

# **Working with the NC Drill Environment**

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## Working with the NC Drill Environment

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# Working with the NC Drill Environment

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The NC Drill environment features enhancements and improvements to boost productivity, among them support for slots and fields for positive and negative tolerance about the drill or slot size in the Pad Designer. The NC legend, for instance, formally a multi-step process on blind/buried via boards, occurs in a single execution. A drill customizing spreadsheet provides flexibility to override library-derived drill data and offers automatic drill symbol creation and validation utilities. These enhancements and improvements focus on the following areas:

### Slots

- Creation
- Figures and Legends
- Report

### Drills

- Tolerance
- Same Drill/Different Tolerance
- Character Field
- Non-Standard Drills

### Drill Customization Spreadsheet

- Overview and Structure
- Validation
- Auto-generation of Symbols
- Library Drill Report

## NC Drill Output

- User Interface
- Auto Select
- Enhanced Excellon Format
- File Management
- Legends for B/B Boards
- Legend Data Control

## Misc

- Display of Plated/Non Plated Drills
- Refreshing Pad Symbols

## Slots

**Creation** – In Pad Designer, slot support is available as an option under *Hole Type*. There are two options from which to choose: oval or rectangular. The dimension of the slot is based on the *Slot size X* and *Slot size Y* options. These values represent the overall dimension of the slot, or the distance as measured from edge to edge. Other relevant fields include *Plating*, *Tolerance*, and *Character*.



### Tip

The slot is an object in the Allegro database, thus resolving issues related to figures not rotating with symbols.

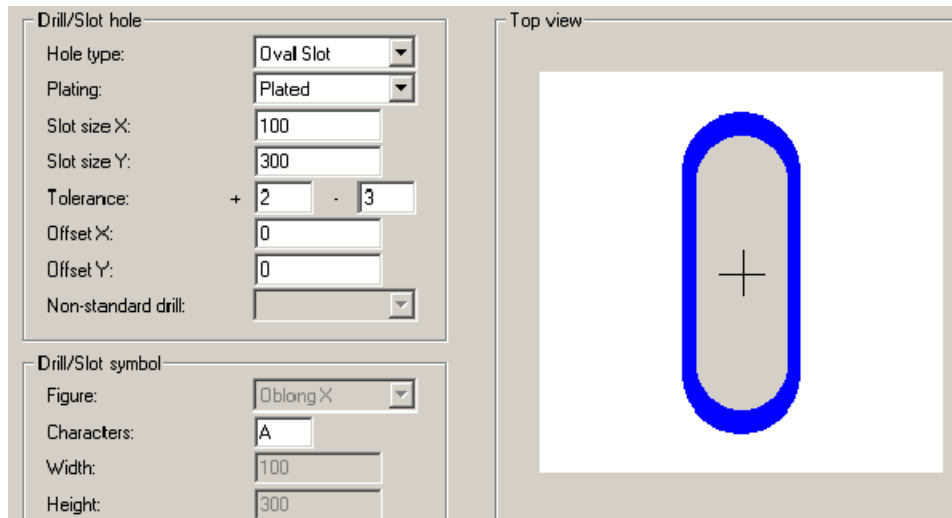


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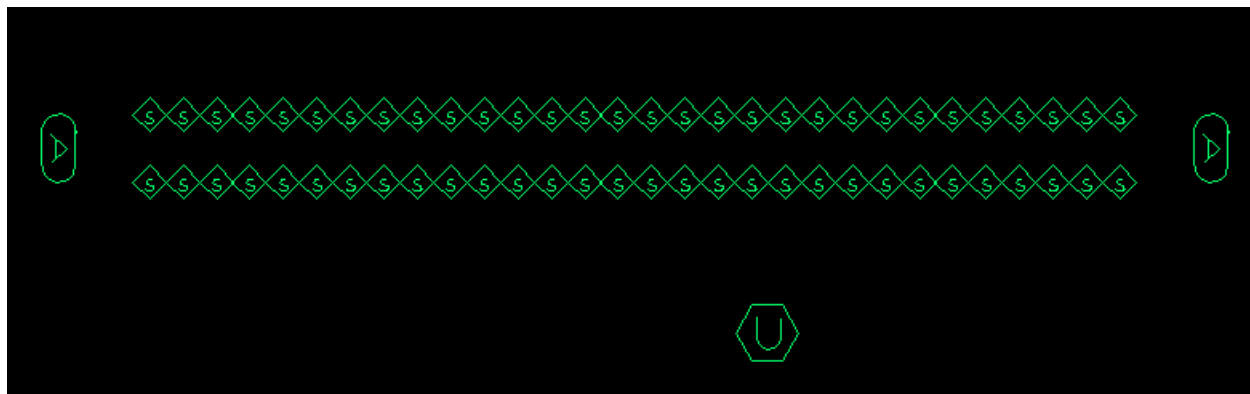
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**Figure 1-1 Oval Slot**



**Drill Drawing Figure** – A slot figure as represented on a drill drawing scales to the actual slot size. The user has no control over the *Figure*, *Width*, and *Height* settings in Pad Designer or the Drill Customization spreadsheet but can assign tolerance and characters up to three places.

**Figure 1-2 Slot Representation on Drill Drawing**



**Drill Legend Representation** – Oval and rectangular slots appear after circle drill holes in the Drill Legend. The slot figure aligns with the actual rotation on the printed circuit board. In the example below, four identical slots each measure 100 x 50. The drill legend itemizes them into two separate line entries as a result of their rotation.

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**Figure 1-3 Drill Legend Representation of Slots**

|   |              |
|---|--------------|
| ④ | 100.0 x 50.0 |
| Ⓐ | 100.0 x 50.0 |

**Report** – A slot report listing the slot type, location, and rotation can be generated from the *Tools – Reports* menu in CSV or HTML format. Four slots of size 100 x 50 are listed with their origin represented in the SLOT\_X and SLOT\_Y columns. The origin is the center location of the slot.

**Figure 1-4**

Design Name C:/boards/cust\_slot\_geometry.brd  
Date Wed Dec 12 10:05:45 2007

**Slot Hole Report**

| SLOT_TYPE      | SLOT_SIZE_MAJOR | SLOT_SIZE_MINOR | SLOT_X  | SLOT_Y  | SLOT_ROTATION | SLOT_PLATING |
|----------------|-----------------|-----------------|---------|---------|---------------|--------------|
| RECTANGLE_SLOT | 50.00           | 35.00           | 2710.00 | 2770.00 | 90.000        | PLATED       |
| RECTANGLE_SLOT | 50.00           | 35.00           | 2490.00 | 2770.00 | 90.000        | PLATED       |
| RECTANGLE_SLOT | 50.00           | 35.00           | 2810.00 | 550.00  | 270.000       | PLATED       |
| RECTANGLE_SLOT | 50.00           | 35.00           | 2590.00 | 550.00  | 270.000       | PLATED       |
| OVAL_SLOT      | 70.00           | 20.00           | 0.00    | 0.00    | 0.000         | PLATED       |
| OVAL_SLOT      | 70.00           | 20.00           | 0.00    | 3700.00 | 0.000         | PLATED       |
| OVAL_SLOT      | 70.00           | 20.00           | 3100.00 | 3700.00 | 0.000         | PLATED       |
| OVAL_SLOT      | 70.00           | 20.00           | 3100.00 | 0.00    | 0.000         | PLATED       |

**Output** – Slot output is generated from the *Manufacture – NC – NC Route* menu. If slots are detected, they are written to the <design>.rou file. NC Route uses the ncroutebits.txt file as input for bit control.

- Rectangular – Must be able to find a tool size that is smaller than the minimum dimension of the rectangle. A rectangle path is then routed with the appropriate Excellon tool compensation.
- Oval – If a tool size can be found that exactly matches the dimension of the oval, the oval is routed as a single line path. Otherwise, a tool size must be found that is smaller than the minor dimension, and an oval path is then routed with the appropriate Excellon compensation.

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**Detail Drawing** – The user is still responsible for creating detail drawings for slots. Most companies rely on detailing a slot object as the method of translation to the fabricator. Although Allegro supports the output of NC Route data, fabricators have advanced CAM tools that generate the required numerical data paths and preferred tool bits.

## Drills

**Tolerance** – Positive and negative tolerance can be assigned to the padstack symbol or entered as an override in the Drill Customization spreadsheet found in *Manufacturing – NC – Drill Customization*. It may be an onerous task to update the entire library of padstacks in favor of applying tolerances at the design level. If done at the library level, overrides are permitted at the design level and appear in bold blue similar to the Constraint Manager override model.

**Figure 1-5 Drill Tolerance: Pad Symbol**

The figure shows a 'Drill/Slot hole' dialog box on the left and a table on the right. The dialog box has fields for Hole type (Circle Drill), Plating (Plated), Drill diameter (8.00), Tolerance (+ 2.00, - 8.00), Offset X (0.00), Offset Y (0.00), and Non-standard drill. The table on the right has columns for + Tolerance, - Tolerance, and Symbol Figure, with rows showing various tolerance values and symbols.

| + Tolerance | - Tolerance | Symbol Figure |
|-------------|-------------|---------------|
| 1.00        | 2.00        | Circle        |
| 1.00        | 2.00        | Cross         |
| 1.00        | 2.00        | Cross         |
| 1.00        | 2.00        | Cross         |
| 1.00        | 2.00        | Triangle      |
| 1.00        | 2.00        | Circle        |
| 1.00        | 2.00        | Circle        |
| 1.00        | 2.00        | Circle        |
| 1.00        | 2.00        | Null          |
| 1.00        | 2.00        | Null          |

Prior to 15.2, only a single tolerance entry could be entered and applied to all plated and non-plated drills. Tolerance information would not be output as part of the NC drill data file. In 15.2, the Drill Legend supports the new tolerance entries from both the pad symbol and overrides made in the customization spreadsheet. Tolerance information displays in the drill file adjacent to the tool code and drill size.

Figure 1-6 Tolerance Entries in Drill Legend

| DRILL CHART: TOP to BOTTOM |      |           |        |
|----------------------------|------|-----------|--------|
| ALL UNITS ARE IN MILS      |      |           |        |
| FIGURE                     | SIZE | TOLERANCE | PLATED |
| •                          | 10.0 | +1.0/-2.0 | PLATED |
| ▪                          | 12.0 | +1.0/-2.0 | PLATED |
| •                          | 22.0 | +1.0/-2.0 | PLATED |
| ◊                          | 25.0 | +1.0/-2.0 | PLATED |
| ▪                          | 30.0 | +1.0/-2.0 | PLATED |

**Same Drill with Different Tolerance Requirements** – NC Drill and NC Legend both support the output of padstacks that have similar drill information but differ only by the tolerance record. An example of a `design.drl` file with a 40-mil drill requiring two sets of tolerances is:

```
;FILE : ncdrill-1-10 for layers TOP and BOTTOM
;T01 Holesize 1. = 12.000 Tolerance = +1.000/-12.000 PLATED MILS
;T02 Holesize 2. = 40.000 Tolerance = +2.000/-3.000 PLATED MILS
;T03 Holesize 3. = 40.000 Tolerance = +1.000/-1.000 PLATED MILS
```

**Character Field** – The drill character field has been increased from one to three places to accommodate requests for the actual drill size to be represented in the field.

**Non Standard Drills** – Pad Designer provides options for *Laser*, *Plasma*, *Punch*, or *Other*. This effectively separates non-standard drills into a separate Excellon-based `.drl` file, making it easier for the fabricator to process incoming data from OEMs. If *Laser* is selected for drills spanning layers 3 and 4, Allegro produces a drill file called `<Design>-3-4-laser.drl`.

## Drill Customization Spreadsheet

**Overview** – The Drill Customization spreadsheet allows the designer to add or customize drill-related parameters. The *Tolerance (+/-)*, *Symbol Figure*, *Symbol Characters*, and *Symbol Size (X and Y)* columns can be edited. Overrides appear in blue, following the methodology in Constraint Manager. The spreadsheet also supports automatic generation of drill symbol figures and characters, the ability to reset values to original design or library intent, and a validation check to ensure drills do not have common symbols or characters. The

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*Library Drill Report* tab generates a read-only padstack spreadsheet and associated drill information based on the PADPATH setting.

Launch the spreadsheet from *Manufacturing – NC– Drill Customization* or type the command `ncdrill customization`.

**Figure 1-7 Drill Customization Spreadsheet**

| # | Type          | Size X | Size Y | + Tolerance | - Tolerance | Symbol Figure | Symbol Characters | Symbol Size X | Symbol Size Y | Plating | Non-standard | Quantity |
|---|---------------|--------|--------|-------------|-------------|---------------|-------------------|---------------|---------------|---------|--------------|----------|
| 1 | Circle Drill  | 13.00  |        | 1.00        | 2.00        | Circle        | A                 | 100.00        | 100.00        | Plated  |              | 390      |
| 2 | Circle Drill  | 35.00  |        | 3.00        | 4.00        | Circle        | B                 | 100.00        | 100.00        | Plated  |              | 76       |
| 3 | Circle Drill  | 36.00  |        | 5.00        | 6.00        | Hexagon       | C                 | 100.00        | 100.00        | Plated  |              | 10       |
| 4 | Circle Drill  | 42.00  |        | 7.00        | 9.00        | Oblong Y      | D                 | 100.00        | 100.00        | Plated  |              | 50       |
| 5 | Oval Slot     | 70.00  | 20.00  | 9.00        | 10.00       | Oblong X      | E                 | 70.00         | 20.00         | Plated  |              | 4        |
| 6 | Rectangle Slo | 35.00  | 50.00  | 3.00        | 4.00        | Rectangle     | B                 | 35.00         | 50.00         | Plated  |              | 4        |

**Drill Types** – The number of rows within the spreadsheet align with the number of unique padstack definitions containing a drill in the database. The holes are divided up into eight sections and sorted by ascending X size within their section. The following table illustrates the sorting algorithm.

|   |              |            |              |
|---|--------------|------------|--------------|
| 1 | Circle drill | Plated     |              |
| 2 | Circle drill | Non Plated |              |
| 3 | Circle drill | Plated     | Non Standard |
| 4 | Circle drill | Non Plated | Non Standard |
| 5 | Oval Slot    | Plated     |              |
| 6 | Oval Slot    | Non Plated |              |

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|   |                |            |
|---|----------------|------------|
| 7 | Rectangle Slot | Plated     |
| 8 | Rectangle Slot | Non Plated |

**Editing and Overrides** – Any override within the spreadsheet appears in blue. Edit a single cell or change an entire column by placing the cursor over a specific cell, then right clicking and choosing *Set All*. To reset the values back to the original design state or values as represented by the library symbol, use *Reset to Design* or *Reset to Library*.



#### Tip

When using *Set All*, do not click the initial cell. Pass the cursor over the cell, then right click and execute *Set All*.

**Figure 1-8** *Set All* Used to Change +Tolerance to 1.00

| + Tolerance | - Tolerance | Symbol Figure |
|-------------|-------------|---------------|
| 1.00        |             |               |
| 1.00        |             |               |
| 1.00        | 2.00        | Cross         |
| 1.00        | 2.00        | Cross         |
| 1.00        | 2.00        | Triangle      |
| 1.00        | 2.00        | Circle        |
| 1.00        | 2.00        | Circle        |
| 1.00        | 2.00        | Null          |
| 1.00        | 2.00        | Null          |

**Validation** – The validate function scans the list of padstacks and flags those with identical definitions. Two conditions are possible, and the second column of the spreadsheet graphically represents them as red or yellow.

- Red: Two different holes have identical definitions.
- Yellow: The same hole is represented more than one time in the spreadsheet and has the same definition. This is an opportunity to merge the rows.

In the example below, the 10- and 12-mil drills have the same *Figure*, *Character*, and *Symbol* sizes. Both rows are flagged with red; the number 1 embedded in the red cell references the row of the first drill containing this error. To resolve the issue, change a value in any of the *Figure*, *Character*, or *Symbol* size cells.

The yellow condition flags the two 55-mil drills having the same *Figure*, *Character*, and *Symbol* sizes. Use the *Merge* button to combine these rows into a single entry.

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**Figure 1-9 Validation Conditions**

| Drill/Slot Holes |              |              |        |             |             |               |                   |               |               |         |                    |          |   |
|------------------|--------------|--------------|--------|-------------|-------------|---------------|-------------------|---------------|---------------|---------|--------------------|----------|---|
| #                | Type         | Size X       | Size Y | + Tolerance | - Tolerance | Symbol Figure | Symbol Characters | Symbol Size X | Symbol Size Y | Plating | Non-standard Drill | Quantity |   |
| 1                | Circle Drill | 10.00        |        | 1.00        | 2.00        | Cross         |                   | 30.00         | 30.00         | Plated  |                    | 1867     | ▲ |
| 2                | Circle Drill | 12.00        |        | 1.00        | 2.00        | Cross         |                   | 30.00         | 30.00         | Plated  |                    | 125      |   |
| 3                | Circle Drill | 22.00        |        | 1.00        | 2.00        | Cross         |                   | 22.00         | 22.00         | Plated  |                    | 267      |   |
| 4                | Circle Drill | 25.00        |        | 1.00        | 2.00        | Diamond       | s                 | 50.00         | 50.00         | Plated  |                    | 120      |   |
| 5                | Circle Drill | 30.00        |        | 1.00        | 2.00        | Square        |                   | 50.00         | 50.00         | Plated  |                    | 36       |   |
| 6                | Circle Drill | 33.00        |        | 1.00        | 2.00        | Null          | D                 | 70.00         | 70.00         | Plated  |                    | 20       |   |
| 7                | Circle Drill | 35.00        |        | 1.00        | 2.00        | Null          | A                 | 80.00         | 80.00         | Plated  |                    | 72       |   |
| 8                | Circle Drill | 40.00        |        | 1.00        | 2.00        | Null          | J                 | 50.00         | 50.00         | Plated  |                    | 9        |   |
| 9                | Circle Drill | 42.00        |        | 1.00        | 2.00        | Hexagon X     | J                 | 50.00         | 50.00         | Plated  |                    | 22       |   |
| 10               | Circle Drill | 52.00        |        | 1.00        | 2.00        | Hexagon X     | X                 | 80.00         | 80.00         | Plated  |                    | 28       |   |
| 11               | Circle Drill | 53.00        |        | 1.00        | 2.00        | Hexagon X     |                   | 53.00         | 53.00         | Plated  |                    | 90       |   |
| 12               | Circle Drill | 55.00        |        | 2.00        | 3.00        | Hexagon X     | F                 | 95.00         | 95.00         | Plated  |                    | 30       |   |
| 13               | 12           | Circle Drill | 55.00  | 2.00        | 3.00        | Hexagon X     | F                 | 95.00         | 95.00         | Plated  |                    | 12       |   |
| 14               | Circle Drill | 60.00        |        | 1.00        | 2.00        | Null          | c                 | 0.00          | 0.00          | Plated  |                    | 4        |   |
| 15               | Circle Drill | 62.00        |        | 1.00        | 2.00        | Square        |                   | 90.00         | 90.00         | Plated  |                    | 4        |   |
| 16               | Circle Drill | 67.00        |        | 1.00        | 2.00        | Null          | b                 | 0.00          | 0.00          | Plated  |                    | 16       |   |
| 17               | Circle Drill | 118.00       |        | 1.00        | 2.00        | Diamond       | B                 | 160.00        | 160.00        | Plated  |                    | 6        | ▼ |

Total quantity: 2796

☒ CSV
 ☐ HTML

**Auto Generation of Symbols** – An automatic symbol-generation utility creates design-specific symbols based on an internal algorithm. The current drill figures supported by Allegro will be used in the following order for up to and including the first eleven drill holes. Users cannot influence the sorting of this list.

- Cross (typical for the smallest/highest quantity)
- Square
- Hexagon X
- Hexagon Y
- Octagon
- Diamond
- Triangle
- Oblong X
- Oblong Y
- Rectangle
- Circle

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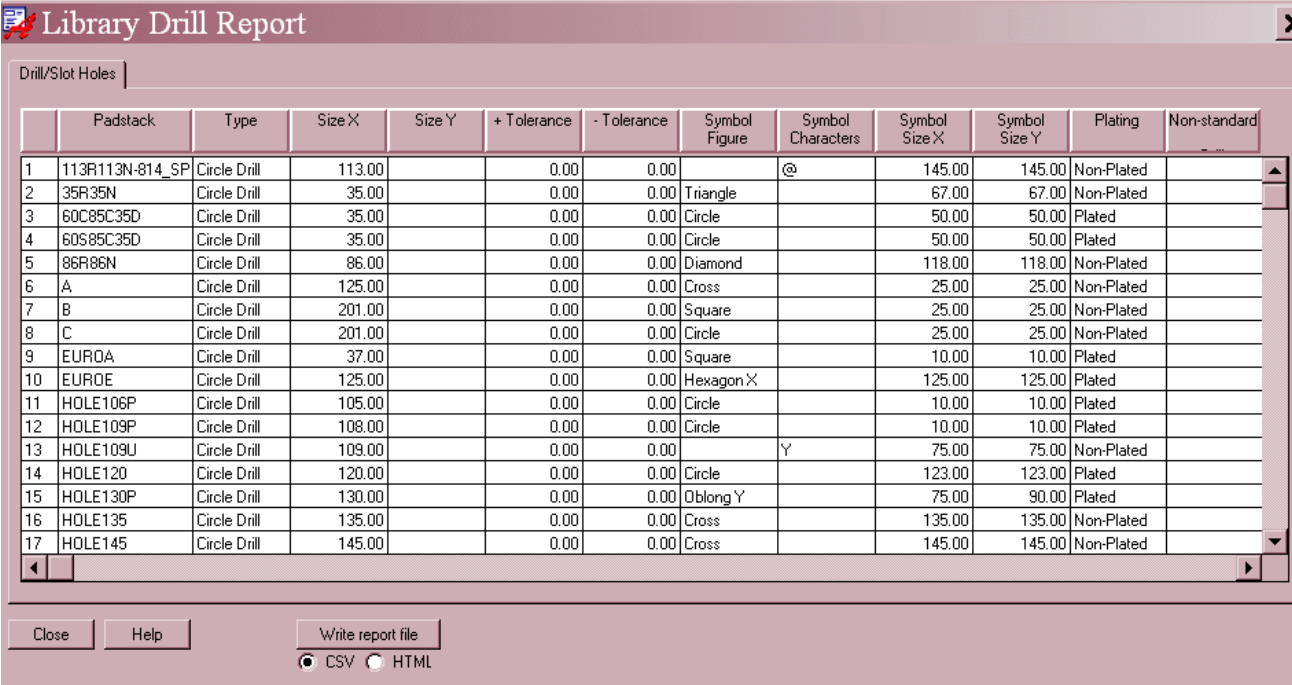
For holes beyond eleven, drill characters rather than drill figures are used in the order A-Z, AA, AB ... AZ, BA, BB ... BZ, etc.

Any slot holes use the characters OA ... OZ, and if necessary, PA ... PZ and QA ... QZ, for oval slots, and characters RA ... RZ, SA ... SZ, etc. for rectangle slots.

For circular drill holes, the *Symbol Size* in both X and Y will be automatically set to the size of the hole itself. For slot holes *Symbol Size X* and *Y* will not be altered by automatic symbol generation and remain fixed at the size of the slot hole itself.

**Library Drill Report** – A read-only, library-based drill report can be generated from the Pad Designer Reports menu or from the Drill Customization spreadsheet. The report lists padstack names and relevant drill information. Right click on a grid cell of a column to re-sort the report on the basis of that column. The default sorting on initial entry to the user interface is by the *Padstack* name.

**Figure 1-10 Library Drill Report**



The screenshot shows a window titled "Library Drill Report" with a tab labeled "Drill/Slot Holes". The window contains a table with the following columns: Padstack, Type, Size X, Size Y, + Tolerance, - Tolerance, Symbol Figure, Symbol Characters, Symbol Size X, Symbol Size Y, Plating, and Non-standard. The table lists 17 rows of data for various padstacks and drill types.

|    | Padstack        | Type         | Size X | Size Y | + Tolerance | - Tolerance | Symbol Figure | Symbol Characters | Symbol Size X | Symbol Size Y | Plating    | Non-standard |
|----|-----------------|--------------|--------|--------|-------------|-------------|---------------|-------------------|---------------|---------------|------------|--------------|
| 1  | 113R113N-814_SP | Circle Drill | 113.00 |        | 0.00        | 0.00        |               | @                 | 145.00        | 145.00        | Non-Plated |              |
| 2  | 35R35N          | Circle Drill | 35.00  |        | 0.00        | 0.00        | Triangle      |                   | 67.00         | 67.00         | Non-Plated |              |
| 3  | 60C85C35D       | Circle Drill | 35.00  |        | 0.00        | 0.00        | Circle        |                   | 50.00         | 50.00         | Plated     |              |
| 4  | 60S85C35D       | Circle Drill | 35.00  |        | 0.00        | 0.00        | Circle        |                   | 50.00         | 50.00         | Plated     |              |
| 5  | 86R86N          | Circle Drill | 86.00  |        | 0.00        | 0.00        | Diamond       |                   | 118.00        | 118.00        | Non-Plated |              |
| 6  | A               | Circle Drill | 125.00 |        | 0.00        | 0.00        | Cross         |                   | 25.00         | 25.00         | Non-Plated |              |
| 7  | B               | Circle Drill | 201.00 |        | 0.00        | 0.00        | Square        |                   | 25.00         | 25.00         | Non-Plated |              |
| 8  | C               | Circle Drill | 201.00 |        | 0.00        | 0.00        | Circle        |                   | 25.00         | 25.00         | Non-Plated |              |
| 9  | EURDA           | Circle Drill | 37.00  |        | 0.00        | 0.00        | Square        |                   | 10.00         | 10.00         | Plated     |              |
| 10 | EUROE           | Circle Drill | 125.00 |        | 0.00        | 0.00        | Hexagon X     |                   | 125.00        | 125.00        | Plated     |              |
| 11 | HOLE106P        | Circle Drill | 105.00 |        | 0.00        | 0.00        | Circle        |                   | 10.00         | 10.00         | Plated     |              |
| 12 | HOLE109P        | Circle Drill | 108.00 |        | 0.00        | 0.00        | Circle        |                   | 10.00         | 10.00         | Plated     |              |
| 13 | HOLE109U        | Circle Drill | 109.00 |        | 0.00        | 0.00        |               | Y                 | 75.00         | 75.00         | Non-Plated |              |
| 14 | HOLE120         | Circle Drill | 120.00 |        | 0.00        | 0.00        | Circle        |                   | 123.00        | 123.00        | Plated     |              |
| 15 | HOLE130P        | Circle Drill | 130.00 |        | 0.00        | 0.00        | Oblong Y      |                   | 75.00         | 90.00         | Plated     |              |
| 16 | HOLE135         | Circle Drill | 135.00 |        | 0.00        | 0.00        | Cross         |                   | 135.00        | 135.00        | Non-Plated |              |
| 17 | HOLE145         | Circle Drill | 145.00 |        | 0.00        | 0.00        | Cross         |                   | 145.00        | 145.00        | Non-Plated |              |

At the bottom of the window, there are buttons for "Close", "Help", and "Write report file". Below the "Write report file" button, there are radio buttons for "CSV" (selected) and "HTML".

## NC Drill Output

**User Interface** – The *Manufacture – NC* menu from the Allegro toolbar contains the following selections, with corresponding console window commands:



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|                            |                                    |                                  |
|----------------------------|------------------------------------|----------------------------------|
| <i>Drill Customization</i> | <code>ncdrill customization</code> | New                              |
| <i>Drill Legend</i>        | <code>ncdrill legend</code>        | no changes                       |
| <i>NC Parameters</i>       | <code>ncdrill param</code>         | formerly <i>Drill Parameters</i> |
| <i>NC Drill</i>            | <code>nctape_full</code>           | formerly <i>Drill Tape</i>       |
| <i>NC Route</i>            | <code>ncroute</code>               | formerly <i>Route</i>            |

NC Drill produces a default file called `<design>.drl`, formally `ncdrill.tap`. To retain the traditional `ncdrill.tap` name, set an environment variable `ext_drill` to `tap`. You can also add this variable in the Versioning section of File\_management category in the *User Preferences Editor*. The NC Route dialog box's default File name string has been changed to `<design>.rou`, formally `ncroute.ncr`. This applies to standalone execution of the NC Route executable as well. The proper drawing name now appears in the NC Drill and NC Route `.log` files when executed from Allegro. Previously, Allegro had to save the design to a cryptic file name that temporarily appeared to allow batch executables to pick it up.

The *Pattern for DIPs* and tape-related menu options are obsolete and have been dropped from the NC Drill dialog box. Any old parameter files with the associated parameters generate warnings that they are obsolete and being ignored, and new parameter files are generated without them. Various related messages and `.log` file contents are revised as well. Although references to tape have been eliminated, the NC Drill callout to the executable remains as `NCTAPE.exe`. Prior to 15.2, the Drill Legend would not proceed if it could not find the appropriate default `.dlt` drill legend template file on the system Cadence provides. A warning message is now issued instead, and the dialog box displays with a blank drill legend template file type-in string.

## Improvements to NC Parameter Dialog Box

Settings common to both NC drill and route are included in the *NC Parameter* dialog box, while those not applicable to both have been moved to the specific output. The *Header* field has increased to 1024 characters and supports multiple header records. Enhanced Excellon format (see description below) has been added as well.

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## Drill Output – Auto Tool Select

Use of the *Auto-tool Select* option no longer requires an `nc_drill.txt` file to insert tool codes in the drill file. A warning message in *Viewlog* appears if the tool file cannot be found, advising one will be automatically generated.

```
WARNING: Can't find tool file (nc_tools.txt) will auto-generate tool file
(nc_tools_auto.txt).
```

Auto select is the preferred method of producing drill files. An example format, including the new tolerance field and expanded header, is shown below.

```
;T01 Holesize 1. = 12.000000 Tolerance = +1.000000/-2.000000 PLATED MILS
;T02 Holesize 2. = 22.000000 Tolerance = +1.000000/-2.000000 PLATED MILS
;T03 Holesize 3. = 55.000000 Tolerance = +1.000000/-2.000000 PLATED MILS
;T04 Holesize 4. = 68.000000 Tolerance = +1.000000/-2.000000 NON_PLATED MILS
G90
T01
X03225Y02125
T02
X00645Y02081
T03
X00311Y-00025
T04
X00208Y-00213
M30
```

## Enhanced Excellon Format

Choose to generate a header in NC Drill and NC Route output files that more fully uses Excellon commands. Starting with M48 and ending with %, the header lists tool specifications, the appropriate INCH/METRIC command appears, and LZ/TZ as required for padding the leading or trailing zeros in the data section. The `Tnn` tool-diameter specification codes expand to a `TnnC.xxx` format to specify the required router bit size. For example:

```
M48
INCH,TZ
T01C.0135
T02C.024
T03C.031
;LEADER: 12
;HEADER:
;CODE : ASCII
;FILE : enh_ex-1-6.drl for board test.brd ... layers TOP and BOTTOM
```

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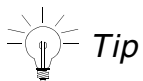
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```
;T01 Holesize 1. = 13.500000 Tolerance = +2.000000/-3.000000 PLATED MILS
;T02 Holesize 2. = 24.000000 Tolerance = +1.000000/-2.000000 PLATED MILS
;T03 Holesize 3. = 31.000000 Tolerance = +2.000000/-1.000000 PLATED MILS
%
G90
T01
X6070Y4100
X5745Y2700
T02
X5850Y4000
X5832Y3562
T03
X6138Y2812
X6175Y2900
M30
```

**File Management** – If you prefer a separate directory for your artwork and drill files, set the variable `ads_sdart` in *Setup – User Preferences* in the *File Management* category to name a specific subdirectory of the Allegro working directory, to or from which artwork and NC files are to be written and read. Outputting to a separate directory makes it easier to zip files required for fab vendor packs.

**NC Legend on B/B Boards** – The creation of drill legends on B/B boards occurs in one step. Executing the drill legend command simultaneously places all legend figures and creates the respective NCLEGEND subclasses. The NCLEGEND subclass combines the former NCDRILL\_LEGEND and NCDRILL\_FIGURE subclasses and is represented as a group entity in the database. Placement location is retained upon subsequent executions. The legend is a group entity in the database and can be moved as such.



*Tip*

Make sure the *Find Filter* is set to *Group* if you wish to move the legend as a group.

## Legend Data Justification

The various default `.dlt` drill legend template files include the layer names in the legend table's title line, and expand the width of the SIZE and TOLERANCE columns to allow for slot holes and +/- tolerancing, respectively. Enhancements allow for control of the data justification made within each column of the drill legend table individually.

**Note:** The justification does not affect the column header, only the data. Each entry in `?ColumnDefinitions` in the `.dlt` file supports an optional fourth element of `center`,

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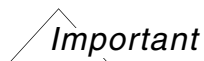
---

left, or right. Any entry with no fourth element (or an invalid one) defaults to the old standard of center justification. An example of a .dlt file can be found in share\pcb\text\nclegend.

```
;
;   Each column definition below can have an optional 4th field
;   included to control the justification of the data displayed
;   within that column. The permitted values are of course;;
;   "center", "right", or "left";
;   with "center" being the default if the 4th field is not provided,
;   or is provided but is not one of the above permitted values.
;
?ColumnDefinitions      '(
                        ("Figure"      "FIGURE"      7)
                        ("Holesize"    "SIZE"         15)
                        ("Tolerance"    "TOLERANCE"    15)
                        ("PlateStatus"  "PLATED"       10)
                        ("NonStandard"  "NONSTANDARD"  15)
                        ("Quantity"     "QTY"          6)
```

## Legend Titles

The title appearing in the drill legend table can be specified in the .dlt drill legend template file, and subsequently appears in the Legend title field of the Drill Legend dialog box, where it can be altered. If the string \$lay\_nums\$ or \$lay\_nams\$ is encountered anywhere in the title string when a legend table generates, it is replaced with either the layer numbers or names, respectively, as 1 to 4 or TOP to BOTTOM, for example. This provides an easy automatic way to visually identify the layers being drilled with each drill legend subclass.



Legend data is not updated dynamically. Changes to the Allegro database that involve the addition and subtraction of drills require regeneration of the legends.

## Miscellaneous

**Display of Plated/Non Plated Drills** – In the *Display* tab of the *Design Parameter Editor*, available by choosing *Setup – Design Parameters*, the display of drill holes can be differentiated between plated and non-plated.

**Refreshing Pad Symbols** – Drill customization changes have to be considered when refreshing pad symbols. The *Reset Customizable Drill Data* option on the *Refresh*

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*Padstacks* dialog box resets any overrides made to the pad symbol in the *Drill Customization* spreadsheet.