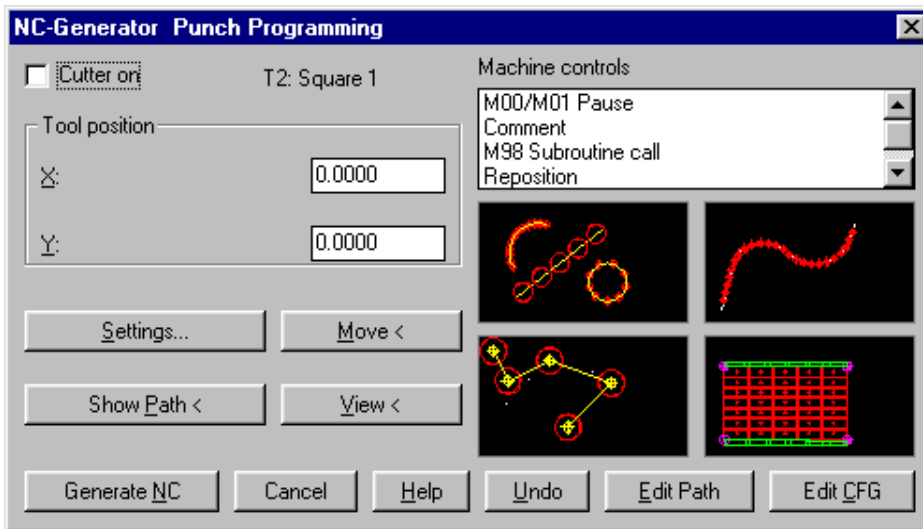


## AUTO-CODE Punch Press Programming

This chapter explains the various components found in the standard punch press interface for AUTO-CODE. Note that not every punch press interface uses all of the elements in the interface. In many custom interface cases, both the dialog boxes and basic operations of the software will be different. The descriptions in this chapter should help you interpret custom changes to the standard interface.

Punch press programming in AUTO-CODE works best with Circle and Block Insert entity objects. The center of a circle or the insert point of the block can define individual punch hits. The punch interface also works with Line, Arc, and Polyline entity objects for nibbling edges. The tool size information is multiplied by a percentage factor to determine the nibbling distance for any shape of tool. There is more information about nibbling later in this chapter.



### ***The Main Dialog Box***

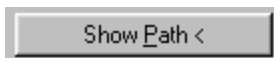
From the main dialog box, titled NC-Generator Punch Programming, you make the decisions as to what you want the machine tool to do next. The current machine tool status is shown in the upper left corner. When the punch is on, positioning the tool will result in a punch hit being output. When the punch is off, positioning the tool will not output a punch hit. The tool location can be changed by typing a new X or Y value or by selecting the Move button. The Machine controls menu is a programmable list of miscellaneous controls you can access to provide support for the type of work you need to do. Below the list box are four icons for starting the various AUTO-CODE punch press commands. From the upper left and reading clockwise, the icons are for punching geometry patterns, tracking entities, rectangular cut outs, and finding objects to punch in the drawing. Buttons at the bottom provide access to other features in the system as described on the next few pages.

**Punch on** – Indicates if the punch mode is currently on or off. For most machine tools this will correspond to a rapid movement with no punch (G0) when off or a move with punch (G1) when on. Machines that support CNC nibbling use this indicator for nibbling and non-nibbling mode enabled.

**Move** – The X-Y coordinates of the tool relative to the zero point indicated at the start of the program. These values are intended for reference only and should be changed only when it is easier to enter a new coordinate instead of showing a new point via the Move button.

**Settings** – Access the machine settings dialog box in which the tool values and other machine parameters can be established.

**Move** – Move the tool to a new location. This option is used when you want to individually locate punch or no-punch points on the drawing using the pointing device. Repositioning of the tool may be needed to avoid travel over clamped or dead areas on the table.



**Show Path** – The movement sequence of the NC/CNC path will be shown in the graphics screen. Arrows indicating the path will be drawn for each step of the program. Select a line or arc object that is part of the NC/CNC path and the sequence will continue from the selection. The following prompts will be shown when the Show Path button is selected. The distance and location for each move in both absolute and incremental values will be presented.

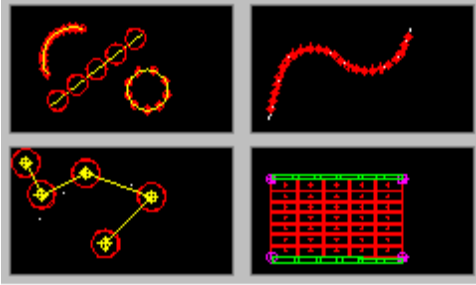
```
Move to X, Y
  dX = x.xxxx dY = y.yyyy Distance=d.dddd
<Next>/Zoom/Refresh/Done/Backup:
```

Press the **Enter** key to continue through the sequence, as <Next> is the default option. Type **Z** for zoom control options, **R** to refresh the display showing arrows for only the current move, **D** when done viewing, and **B** to back up through the movement sequences.

Show path is intended for use when viewing a program already constructed or mostly constructed. If your attention gets drawn away from AUTO-CODE, the show path operation can help remind you what you were doing

**View** – Pressing this button will cause the main dialog box to disappear, allowing you to view the drawing behind it. As in all AutoCAD commands, transparent Zoom and Pan can be used to move the display to another view while the drawing is visible.

**Machine controls** – Variable content list menu containing machine controls that can be used to implement various features of your particular machine tool. This list may be quite extensive or very sparse depending on the needs of your programming. Typical applications include table repositioning, program halts, pallet changes, and so forth.



**Punch Commands** – The punch commands are activated by selecting the icon representing the type of punch work you want to do. Options in the top row are to punch arc, circle, and line patterns or to punch along entities. The bottom row options are to punch inserts and circles or to punch/blank/edge a rectangular area. The specific operations involved for these commands are documented in later sections.

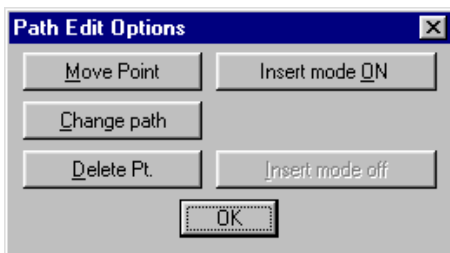
**Generate NC** – The Generate NC button is usually the last button pressed when writing programs inside of AUTO-CODE. A dialog box will appear asking what file name to use and then the translator will start. The translator takes the tool path information along with the settings information and creates an NC/CNC output file.

**Cancel** – Will exit the AUTO-CODE program and return you to the AutoCAD command prompt. AUTO-CODE updates will remain in the drawing. This option is used to add new geometry or perform other edits in AutoCAD and then return to AUTO-CODE. To return to AUTO-CODE after exit through the Cancel button, type the command NCG or select the menu entry.

**Help** – Click this button to access the AUTO-CODE online help files. Several HLP files are supplied with AUTO-CODE and this button will start the general help found in the AUTOCODE.HLP file.

**Undo** – Undoes the last AUTO-CODE command sequence initiated. Click the mouse “pick” button to continue the undo operation or press the Enter key to return to the AUTO-CODE main dialog box. Movement mistakes or control setup mistakes can be corrected immediately if caught during the programming session.

**Edit Path** – When mistakes happen in the tool path, you can correct them using the options in the edit path dialog box, Path Edit Options dialog box. This can be used to define new sequences of movement in your program as well as to adjust existing paths and points.



**Move Point** – To move just a control point (or group of points) located at the end point of some geometry, use the move point option. All control points will be shown. Make a selection near the control point of interest and then pick the new location. All associated control points should move along with it.

**Change path** – Modify an existing path by adding new points into the middle. This option is used to program avoidance moves between parts in large machines.

**Delete Pt.** – Remove control points where selected.

**Insert mode ON** – Insert complete new sequences of code into the current program at any point. This feature is helpful when adding new cuts to an older program or when adding additional tool operations into the middle of an existing program.

**Insert mode off** – Turn off current level of insert mode. Tool point will return to location prior to starting the insert mode. You can have over 32,000 insert mode toggles in an AUTO-CODE program drawing.

**Edit CFG** – Start the AUTO-CODE translation control module described in the CUSTOM.HLP file. Translation control files (CFG) are used when generating the NC output.

### ***What's a Control Point?***

Control points are the data objects of AUTO-CODE inside a drawing. When inserted into a drawing they control how the NC/CNC program will look, what tooling it utilizes, and at what speeds. Control points contain information for tool movements as well as tooling setups and machine controls.

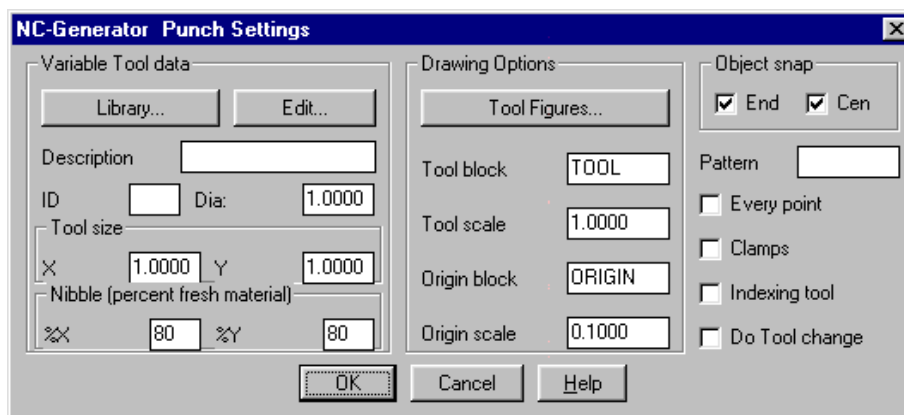
In AutoCAD operator terminology, a control point is a block containing two attributes. Do not change the structure of this block or you will cause AUTO-CODE to fail.

Control points can be embedded inside other AutoCAD blocks to create clusters of control points. You can re-use the blocks created in this manner over and over again for standard code sequences such as tool changes or advanced machine control sequences such as table changes.

For those individuals customizing AUTO-CODE, a great deal of information regarding control points can be found in the CUSTOM.HLP file in the AUTO-CODE program directory.

### ***The Settings Dialog Box***

The values in the NC-Generator Punch Settings dialog box control the machine tool standard elements, such as the tool holder selection and nibbling parameters. These settings can be established via a tool library that is an ASCII text file containing parameter values to be used.



The elements in this dialog box may vary from one machine tool interface to the next. Custom interfaces will often add or subtract data items to meet their requirements. The default punch dialog box control information is described in this document.

**Library** – The tool library selection will present a dialog box containing all the TL files found in the \PUNCH\ directory of AUTO-CODE. TL files contain parameter settings for the variables found in the settings dialog box and are the fastest way to prepare your machine settings for variable tooling setups.

**Edit** – Access to the Tool Library files for editing and selection of custom tool definitions. The tool library editor is described in the customization help file located in the main AUTO-CODE program directory.

**Description** – Provides a place to enter a tool description. The description may be used in the output of the NC/CNC code depending on the type of machine tool interface in use. Do not use the double or single quotation characters (“, ’). This will result in the description being processed incorrectly.

**ID** – The ID is the tool number or name that is typically used with the “T” address character in the output machine code. The ID does not have to be a number but can be a name or string of characters for controllers requiring more than just a turret number assignment.

**Dia.** – The tool diameter that is used for cutter compensation calculations. Nibbling does not use this value but uses the tool size information from the Nibble (percent fresh material) value instead.

**Tool size** – Size of the tool along the X-axis and Y-axis of AutoCAD. These input values are used for calculating the X step size when nibbling.

**Nibble (percent fresh material)** – These settings are percentage values (1-100) of new material to remove with the tool per punch cycle when nibbling.

**Tool Figures** – Displays a directory listing of the \DWGS\ directory inside AUTO-CODE. Not all the drawing files listed will be for tool figures nor are all drawings for punch tools. The origin drawings are for origin (zero point) marking at various scales. The tool figure selected will be displayed in the tool block edit box.

**Tool block** – Tool block selected to represent the current tool. Tool figures can be as complex as needed to convey the size and clearances of the tool.

**Tool scale** – The scale at which the tool block will be inserted. This value allows you to use the same tool figure for more than one tool. For example, you can use a one-inch circle to represent the plan view of a tool of any size by varying the scale factor. Rectangular and other oddly shaped tools will have to be drawn and used at a scale factor of one.

**Origin block** – Block name of the origin figure that marks where the machine’s zero point is located.

**Origin scale** – The scale factor at which the origin block is inserted.

**Object snap** – The two choices for **End** and **Center** point are provided as toggles. When selected, the object snaps will be enabled for point selections. These are not global settings for AutoCAD. They are used strictly for AUTO-CODE point selections.

**Pattern** – Name of the pattern to run when generating the punch point hits. Most punch machines will not require a series of M and G codes to run when punching each point but some will want to have the tool code output with each hit point. Pattern usage will vary from one machine tool interface to the next. The standard punch example interface provided does not use patterns in this nature as it simply outputs the X-Y locations for each punch hit.

**Every point** – The every point toggle controls whether the pattern should be played at every point encountered or only at the start of the cycle sequence.

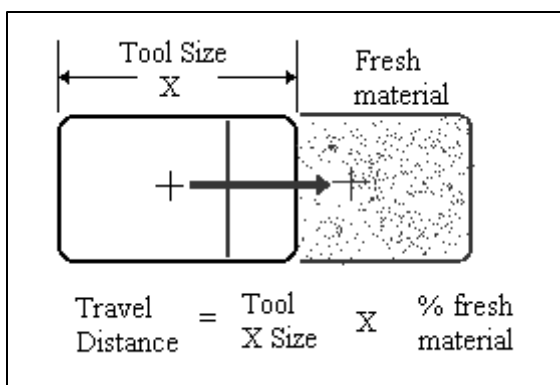
**Clamps** – Indicates the status of the clamping system for holding down the work piece. The Clamps toggle will only be available if the CLAMPON and CLAMPOFF patterns are defined for the machine tool interface.

**Indexing tool** – Indicates if the current tool selection can be rotated or indexed as punch hits are generated. Indexing tools will align with the contour being punched when using the entity object tracking option in AUTO-CODE. The pattern INDEXTOOL must be defined for indexing to be enabled and for this option to be enabled in the dialog box. When selected, the pattern INDEXTOOL will be used at every punch point output. The pattern name and every point toggle will both be updated automatically.

**Do Tool change** – The tool change toggle will cause the tool change event to take place when the OK button is selected on the settings dialog box. This event will cause either the AutoLISP tool change function or the tool change pattern to be run. See the example PUNCH interface and the CUSTOM.HLP file for more detailed information concerning the programming of these features.

### **AUTO-CODE Nibbling**

AUTO-CODE nibbling is based on the input parameters found in the NC-Generator Punch Settings dialog box. The percentage of fresh material is multiplied by the tool size to determine the distance to travel to the next punch point. When the travel is parallel to the X or Y-axis of AutoCAD, the values are used directly as input.



For example, if a rectangular punch were being used that had an X-axis size of 2 inches and the X-axis nibbling value was set to 75%, the table would move 1.5 inches between strokes of the tool.

This value was determined by multiplying 2 by 75 and dividing by 100 (0.75 or  $\frac{3}{4}$ ).

The X-axis values are also used when nibbling a tool along an entity such as a polyline. It is assumed that either a round tool is being used

in these cases or the tool can be indexed (rotated to align with the object contour).

The Y-axis values only come into play when either punching along the Y-axis of AutoCAD or when punching a line edge. When punching a line edge at an angle, the X-axis value is used.

The values to use for nibbling are based on shop preferences, tool rigidity, and the material.

By using a percentage factor greater than 100 you can force AUTO-CODE to leave tabs between each of the hits. When used with a long slitting tool, the tabs will help hold the material in place while other areas are worked.

***Using the Tool Library***

The tool library can be used to set the following values. See the \PUNCH\ directory inside AUTO-CODE for examples of how these variables can be used.

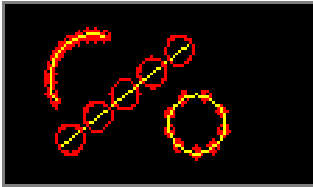
<b>Variable</b>	<b>Usage</b>
BLOCK	Tool figure block name found in the AUTO-CODE DWG directory
DESC	Tool descriptive text
DWELL	Dwell time (optional)
FEEDRATE	Tool feed rate factor (optional)
NUMBER	Tool ID number
PATTERN	Pattern name to run
SCALE	Tool insert scale factor
SIZE	Diameter of tool
TOOLX	Size of tool along X-axis
TOOLY	Size of tool along Y-axis
USER1 .. 5	User variable settings can be used for whatever the interface requires
XOVL	Percentage (1..100) of fresh material for nibbling along X-axis
YOVL	Percentage (1..100) of fresh material for nibbling along Y-axis

The following example shows the tool library file values for a quarter inch center punch. The tool block used is named TOOL (a 1" circle) and it will be inserted at a ¼ scale factor to match the size of the tool. Note that information in the tool library can be either numeric or text.

```

NUMBER=6
DESC=1/4 SQUARE
BLOCK=TOOL
SIZE=0.250
SCALE=0.25
XOVL=80
YOVL=80
TOOLX=0.250
TOOLY=0.250
    
```

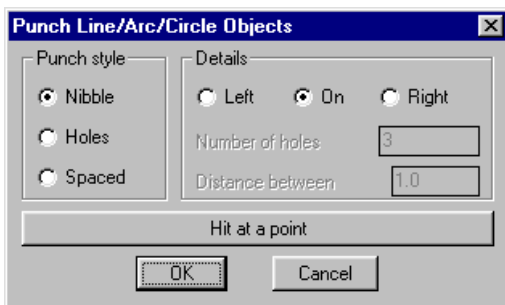
## Punch Arc, Circle, and Line Patterns



Many punch press operations involve placing holes along linear or circular patterns. AUTO-CODE allows programmers to define punch hits by selecting the object and either nibbling it or hitting a specific number of points along the entity. Bolt hole circles and other standard punch shapes can be quickly programmed using this feature. Nibbling along one of these entity objects can be done either on the object itself or to either side of the object.

When the icon shown above is selected from the main NC-Generator Punch Programming dialog box, the following dialog box titled “Punch Line/Arc/Circle Objects” will appear. From this dialog box you select what kind of punch treatment you want applied to objects that will be selected. After selecting the punch treatment, you select the OK button to start the selection of line, arc, and circle objects.

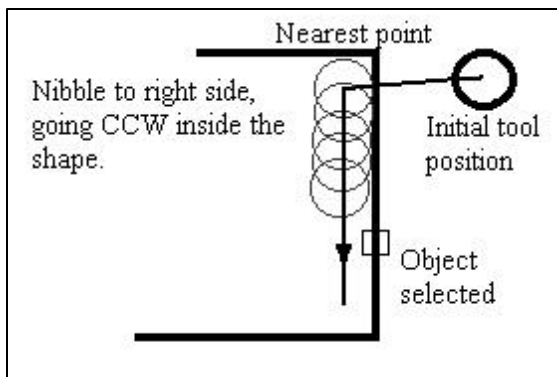
First determine if the objects will be nibbled or not. When nibbling, you can direct the punch to be either directly **On** the object selected or located to the **Left** or **Right** of the object. The Tool X size will be used to compute the offset size when the angle of the line selected is any angle other than parallel to the AutoCAD X-axis. When the line selected is parallel to the X-axis, the Tool Y size will be used.



Nibbling will take place along the entity object with the first and last hits being offset by half the tool size in use. That is, when you select a line or arc the system will place the punch tool along the line or arc selected with the edge of the tool being at the edge of the line object.

The side for offset is determined by the travel direction along the object from the nearest point on the object. The nearest point is the nearest end point to the current tool position as the object is selected. The travel direction along an object is from the closest end point to the furthest end point. For circles, the CW and CCW options are presented after the object has been selected.

For example, punch the inside of a shape with the tool initially located outside the shape to the upper right.

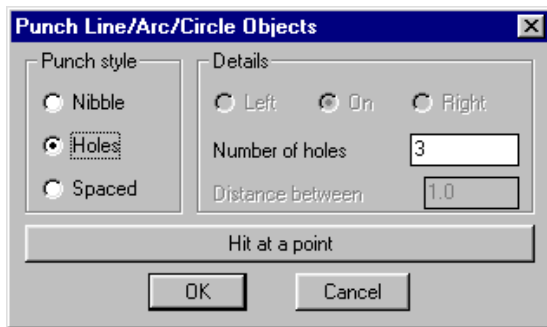


Assuming that the shape consists of lines and arcs and that you are going to go clockwise around the shape, select the right side. Selection of the first object inside the shape is critical. This first object must be going in the correct direction for the side you are cutting. That is, the object selected should have the direction from the current tool point to the closest point of the object to the next point on the object all going in the same direction. In the figure, the tool starts near the top of the line

selected. With nibbling set to the Right side, the punch moves to the lower point. If this edge represented the inside edge of a cut out we would be cutting it in a CCW direction.

As you are writing a program, the notion of left and right of the geometry selected becomes obvious and intuitive if it is not already.

When punching a circle object, the starting point and direction values are requested as the object is selected. Do note that nibbling a complete circle may or may not be desirable depending on the material and machine tool configuration. As the tool approaches the last hits, the material inside the circular area just nibbled may begin to shift. Sometimes circular areas are punched as a series of arcs with some material left between as a “break tab”. This depends greatly on the size of the circle and the nature of the material and material handling devices available.



The line, arc, and circle entity objects can be used as the essential geometry for a pattern of punch press hits. You can either select Holes (and enter the number of holes to punch) or select Spaced (and enter the distance between each hole to be punched).

As the Punch style choices are made, the appropriate detail item will be enabled for input and the other details turned off.

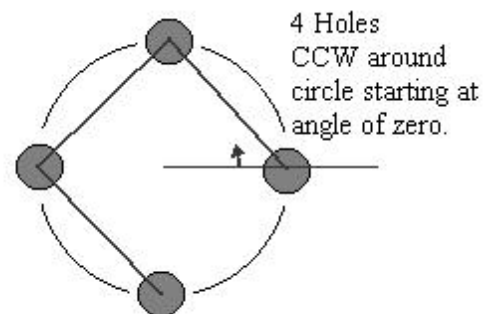
When specifying the number of holes, they will be equally spaced along the object selected. For lines and arcs, the end points of the objects will be included and act as the punch points for the first and last hits in the sequence. For circles, the starting angle and direction will be requested as in nibbling.

The Spaced option was provided for placing the punch along an object at even intervals. Only the starting point (closest point on object to current location) will be punched exactly. The spaced hits will continue to the opposite end point, but may not actually hit that end point depending on how long the object is.

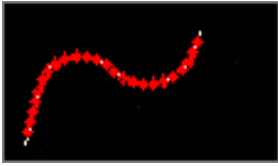
**Circular bolt-hole** patterns can be created by specifying the number of holes. Once the OK button is pressed, the system will ask for an object to be selected. When a circle is selected, the starting angle and direction around the circle is requested.

The direction is specified as either clockwise (CW) or counterclockwise (CCW).

The starting angle default is the angle from the center of the circle selected to the current position of the tool. In most cases it is best to input the angle to the first hole via the keyboard unless a point exists on the object to locate exactly.



## ***Punch along Entities***



AUTO-CODE provides a tool for placing the punch along any continuous entity in AutoCAD. Normally this command is applied to polyline objects to result in a nibbled cut all the way along the object. It can be applied to any AutoCAD entity that accepts the DIVIDE command for breaking the object up into small segments.

There are no further dialog box inputs associated with the punch along entities command function. Instead, the Machine Settings values are used directly for the nibbling distance calculation. When the icon is selected from the NC-Generator Punch Programming dialog box, AUTO-CODE will prompt for the selection of objects.

```
Punch along an entity  
Pick an entity:
```

You can select any number of entities for punching. When selected, the end points will be punched along with all the segments determined by the punch stroke distance. When you are done selecting objects in this manner, the system will ask if you accept these punch points and want to process them into X-Y tool hits.

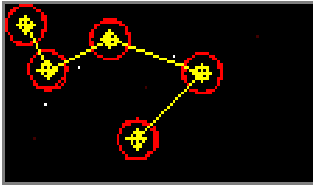
```
Accept <Y>?
```

Press the Enter key to accept the tool hit locations or enter “N” to remove the punch hits and return control to the main dialog box.

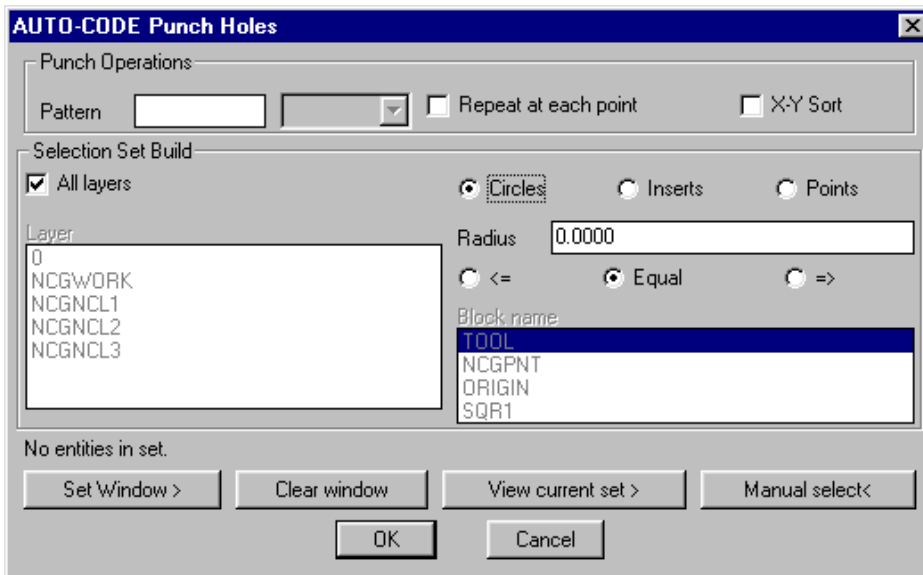
When the tool hits are accepted, AUTO-CODE will ask for the starting point. This starting point is the location from which the X-Y hit locations will be sorted. The system will move from one location to the next looking for the nearest punch point to the one just finished.

*AUTO-CODE Operations trick:* Suppose you want to use the punch hits, but remove a few of them in the middle to leave a gap in the nibble. When the “Accept <Y>?” prompt is displayed, press the Escape key to force AUTO-CODE to exit. You can then erase the tool hit blocks you want to remove and then start AUTO-CODE again. This time select the “Punch Circle and Insert Points” option and locate the tool block figures. The tool block figures will have the same name as the current tool block and be located on a layer named NCGTOOLINSERT. If you intend to do this with more than one object, make all the edits at once so as not to cause confusion in the automatic punch hit location.

### Punch Circle and Insert Points



A common practice in drawing for punch press programming is to show punch out locations using circle and block insert objects. AUTO-CODE can be set up to seek out these circles and block inserts inside the drawing and place a punch hit at their location. AUTO-CODE uses a filtered search system as shown in the AUTO-CODE Punch Holes dialog box that appears when the icon for punch circle and insert points is selected from the main NC-Generator Punch Programming dialog box.



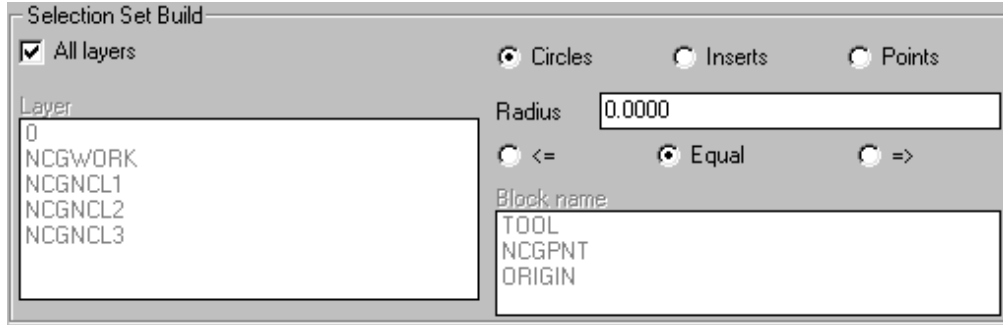
**Punch Operations** – These options control what will happen at each punch point and if the points selected are to be sorted using a simple nearest point system.

**Pattern** – The name of the pattern to run. The patterns are used to define the exact G and M code sequences needed to initiate the punching sequence. A pattern is also used when programming an indexing tool.

**Repeat at each point** – Toggle indicates if the pattern is to be repeated at each point. When selected, the pattern will be played over and over again for each point in the selection set. This option is typically selected when using a pattern for an indexing tool where the angle of tool insertion must be output at each punch location.

**X-Y Sort** – A toggle to turn on the nearest point search system when programming the entities selected. When off, the system will drill the holes in the order you select them. When on, the nearest point system is used to find the next hole to punch.

**Selection Set Build** – A selection set is a collection of entity objects from the AutoCAD drawing database. AUTO-CODE can automatically locate Circle and Insert entity objects based on the criteria established in this dialog box.



**All Layers** – Toggle to enable a more refined search of the drawing based on specific layer selections. When enabled, all drawing layers are searched. When not enabled, the layer list is displayed so those specific layers to match can be picked.

**Layer** – List box that displays the layer names within the current drawing. When the “All Layers” toggle is not enabled, a single layer name to match can be selected.

**Circles** – Instructs AUTO-CODE to locate circle objects in the drawing. All circles can be selected or just those matching a specific radius relationship.

**Inserts** – Instructs AUTO-CODE to locate block insertions in the drawing based on the insert name selected.

**Points** – Instructs AUTO-CODE to locate point objects in the drawing.

**Radius** – This is the radius to use when locating circles for the drill operations. Enter zero to have the program find all of the circles in the drawing. Enter a numeric value to have the program locate circles that either match that size exactly or are greater than or less than the value input.

<=   
  Equal   
  =>

– Radio button selection of the relationship between radius values of the circles and the value input. The “<=” option will test for circles that have a radius that is equal to or less than the input value, “=>” will look for circles of the same size or larger, and Equal will match the size of the input value for radius exactly.

**Block names** – A list of all the known block names in the current drawing. Select which one represents the holes to be drilled. This entry is enabled only when the Inserts option has been selected.



**Set Window** – Returns display to the AutoCAD screen so that a window (rectangular region) can be specified in which to search for the entity objects desired. A window can be used to reduce the number of objects selected or to isolate only that part of the drawing that is relevant.

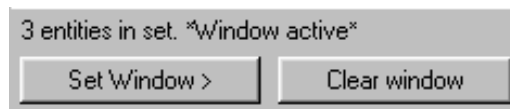
**Clear window** – Clears the rectangular window region setting so that the entire drawing is searched for the entity objects. Window settings are remembered from one run of the drill dialog box to the next within the same AutoCAD session.

**View current set** – Returns display to the AutoCAD screen highlighting the entity objects that are currently selected for drilling. The window box, if one has been defined, will be shown on the screen as well.

**Manual select** – Returns display to the AutoCAD screen so that the entity objects can be selected individually for the punch operation. Manual selection will override the layer, radius, block name, and window selection criteria. Only those objects selected manually will be included in the selection set.

**OK** – When the OK button is picked, AUTO-CODE will follow your selections and automatically locate the circles or inserts requested.

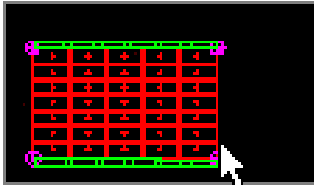
**Cancel** – Returns control to the AUTO-CODE main dialog box and does no drilling cycles.



As the values in the dialog box are adjusted, the number of entity objects found to match the settings will be displayed just above the Set Windows button. The running count will be changed each

time a different criterion is selected.

## Punch Rectangular Shape



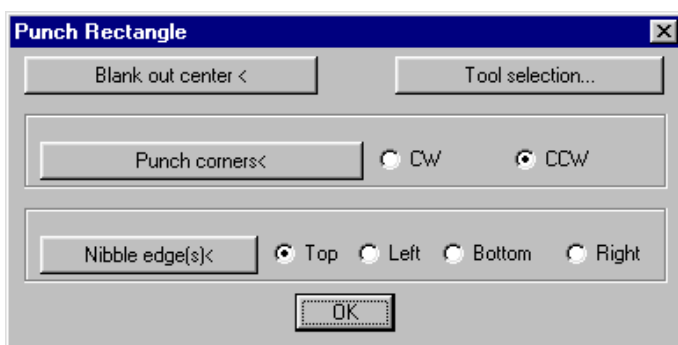
A common shape to cut out with a punch press is a rectangle. The punch rectangular shape is a single command that performs multiple operations on a rectangular region. Rectangles can be blanked out by having the interior punched clean, the corners punched, and the edges nibbled. The selection of which (or all) operations to perform is up to the application at hand. Tools can be changed between each of the operations without redefining the rectangular region allowing for specialty tools to be used for each step.

When the icon shown above is selected from the main NC-Generator Punch Programming dialog box, the operator is prompted to supply two points that define the rectangular area. There does not have to be geometry for the rectangle; however, the presence of the geometry does make it easier to select the proper points.

Punch rectangle: First corner:

Two points will be requested that define the corner limits of the rectangle. They can be located using the pointing device or by typing in the AutoCAD coordinates. If just the size and a corner point are known, locate the known corner point and use the AutoCAD relative coordinate entry method using the at sign “@”. For example, to locate a 15,25 rectangle with an upper left corner point located at 17.5,12 in the drawing, enter the point 17.5,12 first. Then enter the size of the rectangle as @15,-25. Note that the Y-axis value used was -25. This was because the point defined was in the upper left corner and to show the opposite (lower right) corner, we add in X and subtract in Y.

After the two points defining the limits of the rectangle have been input, the Punch Rectangle dialog box will appear from which you select what operations are to be performed on the rectangular region.



Selecting the buttons on this dialog box will activate the various command options. Each row in the dialog box is a different operation to be performed on the rectangle. The sole exception is located in the upper right corner. The **Tool selection** button brings up the machine settings dialog box so that another tool or turret position can be selected. Rarely will the same tool be used for all operations involved in

punching out the rectangle and this button provides a quick jump to the tool library to make the appropriate selections.

**Blank out center** – Uses the current tool to remove all material in the middle section of the rectangle. Material will be left along the edges and corners for the finish operation. Blanking, or as it is sometimes called “Slugging”, the center of the rectangle saves the operator the step of stopping the machine to remove the large slug left after nibbling just the edges. The choice to use

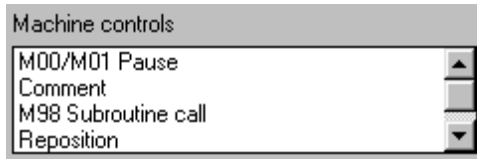
the blank out center macro depends greatly on the speed of the punch operation and the handling of scrap material.

**Punch corners** – Uses the current tool to punch a hole at the four corner points. Use the radio buttons to select the direction around the rectangle for the punches. CW moves the tool in a clockwise direction, while CCW moves the tool in a counterclockwise direction. Corner punching is typically used when a shaped or very sharp tool is to be placed at each corner to make a clean punch.

**Nibble edges** – Uses the current tool to nibble out the selected edge. The edge nibbling operation generally calls for a rectangular or square tool with a straight edge. The rectangle edges are punched as directed in the radio buttons starting from the corner closest to the current tool location. It is not uncommon to switch tools between the top/bottom and left/right edges. The nibbling parameters from the machine settings dialog box are used to compute the hit locations.

**OK** – Processes the punch requests as defined in the Punch Rectangle dialog box and returns control to the main dialog box.

**Additional Machine Control Functions**

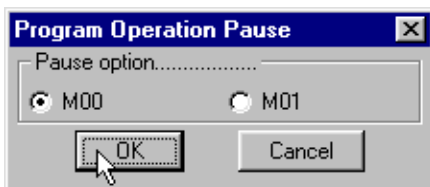


The functions found in the Machine controls section of the main dialog box will vary from one interface to another. The following commands are from the standard PUNCH interface and can be used in most custom interfaces.

You can add or remove machine control functions by changing the CTL file for the interface in use. Details about the CTL file can be found in the CUSTOM.HLP file accessible from the AUTO-CODE Help menu. Machine control functions can call custom AutoLISP programs of your own design or patterns that are part of the interface in use. The functions presented below are all written in AutoLISP and can be found in the LSP file for the interface or are part of the base AUTO-CODE VLX module.

CTL Entry	Function performed
M00/M01 Pause	AutoLISP function to output the pause code options into the program sequence.
Comment	AutoLISP function for user entry of comments into the program code.
M98 Call Subroutine	AutoLISP function to call a subroutine up using the M98 code.
Reposition	AutoLISP function to perform repositioning. Only generates comment lines in the generic PUNCH interface since repositioning varies greatly from one controller to the next.
M30 End Program	Pattern to output the M30 closing statements for a program.

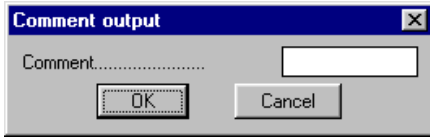
**Program Operation Pause**



Issue a program pause using the standard M00 or M01 syntax. Program pauses are used to allow the operator to

do something while the machine tool program waits to restart after the “go” button is pressed at the controller.

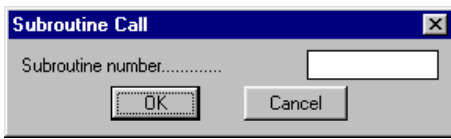
Typical reasons to pause are to allow slug removal, gauge checks, clamps or material checks, or even to load new stock manually.



#### **Comment output**

Enter text for a comment to be output in the NC program file at the current position in the program.

The comment text can exceed the window limits but should be kept to a minimum, as most machine tool controllers will only display a limited number of characters per line.



#### **Subroutine Call**

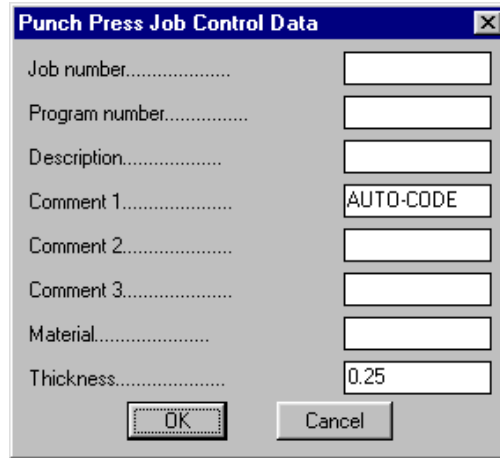
Subroutines can be called up by just supplying the name. In most controller systems, the name is the program number it was stored under.

Subroutines are useful for standard operations such as loading and off-loading, locating local zero points, repositioning clamps, and starting or stopping the punch ram system.

If you know AutoLISP, you can customize these routines even more for your purposes. Customization information specific to AUTO-CODE is contained in the CUSTOM.HLP file that can be accessed from the Help menu in the AUTO-CODE pull down menu. See AutoCAD Visual LISP for help in writing AutoLISP or modifying AutoLISP programs.

### Job Control Data Dialog Box

The Punch Press Job Control Data dialog box collects data from the programmer about the program to be created. This information includes the program number, material specifics and comments for the operator to be included in the output file.



The following NC code template shows the output that will be generated when running the standard PUNCH.LSP interface. The values from the dialog box will be placed in the code instead of the heading names.

```
%
Oprogram number
(Job number - Description)
(Material - Thickness)
(Comment 1)
(Comment 2)
(Comment 3)
N10G90
N12G70
```

Note that you can customize the interfaces so that your output may or may not be the same as what is shown above. This output shows what is obtained using the general purpose PUNCH interface supplied with the AUTO-CODE package. AutoLISP programmers are encouraged to look at PUNCH.LSP for an example of how to customize the AUTO-CODE package for your specific applications.

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