



ACE Structural Engineering Applications LLC

ACE FrameWorks Utilities

Slab Hole Punch Documentation

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Slab Hole Punch Program (ACE_HP.MA)

(Versions - FWP 3.1.x.x/3.2.x.x rel 2.0.7 & FWP 7.0.x.x rel 7.0.7 & FWP 7.1/7.2/7.3 rel 6.0.7 & FWP 8.0.x.x rel 8.0.7 & FWP 9.0.x.x rel 9.0.7 & FWP 10.0.x.x rel 10.0.7 & FWP 11.0.x.x rel 11.0.7 & FWP 12.0.x.x rel 12.0.7)

The slab hole punching utility facilitates easy hole punching for slabs. This utility allows two techniques for selecting a slab: namely, “selection set mode” or “individual selection”. With the selection set mode technique, a slab(s) is selected using the selection set tool (note that only one slab is punched at a time). With the individual selection technique, a slab is picked interactively with a datapoint. Under either technique, the hole punch has both an interactive and a batch mode. The puncher can punch rectangular, square, circular or slotted holes at any specified angle. The hole may be a complete or partial hole punched from either the top or bottom of the slab. In the interactive punch mode, an outline for the hole is displayed when a slab has been selected via either mode and a valid hole has been defined. In the batch punch mode, an outline for all of the holes is displayed when a slab has been selected via either mode and a valid punch file (.HOL) has been defined. For either situation, the hole outline is hilited when the hole is inside or extends the boundary. If the hole is outside the boundary, the hole is displayed in red. Only the holes where the outline is inside or extends the boundary (outline hilited) may be punched. If a hole is completely outside the boundary (red outline), may not be punched. The hole puncher can greatly speed the hole punching process in the interactive mode and is even more powerful in the batch mode. The hole punch is initiated by selecting the general utility Hole Punch from the ACE_FPL menu. The hole punch will start in selection set mode but can be toggled to interactive select at any time. If a selection set is active at startup, the first valid slab in the selection set will be ready to punch.

“selection set mode”

For selection set mode, create a selection set containing a slab or multiple slabs to be punched. Selection set may contain invalid elements, the first valid slab will be displayed. If multiple valid slabs exist, the first will be presented and a button to cycle through and select specific slab will be presented. (Slab can be created before or after the Hole Punch is started). If holes are desired, press the Activate Hole Punch button. The interactive hole punch dialog box will be displayed (see page 4). Select either interactive or batch mode.

“interactive select”

Change button “selection set mode” to “individual select” if a selection set is active it will optionally be dismissed. Slab can now be located and accepted. Once a Slab is accepted, it can be re-selected at any time. If holes are desired, press the Activate Hole Punch button. The interactive hole punch dialog box will be displayed (see page 4). Select either interactive or batch mode.

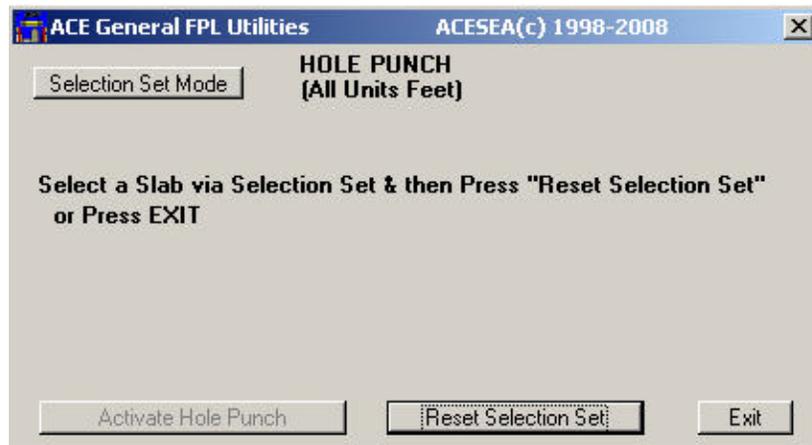
In the interactive punch mode, rectangular, square, slotted and round holes can be punched repeatedly. Simply specify the size and location and press the Punch Hole button. An outline of the hole is displayed in temporary graphics. The hole outline can be redisplayed by pressing the redisplay button.

In the batch mode, select the batch definition file and press the Punch Holes button. An outline of the holes is displayed in temporary graphics. The hole outlines can be redisplayed by pressing the redisplay button. A sample batch files is included with distribution of the program named ACEBATCH.HOL. The format for this ASCII file is very simple. A sample file and the command definition are discussed in detail later in the documentation. The search directory for batch files may be specified with the environment variable ACE_HP_FILE. If a search directory is not specified, the root on the C drive will be used (c:\).

A great way to utilize the batch capability is to keep track of a given slab penetrations in either a database, spreadsheet, ASCII file etc. Then when hole requirements change, the holes can be quickly re-punched with the following steps. First, delete all holes in the existing slab. Next, create the new batch file from database or whatever. Finally, run the batch capability for the Slab Hole Puncher. A large number of hole punches will take a while but not nearly as long as the old manual approach.

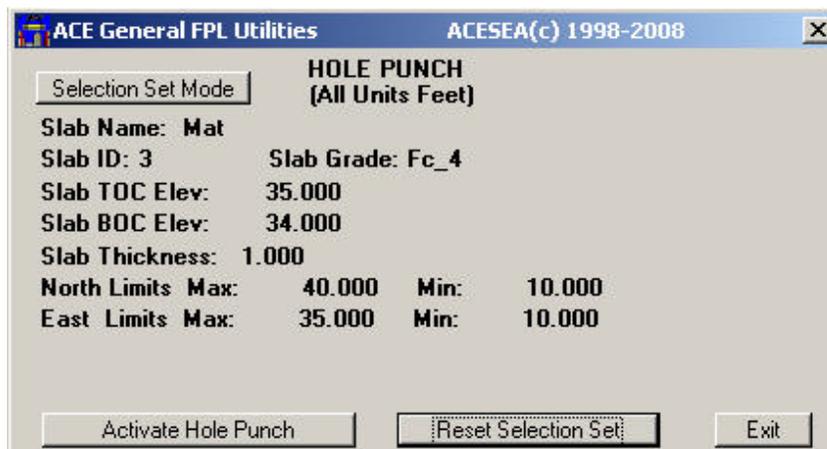
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Selection Set Mode



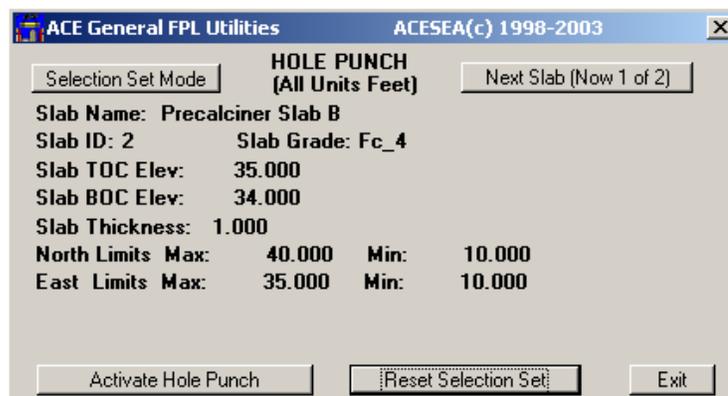
Opening Dialog Box w/o Slab Selection

When the Hole Punch is activated, either the dialog box shown above or the dialog box shown below will be displayed. If a slab is not currently selected, the dialog box above will be displayed. Simply select a slab and then press reset selection set and the dialog box shown below will be displayed. If this is the correct slab, press Activate Hole Puncher to display the interactive dialog box shown on page 4.



Opening Dialog Box w/ Single Slab Selection Set

The hole puncher behaves the same way for both the Selection Set Mode & the Interactive Select with the one following difference. If the Selection Set Mode is utilized with multiple valid slabs, the slab remains active when returning from the Activate Hole Punch Option and the next slab may be selected by present the Next Slab button. For both Selection Set Mode & Interactive Select, the current slab remains active when returning from punch dialog box. If multiple slabs are in selection set dialog box appears as follows:



Selection Set Mode w/ Multiple Slabs

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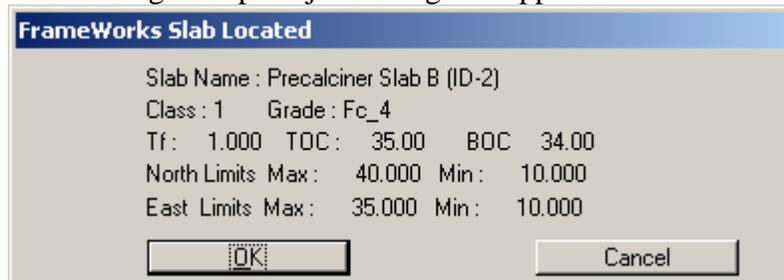
Interactive Select



Opening Dialog Box w/o Slab Selection

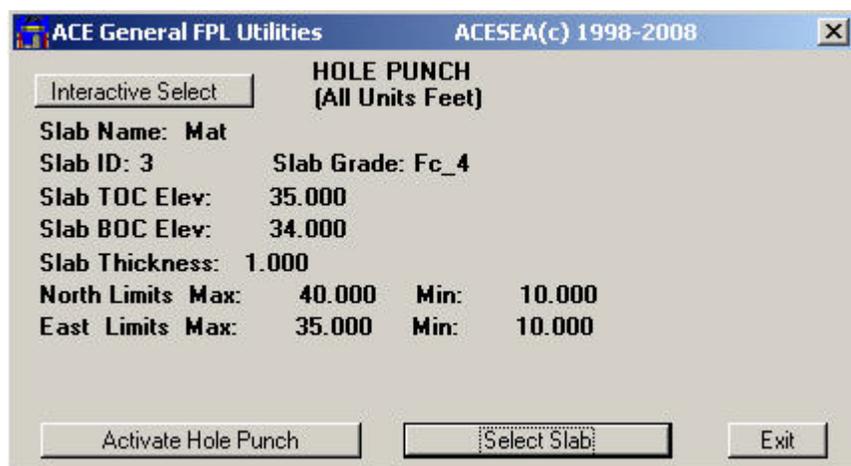
When Interactive Select is activated, either the dialog box shown above or the dialog box shown below will be displayed. If a slab is not currently selected via a selection set, the dialog box shown above will be displayed. Simply press the Re-Select Slab button and select a slab. The dialog box shown at the bottom of this page will be displayed when a slab is located. If this is the correct slab, press Activate Hole Puncher to display the interactive dialog box shown on the next page.

When a slab is selected, the following Accept/Reject dialog box appears:



Dialog Box when Slab is Located

If the slab is accepted (OK), the following dialog box appears:



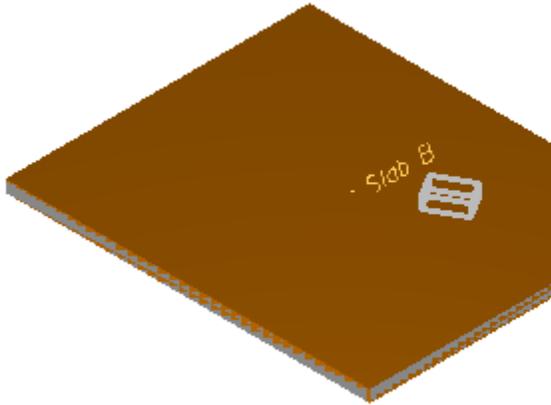
Opening Dialog Box w/ Slab Selection

The hole puncher behaves the same way for both the Selection Set Mode & the Interactive Select with the one following difference. For both Interactive Select & the Selection Set Mode, the slab remains active when returning from the Activate Hole Punch Option.

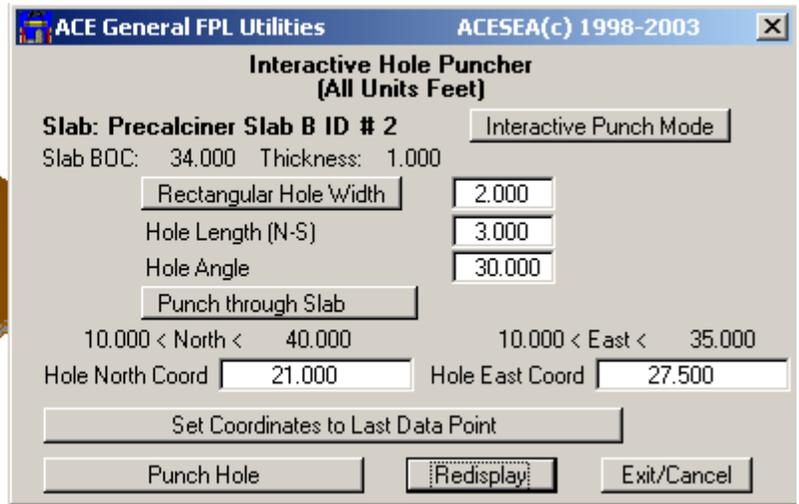
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Interactive Punch Mode

The interactive mode allows holes to be defined and punched interactively. Circular, square, rectangular and slotted holes may be punched. Rectangular, square & slotted holes may be rotated. Complete holes or partial holes may be punched. A partial hole may be punched from the top or bottom of the slab. If a hole thickness greater than the slab thickness is specified, a complete hole is punched. An outline for the hole is displayed when a slab has been selected via either mode and a valid hole has been defined. If the hole is inside or extends the boundary it is hilited. If a Hole is off the boundary it is displayed in red. The figure left below shows the display of a valid hole for the rectangular definition show in the dialog box at the right below.

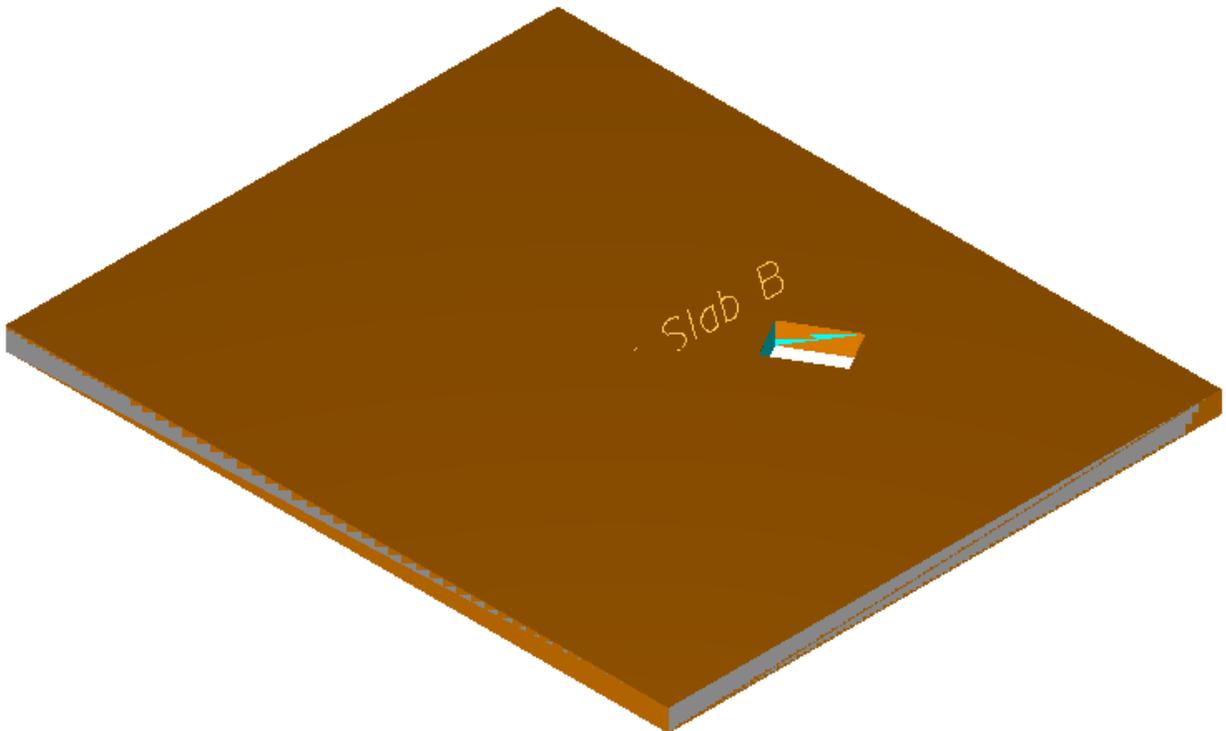


Slab w/ Hole Hilited



Dialog Box for Interactive Mode

If the punch hole button is pressed, the slab would look as shown below.



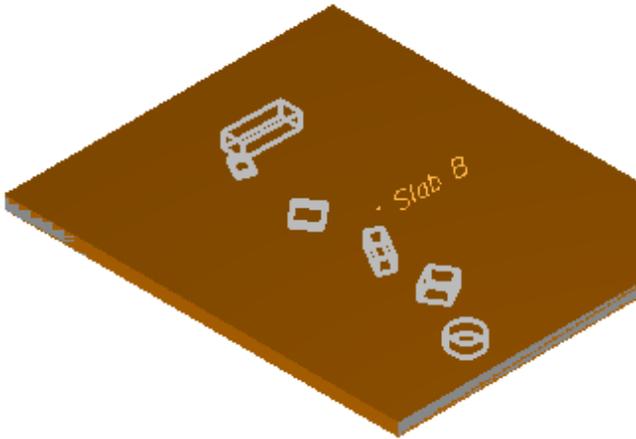
Slab after Hole has been punched

After punching, additional holes may be punched as desired. If a punch is attempted where a hole exists, FrameWorks will display a error message. Press "Exit/Cancel" to select another slab for processing.

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Batch Punch Mode

In the batch punch mode, a batch file is first selected. The batch file is then scanned for valid holes. The hole count for valid circular, rectangular and slotted holes is displayed on the dialog box. If invalid holes are encountered (bad definition or hole is off the slab boundaries) the number of invalid holes is displayed. Valid holes & holes off the slab boundary are displayed. Holes which are inside or extend the boundary are hilited. Holes which are off the boundary are displayed in red. If the Punch Holes button is pressed, the holes will be punched. The batch option supports the same type holes as the interactive option (see Hole Punch Batch File Input in ensuing sections). The figure left below shows the display of 6 valid holes from the sample .HOL file on the next page. The dialog box right shows the results of reading the .HOL file.

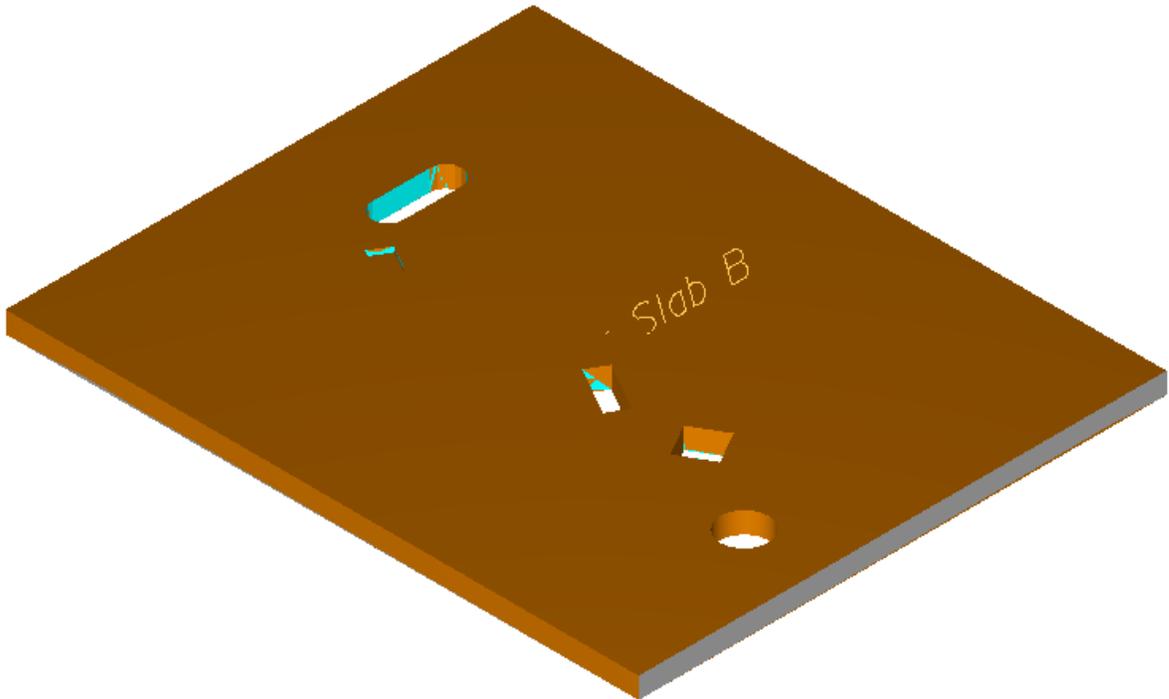


Slab w/ Holes Hilited



Dialog Box for Batch Mode

If the punch holes button is pressed, the slab would look as shown below.

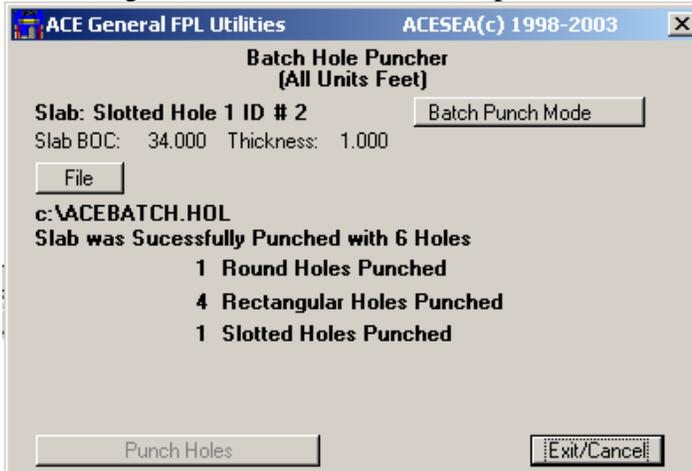


Slab after 6 Holes have been punched

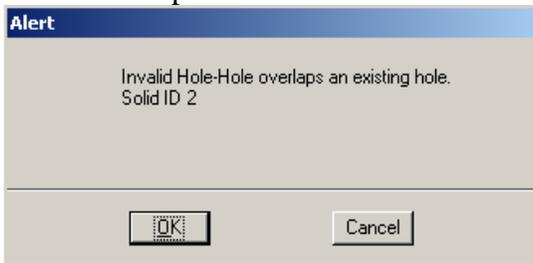
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Batch Punch Mode (con'd)

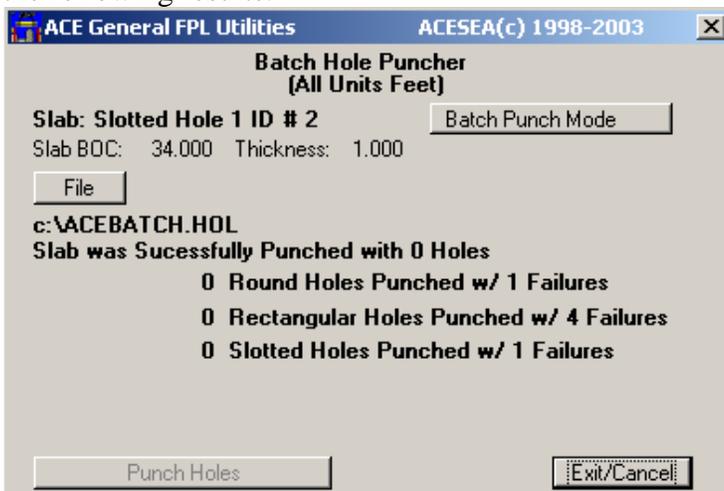
The dialog box will indicate the batch punch results as shown below:



After batch punching, the punch holes is disabled until another or the same slab is reselected. If an attempt is made to punch a hole where a hole presently exists, the punch will of course fail. An ALERT dialog box from FWP will be presented and OK/Cancel will have to be pressed. Such a dialog box is shown below:



For the slab above a complete re-punch of the slab when it was already punched would generate six alerts and the following results:



After punching, another .HOL file may be selected and/or the interactive punch capabilities may be utilized on the same slab. Press "Exit/Cancel" to select another slab for processing.

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Sample Batch Hole Punch Batch Input File

- All records that start with a blank are comments

Hole Punch Batch Input File

```
UNI      ENG  FEET
OFF      15.0  10.0
HOL      3.5  3.5   C   2.250 0.0          NAME Circular Hole
HOL      6.0  8.0   S   1.725 30.   0.0      NAME Square Hole
HOL      6.0  12.5  R   2.625 1.000 60. 0.0    NAME Rectangular Hole
HOL      6.0  23.0  R   1.500 1.000 60. .25   NAME Rect Partial from top
ELE      50.0  .25
HOL      6.0  18.0  R   2.125 1.750 40. -.25   NAME Rect Partial from bottom
ELE      OFF
HOL      9.5  25.0  SL  4.250 1.500 0.   0.0    NAME Slotted Hole
```

Six holes are defined in the batch hole punch file shown above. The offset command has been placed such that all holes will be offset. The first four holes are elevation independent. The fifth hole is elevation dependent and will only be punched if the slab/solid in question has a elevation range (TOC to BOC) which includes the elevation "50.25 to 49.75". If the range is not specified a zero value is utilized. After the fifth hole, the ELE OFF command is issued to turn off elevation dependence. The sixth hole is elevation independent and will be punched regardless of slab/solid elevation.

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Hole Punch Batch File Input Format

Command Definition

- **Valid Primary Keyword Commands : (UNI, OFF, HOL, ELE)**
- **Each record must begin with a valid primary keyword or it is ignored**
- **All records that start with a blank are considered comments**
- **The commands/keywords (records) may be placed in any order however the order is significant**
- **The components of a given command (record) must all be present and in the order shown**
- **There are only four valid commands in the Hole Punch Batch Input file however the "place hole" (HOL) command takes four different forms depending on the type of hole. The four hole types supported are C-Circular, S-Square, R-Rectangular and SL-Slotted.**
- **All Keywords Must Be Capitalized**

UNIT Command - Units Command (optional command)

UNIT {UNITTYPE} {UNIT}

where :

{UNITTYPE} May be ENGLISH (feet) or METRIC (meters).

If units is not specified it is assumed that the units match the current model units.

{UNIT} Must be FEET or INCH for ENGLISH (default feet) or must be METER or MM for METRIC (default meters).

If unit is not specified, it is assumed that the units are feet for English & meters for metric.

Units may be changed at any time but be aware that the properties (in attached library) for the member specified must match the current model units.

OFF Command - Offset Command (optional command)

OFF east_cord north_cord

where :

east_cord is offset to be applied to all East coordinates.

north_cord is offset to be applied to all North coordinates.

If command is utilized both coordinates must be provided.

Once command is used offset remains in effect until a new offset is specified.

Command may be specified multiple times.

ELE Command - Elevation Association Command (optional command)

ELE elevation_value elevation_tolerance

where :

elevation_value is elevation to be associated with subsequent HOL commands.

The elevation value may be a numeric value or it may be "OFF" to disable subsequent associations.

elevation_tolerance is a plus-minus tolerance to be applied to TOC & BOC as shown below

EQUATIONS: $(\text{elevation_value} + \text{elevation_tolerance}) \geq \text{BOC} - 2 \text{ UORS}$ AND
 $\text{elevation_value} - \text{elevation_tolerance} \leq \text{TOC} + 2 \text{ UORS}$

NOTE: The ELE command is optional and if it is not provided, holes defined with HOL commands are elevation independent (default condition). If an ELE value is defined (ELE is active) when a HOL command is encountered, the current ELE value is compared to the elevation range of the current slab. If the ELE value is within the elevation range, the hole is punched otherwise it is ignored. Once an ELE value command is encountered, ELE remains active unless the following command is issued: ELE OFF

The ELE command may of course be specified multiple times.

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Hole Punch Batch File Input (continued)

HOL Command - Hole Command to place a Circular hole

HOL east_cord north_cord C diameter thick NAME name

where :

- C Keyword specifying circular hole
 - diameter is the hole diameter
 - thick is the hole thickness
 - a value of 0.0 indicates a complete hole
 - a positive value indicates a partial hole punched from the top
 - a negative value indicates a partial hole punched from the bottom
- NAME keyword for name - required (capitalization is important)
 - name can be up to 24 characters (may contain blanks - any case)

HOL Command - Hole Command to place a Square hole

HOL east_cord north_cord S width angle thick NAME name

where :

- S Keyword specifying square hole
 - width is the hole width & depth
 - angle is the hole angle
 - note that angle must always be supplied even if 0***
 - thick is the hole thickness
 - a value of 0.0 indicates a complete hole
 - a positive value indicates a partial hole punched from the top
 - a negative value indicates a partial hole punched from the bottom
- NAME keyword for name - required (capitalization is important)
 - name can be up to 24 characters (may contain blanks - any case)

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Hole Punch Batch File Input (continued)

HOL Command - Hole Command to place a Rectangular hole

HOL *east_cord north_cord R width depth angle thick NAME name*

where :

R Keyword specifying rectangular hole
width is always a East-West dimension
depth is always a North-South dimension
angle is the hole angle
note that angle must always be supplied even if 0
thick is the hole thickness
a value of 0.0 indicates a complete hole
a positive value indicates a partial hole punched from the top
a negative value indicates a partial hole punched from the bottom

NAME keyword for name - required (capitalization is important)
name can be up to 24 characters (may contain blanks - any case)

HOL Command - Hole Command to place a Slotted hole

HOL *east_cord north_cord SL width depth angle thick NAME name*

where :

SL Keyword specifying slotted hole
width is always a East-West dimension of slot
depth is always a North-South dimension of slot
the smaller value of width and depth defines the slot diameter
the width may not equal the depth (Use a Circular hole instead)
angle is the hole angle
note that angle must always be supplied even if 0
thick is the hole thickness
a value of 0.0 indicates a complete hole
a positive value indicates a partial hole punched from the top
a negative value indicates a partial hole punched from the bottom

NAME keyword for name - required (capitalization is important)
name can be up to 24 characters (may contain blanks - any case)

NOTE: *Slotted holes are formed with an 18 sided polygon – they are very slow elements*

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LOG FILES

All applications can write log files if the environment variable ACE_DUMP is set to 1. There have been reports that some sites lock the C root drive and under certain conditions a locked C drive can cause a system fault 5.

All applications have been modified to warn of a locked drive/file and then gracefully exit. All applications now look for the environment variable ACE_LOG_PATH. If it is found, that is the directory where the log files will be placed. If the directory is locked or non-existent or if file is locked a warning will be given and the C drive will be tried. If it is locked or the file is locked a warning will be given and application will gracefully exit.

Usage of the variable ACE_LOG_PATH to control log file locations is similar to ACE_DEF_PATH to control DEF files. However there is one very important difference: ACE_LOG_PATH should NEVER point to a network drive (this is highly recommended for ACE_DEF_PATH). Everyone writes to the same named log file and if they are on a network drive there will be bad consequences. ALWAYS point ACE_LOG_PATH to a local drive (perhaps a temp off C root).