



Bartels AutoEngineer®

Version 7.0

Release Notes

This documentation contains information about the new features introduced with **Bartels AutoEngineer Version 7.0**. Forward compatibility from earlier versions to **Bartels AutoEngineer Version 7.0** is ensured, but not backward compatibility.

Bartels AutoEngineer Version 7.0 Release Notes

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1 General

1.1 Installation

Installation Guide

The [Bartels AutoEngineer® Installation Guide](#) (file `inst_en.htm` from the `baedoc` directory of the BAE-CD-ROM) provides detailed **Bartels AutoEngineer** installation instructions for all supported hardware and software platforms.

Hardlock Driver

The third-party hardlock driver setup program `hldr32.exe` which is automatically activated during the installation of the BAE software has been updated with a version which supports **Windows Vista**. With its default security settings, **Windows Vista** will activate a confirmation prompt for the installation of the hardlock driver.

1.2 User Interface and General Functions

File Access Error Messages

Notes about DDB file write and/or read access restrictions have been added to the file access error messages.

Project File Recovery

The `Project Recovery` function for recovering damaged DDB files has been added to `File / Library Utilities / Copy Elements`. Unlike the `-recover` option of the `COPYDDB` utility program, `Project Recovery` also copies parameter settings and SQL databases.

Configuration File

The `bae.ini` file syntax has been extended to support or'ed bitmask input values such as `1|4|8` instead of `13`.

Key Assignments

The `Key Programming` functions of the BAE **Windows** version have been updated to support `F10` function key programming.

File Content Preview (Windows)

A tooltip facility for `.ddb` files has been added to the BAE **Windows** versions. The tooltips are activated with a little delay when hovering over `.ddb` files in file explorer windows. The tooltips provide information about the number and names of updated SCM and layout file elements and display element comments.

Installation Note

The required registry entries are automatically created when installing the BAE software with the BAE **Windows** setup program. Users who prefer to install software updates by unpacking the appropriate BAE zip files should use the `baereg_e.reg` file which has been amended to support the required registry updates.

System Font Selection (Windows)

New controls for selecting BAE character fonts have been added to the main menu setup of the BAE **Windows** versions. This allows for the selection of a fixed character width font and a variable character width font. The fixed character width font is used for the BAE status line, the BAE toolbar and column-oriented BAE dialogs. The variable character width font is used for all other standard dialog box elements. The size of the toolbar controls and dialog box list entries scales to the selected character font size. This enables users to select dialog fonts/sizes which best suite their monitor setup and/or screen resolution.

The `std` default setting for the character font size causes the system to use the default **Windows** character fonts. Usually, these are `Courier` for the fixed width character font and `MS Sans serif` for variable character width, both with a character font size of 13 pixels. A character font size of 11 pixels still displays reasonably well with, e.g., `Lucida Console` and `Small Fonts`.

Please note that `bae.ini` contains certain parameters which are defined in units relative to the system character font size. It might be necessary to adapt those entries if the system character font size is changed. The most important parameters, `DIALOGXMAX_STD` and `DIALOGYMAX_STD`, have been added to the `Settings / Settings bae.ini` dialog. For information purposes, the input prompts for those entries are displaying the maximum possible dialog box size for the current settings.

The functions for calculating dialog box sizes have been modified to take the current monitor DPI setting into consideration. This wasn't the case in previous BAE versions which could cause dialog controls to overlap.

Scrollbars (Windows)

The handle bars of the graphic workarea scrollbars in the BAE Windows versions are now changing their size according to the screen size to element size ratio.

Tooltips

Tooltips have been added to the toolbar and some selection menus.

Toolbar Button Definitions

New `bae.ini` entries for adding toolbar buttons with arbitrary command sequences have been added. These entries can be defined using `TB_ACTBUTN1_STD` (first action button name), `TB_ACTBUTS1_STD` (first action button command sequence) `TB_ACTBUTT1_STD` (first action button text color), `TB_ACTBUTTC1_STD` (first action button tooltip text) and `TB_ACTBUTBC1_STD` (first action button background color) patterns. The name should consist of a single character. The toolbar supports multiple occurrences of the same character. If an empty string is specified for the command sequence, then the name is displayed as text between button rows and can consist of multiple characters.

Toolbar Position

The mode 2 for blocking the system from saving and restoring the project-specific toolbar positioning has been added to the `TOOLBAR_STD` `bae.ini` parameter. This mode ensures that the toolbar stays in its selected position, even when loading projects from other users.

Dialog Box Position Memory

The dialog box positions of BAE session are now saved to `baewin.dat` for re-use in subsequent BAE sessions.

Coordinate/Info Display

Pressing the `Ctrl` key activates the mouse and/or graphic cursor coordinate display even if no menu function is currently active. **Schematic Editor**, **Layout Editor** and **CAM View** also provide information about the element at the mouse position. The `MOUSEINFO_STD` entry for permanently activating the mouse/graphic cursor during menu idle times or for **Windows** tooltip display configurations has been added to the `bae.ini` file. The new parameter can also be accessed and/or modified through `Settings / Settings bae.ini`.

Window Redraw

The screen redraw of the BAE Windows version is now restricted to the status line if only the status line is overlapped by another window. This helps to avoid full screen redraws and/or flickering effects which were previously caused by Windows taskbar tooltips.

Menu Coloring (Motif)

New options for setting menu background colors have been added to the main menu setup of the BAE **Motif** versions.

1.3 Symbol and Part Libraries

Schematic Labels

The pin marker symbol `labelpin` has been added to the `stdsym.ddb` library. `labelpin` consists only of a contact area and does not have a `$` text. The element boundaries of `labelpin` are smaller than those of a marker with `$` text. The marker symbols for the pins of the labels from the `stdsym.ddb` library and the **Bartels AutoEngineer** example design files have been changed to `labelpin`, and the element boundaries of the labels have been minimized. With these changes, the label pick function for selecting labels which are placed very close to other labels has become more accurate and reliable.

PDF Part List Templates

The layout library file `pdfpage.ddb` with page templates for part list outputs in batch definitions for the `EPS/PDF Output` function has been added. The template from the `partlist` layout creates a part list with an entry for each part. The template from the `partlist_cnt` adds different parts with equal values into single part list entries with part counter.

Net Name Assignment Symbols

The `att_netname`, `tag_net_netname` and `tag_netpin_netname` symbols for net name assignments through the `$netname` system attribute have been added to the `ROUTE` symbol library.

2 Schematic Editor

2.1 General

Element Selection

The `Element Selection` option of the `Pick Mode` setting has been changed to provide element selection of multiple pick elements sorted by their distance to the pick position.

Dynamic Element Boundaries

The `DEFDYNBOUND_SCM` entry for configuring class-specific fixed or dynamic element boundaries for new elements has been added to `bae.ini`.

Toolbar File Element Favorites

The label and marker element class assignments for the definition of file element favorites through the toolbar `Open` button were mixed up. This problem has been fixed.

The file name prompt/query for element favorites has been modified to allow for `*` input to be interpreted as project file name. This allows for the configuration of file element favorites such as project file `overview`.

The `New` (empty sheet) toolbar button has been modified to distinguish between left and right mouse button clicks. Left mouse button clicks are still activating the `New` menu. Right mouse button clicks are activating a new menu for managing and accessing favorites. Up to 28 favorites can be configured for quick access, either with fixed file names, element classes and/or element names or with file name, element class and element name prompts. Element size and origin offset settings are also supported, and it is possible to configure group elements for automatic placement at the origin of new elements. This allows for the definition of menu functions for the generation of labels in the standard SCM symbol library or the creation of schematic sheets in a predefined format/size.

The key programming sequence for the activation of the favorites menu is `favorite:!"": "n"`.

List DDB

The `File / Import/Export / List DDB` function has been converted to a submenu. The `Standard` function creates a list of all elements with sub-references for a DDB file. The `References to Element` submenu and the `Reference Overview` function can be used to list all elements referring to a single or all macro elements within a DDB file. This feature can be used to list all SCM sheets which are using a specific symbol macro.

The list of SQL tables has been now included to the `Standard` output option. The SQL tables listings contain the number of table entries and the field names and types.

Update Library

The `All Sheets` and `All Project Sheets` options for updating the library elements for all SCM sheets of a project file have been added to the `File / Update Library` submenu.

The `Update Library` function has been changed to trigger a save prompt and a reload if applied to the currently loaded element to ensure that the changes are immediately applied and visible in the **Schematic Editor**.

Spice Simulation

The `SPICEARUN_SCM` parameter for automatically activating a Spice netlist export processing tool/application has been added to the `bae.ini` file. The BAE Windows version determines the Spice netlist processor using the file type association for the `.cir` file name extension. On non-Windows platforms, the `SPICECMD_SCM` parameter can be used to specify the Spice netlist processor.

The system has been modified to support numbered attributes (`$spicepar2`, `$spicepar3`, etc.) in addition to the `$spicepar` attribute to allow for the specification of long Spice parameter lists. The attribute values are separated by blanks when written to the Spice netlist.

EDIF Import

The `File / Import/Export / EDIF Data Import` function for importing SCM plans now automatically activates the **LOGLIB** utility program to transfer the logical library definitions from the generated `.def` file into the project file.

2.2 Symbols, Labels

Symbol Search

The **Search SCM Name** function was restricted to the currently loaded SCM sheet. This restriction has been removed. **Search SCM Name** now searches all SCM sheets of the project and automatically loads the SCM sheet with the requested symbol if necessary.

Symbol Query

The **Symbols / Other Functions / Symbol/Label Query** has been changed to sort the symbol attribute listing alphabetically or according to a sort order specified in **bae.ini**.

For tag symbols, **Symbol/Label Query** now also lists tag pins with target element types and names.

Pin/Text Placement

The **Place Pin List/Row** and **Place Texts/Labels** functions from the **Symbol Edit Functions** menu which can be activated through the **e** key have been modified to save pin placement parameters and modes for repeated application. This simplifies certain procedures such as the placement of text documentation for previously placed pin lists/rows.

Move Attribut

The **Move Attribute** function could cause system crashes when applied to internal attributes with extended content length (e.g., **\$pltfname** and **\$pageref**).

Part Name Assignment

The **Pick \$rpname** function for transferring the **\$rpname** attribute value from one selectable symbol to other selectable symbols has been added to the **Symbols / Other Functions / Renumber Parts** submenu. If the first symbol doesn't contain any **\$rpname** assignment, then the name of the symbol itself is used for subsequent assignments. This function simplifies the assignment of names to parts which consist of multiple gates/symbols.

A **Pick** button for the **\$rpname** attribute has been added to the dialog box of the **Assign Value(s)** function. The **bae.ini** entry **RPNAMEAUPD_SCM** can be used to activate automatic attribute value transfers not only for **\$rpname** but also for all other attributes of the selected symbol.

The **Symbols / Other Functions / Copy Symbol** function and the functions from the **Symbols / Other Functions / Renumber Parts** submenu are now automatically assigning the symbol macro name to the **\$rpname** attribute for symbol macros with a **\$** default value for the **\$rpname** attribute.

Part List Cleanup

The **Part List Cleanup** has been updated to check whether the selected project file contains logical netlists without SCM sheets and provides options for deleting such logical netlists. This feature is useful for cleaning up project files after importing netlists with the **File / Import/Export / Net List Import** function.

Symbol Logic Edit

The **Macro(s)** button for adding and/or removing alternative part package types from the project and layout library has been added to the **Edit Symbol Logic** dialog.

Symbol Preview

The symbol preview in the symbol selection dialogs of the **Symbol Database** function is now activated and/or updated through single clicks on symbol list entries. The preview and page up/down buttons have become obsolete and have been removed from the dialog.

Symbol Database

A part number menu/listing with the part numbers used on the current SCM sheet has been added to the replacement key prompt of the **ID Replacement** function from the **Symbol Database**.

Label Routing

The function for moving labels which is available through the **p** key has been changed to support label connection re-routing according to the current symbol routing configuration and/or settings.

The label router unnecessarily considered invisible **\$** text references on label markers as obstacles. This problem has been fixed.

Label Name Swap

The **Symbols / Other Functions / Renumber Parts / Swap Names** has been modified to support not only symbol name swaps but also label name swaps.

Layout Part Placement (BAE HighEnd)

The system now displays a selection list of connected layout parts with placement status for the selected SCM symbol when using the **Symbols / Other Functions / Place Layout Part** function on a hierarchical sub-circuit which wasn't loaded with **Load Block Sheet**.

Library Documentation

The name of the first and last macro placed on each page is included as comment text in symbol and label documentation output created with **Files / Library Utilities / Library Documentation**. On default, the **EPS/PDF Output** function adds such comments to the PDF bookmarks, thus providing a facility for easily navigating to the page of a specific marco (prefix) without having to scroll through the whole document.

2.3 Connections

Connection Drawing

The `Add Connection` function is now automatically starting a new connection whenever a segment or pin is reached. This allows for the creation of multiple connections without having to re-activate the `Add Connection` function. Each of the connections created with a `Add Connection` call is subject to a separate `Undo` step.

Connectivity Update

The `Project Update` option for forcing connectivity updates for all SCM sheets has been added to the `Settings / Rule Attachment / Connectivity` selection. This feature can be used to trigger connectivity updates after renaming and/or moving pins on SCM symbol macros without subsequently loading and saving affected SCM sheets.

Bus Tap Settings

The `Bus Display Mode` function from the `Connections / Other Functions` submenu has been renamed to `Bus Settings` and allows now also for the selection of modes where bus taps are automatically moved and/or deleted with adjacent connections.

A bus tap pin snap has been added to the `p` function key operations to provide better support for interactive bus tap connections when working with low display zoom factors.


Antenna Highlight

The highlight for nets with antenna segments has been extended to connection segments which are open at one end and are not connected to a segment at the other end. This highlights segments without connection to a selectable pin and also helps to identify exact antenna positions in complex nets.

The `scm_pin_drc` rule for `All Sheets` can be used to activate the highlighting of open segments with one end connected to a pin.

2.4 Graphics

Polygon Point Edit

The selected polygon graphic is now displayed in the polygon property dialog which is displayed when clicking the  key on polygon corners.

For arc center points, the radius is now displayed with the arc direction. Previously, arc radius queries had to be carried out through more tedious distance queries.

Graphic Line Plot Width

The **File / Library Utilities / Symbol Edit Batch** function has been changed to support plotter pen width settings for graphic lines.

2.5 Text, Attributes

Element Comment Display

The system has been modified to support `$pltecomment:planname` attribute text patterns for the display of element comments from different SCM sheets of the current project. This feature can be used on documentary sheets for displaying up-to-date comments from different project SCM sheets.

Text Plot Width

The **File / Library Utilities / Symbol Edit Batch** function has been changed to support plotter pen width settings for texts.

2.6 Group Functions

Symbol Renaming

The **Load Group** and **Copy Group** functions have been changed to issue a message displaying the number of symbols which have been automatically renamed to avoid any name conflicts with already placed symbols. Please note that symbols are renamed to # if the system can't find free symbol names matching the assigned symbol name patterns. In this case, the system activates a confirmation prompt to notify the user about the potential loss of attribute value assignments.

The new symbol name is assigned to the `$rpname` attributes of all group symbols with name conflicts and `$rpname` values pointing to the old symbol name. This ensures that symbols which have been assigned to the same package stay together without causing **Packager** error messages.

Markers

The **Schematic Editor** group functions have been made available on marker level.

2.7 Plot Output

Plot Scaling

The **Generic Output Scale Mode** option for scaling **Generic Output** has been added to **Plot Output / Settings**. The **Use Scale Factor** mode uses the scaling factor selected with **Plot Scale**. The **Scale to Paper Size** mode automatically scales the output element to the paper size.

EPS/PDF Output

Element comment are now appended to the element/page names in the PDF file bookmark section. Batch PDF outputs allow for the element name only or the element comment only to be used as page name.

The **Files for variants** option for creating variant-specific PDF output files has been added to **Output Element(s)**. The PDF output file names are automatically derived from the variant names. If the specified file name is an extension of the project file name, then this extension is also used for variant file names.

The **Control Output** option has been added to the PDF output facilities. This option automatically passes the PDF output on to the application which is registered for opening files with the extension **.pdf**.

Certain third-party tools such as **Ghostscript** and **Spicer Imagination** were not able to process compressed BAE PDF outputs. The BAE PDF output functions have been adapted to fix these problems. These modifications also resulted in a PDF output file size reduction of some 25 percent.

The **PDF Color** option for PDF color assignments has been added to the **Settings / Rule Attachment / Set Group Rules** and **Select Elements** functions.

DXF Data Output

A number of DXF table entries have been added to DXF outputs created with the **DXF14OPT_SCM bae.ini** option to support additional third party systems such as **Autosketch**.

3 Packager

3.1 Error Messages

Net Type Conflicts

Layout part pin lists and SCM symbol pin lists have been added to the warning messages caused by driver collisions and nets which are only connected to input pins. This simplifies the location of the affected circuitry for unnamed nets.

Part Macro Assignment

Part package type assignments through the `$plname` (Physical Library Name) attribute are now deactivating the part's alternate part macro lists from the logical library to prevent from unintentionally changing the part type in the layout.

3.2 Attribute Assignments

Part Name Assignment

The `$rbname` (Requested Backannotated Part Name) system attribute for layout part name assignments and for controlling package assignments has been added. The **Packager** treats `$rbname` attributes like `$rpname` attributes and assigns SCM symbols to layout parts according to `$rbname` settings. The **Layout Editor** allows for `$rbname` part names to be changed and the `Backannotation` transfers changed layout part names back onto the `$rbname` attributes of the corresponding SCM symbols. I.e., `$rbname` can be used for controlling symbol package assignments without prohibiting subsequent layout part name changes.

Net Type Assignments

A warning message is now issued if different `$nettype` attribute values are assigned to the same net, thus providing feedback about the automatic assignment of the `mixed` net type in such cases.

3.3 Connection Name Assignment

Unnamed Connections

The `Unnamed Nets` option for controlling net name assignments for nets without names has been added to the `Settings` menu. The default setting is `@Number`. This mode assigns net names `@1`, `@2`, etc. to nets without predefined net names. The `Partname_Pinname` mode generates net names from the first connected layout part pin. With this mode, the net connected to pin `1` of part `r7` will be named `_r7_1`. This naming scheme ensures that automatically generated net names stay the same as long as the nets' part and pin connectivity isn't changed during redesigns and/or circuitry modifications. Consequently, it's possible to assign such synthetically generated net names to fill areas or net colouring data sets without causing assignment problems after net list and/or circuitry modifications.

The `_s_Partname_Pinname` mode uses the same net naming scheme, however, with the prefix `_s` for single-pin nets. This allows for unconnected pins to be easily identified in the alphabetically sorted net name list.

The `Unnamed Nets` setting is saved with the project file for automatic re-activation in subsequent **Packager** runs.

Net Name Assignment

The **Packager** supports the new `$netname` system attribute for setting net names. This net name assignment has priority over net name assignments label. This feature can be used to control net name assignments for nets with different labels which would otherwise be named after the label which comes first in the alphabet.

The `att_netname`, `tag_net_netname` and `tag_netpin_netname` symbols for `$netname` assignments have been added to the **ROUTE** symbol library. For frequently used net names, the system also supports label definition with fixed `$netname` assignments such as the following:

```
part gnd : virtual
{
    pin ("#");
    netattr "$netname" "gnd" : ("#");
}
```

The label's `Symbol Tagmode` must be set to `Net Attribute Label` to force the use of the label definition.

4 Layout Editor

4.1 General

Element Selection

The `Element Selection` option of the `Pick Mode` setting has been changed to provide the element selection of multiple pick elements sorted by their distance to the pick position.

Toolbar File Element Favorites

The file name prompt/query for element favorites has been modified to allow for * input to be interpreted as project file name.

The `New` (empty sheet) toolbar button has been modified to distinguish between left and right mouse button clicks. Left mouse button clicks are still activating the `New` menu. Right mouse button clicks are activating a new menu for managing and accessing favorites. Up to 28 favorites can be configured for quick access, either with fixed file names, element classes and/or element names or with file name, element class and element name prompts. Element size and origin offset settings are also supported, and it is possible to configure group elements for automatic placement at the origin of new elements. This allows for the definition of menu functions for the generation of macros in the standard layout library or the creation of standard layouts with group-defined board outlines.

The key programming sequence for the activation of the favorites menu is `favorite:"!": "n"`.

Dynamic Element Boundaries

The `DEFDYNBOUND_GED` entry for configuring class-specific fixed or dynamic element boundaries for new elements has been added to `bae.ini`.

List DDB

The `File / Import/Export / List DDB` function has been converted to a submenu. The `Standard` function creates a list of all elements with sub-references for a DDB file. The `References to Element` submenu and the `Reference Overview` function can be used to list all elements referring to a single or all macro elements within a DDB file. This feature can be used to list all layout part definitions which are using a specific padstack macro.

The list of SQL tables has been now included to the `Standard` output option. The SQL tables listings contain the number of table entries and the field names and types.

Update Library

The `File / Update Library` function has been changed to trigger a save prompt and a reload if applied to the currently loaded element to ensure that the changes are immediately applied and visible in the **Layout Editor**.

Drill Overview

The **PSTKDRL User Language** program for listing all project padstack definitions with drill holes has been integrated to the `File / Library Utilities` menu and drill classes are now included with its output.

Layout Backup

The functions for loading layouts with automatic connectivity generation are now saving the old layout to the `.bak` backup file of the current `.ddb` project file to allow for fill and power area net assignments removed by the connectivity generation to be restored from the backup file.

Airline Calculation (BAE HighEnd)

The performance of airline calculations in **BAE HighEnd** has been significantly improved at the cost of slightly increased memory requirements. The performance increase is most evident during airline calculations for (partially) routed nets and for connections to/through copper fill areas.

4.2 Display, Design Rule Check

Placement Grid

Markers have been added at the edges of the graphic workarea to indicate the current input grid setting. This makes it easier to establish whether the input grid is different from the display grid and/or whether the graphic/crosshair cursor matches the input grid during a placement interaction.

The **View / Other Functions / Corner Scan** submenu with a series of functions for extending the input grid to element-specific pick points has been added. With these features, macro reference points and visible corner points of traces and polygons can be added to the list of potential input grid points. The **Complete Scan** function scans the whole of the currently loaded element for such points, **Current Window** scans the visible objects of the currently loaded element, and **Dynamic Window** scans the visible objects and automatically updates the pick point list upon the viewport changes. The pick point list can be cleared with the **Reset Point List** function or by loading a new element.

Markers for the pick points created with the **Corner Scan** functions are added at the edges of the graphic workarea. The pick points are considered by the manual grid step operations which are activated by hitting cursor keys whilst the **Shift** key is pressed. Unlike the **P** key, these features consider elements and/or objects from lower hierarchy levels, thus allowing for off-grid pad corner points and/or part level polygons on layout level to be hit and/or picked. It also provides a useful facility for exactly connecting to off-grid pins.

Grid Display

The **Display** for displaying the input grid has been added to **View / Settings**. The input grid is displayed using the origin colour to distinguish the input grid from the display/background grid which is drawn using the workarea colour. This allows for different grids to be displayed for comparison at the same time. The background grid has priority over the input grid if grid points are to be displayed at the same position.

Element Query

The **Query Element** function has been modified to display part values at the graphic cursor and in the info/status window when querying parts. Part values are retrieved from either the **\$val**, the **\$wert**, or the **\$value** attribute.

Toolbar Layer Color Setup

The **TB_PLCOLCNT_LAY** entry for configuring toolbar buttons for power layer color settings has been added to the **bae.ini** file.

TB_ALCOLCn_LAY/TB_ALCOLTn_LAY entries for layer number and layer text can be used in **bae.ini** to configure arbitrary toolbar colour fields for special layers such as **All Layers**.

Color Settings

The **Load Colors** has been changed to load the color table which was loaded prior to the current color table if the user types in **..** for the color table name. This allows for quickly toggling between frequently used color tables and can be used in macros for temporarily loading a color table and then restoring the original color table at the end of the macro command sequence.

Layer Browse

The dialog box of the **View / Other Functions / Layer Browse** function has been turned into a modeless dialog, i.e., it can now be left open while work continues in the BAE window.

WRL Output

The **WRLARUN_LAY** parameter for activating an application for automatically displaying files created with the **File / Import/Export / WRL/VRML Data Output** function has been added to the **bae.ini** file. Under Windows, the WRL/VRML output is passed on to the application which is registered for opening files with the extension **.wrl**. For other operating systems, the **WRLCMD_LAY** command in the **bae.ini** file can be used to select the WRL/VRML application.

The **WRLDRLOUTC_LAY** entry for controlling drill class outputs has been added to the **bae.ini** file.

Report

The **Utilities / Report** function has been modified to include the number of layout airlines.

On layouts with unplaced parts, the **Utilities / Report** function is now adding the number of unplaced netlist pins to the open connection count to emphasize the fact that the layout has not yet been fully routed.

DRC Error List

Information about vias and traces causing DRC violations has been added to the report produced by the `Utilities / DRC Error List / DRC Error List` function.

Advanced DRC (BAE HighEnd)

DRC-specific parameters rather than net clearance settings are now used to create DRC distance lines when routing traces with DRC distance display activated. This simplifies the location of DRC errors when working with net group DRCs.

The `Delete Block` button for deleting the currently processed DRC data block from a layout has been added to the block distance input interface of the `Settings / Advanced DRC` dialog.

The assignment of block names in `Settings / Advanced DRC` sometimes caused the loss of layout rules and other undefined behaviour. This problem has been fixed.

DRC Performance (BAE HighEnd)

The performance of the `BAE HighEnd` DRC has been significantly improved at the cost of slightly increased memory requirements.

On multi-processor systems, the `BAE HighEnd` DRC calculations are now delegated to the different processors. The `BAE_THREADS` environment variable has been introduced and can be set to 2 to support hyperthreading technologies. However, the performance increase is hereby limited to some 5 to 10 percent as the DRC performance is more dependent on the processor's cache size than its computing power.

4.3 Parts, Placement

Part Placement

The part selection dialog of the **Add Part** function has been changed to display additional part info such as package type, value attribute, SCM symbol macro and SCM sheet name when clicking a part from the list once. The pin net names of parts with not more than two pins are also displayed to simplify the identification and/or selection of test points and block capacitors.

The **Constructive** column in the part selection box of the **Add Part** menu has been changed to place a new part when double-clicking a part name. According to the function of the **Next free Number for Name** button, the next free part name/number for constructive parts is derived from the selected name, and the part macro is also derived from the selected list entry. This simplifies the repeated placement of similar constructive parts.

The **Other Functions / Place Autoselected** function has been converted to a submenu with the default mode **Max. Connected Pins** and the new function **Pin Connection Part**. **Pin Connection Part** prompts for a pin selection and automatically selects and places the next unplaced part which is closest connected to the selected pin, thus simplifying the placement of circuitry clusters. The **Pin Connection Part** function has also been integrated to the right mouse button context menu for part pins.

Part Placement Side Control

The new **\$partside** part system attribute can be used to block (attribute value **top**) or force (attribute value **bottom**) part mirroring. These settings have priority over any other mirror modes during interactive and automatic part placement operations. Parts violating these placement preferences are marked by the DRC, and the **Utilities / Report** functions list such parts in a part side error list.

The **tag_sym_partside** tag symbol for assigning **\$partside** attribute values has been added to the **ROUTE** library.

Part Macro Update

Correcting netlist package type assignments through the **p** key dialog sometimes triggered the system to delete the corrected parts. This problem has been fixed.

Find SCM Symbol (BAE HighEnd)

The **Find SCM Symbol** function does not require the selection of an SCM symbol anymore if **Find SCM Symbol** is assigned to a key and activated during part placement operations by pressing that key. In that case the SCM symbol for the selected layout part is automatically selected for search.

Padstack Attribute for Part Name Display

The padstack text **\$@** is on layout level substituted with the name of the part on which the padstack is placed. This feature can be useful if part names need to be displayed for pins which are placed outside the part body (e.g. during **Move Pin** operations).

Pin Placement Statistic

The number of SMD pins with pads on the solder and/or part side has been added to the SMD pin listings created with the **Traces / Via Functions / Count Vias/Pins** function.

Library Documentation

The name of the first and last macro placed on each page is included as comment text in part, padstack and pad documentation output created with **Files / Library Utilities / Library Documentation**. On default, the **EPS/PDF Output** function adds such comments to the PDF bookmarks, thus providing a facility for easily navigating to the page of a specific marco (prefix) without having to scroll through the whole document.

4.4 Traces, Routing

Move Segment

Trace segments created with the `Adjust neighbours` option don't extend beyond the start and end points of neighbouring segments anymore to avoid the generation of acute angles and possibly eliminate the need for correcting pin connections.

The `Adjust without vias` option has been added for carrying out an `Adjust neighbours` modification which stops at vias. I.e., `Adjust without vias` does not shift any via positions, unless the via is at the end point of the modified segment.

Delete Segment

The `Delete Segment` function now also supports the deletion of arcs from trace routes.

Trace Highlight

The `Fix Trace/Net` and `Unfix Trace/Net` functions have been changed to deactivate any currently active group highlight during trace selections to allow for the identification of (highlighted) fixed traces and unfixed traces.

Via Mirroring

The mirroring of vias on part level as required for the placement on microvias on SMDs is not implicitly supported through the part `Default Mirroring` option in `Settings / Settings` anymore to prevent from unintentionally setting via mirror modes. Vias on part level can still be mirrored explicitly through the right mouse button context menu and the dialog activated through the `p` key.

Teardrop Generation

The `Length Mode` option has been added for controlling the length of teardrops to be created with the `Traces / Other Functions / Teardrop Utilities / Create Teardrops` function. `Relative to Radius1+Radius2` is the default mode for setting the teardrop structure length in relation to the dimensions of the affected elements. `Fix Length` sets a fixed length for creating the teardrop structures. `Full Length` creates teardrops at full trace segment length.

The `Delete Teardrops` menu item has been turned into a submenu with the options `All` (delete all teardrops), `Trace` (delete teardrops for selectable traces) and `Net` (delete teardrops for selectable nets).

Trace Beautify

The `Traces / Other Functions / Trace Beautify` function has been added for optimizing and/or straightening either selectable traces or group-selected traces or all traces of the currently loaded layout. The trace beautifier eliminates redundant short trace segments, replaces right-angled corners with diagonal segments and straightens traces segments wherever possible without violating design rules. The `Trace Beautify` function complements the `Optimizer` function of the **Autorouter**. Fixed and glued traces are not modified by `Trace Beautify`.

Trace Length Query

The `Query Trace Routes`, `Query Group Traces`, `All Nets by Name`, `All Nets by Length`, `Visible Nets by Name`, and `Visible Nets by Length` functions have been added to the `Traces / Other Functions / Trace Length / Length Query` submenu. `Query Trace Routes` extends the standard trace length query (function `Query Single Trace`) to the nearest pin and/or T-connection point. Measured elements are highlighted during trace length queries. The new functions allow for `All Nets` reports to be sorted either by net lengths or by net names. The reports for visible nets are only listing nets which are selected by the current airline visibility configuration.

Traces and vias on part macro level were not considered by net-specific trace length queries. This problem has been fixed.

Trace Length Adjustment

The `Set Length` function from the `Traces / Other Functions / Trace Length` submenu has been renamed to `Set Antenna Length`.

The `Serpentine Trim Length` for increasing trace lengths by meandering has been added to the `Traces / Other Functions / Trace Length` submenu. A series of options for controlling meander sizes and shapes are provided with this function. The meandering starts at the selected trace corner point and proceeds under consideration of the current DRC settings until the desired trace length is reached.

Differential Pairs

The **Pair Trim Length** function for synchronizing the lengths of pairs of parallel traces by meandering the shorter trace has been added to the **Traces / Other Functions / Trace Length** submenu.

The **Display Pair Phases** function for visualizing signal phases along pairs of parallel traces has been added to the **Traces / Other Functions / Trace Length** submenu. **Display Pair Phases** draws configurable periodical signals on a selectable documentary layer and assigns the generated documentary areas to a group with the name **trcwave**. Signals start with inverted phases at the selected trace corner points. The signal graphic areas are drawn on side 1 and 2 of the selected documentary layer alongside the center line between the two traces. Phase shifts are visualized through a suitable choice of documentary layer colors. The documentary layer graphic created with **Display Pair Phases** can be removed with **Undo** or by pressing the **Delete old graphic** button from the **Display Pair Phases** dialog.

Trace Rules

Trace and via rule assignments got lost when editing traces. This problem has been fixed.

Power Layer Setup

The **Load Power Layer Setup**, **Store Power Layer Setup** and **Delete Power Layer Setup** functions for managing power layer definitions have been added to the **Traces|Power Layers** submenu. This simplifies temporary power layer setups, e.g., to prevent the **Autorouter** from routing nets which are intended for copper fill and/or split power plane implementation.

Net List Assistant

The **Net List Assistant** function for activating a modeless layout net list dialog with buttons for various net-specific functions has been added to the **Traces / Net List Utilities** submenu. Double-clicking a net list entry activates the **Report Net Data** function for the selected net.

The **Color Net**, **Highlight Toggle Net**, **Toggle Airline**, **Select** and **Deselect** functions can now be applied to net name patterns specified in the net name dialog prompts. **\$** inputs allow for net selections by net, part or pin attributes.

Net Highlight

The **Unrouted Nets** and **Routed Nets** functions for highlighting nets with or without airlines have been added to the **Traces / Net List Utilities / Highlight Nets** submenu. Single-pin nets and nets with disabled airlines are excluded from the highlight. In **BAE HighEnd**, these net highlights are transferred to open project SCM sheets, thus visualizing SCM connections which are routed and/or unrouted on the layout.

4.5 Graphic, Copper Areas

Layer Fade In

The input layer is now automatically faded in when creating a polygon on an invisible layer.

Board Outline Copy

The **Copy Area** function, when applied to the board outline, no longer cancels its operation, but prompts for a destination documentary layer for the board outline copy and creates a documentary line copy. This reduces the number of steps which previously had to be carried out for creating a board outline copy. Please remember also that the **P** key can be used to turn documentary lines into other polygon types.

Border Keep Outs

A prompt for specifying the keepout area type has been added to the **Areas / Other Functions / Border Keep Outs** function for creating border keep out areas. This simplifies the creation of specific keep out areas (e.g., for the **Autrouter**).

Polygon Combination

A series of new functions for combining two intersecting polygons have been added to **Areas / Other Functions / Polygon Combination**. The **Cut Out** function removes the second polygon's intersecting area from the first polygon. The **Contour** function creates a new polygon from the combined outline of both polygons. The **Intersection** function creates an intersection of the two original polygons. Depending on the shapes and placement of the original polygons, this can lead to the generation of more than one new polygon. The **Circle** and **Rectangle** options allow for a circle (defined by center point and radius) or a rectangle (defined by two corner points) to be used as second polygon for the **Cut Out**, **Contour** and **Intersection** functions.

Tile Polygons

The **Tile Polygon** function for covering the surrounding rectangles of selectable polygons with a matrix of tiles on a different layer has been added to the **Areas / Other Functions / Drawing Utilities** submenu. **Tile Polygon** prompts for the destination layer, the number of rectangles in X and Y direction, the polygon type, and the degree of coverage. This function can be used to achieve a stencil design for large thermal pads according to recommendations for avoiding large solder paste coverage which could cause splatter and solder balling defects during the reflow soldering process.

Polygon Point Edit

The selected polygon graphic is now displayed in the polygon property dialog which is displayed when clicking the **P** key on polygon corners.

For arc center points, the radius is now displayed with the arc direction. Previously, arc radius queries had to be carried out through more tedious distance queries.

Documentary Line Plot Width

The **File / Library Utilities / Layout Library Edit Batch** function has been changed to support plotter pen width settings for documentary lines.

Corner Distance Display

During the creation of documentary lines, the distance to the last polygon corner point is now displayed in the first status line together with the current coordinates. This distance value can also be faded in at the graphic cursor by pressing the **Shift** key.

DXF Import Layer Selection

Wenn auf dem aktuell geladenen Layout noch keine Umrandung platziert ist, kann beim **AutoCAD/DXF Input** has been changed to allow for the board outline layer to be selected as a destination layer for a DXF layer. The first polygon from the selected DXF board outline layer is imported as board outline. Further polygons from that DXF layer are discarded and will be listed as polygon errors in the DXF import report.

The **DXFINSLAYM_LAY** and **DXFCOLLAYM_LAY** entries have been added to **bae.ini** to allow for block layer priority over single element colours to be deactivated when placing blocks and to activate the generation of destination layer names from DXF layer names and colour index for elements with layer specification to assign coloured DXF elements to specific BAE layers.

4.6 Text, Drill

Text List/Row Placement

The `Place Pin/Text List` and `Place Pin/Text Row/Matrix` functions from the `Part Edit Functions` which can be activated through the `e` key have been changed to allow for the assignment of the previously used text layer through the `Last Layer` button when repeatedly placing texts. This simplifies the editing of specific elements such as part list templates for `EPS/PDF Output`.

Text DRC

In layouts with multiple DRC data blocks for signal layer texts, **BAE HighEnd** sometimes issued erroneous DRC error messages. This problem has been fixed.

Centered Texts

The `File / Import/Export / TXF Input` has been changed to support the import of center-aligned text by assigning corresponding text attributes.

Text Plot Width

The `File / Library Utilities / Layout Library Edit Batch` function has been changed to support plotter pen width settings for texts.

Drill Batch Edit

Functions for changing drill classes have been added to the padstack processing functions in `File / Library Utilities / Layout Library Edit Batch`.

4.7 Group Functions

Group Area Movements

Context menu group operations which are restricted to a certain area have been modified to display the number of changed elements instead of the number of group-selected elements after successful execution.

Via Selection

The **Edit / Other Functions / Select / Net** function has been changed to support the selection of vias which are assigned to the selected fill net but are not yet connected to the selected net.

Drills

Drill holes on padstack level were not properly supported by a number of group functions. This problem has been fixed.

Pads

The **Layout Editor** group functions have been made available on pad level.

Polygon Selection

The **Edit / Other Functions / Select / Polygon Type** function now also supports the selection of **Hatch Area** polygon types. This is useful for deleting hatch areas which lost their net assignments due to netlist changes.

PDF Color

The **Set PDF Color** and **Select PDF Color** functions have been added to the **Settings / Rule Attachment / Group** submenu to allow for element-specific color settings for the **EPS/PDF Output** function. Previously, such element-specific settings could only be carried out through the **p** key dialog.

4.8 Automatic Copper Fill

Heat Trap Generation

New parameters have been added to the copper fill functions to support pin and via heat trap generation through traces instead of rectangular polygons. The system automatically fixes heattrap traces and attaches rules to support automated removal. This trace heattrap generation mode can be used to pass filled areas with very small pins to the **Autorouter** which does not accept pins which are fully covered with active copper areas.

The **Only Unconnected Layers** option for deactivating heat trap generation for pins and vias which are already contacted to a fill layer trace or area has been added to **BAE HighEnd**. This feature can be used prevent automatic heat trap generation in critical board areas, while applying standard heat traps to the rest layout.

Part Side Layer

The functions for filling and hatching areas, when applied to areas on the **Layer n (Parts.)** layer, are now creating filled and hatched areas on the **Layer n (Parts.)** special layer rather than the signal layer currently selected **Top Layer**. This ensures that such fill and hatch areas stay on the top layer even if the **Top Layer** setting is changed. It also allows for part side fill and hatch areas to be created on part level.

Performance

The performance of the copper fill algorithms has been significantly increased, especially for large layouts.

Keepout Areas

New options for cutting out keepout areas without clearance have been added to the automatic copper fill facilities.

Net Group DRC (BAE HighEnd)

The copper fill functions in **BAE HighEnd** have been modified to support net type/group clearance parameters from the **Settings / Advanced DRC / Net Group DRC** function.

Hatch Area Deletion

Automatically generated hatch areas could only be removed automatically within the same BAE session. This problem has been fixed. It is now possible to remove hatch areas automatically after reloading the layout.

5 Autorouter

5.1 General

Standard Autorouter

Support for the deprecated **Standard Autorouter** has been discontinued. Accordingly, the option for selecting the **Autorouter** module has been removed from the main menu setup. The system has been changed to force the use of the advanced **Neural Autorouter**, and **Autorouter** module selections from old setups are simply ignored.

Grid Display

The **Display** for displaying the input grid has been added to **View / Settings**. The input grid is displayed using the origin colour to distinguish the input grid from the display/background grid which is drawn using the workarea colour. This allows for different grids to be displayed for comparison at the same time, and this in turn can help to decide whether the **Off-Grid Cost** strategy parameter setting is the cause of unnecessary half-grid routing trace corners. The background grid has priority over the input grid if grid points are to be displayed at the same position.

Color Manipulation

The **Ctrl-P** key function for loading a new color table during routing is now supplemented with the **Ctrl-E** key function for direct color table editing.

The **Ctrl-G** key can be used to change the display grid.

Control/Strategy Parameter Setup

The **Current Layout** button has been added to the **File / Load Parameters** and **Save Parameters** name selection menus. This allows for control and strategy parameter data sets to be optionally loaded from and saved to the project file instead of the central database `rutparam.dat`. The parameter data set is saved under the name of the currently loaded layout and is automatically activated whenever the layout is subsequently loaded. This allows for the configuration of layout-specific routing parameters such as BGA or SMD via fanout routing.

5.2 Autorouter Algorithms

Gridless Routing

The gridless routing algorithms have been modified to improve the performance of the gridless router by 20 to 30 percent for certain routing tasks at the cost of slightly increased memory requirements.

The algorithm for connecting offgrid pins has been improved to extend the length of the gridless pin-centered trace start segment if this helps to avoid clearance violations to neighbouring pins.

Power Layer Vias

Using the **Power Layer Vias** options for marked vias sometimes caused the **Autorouter** to place power layer net traces on keepout layers. This problem has been fixed.

6 CAM Processor

6.1 General

Plot Origin

The **Set to Layout Origin** button for positioning the **Plot/CAM Origin** to the **Layout Editor** layout element origin has been added to **Settings / Settings**.

DXF Data Output

The **AutoCAD/DXF Output** output function has been changed to include information about metric units being used in the header of the output file to allow for direct import to Inch-based CAD systems.

Trace polygon line outputs at pen width are now automatically split at acute corner points to avoid overdraw effects caused by corner modes in certain third party CAD systems.

A number of DXF table entries have been added to DXF outputs created with the **DXF14OPT_LAY** **bae.ini** option to support additional third party systems such as **Autosketch**.

The **DXFTXTLINE_LAY** entry for forcing vectorized DXF text output has been added to **bae.ini**. This forces text to be displayed exactly as in BAE, regardless of any font selections in the DXF target system. Please note that vectorized text output can result in significantly increased DXF output file sizes.

Batch Output

The **Warning Control** batch option for deactivating warnings about layout layers and drill classes which are not included in the output batch has been added. This is useful for non-productive batches which are intended for documentary purposes only.

The **cd *** command for changing the current directory to the project file directory has been added to the list of valid **Command Call** batch steps. This command can be used to simplify subsequent commands and/or processes such as creating an archive of the output files in the project file directory.

To allow for certain **User Language** data export programs to be incorporated into automated batch output sequences, the interaction code **: "*" "** has been introduced to support the automatic confirmation of default output file names derived from the project file name.

6.2 Control Plot

Plot Scaling

The **Generic Output Scale Mode** option for scaling **Generic Output** has been added to **Control Plot / Settings**. The **Use Scale Factor** mode uses the scaling factor selected with **Plot Scale**. The **Scale to Paper Size** mode automatically scales the output element to the paper size.

EPS/PDF Output

Element comment are now appended to the element/page names in the PDF file bookmark section. Batch PDF outputs allow for the element name only or the element comment only to be used as page name.

The **Files for element variants** option for creating variant-specific PDF output files has been added to **Output Element(s)**. The PDF output file names are automatically derived from the variant names. If the specified file name is an extension of the project file name, then this extension is also used for variant file names.

The **Control Output** option has been added to the PDF output facilities. This option automatically passes the PDF output on to the application which is registered for opening files with the extension **.pdf**.

A PDF layer for the display grid is now included in PDF outputs of visible layers with PDF layer assignment option and visible BAE workarea layer. Like the BAE display grid, the PDF display grid layer is automatically faded in or out depending on the display zoom factor.

Certain third-party tools such as **Ghostscript** and **Spicer Imagination** were not able to process compressed BAE PDF outputs. The BAE PDF output functions have been adapted to fix these problems. These modifications also resulted in a PDF output file size reduction of some 25 percent.

The **Part List Pages for Element** option integrating part lists to the output has been added to the batch output function. This option prompts for a layout page template from the **pdfpage.ddb** layout template library from the BAE library directory. These templates contain attribute references named **\$attributname:1:** through **\$attributname:maximum_row_count:** which will be substituted with corresponding attribute values.

The **EPS/PDF Output** function has been extended to support the attribute texts **\$pdfpagecnt** (total output page count), **\$pdfplpage** (current part list page), **\$pdfplpagecnt** (total part list page count), **\$pdfplpos** (current part list entry number/position), and **\$pdfplcnt** (part count for current part list entry). The **\$pdfplcnt** reference automatically activates the part list output which adds parts with equal values (see also layout page templates in **pdfpage.ddb** for examples).

Batch output of power layers can now be configured to use the project-specific **Settings / CAM Settings** instead of constant values.

The layer selections of the batch definitions are now also supporting the **Circle with Cross** (default; as displayed on screen), **Circle Outline** and **Filled Circle** drill output modes. For Postscript and PDF outputs, white **Filled Circle** drill output at the end of the batch is recommended to create the most realistic image of the copper structures.

6.3 Gerber Photo Plot

Gerber Output Formats

Metric Gerber output options (3.3, 3.4, 3.5 and 3.6) have been added to Gerber Photoplot / Settings and to the Gerber batch output settings in CAM-Batch Output.

Power Layer Heat Traps

The generation of line-drawn heat traps and the definition of heat trap flash apertures has been modified for Extended Gerber outputs. The heat trap connectors are now created diagonally in 45 degree angles, and the standard line width setting for Gerber outputs is now used for heat trap isolation distances. The P-HT Base Angle parameter has been added to the Settings / Settings dialog to allow for orthogonal heat trap connectors. The P-HT Base Angle parameter is also supported by CAM-Batch Output.

Warning

Please check the Default Line Width and Power Layer Isol. settings for batch-driven Gerber outputs. Default Line Width now applies to the isolation of both line-drawn and flashed heat traps. Power Layer Isol. now only applies to the isolation of split power plane areas.

Dynamic Aperture Table

The CAM-Batch Output for Extended Gerber outputs with dynamic aperture table has been modified to create a single aperture table for all batch steps, thus providing a common aperture table even if batch steps have different standard line width and/or power layer isolation parameter settings.

6.4 Insertion Data Output

Insertion Data Output

The **OUTPICK** command for using part macro origins instead of the **\$** text has been added to the output configuration files for the **Generic Insertion Output** function. The syntax of the **OUTPICK** command is similar to the **OUTLAYER** command syntax, however without layer number. The **OUTPICK** command allows for any insertion data outputs without the need of placing **\$** texts on part macro level.

New options have been added to the format description file to derive the insertion data output file name from part attributes and/or the project variant name and to create insertion data output files for all project variants in a single batch.

7 CAM View

7.1 General

Element Query

Pressing the **Ctrl** key without active menu function activates the mouse and/or graphic cursor coordinate display and shows additional information about the element at the current cursor position such as the data set number, drill class and diameter for drill holes, and Gerber D code with aperture size, draw mode and layer for Gerber data. If different elements are placed at the cursor position, then the system picks drill holes first, then flashed structures, then line structures, and then G36/G37 areas.

Drill Data Report

A tool table listing for the currently loaded drilling data has been added to the **Utilities / Report** output.

7.2 Data Import

Drill Data Import

The load and save toolbar button definitions have been extended to distinguish between left and right mouse button clicks. Left mouse button clicks activate the functions for loading and/or saving Gerber data, whilst right mouse button clicks now activate the functions for loading and/or saving drilling data.

The system always assumed Imperial units for the tool table when importing Excellon drilling data without input unit specification. This behaviour has been changed. Metric specifications for **Length of one Plotter Unit** parameter are now forcing the Excellon import function to interpret the tool table in metric units.

7.3 Gerber Data

Gerber Data Display

New entries for areas drawn with **G36/G37** codes have been added to the **Change Colors** dialog for D-Code-oriented Gerber data display. The color assignment dialog has also been modified to allow for D-Code number inputs through keyboard, thus eliminating the need for paging through numerous color setup pages to find color assignments for high D-Code numbers.

The layer-oriented outline display has been changed. Previously, element outlines on invisible layers were still displayed if the outline layer was visible. Now element outlines are only displayed if both the element layer and the outline layer are visible.

Gerber Formats

Options for selecting metric Gerber formats (**3.3**, **3.4**, **3.5** and **3.6**) have been added to **Settings / Settings**. Previously, these formats had to be selected by specifying corresponding conversion factors.

Flashed Heat Traps

The **Heat Trap Isolation Width** and **Heat Trap Base Angle** parameters have been added to the **Settings / Settings** dialog to provide better control over the display and generation of flashed heat traps when viewing and/or exporting Extended Gerber data.

The **Load Gerber Data** function for importing Extended Gerber data sometimes failed to import heat traps correctly. This problem has been fixed to allow for correct power layer panelization.

8 Utilities

8.1 COPYDDB

DDB File Names

The **COPYDDB** utility program has been updated to support double-quoted project file names with spaces.

8.2 LOGLIB

Name Truncations

Warning messages have been added to the **LOGLIB** utility program to notify about any truncation of element names which are exceeding the maximum element name length of 40 characters.

Pin Combinations

LOGLIB is now issuing a warning message if more than one pin of a `net internal` command is listed in `xlat` commands to indicate that this `net internal` command might unintentionally connect different SCM symbol pins.

9 Bartels User Language

9.1 General

This section describes general changes to the **User Language** specification. See [Bartels User Language Programmer's Guide - Chapter 2](#) for a detailed description of the **User Language** specification.

Internal User Language Version

The internal **User Language** version has been changed. **User Language** programs compiled under earlier BAE versions won't execute in the **User Language Interpreter** environment of the new **Bartels AutoEngineer** version (error message `User Language program version incompatible!`). This means that each **User Language** program compiled under earlier BAE Versions must be recompiled under the new **BAE** version to regain compatibility.

9.2 User Language Compiler

This section describes the news and changes introduced to the **User Language Compiler**. See [Bartels User Language Programmer's Guide - Chapter 3](#) for detailed information on how to operate the **User Language Compiler**.

Line numbers in the **User Language Compiler** error messages were incorrect when errors occurred in different source code files during the compilation of multiple programs in a single **User Language Compiler** run. This problem has been fixed.

The **User Language Compiler** is now issuing a warning message if `return` is used without argument in functions with a base data type specification for the return value.

9.3 User Language Interpreter

This section describes the news and changes introduced to the **User Language Interpreter**. See [Bartels User Language Programmer's Guide - Chapter 3](#) for detailed information on how to operate the **User Language Interpreter**.

9.4 Index Variable Types

This section lists new and changed **User Language** index variable types. See [Bartels User Language Programmer's Guide - Appendix B](#) for a detailed description of all index variable types.

Changed Index Variable Types

The `NAME` attribute of the `L_FIGURE` index variable type has been modified to return the name of the padstack macro for elements of `TYP 7` (intern) if the internal element is a standard via definition.

The `LAYER` attribute for power layer code queries has been added to the `L_POWLAYER` index variable type.

9.5 System Functions

This section lists new and changed **User Language** system functions. See [Bartels User Language Programmer's Guide - Appendix C](#) for a detailed description of all system functions.

New System Functions

The following **User Language** system functions have been implemented:

IP	System Function	Short Description
STD	bae_dialaskcall	Activate BAE dialog with callback function
	bae_dialboxperm	Activate modeless BAE dialog
	bae_dialsetcurrent	Set current BAE dialog box
	bae_nameget	Get BAE name selection list element
	filemode	Get file mode
	namestrcmp	Name string compare
	quicksort	Sort index list
CAM	cam_getdblpar	Get CAM double parameter
	cam_setdblpar	Set CAM double parameter

Changed System Functions

The [askdist](#) function has been modified to support additional options for distance queries.

Support for parameter queries/settings has been added to the [ar_getintpar](#), [ar_setintpar](#), [bae_getintpar](#), [bae_setintpar](#), [cam_getintpar](#), [cam_setintpar](#), [cv_getdblpar](#), [cv_setdblpar](#), [cv_getintpar](#), [cv_setintpar](#), [ged_getintpar](#), [ged_getstrpar](#), [ged_setintpar](#), [ged_setstrpar](#), [scm_getintpar](#), [scm_setintpar](#), [scm_getstrpar](#) and [scm_setstrpar](#) functions.

The [con_setddbpattrib](#) function has been modified to reset attributes for `PA_NILVAL` attribute value specifications to mimic the behaviour of the `No Value` button in the **Schematic Editor**.

A new net name selection mode has been added to the [ged_asktreeidx](#) function.

The value range for the group status parameter of the [ged_elemgrpchg](#) function has been modified to allow for the activation of a status line message about the selected/deselected element and the total number of group-selected elements.

Support for `Adjust neighbours without vias` trace segment move mode settings has been added to the [ged_getsegmovmode](#) and [ged_setsegmovmode](#) functions.

9.6 BAE User Language Programs

BAE installs some 220 pre-compiled **User Language** programs to the `u1cprog.vdb` file of the BAE programs directory. Additionally, the **User Language** *source* files (more than 7 Mbytes; some 240,000 lines) are installed to a special directory (`baeu1c`). See [Bartels User Language Programmer's Guide - Chapter 4](#) for a complete listing and short descriptions of the BAE **User Language** programs.

User Language Include Files

The **User Language** include files have been revised and extended by a series of new definitions and functions.

New User Language Programs

The following **User Language** programs have been implemented:

IP	Program Name	Short Description
STD	BAE_DIAL	BAE Dialog Box Action
	BAE_SAVD	BAE Save Done Action
GED	VHDLOUT	VHDL Netlist Data Output

Changed User Language Programs

The **User Language** programs already delivered with the previous BAE Version have been completely revised and extended by many new features and functions. A series of significant improvements and enhancements have already been mentioned in the previous sections of these Release Notes.