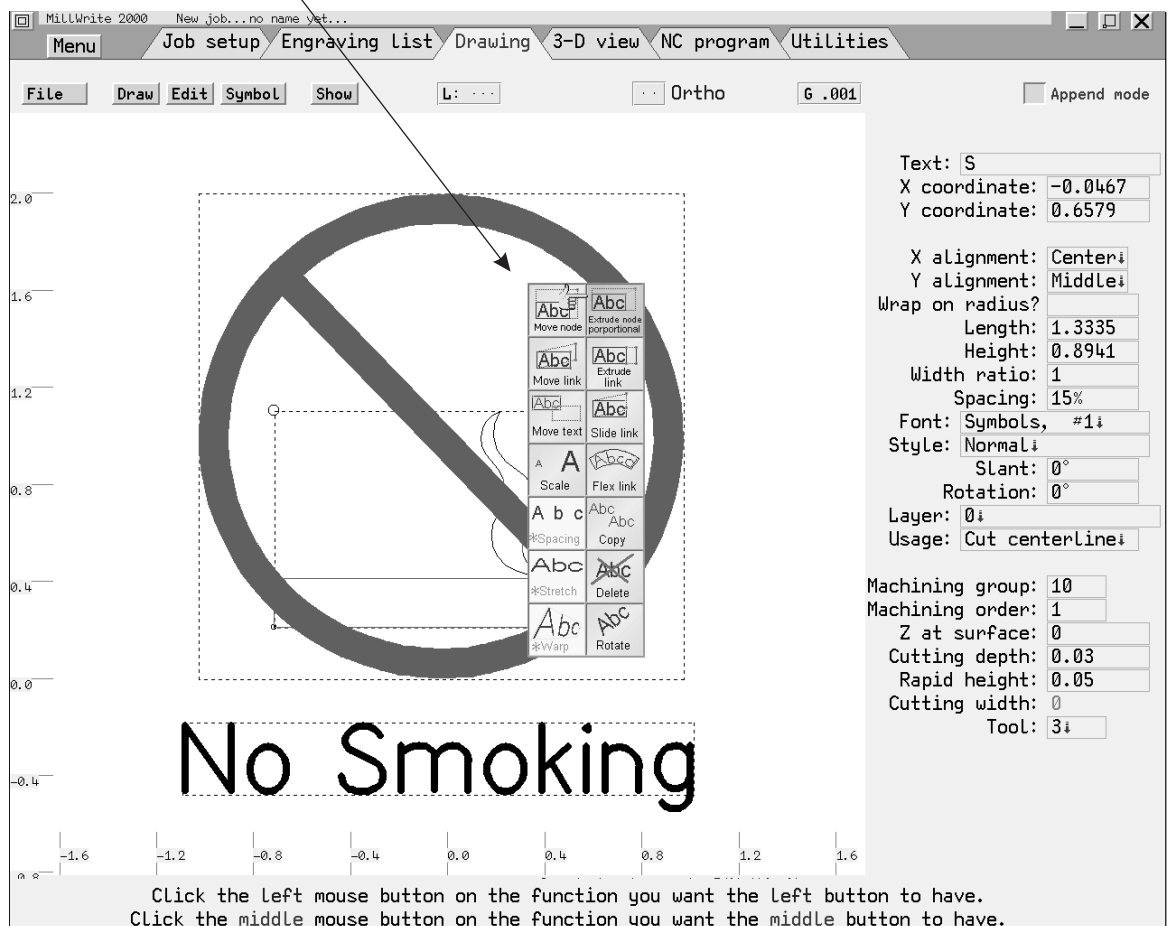
Figure 2-11

When the mouse is touching the character box around text or symbols, the mouse icon will change, and the right mouse button provides access to the Node Menu

MillWrite 2000   New job...no name yet...

Menu | Job setup | Engraving List | Drawing | 3-D view | NC program | Utilities

File   Draw Edit Symbol   Show   L: ···   ·· Ortho   G .001   ☐ Append mode

Text: S
X coordinate: -0.0467
Y coordinate: 0.6579

X alignment: Center⬇
Y alignment: Middle⬇
Wrap on radius?
Length: 1.3335
Height: 0.8941
Width ratio: 1
Spacing: 15%
Font: Symbols, #1⬇
Style: Normal⬇
Slant: 0°
Rotation: 0°
Layer: 0⬇
Usage: Cut centerline⬇

Machining group: 10
Machining order: 1
Z at surface: 0
Cutting depth: 0.03
Rapid height: 0.05
Cutting width: 0
Tool: 3⬇

The right mouse button will now bring up the Node menu

No Smoking

Some keyboard commands: Edit this item.
Spacebar: select different item at crosshairs.

Move node   Add a node   Menu: Node

ID: 3   -0.552, 1.097

Figure 2-12

*Click the **right** mouse button to access menus. When the mouse is touching text or symbols, it brings up the **Node Menu**.*

The Node Menu will be different if the mouse is touching geometry rather than text when you click the right mouse button.
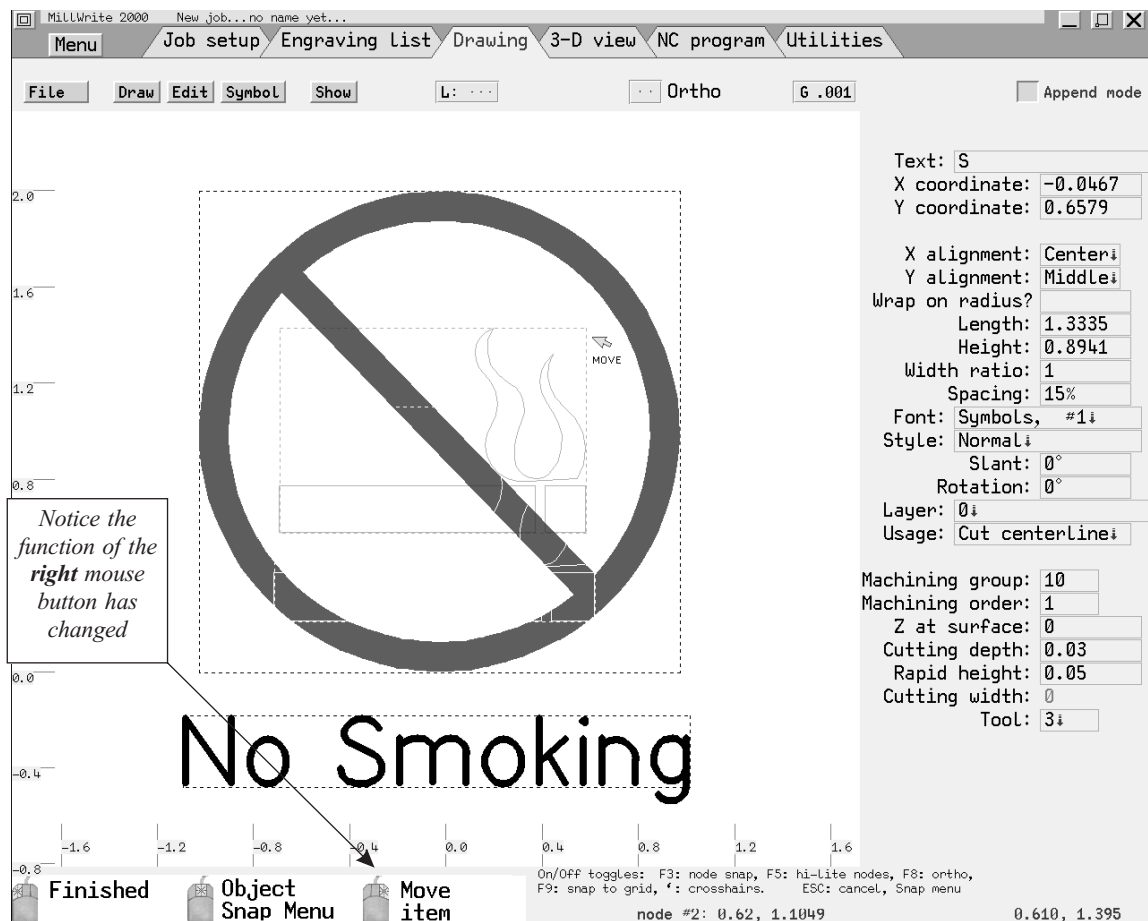
MillWrite 2000   New job...no name yet...

Menu | Job setup | Engraving List | Drawing | 3-D view | NC program | Utilities

File   Draw Edit Symbol   Show   L: ···   ·· Ortho   G .001   ☐ Append mode

Text: S
X coordinate: -0.0467
Y coordinate: 0.6579

X alignment: Center⬇
Y alignment: Middle⬇
Wrap on radius?
Length: 1.3335
Height: 0.8941
Width ratio: 1
Spacing: 15%
Font: Symbols, #1⬇
Style: Normal⬇
Slant: 0°
Rotation: 0°
Layer: 0⬇
Usage: Cut centerline⬇

Machining group: 10
Machining order: 1
Z at surface: 0
Cutting depth: 0.03
Rapid height: 0.05
Cutting width: 0
Tool: 3⬇

Move node | Extrude node porportional
Move link | Extrude link
Move text | Slide link
Scale | Flex link
*Spacing | Copy
*Stretch | Delete
*Warp | Rotate

No Smoking

Click the left mouse button on the function you want the left button to have.
Click the middle mouse button on the function you want the middle button to have.
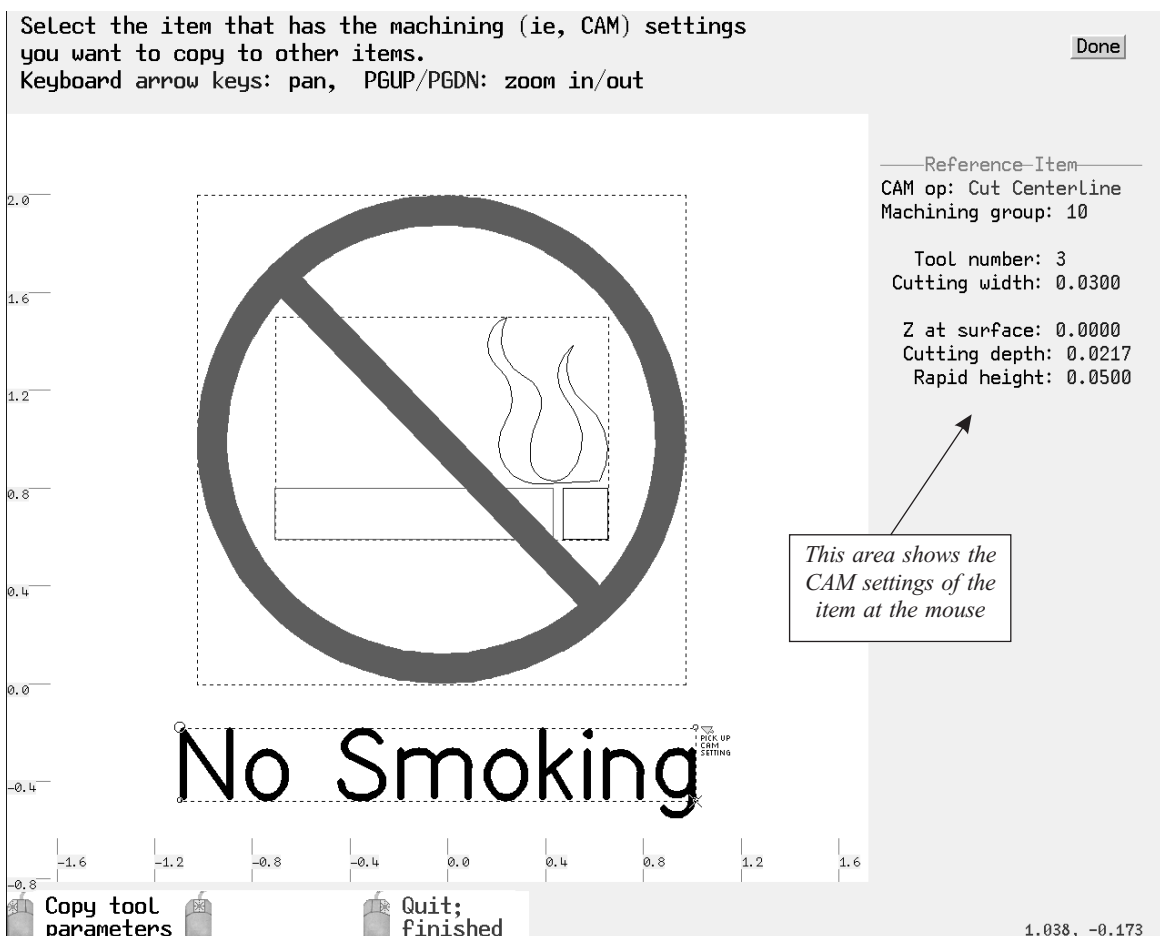
Figure 2-14

Selecting the item that has the CAM settings you want to copy.

slant the text. You will have to spend some time trying the different options to understand their differences. For now, pick the **EXTRUDE NODE PROPORTIONAL** by clicking the *left* mouse button on it. This will let you change the size of the text without distorting it.

> Tip: If you have a three-button mouse, you can pick a function for the **middle** button by clicking the middle button on the function you want it to be.

Now move the mouse to one of the four nodes of the dotted box around the cigarette. The mouse icon will change to **EXTRUDE NODE** when you have it correctly on a node. Then click the left button. As you move the mouse, the node will move, but the cigarette will retain its proportions, as seen in Figure 2-13. While you are resizing it, notice the right mouse button has changed to *Move Item*. Click the right button to shift the cigarette's position, and click it again to resume extruding the node. This lets you quickly set the size of the cigarette and its position. You could do the same operation with the *No Smoking* text also, or you could try using the **MOVE LINK** function instead to learn about that function.

Copy CAM settings from one item to another

Often you will have several items in a job that need the same tool and other settings. While you could set the parameters for each item one by one, it is easier to set up only one of the items, and then copy its parameters to the other items.

You already set a tool for the *No Smoking* text and for the NO symbol, so if you can use either of those tools for the cigarette, just copy those tool settings to the cigarette. In this example, the tool that cuts the *No Smoking* text could be used to engrave the cigarette.

To copy the tool settings from the *No Smoking* text to the cigarette, click the **Main Menu** button in the upper left corner, then pick the **CAM Functions** option, and then pick **Make CAM Settings Identical**. Or you could press `Esc`, then `C`, and then `I`.

MillWrite will then prompt you to click the mouse on the item that has the CAM settings you want to copy. Put the mouse anywhere on the dotted box around the *No Smoking* text. As seen in Figure 2-14, MillWrite will display some of its CAM settings along the upper right of the screen so you can verify that this item has the CAM settings you want to copy. Since it is, click the **left** mouse button.

The prompts will then change and MillWrite will wait for you to click on the items you want to give those same CAM settings to. As seen in Figure 2-15, notice that when you move the mouse onto the dotted box around the cigarette or the *NO* symbol, its CAM settings are displayed at the bottom right to let you verify that you want to change this item's CAM settings. Also, the mouse icon changes when you touch an item to show that clicking the left mouse button will change its CAM settings.

In this example there is only one item to choose from, so you could just put the mouse on the cigarette and click the **left** mouse button. But if you had a lot of items to set, it would be easier to draw a selection box around the items. To draw a selection box, just move the mouse to an empty area of the drawing, click the **left** mouse button, and move the mouse. Remember to click the **right** mouse button if you want to shift the position of the box while you are drawing it.
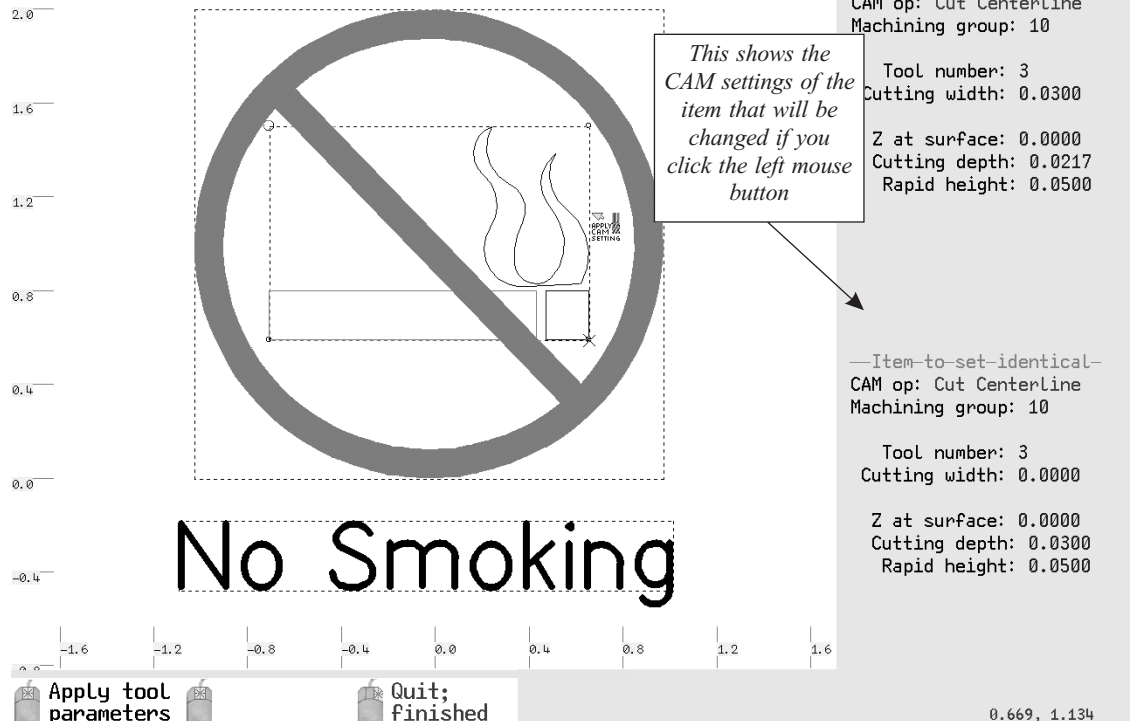

Figure 2-15

The bottom right side of the screen shows the CAM settings of the item at the mouse.

The mouse icon changes to show a tool to let you know that clicking the left mouse button will change the CAM settings for the item.
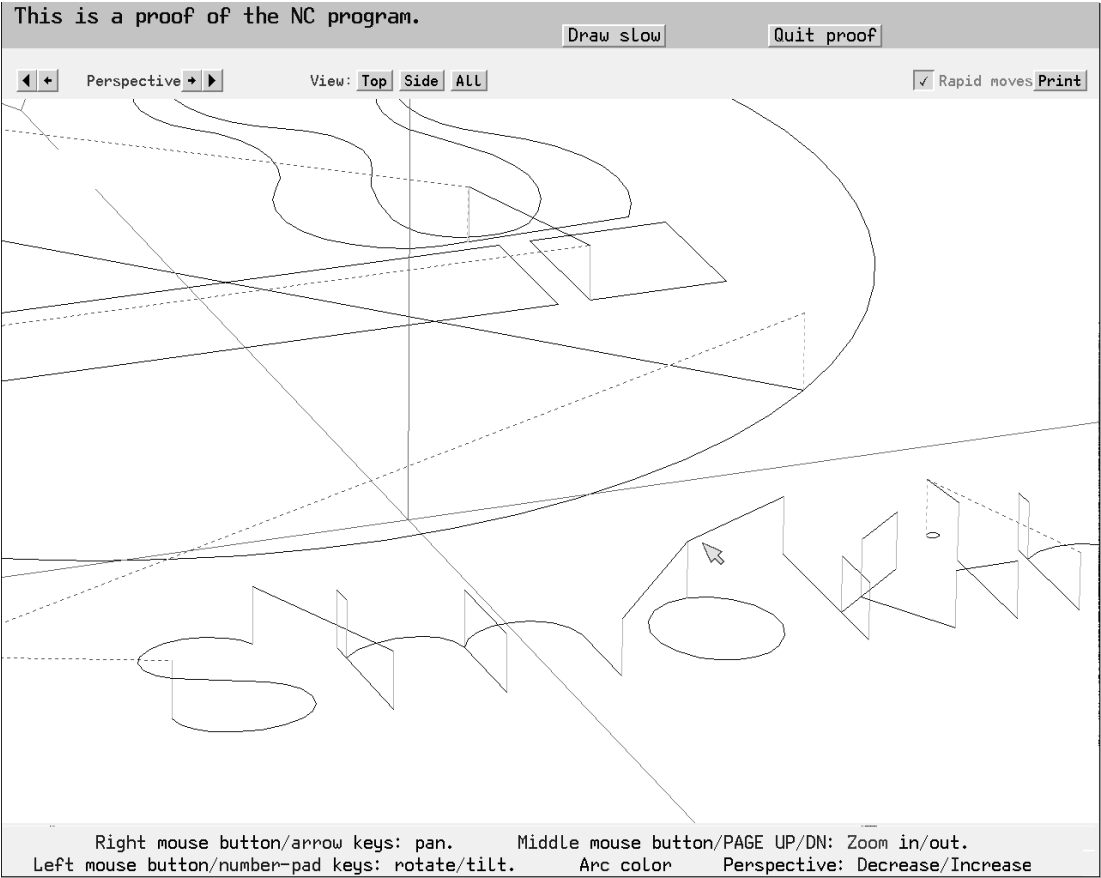
Figure 2-16

Proofing the NC program.

The dotted red lines are rapid moves. The blue lines show when the tool is moving only in the Z axis.

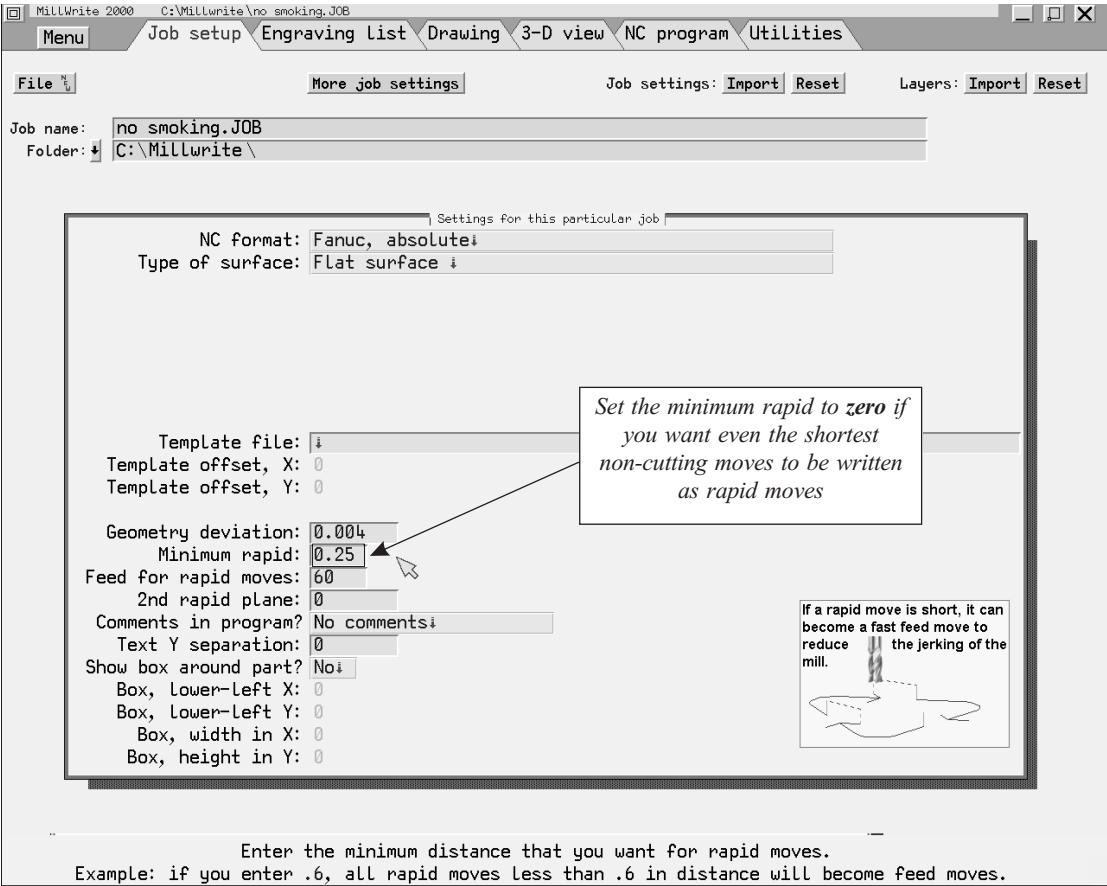*Click the **Draw Slow** button at the top of the screen to see the path the tool will take.*

Figure 2-17

The Job Setup page lets you set the parameters for the partciular job that is open.

Viewing in 3D

To verify that you set up the engraving correctly, you should verify the job using the 3D proof function. There are two ways to do this:

1) Click the **3D View** tab. This shows the job in 3D, and when you are doing pocketing or contouring, it also lets you see the boundary geometry of the items you are pocketing or contouring so that you can verify that the pocketing is accurately following the boundary geometry.

2) Click the **NC Program** tab, and then click the **3D Proof** button. This shows the actual NC program. There is no boundary geometry in this view because the NC programs do not have such information.

Try both views. Notice that you can use the mouse buttons or the keyboard to rotate and move the image, and zoom in and out.

Do you want short rapid moves?

You may notice when you look at the proof of the NC program that some of the rapid moves are showing up as solid lines, which implies they are cutting moves rather than rapid moves. Look at Figure 2-16 and notice that when the tool lifts to move from one area to the next, some paths show as a dotted red line, and others show as solid lines. (The dotted red lines are rapid moves.) However, when you look at the job in the **3D View** page, all the rapid moves show up as dotted red lines. So why does a proof of the NC program show cutting moves for some of the rapid moves?

The reason is that the default for MillWrite is to convert short rapid moves to fast cutting moves. In other words, if MillWrite has to move the tool a short distance, such as .2 inches, instead of creating a short rapid move of **G00 X.2**, MillWrite will instead create **G01 X.2 F60.0**. The reason for this is that the machines cannot move a short distance at their rapid rate, and some machines jerk a lot when they try to do so. Using fast cutting moves instead will reduce the jerking and

shaking of the machine, but it will not significantly affect the time the machine spends on the job.

You can adjust these settings at the Job Setup page. Click the **Job Setup** page and then click on the **Minimum Rapid** field, as seen in Figure 2-16. This is where you can specify when to convert short rapid moves to fast cutting moves. If you want **all** non-cutting moves to be written as G00 moves, enter a **zero** in this field. This disables this feature. But if you prefer to avoid short rapid moves, enter the minimum distance for them. For example, if you want all rapid moves shorter than a distance of .4 inches to be cutting moves, enter .4. Then move the cursor bar to the data field under it and specify the feed rate you want for these fast cutting moves.

Show Box Around Part

Now let's assume you have to make this no smoking sign fit a rectangular piece of material that is 3 inches wide by 4 inches tall, and this material will be located on the machine's table with the upper left corner at 0,0. The easiest way to determine how well the sign fits would be to have a 3 by 4 inch box display on the drawing page in the correct X-Y location. MillWrite can do this easily. At the **Job Setup** page, click on the **Show Box Around Part** field so that it shows "YES". Then in the four fields underneath it, enter the **lower left** corner point of the box, and the height and width of the box, as seen in Figure 2-18.

Note that MillWrite is expecting you to specify the **lower** left corner, not the upper left corner. The only confusing aspect of this is that people who clamp parts in vises in vertical machining centers usually prefer to set the **upper** left corners of their parts to **X0, Y0**, so they may assume that MillWrite is also working with the upper left corner.

Select and alter a group of items

After setting up the box to show you the material you will engrave, switch to the drawing page. You are certain to find that your no-smoking sign is not correctly located to fit the material. You need to move and resize all three items. While you could move and resize each of them individually, it is easier to select them all and move and resize them at the same time.

Figure 2-18

MillWrite can put a box on the drawing to show you the size and location of the part you are working with so that you get all the text and geometry in the correct locations and set to the correct size.

This field determines if a box shows around the part

As mentioned on page 5 about **selecting items**, put the mouse in a blank area of the screen. The mouse icon should be a arrow without any text. If the icon has any text, such as *"Draw Rectangle"* or "Measure", click the **right** mouse button to bring up the **New Item** menu, and then pick the plain arrow in the upper left corner.

Now click the **left** mouse button and draw a box around the three items. Remember to click the **right** mouse button if you need to shift the location of the box as you draw it. When you click the **left** button a second time, you will have selected the items, and the screen will change, as seen in Figure 2-19.

To move all three items at once, touch any of the three with the mouse. When the mouse icon changes to show the word **MOVE**, click the left button. MillWrite will prompt you to pick the starting point for the move, but in this case you are moving the items visually, so you don't care. Rather, just click anywhere in the drawing.

Next you will be prompted to pick the destination point for the move. Move the mouse and click it when the items are inside the box.

Resizing the items / Anchor points

Now that you have items in the correct location, you may find that they are too small to fit nicely. To make them larger, click the **Scale** button. You will be prompted for the **anchor point** for the scale. This is the point from which the items become larger or smaller. In this case you could pick any anchor point. The anchor point is only significant if you already placed one node of the items at the correct X-Y location, in which case you could make that node the anchor point. Then when you scale the items, that node will remain where it is.

In this case you can pick any point as the anchor point, and then move the mouse to the left to reduce the size of the items, or to the right to enlarge them. Again, remember than you click the *right* mouse button to shift the position of everything while you are scaling it -- this moves the anchor point also, so you would **not** want to this if you already placed the anchor point in the correct X-Y location.

As you resize the items, notice the recessed data entry box in the upper right corner. This shows you the current scaling factor. You can type a scaling factor at any time, if you want to specify one. As discussed on page 8 and in Figure 2-5, since there is only one data entry box, you do **not** click it first before entering a scaling factor; rather, just start typing.

When you have the items scaled and positioned correctly, click the left mouse button, click the **Done** button to exit the **Selection mode** (or press the [Esc] key).

You could then click the NC program tab, save the NC program on a floppy disk to take to your machine, or use the serial communications functions to transmit the NC program to the machine.
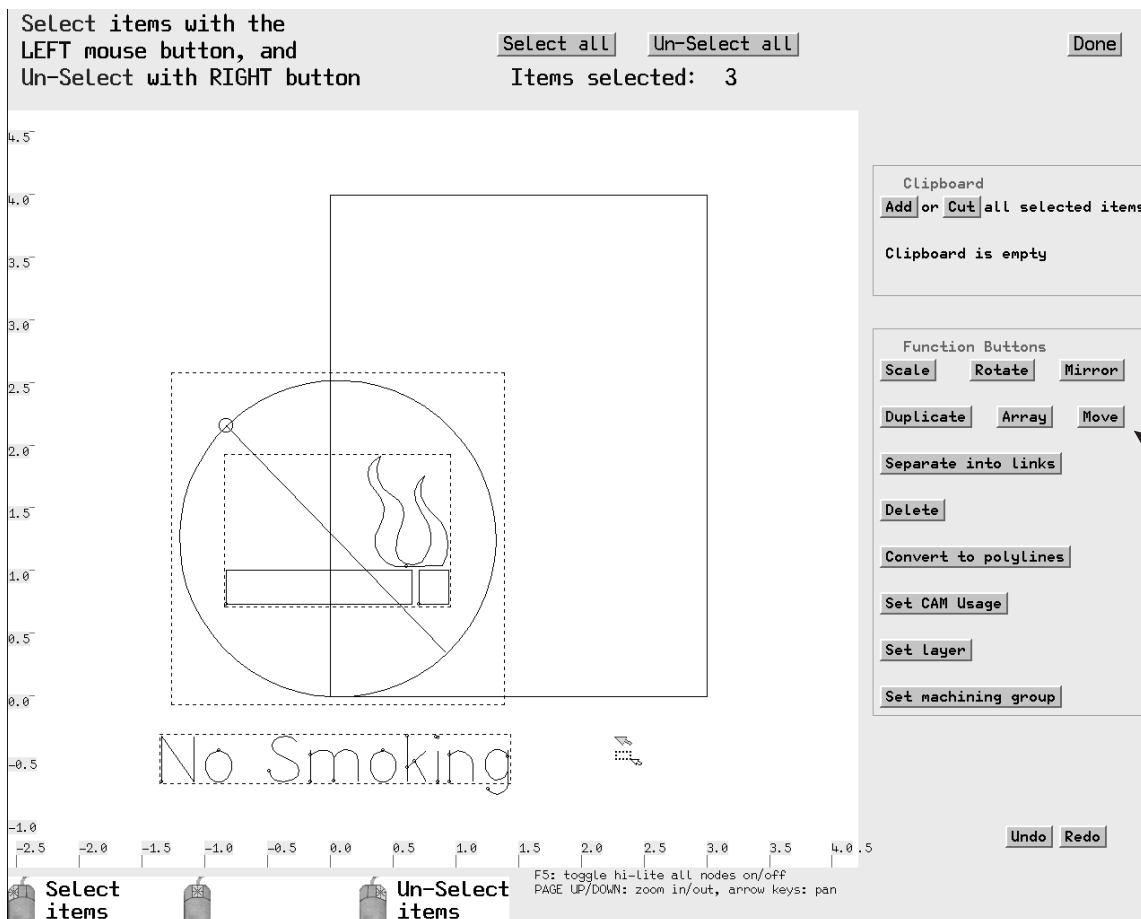

Figure 2-19

MillWrite is in its "Selection Mode".

In this mode you can select and un-select items, and modify them as a group or individually.

To move selected items, either use the MOVE button, or just touch them with the mouse. The mouse icon will change to MOVE. Then click the mouse.