



Bartels AutoEngineer®

Version 7.4

Release Notes

This documentation contains information about the new features introduced with **Bartels AutoEngineer Version 7.4**. Forward compatibility from earlier versions to **Bartels AutoEngineer Version 7.4** is ensured, but not backward compatibility.

Bartels AutoEngineer Version 7.4 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.

Windows 7

The **Bartels AutoEngineer** software can be operated on **Microsoft Windows 7** operating systems.

Solaris/OpenSolaris

The **Bartels AutoEngineer** software has been made available for the **SUNSolaris/OpenSolaris** operating system on X86 hardware (Intel and/or AMD processors).

1.2 User Interface and General Functions

BAE Window Focus

Mouse clicks which are intended to set the focus to BAE windows which don't have focus (or are not on top of the screen) are not triggering any internal BAE function anymore. I.e., it is now possible to set the focus to a BAE window by clicking into the BAE window graphic workarea without also triggering the last BAE menu function or a BAE context function.

Tree View Menu (Windows)

The **Tree View Menu** option for action a tree view function menu at the left or right of the BAE window has been added to the **View / Toolbar** function and the BAE logo in the toolbar. It is possible to open different tree view submenus. This simplifies tasks which require the frequent activation of submenu functions.

Right-clicking a submenu item fully expands and/or collapses the selected submenu.

The **Restore Position** parameter which can be set through **Settings / Settings bae.ini** is considered when selecting tree view menu entries. This allows for menu interactions similar to those of the old BAE side menu where the focus automatically switches between graphic area mouse cursor and menu cursor, however, with the added benefit that tree view submenus stay open for subsequent submenu function selections.

After executing a menu function, the input focus stays in the graphic workarea to ensure that the BAE hotkey functionality stays active. The interaction sequence code **#9053** can be used to set the input focus to the menu tree window. With this feature, the system can be fully operated through the keyboard if a hotkey is programmed accordingly.

The module-specific width and position of the tree view menu are stored together with the BAE window position and size to allow for each module to restore its tree view menu in subsequent sessions.

File Selection

The file selection menus have been modified to display an error message if the length of the selected file name exceeds the maximum BAE file name length of 200 characters.

Activating the file selection dialog in the **Windows** version triggered a redraw of the parent/background BAE window. To eliminate unnecessary delays caused by redrawing the currently loaded element, the screen redraw is now suspended until the file and element name selection is completed.

Element Preview (Windows)

Schematic sheet and layout preview options have been added to the DDB file element selection dialogs. On default, these previews are deactivated to avoid long response times for large SCM sheet and/or layout elements.

Edit/Angle Direction

The **Insert Corner** and **Move/Delete Corner** functions for editing traces and polygons have been modified to display a dashed center line for the segment side in edit direction. This indicates the edit direction before picking a polygon point and simplifies the start point selection for subsequent edit operations.

A marker indicating permitted angle directions is displayed at polygon corner points with angle lock settings. This helps to identify segment sides with correct angle directions without having to move the mouse. The **Angle Direction** parameter can be set through **View / Settings**. The default mode is **Pick Side** for adjusting the angle direction to the segment side which has its segment corner closer to the pick point. The **Grid Toggle** mode changes the angle direction according to the crosshair graphic cursor position relative to the input grid. The **Shorter Side Toggle** mode sets the angle direction dynamically to the segment side which has its segment corner closer to the pick point. The **Edit Direction** mode keeps the angle direction in line with the edit direction (which is basically according to the behaviour prior to BAE Version 7.2).

The **Direction** polygon and trace edit context menu function has been assigned to the **m** key.

The **Angle Direction** polygon and trace edit context menu function has been assigned to the **i** key.

Arc Drawing

The **Arc Left** and **Arc Right** polygon editing functions have been modified to display the connection line from the circle center point to the arc start point in addition to the arc. This provides better guidance for certain tasks such as setting the circle center point at a right angle to the arc start point with fine input grid settings.

Multicolumn Listboxes

Multi-column name selection list boxes sometimes only displayed a single column even if there was enough space for multiple columns. This problem has been fixed.

Dialog Box Positions (Motif)

The **Motif** versions of the BAE software have been updated to save dialog window positions for the current and subsequent BAE sessions. The dialog box configurations are saved in the `baexwin.dat` file.

Autosave

The `EFAUTOSAVE_STD` parameter for activating an autosave facility without user prompt for the `Load Previous` and `Load Next` functions has been added to `bae.ini`. This can be useful when systematically editing a series of library elements.

A new feature for recovering project files after program crashes due to memory access violations has been added. When a memory access violation occurs, the system now asks the user whether it should try to recover and save the last project state before calling the function which caused the error. It is strongly recommended to make a backup copy of the project file before starting the recovery as there is a possibility that the program crash may have caused inconsistencies in the project data structure to be recovered and/or saved.

Clipboard (Windows)

The `Ctrl-A` key function for marking edit field contents has been added to the text edit controls of the BAE dialog boxes to allow for quickly copying edited text to the clipboard with subsequent `Ctrl-C` keystrokes.

A new function has been added to the BAE dialog windows which allows for the content of selection lists to be copied to the clipboard by pressing the `Ctrl-C` key if the selection box has the mouse input focus. Each selected and unselected list entry of single-column or multi-column selection lists is stored in a separate output line in the clipboard. Please note the difference between selection list boxes and report output text boxes. The content of report output text boxes still has to be marked with `Ctrl-A` before it can be copied to the clipboard with `Ctrl-C`.

Display Functions

The `Zoom Window` function has been modified to distinguish between left and right mouse button clicks when selecting the first zoom window point. Clicking the right mouse button considers the selected position as zoom window center point and renders a symmetric zoom rectangle around this point when selecting the second position.

A control element for scrolling the current view in arbitrary directions by positioning the mouse in the desired direction within the control element circle has been added at the junction point of the vertical and horizontal scrollbars of the BAE graphic workarea. A line from the current window center to the new window center point is dynamically displayed when positioning the mouse in the scroll circle. The scroll operation is triggered by clicking the left mouse button.

The new interaction sequence/code `#9054` can be used to implement a function for directly setting a display zoom factor. A command sequence such as `#9054:"6.0"` can be used to set a specific zoom factor for, e.g., screen shots.

Toolbar

The `Input` and `Display` buttons for displaying and setting the current input and display grids have been added to the toolbar. The `TB_INPGRID_STD` and `TB_BACKGRID_STD` parameters for deactivating these buttons have been added to the `bae.ini` file.

Context Functions

The `Properties` context menu function sometimes selected the wrong element. This problem has been fixed.

The context functions for left mouse button rectangle selections were processing both traces and vias according to the element parameter settings for `Traces`. This behaviour has been changed. The rectangle context functions are now distinguishing between context pick element parameters for `Traces` and context pick element parameters for `Vias`.

Info Display

The information display which can be activated by pressing down the `Ctrl` key when hovering the graphic cursor over an element has been modified to display the element information to the left of the selected element if there is not enough space for displaying this information to the right of the selected element.

Text/Attribute Value Length

The system limits for maximum text and attribute value lengths have been increased from 40 to 200 characters.

Prior to BAE Version 7.2.013, a `File structure damaged!` was issued when elements with texts or attribute values longer than 40 characters were imported. Please note that the **Packager** automatically sets `$orgname` part attributes which could have exceeded the 40 character limit if a layout part is compiled from multiple schematic symbols.

Default Settings

The `Settings / Settings bae.ini` function and the `Save Defaults` dialog buttons have been modified to save modified parameter settings to a user-specific parameter file with the name `baeuser.ini` instead of the `bae.ini` parameter file if such a `baeuser.ini` file exists.

Rule System Errors

Missing rule definitions in a project could cause certain functions to abort with error messages, even if the function did not depend on the missing rule. The system has been modified to display a verification prompt together with the error message in such cases to enable the user to either abort the function or to ignore the rule system error.

Control Characters

The tilde character was inconsistently considered a valid or invalid character by different functions for checking part names, net names, etc. This behaviour has been changed. The tilde character is now generally considered a valid character in names.

SQL Databases

The `SQL Table Export` and `SQL Table Import` functions for exporting and importing SQL tables in `.csv` (Comma-Separated Values) format have been added to the `File / File Utilities` submenu. The export function creates an output line for each database entry using the semicolon as field separator. The first two output file lines contain the file names and the field data types. The import function uses the base input file name (without path and file name extension) as destination table name. If the destination file already contains a table with the same name, then the system asks the user whether the import data should be added to the table or whether the destination table should be replaced.

The SQL table import and export functions can be facilitated if BAE SQL table are created and/or updated using third party tools such as **Microsoft Excel**.

1.3 Symbol and Part Libraries

New Library Elements

The following elements have been added to the symbol and part libraries supplied with the BAE software:

| Library | Type | Elements |
|----------------|--------|---|
| ROUTE | Symbol | att_diffpair, tag_netpins_diffpair, tag_nets_diffpair |
| PDFPAGE | Layout | partlist_cntnames_sep |

2 Schematic Editor

2.1 General

Element Boundaries

The `AUTOSHRINK_SCM` parameter for automatically shrinking element boundaries when saving SCM elements has been added to the `bae.ini` file. The element boundaries are set to the next millimetre grid (except for markers). `AUTOSHRINK_SCM` is an optional parameter. On default, the system does not change element boundaries when saving SCM elements.

The `Settings / Lower/Left Border` function has been added to the right mouse button context menu when activated to the bottom left of the current workarea, and the `Settings / Upper/Right Border` function has been added to the right mouse button context menu when activated to the right top of the current workarea.

The element report which is displayed through the `1` key or the `i` toolbar button has been modified to display the sheet description and orientation with the `Element Size` if the element size matches a standard sheet size such as `A4 Landscape`. This information can be used to check whether the currently loaded schematic sheet can be printed or plotted without scaling.

DDB Element Renaming

The `File / Rename Element` submenu has been added with functions for directly renaming DDB file elements without having to use `Load` and `Save as` command sequences.

The `Sheets` option activates a dialog for simultaneously changing the names and editing the element comments of all schematic sheets in a DDB file. `+` and `-` are provided for incrementing and/or decrementing the numeric parts of all schematic sheet names in the button row and below. This simplifies the insertion and/or removal of numbered schematic sheets enormously. The `Old Names -> Element Comments` button can be used to convert function-specific sheet names to numeric sheet names without losing the function descriptions.

Schematic Sheet Copy

The `File / Library Utilities / Copy Elements / Sheet` function has been extended to include the logical library definitions of the symbol macros when copying schematic sheets.

Possible symbol name conflicts in cases where the destination project file already contains schematic sheets are resolved by automatically renaming and/or renumbering affected symbols using their symbol name patterns.

DDB Element Comments

The functions for deleting DDB file elements did not delete corresponding element comments. Such obsolete element comments could still be displayed through text definitions such as `$pltecomment:planname` and could cause the display of wrong project page counts through `$pltpagecnt` text definitions. This problem has been fixed.

Logical Netlist

The `Logical Netlist` option has been added to the `File / Delete Element` function to allow for the deletion of logical netlists. This is useful if imported net lists need to be deleted in order to replace them by a schematic drawing or in situations where a netlist is causing `Packager` errors because it was accidentally re-imported with a different name.

The `Netlist` option of the `File / Delete Element` function has been renamed to `Layout Netlist` to avoid any confusion with the new `Logical Netlist` option.

Variants

The variant name input control in the variant selection dialog of the `Settings / Variants` function has been modified to select the variant after the currently active variant when entering `+` and to select the variant before the currently active variant when entering `-`. These inputs can also be facilitated in key programming sequences and in user-specific menu function and toolbar button definitions. This allows for command sequences such as `scmvar: "+" :s10` and `scmvar: "-" :s10` to be implemented for quickly stepping through variants.

Rule Update

The `Settings / Rule Attachment / Rule Update` for replacing project file rule definitions with the corresponding rule definitions from the central rule database file `brules.vdb` has been added. This function can be used to update project-specific rule definitions after re-compiling rule definition updates in the central rule definition database.

BAE ASCII Import

The `BAE/ASCII Input` has been modified to set the `Library Name` to the import project. This prevents the import function from incorrectly substituting label macros which are defined with a standard label name in the import file.

The `SYMGRPLIB_SCM` and `SYMGRPNAME_SCM` parameters for specifying a symbol group which is automatically placed at the symbol origin when importing symbols with `BAE/ASCII Input` (and `EDIF Data Import`) have been added to `bae.ini`. This is useful if special features such as symbol part number attributes are facilitated in BAE for which there is no corresponding data in the imported files.

The `sbaedmp.ulp` ULP program which is provided in the `eagleulp` directory of the BAE CD has been modified so that it can be activated in the **Eagle** library editor. `sbaedmp.ulp` exports all symbols and labels from the currently active **Eagle** library.

Error Report

The `Utilities / Report` function has been extended to list the number of open and/or unconnected pin contact areas on the currently loaded schematic plan. This helps to check whether all pin are connected when working with white screen background.

Antenna highlights and unconnected pin contact areas have been added to the reference listings created by the `Symbols / Other Functions / SCM Cross Reference` function. Pin and/or connection segment coordinates are included with these listing entries for easy location.

Packager Error Messages

The `Packager+Update` button for activating a **Packager** run with subsequent dialog box update has been added to the dialog box of the `Utilities / Packager Error List` function. The `Packager Error List` dialog and the **Schematic Editor** are deactivated during the **Packager** run.

2.2 Symbols, Labels

Part Name Pattern

The report which is displayed through the **1** or the **i** toolbar button has been modified to display the symbol name pattern of the currently loaded symbol macro.

The **File / Library Utilities / Report Namensmuster** submenu with the **Report Name Patterns** and **Report Symbols** functions for displaying the symbol name patterns of a selectable SCM library file sorted by name patterns or symbol names has been added.

Symbol Renaming

The **Symbols / Other Functions / Renumber Parts / Replace Pattern** function has been modified to allow for the substitution of name patterns at fixed positions in symbol names. Thus it is possible to rename, e.g., **r600**, **r601**, **c600** and **c606** in one go to **r700**, **r701**, **c700** and **c706** by replacing **6** with **7** at the second symbol name character position.

The **Replace Pattern** function has been modified to ignore modified elements to prevent endless loops and/or name length errors when substituting, e.g., **a** with **aa** at the end of names.

Part List Cleanup

The **Part List Cleanup** function has been modified to list any duplicate project symbol names at the end of the cleanup process. Duplicate project symbol names can be created when merging schematic sheets from older BAE versions. Unlike the **Packager** which includes only the last symbol and sheet name with duplicate symbol name error messages, the **Part List Cleanup** function lists all schematic sheets containing duplicate project symbol names.

Symbol Properties

The **p** key symbol properties utilities sometimes transferred certain symbol properties such as the plot visibility to referencing tag symbols instead of the processed symbol. This problem has been fixed.

Clipboard (Windows)

The **Place Clipboard Pin/Label** for placing pins on symbol level using the text from the clipboard as pin name and/or for placing labels on plan level using the clipboard text as label/net name has been added to the **Symbols / Symbol Edit Functions** menu. The name text is clipped at the first blank or when the maximum name length is reached.

Symbol Variant Data

The **Symbols / Other Functions / Copy Symbol** function for symbols and labels with variant-specific attributes and/or plot visibility settings has been modified to consider the **VARATTRCHK_SCM** parameter from the **bae.ini** parameter. This allows to prevent the system from including variant-specific data with symbol and/or label copies.

Symbol Pick

The pick performance for symbol selections and info queries with pressed **Ctrl** key has been improved. This improvement is most noticeable in large schematic sheets with active variant.

Pin Placement

The **Text Pin** button for placing pins with pin names derived from mouse-selectable texts has been added to the **Utilities / Draw Assistant** dialog. This is useful after importing DXF symbol drawings where pins are implemented with graphic and text rather than pin macros. The **Placement Loop** option can be used to carry out multiple **Text Pin** operations without having to re-activate this function between individual pin placement operations.

Symbol Pin Mode

The **Settings / Rule Attachment / Set Group Rules / Symbol Pin Mode** function has been added for assigning the symbol pin mode which controls symbol pin movement, symbol pin rotation and symbol pin mirroring on schematic sheet level to all group-selected pins of the currently loaded symbol.

Symbol Generation

The **Symbols / Other Functions / Create FPGA Symbol** function has been converted into a submenu with the **Netlist** default function and the new **CSV File** function for generating FPGA symbols from a symbol pin description file. The symbol pin description file is a CSV (Comman-Separated Values) file with semicolon-separated pin description entries. New parameter definitions for automatic symbol text and attribute assignments and logical library definitions have been added to **bae.ini**.

Label Placement

The **Symbols / Symbol Edit Functions / Place Texts/Labels** function which can also be activated by pressing the **e** key has been modified to support the placement of labels using a list of label names imported through the **Import** button after selecting the **Label List** mode.

Plot Visibility/Placement Status

The **NOPLCPVIS_SCM** parameter for controlling the way in which the system automatically correlates symbol plot visibility settings with the current **\$noplc** attribute value setting has been added to the **bae.ini** file. Previously, plot visibility changes were transferred to the **\$noplc** attribute value, but **\$noplc** attribute value changes did not affect the plot visibility settings. The default **NOPLCPVIS_SCM** setting correlates the plot visibility with the **\$noplc** attribute value and vice versa. The **NOPLCPVIS_SCM** parameter is considered by the group functions and by all symbol functions for modifying attribute values and plot visibilities.

Changes to the **\$noplc** value of the base variant are now also transferred to plot visibility settings of variants without **\$noplc** value assignment. This ensures consistent settings for the plot visibilities and **\$noplc** values of all variants.

Symbol Attributes

The **Assign Value(s)** function has been modified to focus automatically on the edit field of a pick position symbol attribute, thus simplifying attribute selections and reducing the time required for single attribute value changes.

Symbol Browser

A control element for activating a text info field for displaying the logical library definition of the selected SCM symbol has been added to the **Symbols / Other Functions / Symbol Browse** function. The logical library definition is retrieved from the standard layout library which is selected through the BAE setup.

Symbol Search

The symbol selection dialog of the **View / Find Symbol / Search in list** function which can also be activated through the **Ctrl-F** key did not always display all attribute values if the numeric symbol list order was different from the alphabetic symbol list order. This problem has been fixed. Attribute values are now always displayed for the whole project and all symbols.

The **Search layout part name** has been modified to display a symbol selection menu rather than the first schematic symbol match if the selected layout part consists of multiple schematic symbols. Once a schematic symbol is selected from that list, **+** and **-** buttons are provided for stepping through the symbols which are packed into the selected layout part.

Symbol Query

The net name column of the **Symbols / Other Functions / Symbol/Label Query** output has been modified to display **Packager** assigned layout net names with the original SCM net names if the layout net name is different from the SCM net name. This allows for unnamed or merged net names to be traced to the layout.

A column for displaying **newattr** pin attribute values (e.g., ERC pin types) has been added to the symbol pin table output of the **Symbols / Other Functions / Symbol/Label Query** function. Please note that a **Packager** run is required for the **newattr** pin attribute to be set.

Symbol Documentation

The **Symbol Database Doc** function for loading the documentation for the part number of a mouse-selectable symbol is now also available through the **Documentation** function of the right mouse button symbol context menu.

The **Settings / Rule Attachment / Single Elements / Sheet/Macro** function has been modified to support the assignment of the **sym_docu** (symbol document file) String predicate to SCM symbols on SCM macro level. This allows for the definition of external symbol document file references without part number references in the symbol databases. Please note however that the symbol database document file reference has priority over the **sym_docu** symbol macro predicate.

Symbol Pool

The **Symbol Database** symbol pool window can now be activated as modeless dialog using the new **Symbols / Symbol Pool** function. This allows for the placement of symbol pool symbols without having to re-activate the symbol database between symbol placement operations. The symbol pool and the symbol database selection dialog can be activated simultaneously, thus allowing for the content of the symbol pool to be viewed during the selection of new database symbols for the symbol pool.

Symbol List Output

The part list output of the **Symbols / Other Functions / SCM Part List** function has been modified to include total symbol type counts in the symbol type section headers (e.g., the total number of resistors on a schematic sheet).

The **PLPNUPPER_SCM** and **PLPMUPPER_SCM** parameters for forcing uppercase symbol names and/or symbol macro names when creating part list outputs with the **Symbols / Other Functions / SCM Part List** function have been added to the **bae.ini** file.

Symbol Edit Batch

The **Process Folder Tree** option for processing all DDB files of a selectable library directory and all its subdirectories has been added to the **File / Library Utilities / Symbol Edit Batch** function.

The **Change Name Pattern** option for substituting symbol name patterns such as **ic*** with other patterns such as **u*** has been added to the **Part Name Pattern** batch function of the function.

Symbol Logic Edit

A new text field with logical library example definitions and copy/paste functionality has been added to the **Edit Symbol Logic** function. The **Help** button has been added for displaying the **LOGLIB** command documentation.

The **Edit Symbol Logic** function terminated with an error message when graphically assigning pins to single-pin layout macros. This problem has been fixed.

The symbol logic suggestion provided with the **virtual** button of the part macro selection contained empty pin commands for symbols without pins. Such empty pin commands are now omitted to allow for direct compilation of the symbol logic suggestion without further editing.

Pins with **xlat** in their pin names caused invalid symbol logic suggestions in the tabular and graphical pin assignments interfaces. This Problem has been fixed.

Symbol Data Consistency

The **NOPLCCHK_SCM** parameter setting in the **bae.ini** file could cause the system to issue redundant error messages about inconsistencies of **\$noplc** attribute values when creating variants with variant data transfers. This problem has been fixed.

Logical Definition Check

Under Windows, the **File / Library Utilities / Check Definitions** function always displayed a **No SCM library file found in directory ...!** error message after selecting a library directory. This problem has been fixed.

2.3 Connections

Context Functions

Bus tap names and/or connections names are now displayed after selecting bus taps or connections with the right mouse button to allow for the recognition of erroneous selections before selecting a context function.

Net Highlight

Net highlights for unnamed nets are now preserved when changing between different schematic sheets of a project.

The **BAE HighEnd** cross-highlight function has been modified to synchronize SCM net highlights for unnamed layout nets if the **Layout Editor** net highlight was activated prior to changing to the corresponding schematic sheet. The crosshighlight screen redraw performance for unnamed nets and nets with `$netname` names and many pins has been increased significantly.

Connection Routing

The algorithm for re-routing symbol and group connections sometimes considered invisible rotation-specific symbol texts and net range areas as obstacles. This problem has been fixed.

Connection segments with bus taps are now considered to be fixed when rerouting bus connections to labels. This prevents the system from accidentally losing bus taps when modifying.

The signal router has been modified to create dotted lines with the group name `open` for connections which can not be re-routed when making complex modifications to the symbol or group placement.

Delete Connection

The **Delete Connection** used to delete both connections when selecting one of two connections connecting the same pin at a right angle. This behaviour has been changed. The connection leaving the pin in a different direction will not be deleted anymore.

Bus Connections

The **Add Bus Connection** function for creating bus connections without having to go through the **Define Bus** function has been added to the **Connections** menu.

Bus Taps

Bus taps can now not only be selected by clicking the bus tap pin contact area but also by clicking bus tap graphics and/or bus tap texts. This simplifies bus tap selections significantly.

The **Tap Bus** function has been modified to select the bus connection before displaying the dialog with the bus tap name list of the selected bus, thus eliminating the need to go through the **List** button of the bus tap name dialog.

The **Tap Bus** function has been modified to use the selected symbol pin name as bus signal name if a symbol pin is selected prior to the bus. If the selected symbol pin is positioned within the coordinate range of the selected bus segment, then the system automatically places the bus tap on the bus and connects the symbol pin with the bus tap. This simplifies symbol pin to bus connections significantly if both pin name and bus signal name are the same.

If a text instead of a bus is first selected after activating the **Tap Bus** function, then the name of the text string is used for subsequent bus tap placements. This is useful when processing schematic plans which were imported from DXF.

Activating **Element Selection** for the **Pick Mode** causes the system now to display bus tap names instead of bus names to allow for adjacent bus taps to be safely identified during selection.

Previously, the system only issued an `Invalid name!` error message when trying to save a schematic sheet with bus and bus tap name combinations exceeding the maximum length of 40 characters. Now, a popup info window listing the bus and bus tap names which are causing the problem is activated instead. The maximum name length is now also checked when setting or changing bus tap names. I.e., the maximum name length limit can now only be exceeded when subsequently naming or renaming busses.

The **Current Sheet** and **All Sheets** options of the **Symbols / Other Functions / Renummer Parts / Rename Labels** function have been modified to optionally support the renaming of bus taps instead of net name labels to allow for project-wide bus tap renaming.

2.4 Graphics

Segment Editing

The **Insert Segment** function has been added to the **Areas** menu and to the areas context menu which can be activated through the right mouse button.

Draw Assistant

Due to rounding errors, the **Utilities / Draw Assistant** sometimes created corner arcs in the wrong direction when generating vertical rectangles with rounded corners. This problem has been fixed.

The matrix origin for group element matrix placements is now set to the first group placement coordinate rather than the element origin to provide better visual guidance for group matrix placement operations.

Dimensioning

The **X Dimensioning**, **Y Dimensioning** and **X/Y Dimensioning** functions for labelling coordinates have been added to the **Graphic / Other Functions / Drawing Utilities** submenu. Coordinate labels are created by placing a text which displays the coordinates of the first selected position. The **X Dimensioning** and **Y Dimensioning** functions restrict the text placement to the X and/or Y position of the labelled coordinate.

Clicking the right mouse button during the selection of the coordinate label point activates a measurement line which will be drawn from the coordinate label point to the label text. It is also possible to set a measurement origin different from the element origin. The selected measurement origin stays active until a new element is loaded.

New **bae.ini** parameters for setting default values for label text size, measuring line display and coordinate units suffix have been added to **bae.ini**.

Polygon Arcs

When drawing arcs, the current arc angle is now displayed as text at the graphic cursor, thus assisting in correctly setting specific angles such as 90 degrees even if a very fine input grid is selected.

The polygon property dialog which can be activated through the **p** key has been modified to display arc center points with arc angle span in addition to the arc type and the arc radius, the latter of which is now displayed in a separate dialog box line.

DXF Import

The **AutoCAD/DXF Input** function has been modified to support multiple areas when importing polygons defined with the **HATCH** DXF command.

Bitmap Data Import

The **File / Import/Export / Bitmap Input** function sometimes skipped areas touching the upper edge of the bitmap. This problem has been fixed.

2.5 Text, Attributes

Centered Texts

New options for center-aligning texts horizontally or vertically have been added to the text properties dialog which can be activated by pressing the **p** during text placement operations. These options are useful when placing symbol pin texts.

Clipboard (Windows)

The **Place Clipboard Text** function for placing texts from the **Windows** clipboard has been added to the **Text / Other Functions** menu. The **Place Clipboard Text** automatically recognizes and creates multiline texts.

The **Edit / Paste** function which can also be activated through the **Ctrl-V** key automatically checks whether the clipboard contains a BAE group or a text and activates the appropriate placement operation.

2.6 Group Functions

Symbol Name Conflicts

The **Edit / Save Group** and **File / Save As** functions did not consider existing symbol names in the destination file when saving to a file different from the current DDB file. This could cause unintentional attribute value substitutions in the destination file. A warning message/prompt has been added to the **Edit / Save Group** function to allow for the commonly desired cancellation of this operation in such cases. The **File / Save As** has been modified to handle such situations by copying the current schematic plan to the clipboard and then performing an **Edit / Paste** operation which fixes symbol name conflicts by automatically renaming symbols according to their symbol name patterns and then copying the modified clipboard content to a new schematic sheet in the destination file.

Group Selection

Some of the functions from the **Edit / Other Functions / Select** submenu carried out redundant drawing operations. This problem has been fixed, thus improving the performance of group selection functions.

The dialog boxes for selecting and/or deselecting symbols through attribute value have been modified to allow for the selection of multiple attribute values and the specification of attribute value patterns. Only those values which don't have the desired selection mode are displayed. This also allows for checking different attribute value combinations through multiple consecutive selection and/or deselection queries.

Polygon Selection

The **Polygon Type** function for selecting and/or deselecting polygons by type have been added to the **Edit / Other Functions / Select/Deselect** group selection menus.

Attribute Selection

The **Edit / Other Functions / Select / Attributes** function for selecting symbols by attributes has been modified to support not only base variant attribute selections but also currently active variant attribute selections.

The **Inot_set!** entry for querying symbols without attribute value assignment has been added to the attribute value selection menus.

Group Display

The **Edit / Group Display Mode** function with the **Moving Picture All** mode and the **Instantly Moving Picture** mode has been added. **Moving Picture All** causes the system to redraw texts and connections during group placement operations. **Instantly Moving Picture** causes the system to redraw texts and connections only when the mouse pointer stops during group placement operations. The **GRPDISPMODE_SCM** parameter for setting the default group display mode has been added to the **bae.ini** file.

Element PDF Colors

The **BAE-Selection** button for selecting RGB values from the BAE color table has been added to the color input dialog of the **Settings / Rule Attachment / Set Group Rules / PDF Color** function for assigning PDF output colors to elements. Upon completion, the **PDF Color** function reports the number of processed elements together with the assigned RGB value in the status line.

Element Group IDs

The **Copy Group** and **Load Group** functions have been modified to assign new unique element group ids for new multiline texts and distance labels to ensure that these elements can subsequently be edited as separate entities.

Connections

The **Graphic Lines to Connections** function for converting group-selected graphic lines into connections has been added to the **Edit / Other Functions** menu. This feature is useful after importing schematic plans from DXF format which draws connections as graphic lines.

2.7 Plot Output

EPS/PDF Output

PDF batch definitions have been modified to support colon-enclosed output sort order number prefixes for layer level names. This allows for output layers to be sorted independently from layer level names. The sort order prefixes are not included in any layer level name output.

The `Element Name Pattern` and `Element Name Exclude Pattern` parameters for selecting and/or deseleting pages have been added to the EPS/PDF output functions for automatically generating outputs for all SCM sheets and/or elements of a project. Only SCM sheets or elements matching the `Element Name Pattern` and not matching the `Element Name Exclude Pattern` are selected for output. This also allows for the selection of a specific (unloaded) project SCM sheet by specifying its full name through the `Element Name Pattern` option.

Plot Settings

Plot parameter changes are now triggering element save prompts when subsequently loading a different schematic sheet. This prevents the system from "silently" substituting plot parameter settings with last saved plot parameters if multi-sheet plot batches are carried out.

3 Packager

3.1 Error Messages

Name Attributes

The **Packager** has been modified to restrict the length of special attributes which are referring to reference and macro names (e.g., `$rpname`) to the system's maximum name length of 40 characters. An exception to this are alternative part macro lists (`[macro1,macro2,...]`) which can be assigned through the `$plname` attribute. The alternative part macro name list can extend to a total length of 200 characters with individual list entries restricted to a length 40 characters.

Symbol Macro Changes

The **Packager** has been modified to check prior to the processing of logical netlists whether symbols referenced from that net list were modified/saved after the corresponding schematic sheet was modified/saved and issues a warning message in that case as symbol symbol pin names and/or symbol pin positions may have changed since the schematic sheet was last changed.

3.2 Pin Attributes

Name Attributes

The `Ignore missing Pins` option sometimes reported incorrect layout part pin names for parts consisting of different symbols back to the SCM if the layout part macro was not defined in the library. This problem has been fixed.

3.3 Settings

Project File Settings

The `Load Settings` function for loading **Packager** parameter sets from the central library has been modified to automatically save such parameter sets in the project file for subsequent **Packager** runs. Previously, these parameter sets were only saved subject to modification and confirmation.

4 Layout Editor

4.1 General

DDB Element Renaming

The `File / Rename Element` submenu has been added with functions for directly renaming DDB file elements without having to use `Load` and `Save as` command sequences.

Airline Generation

New control elements for including passive and/or active copper areas in the Mincon generation with `Corner` options have been added to the `Settings / Settings` dialog. The default settings only consider trace and split power plane corners.

The performance of the Mincon generation function with `Corner` options has been significantly improved for large copper-filled layouts.

Inner Layers

The `Layer 2+Inner Layers` entry has been added to the `Settings / Set Top Layer` layer selection. `Layer 2+Inner Layers` sets the top layer to signal layer 2 and prompts for the number of inside layers to be configured. This allows for `Middle Layers` to be used for pad definitions even if the top layer is assigned to signal layer 2. In that case, the `Middle Layers` are assigned to signal layer 3 and above.

The toolbar color selection controls have been adapted to indicate the "highest" used signal layer by inverting the lower part of the layer button.

Element Pick

The `Edit Layer Only` setting for exclusively limiting element picks to the pick preference layer has been added to the `Element Pick Mode` option of the `View / Settings` function. The `Edit Layer Only` setting can be used during layer-specific operations to prevent the user from accidentally picking and/or processing elements from other layers.

Arc Centers

Arc center points outside the surrounding rectangle of a trace or area were not selectable and/or could not be picked in coordinate snap mode. This problem has been fixed.

Element Boundaries

The `AUTOSHRINK_GED` parameter for automatically shrinking element boundaries when saving layout elements has been added to the `bae.ini` file. `AUTOSHRINK_GED` is an optional parameter. On default, the system does not change element boundaries when saving layout element elements.

The `Settings / Lower/Left Border` function has been added to the right mouse button context menu when activated to the bottom left of the current workarea, and the `Settings / Upper/Right Border` function has been added to the right mouse button context menu when activated to the right top of the current workarea.

Library Edit Batch

The `Process Folder Tree` option for processing all DDB files of a selectable library directory and all its subdirectories has been added to the `File / Library Utilities / Layout Library Edit Batch` function.

Variants

The variant name input control in the variant selection dialog of the `Settings / Variants` function has been modified to select the variant after the currently active variant when entering `+` and to select the variant before the currently active variant when entering `-`. These inputs can also be facilitated in key programming sequences and in user-specific menu function and toolbar button definitions. This allows for command sequences such as `gedvar:"+"` and `gedvar:"-"` to be implemented for quickly stepping through variants.

Rule Update

The `Settings / Rule Attachment / Rule Update` for replacing project file rule definitions with the corresponding rule definitions from the central rule database file `brules.vdb` has been added. This function can be used to update project-specific rule definitions after re-compiling rule definition updates in the central rule definition database.

BAE ASCII Import

The `bae.ini` entries for converting **Eagle** layout data through `BAE/ASCII Input` only included layer conversion settings for **Eagle** documentary layers. However, it is also possible to convert **Eagle** signal layer structures for pads and traces through additional `DMPLAYASSL_LAY` signal layer entries.

The `Complete Project` option for importing the `projectname_s.dmp`, `projectname.def` and `projectname_1.dmp` project import files for schematic plans, logical library definitions and the project layout has been added to the `BAE/ASCII Input` function. The system automatically switches between program modules as required, and the user might only have to confirm warning messages issued during the **Packager** run. Only the `projectname_1.dmp` import/input file has to be selected, and the system automatically retrieves the other import file names from that.

The `1baedmp.ulp` ULP program which is provided in the `eagleulp` directory of the BAE CD has been modified so that it can be activated in the **Eagle** library editor. `1baedmp.ulp` exports all parts, padstacks and pads from the currently active **Eagle** library.

HighEnd Performance (BAE HighEnd)

For layouts with large numbers of parts, the performance of the procedures for loading the layout and transferring the part placement status to the schematic plan has been significantly improved. These improvements are most noticeable in the Windows version.

4.2 Display, Design Rule Check

Color Edit

The **View / Change Colors** dialog for BAE windows which are wide enough to display both signal and documentary layers has been modified to display the name of the currently loaded color table and the buttons **Load**, **Save** and **Save As** for loading and saving color table settings. The **<** and **>** buttons can be used to step through the list of available color tables.

Element DRC Data Query (BAE HighEnd)

The **View / Query Element** for querying net element data has been modified to display DRC block numbers and/or DRC block names in the **Mindist.** field.

In addition to that, the net element query function now also appends slash-separated net type information to the net names of queried net elements.

DRC Error Display

The **DRC Violation Text Size** parameter for optionally setting the text size for displaying distances between error elements at the top left of distance violation marker rectangles has been added to the **View / Settings** dialog. The default value for this parameter is 0.0 for suppressing the distance text display.

The **fixed/fixed** and **Macro level** filter functions for optionally excluding DRC errors between fixed elements and DRC errors on part macro level from the DRC error listing have been added to the **Utilities / DRC Error List / DRC Error List** dialog. This allows for tolerated errors to be excluded from the error listing by fixing the elements which are causing the errors.

Current element distances and element-specific clearance parameters are now displayed with clearance errors. With this information it is easy to check whether standard DRC settings or a special minimum clearance parameter (e.g., from extended DRC settings) is causing an error.

WRL Output

The **File / Import/Export / WRL/VRML Data Output** function has been modified to optionally support the export of traces and copper structures from the part and/or solder side. Please note that special copper structures such as trace arcs can cause long loading times in certain VRML viewers.

The **PCB Transparency** option for transparent PCB output has been added to allow for the simultaneous WRL/VRML display of parts placed on both part and solder side.

The system has been modified to support the assignment of **wrlmodscale** and **wrlmodhoff** double rule system attributes to model reference texts in order to set model scaling factors and placement height offsets. This allows for more arbitrary constructions such as the definition of models which are placed on levels different from the board level.

4.3 Parts, Placement

Part Info

The name of the part macro has been added to the tooltip display which appears when hovering over a part. A plus sign is appended to the part macro name if alternative packages are defined for the part.

Part Selection

A plus sign is now displayed at the end of macro names in the part name selection dialog of the **Add Part** if a net list part is defined with alternative macros.

Part Renumbering

New options for applying part name changes to group-selected parts only have been added to the **Parts / Other Functions / Autaname Parts / All Prefixes** function. This allows for different part name schemes to be used on different layout part groups.

The **Parts / Other Functions / Renumber Parts / Replace Pattern** function for the substitution of name patterns (e.g., **_1** with **_2**) at arbitrary positions in layout part names has been added. Buttons are provided to extend the name pattern substitution to texts and/or to restrict the substitution to the currently selected group.

Constructive Parts

The confirmation prompt of the **Parts / Other Functions / Delete Constructive** function has been replaced by a selection box with the names of the constructive parts to allow for parts to be selected by mouse click or through the specification of part name patterns. On default, all constructive parts are selected for deletion.

Part Texts

The **Move Name** and **Move Attribute** functions have been modified to accept 0.0 text size settings for fading out name and/or attribute texts.

Part Properties

Using the **p** key dialog for changing properties of fixed parts sometimes cleared name, attribute and/or pin position modifications of the processed part. This problem has been fixed.

Find SCM Symbol (BAE HighEnd)

If applied to layout parts consisting of multiple SCM symbols, the **Parts / Other Functions / Find SCM Symbol** now automatically zooms to the SCM symbol which corresponds to the selected layout pin. A symbol selection menu is displayed if the selected layout pin can not be assigned to a schematic symbol.

Part List Output

The part list output of the **File / Import/Export / Part List Output / BAE Format** function has been modified to include total part type counts in the part type section headers (e.g., the total number of resistors in a project).

The **PLPNUPPER_LAY** and **PLPMUPPER_LAY** parameters for forcing uppercase part names and/or part macro names when creating part list outputs with the **File / Import/Export / Part List Output** function have been added to the **bae.ini** file.

4.4 Traces, Routing

Trace Length Adjustment

The **Traces / Other Functions / Trace Length / Serpentine Trim Length** function has been modified to start meanders after trace corners always at the side opposite to the previous segment to prevent meander structures from crossing each other.

The **Trace Route** and **Net** options have been added to allow for trace length adjustments to be applied to either the selected trace or the overall net trace length.

Differential Pairs

The highlight of the currently edited trace and/or net has been extended to the net which is assigned to the edited net through the `$pairid` net attribute (differential pair) and the traces of the secondary net are displayed with a hatch pattern unless a color and/or display pattern assignment is already activated for that net.

The fill options of the **Edit Display** mode have been extended to display a trace segment parallel to the currently edited trace segment if trace pair distance (`$pairsig` net attribute) and `p` signal type (`$pairsig` net attribute) parameters are assigned to the edited net. Distance violations caused by the neighbouring trace segment are displayed in dark grey if DRC display is activated to provide a real-time clearance check for the parallel trace. The **Toggle Pair Side** context menu function and/or the `r` key can be used to toggle the neighbouring trace display to the opposite side.

The **Pair Check Report** function for generating a report for all nets grouped by the `$pairdist` net attribute has been added to the menu. **Pair Check Report** lists total net lengths and `$pairdist` (parallel distance) compliant net lengths. **Pair Check Report** also allows for the selection of a documentary layer for graphically displaying pair distance and/or parallelity violations. The `trcpairgap` group name with layer number extension is assigned to the differential pair DRC graphics to allow for subsequent layer queries and/or DRC graphic selection and/or deletion.

Trace Processing

Some of the functions from the **Traces / Other Functions** menu, when applied to traces with arcs, could cause arc directions to toggle depending on pick point selections. This problem has been fixed.

Trace Split

Applying the **Traces / Other Functions / Trace Split** to very long trace segments could cause segment pick failures and/or the lengthening of neighbouring segments instead of splitting the selected segment. These problems have been fixed.

Crosspoint Snap

The **Crosspoint** function of the `x` key has been modified to support trace segment picks thus supporting snaps to intersection points between two trace segments and/or between a trace segment and a polygon segment.

Via Fill Net Query

The via element queries of the **View / Query Element** function and the info query with the `Ctrl` key pressed have been extended to display via fill net names for vias without net connection.

Net Parameter DRC

The `rouwidth` (minimum net trace width), `$maxnetlen` (maximum net trace length) and `$maxviacnt` (maximum net via count) net attributes which were already considered by the **Autorouter** are now also considered by the **All Nets by Name** and **All Nets by Length** reports from the **Traces / Other Functions / Trace Length / Length Query** submenu and the **Traces / Net List Utilities / Report Net Data** function of the **Layout Editor**. Violations of these DRC parameters are listed at the beginning of the net reports.

Routing Grid Query

The query tolerance of the **Traces / Other Functions / Grid Query** function has been increased to improve grid query matching.

Move Segment

Moving trace segments displayed one of the adjacent segments with incorrect color and/or pattern if the **Move with neighbours** option is activated. This problem has been fixed.

The neighbour segment processing mode is now displayed with the prompt string which is displayed in the info/status line during interactive segment move operations.

The **Open End Points** option with **Follow Segment** mode has been added to the **Settings / Settings** dialog. **Follow Segment** allows for trace segments to be moved without inserting new segments at open ends of the segment, thus simplifying the manual routing of partially completed (antenna) traces.

Via Placement

The **fixed** menu option for placing fixed vias has been added to the **Place Vias** and **Dot Fill Area** functions from the **Traces / Via Functions** submenu.

The **Move Corner** function has been modified to keep vias on trace segment ends not only for power layer nets but also for nets which have fill areas on the current layout.

DRC Distance Display

The DRC distance display for traces has been modified to display distance lines when placing vias with **Traces / Via Functions / Place Vias**.

When editing trace segments with DRC distance display activated, elements of the currently edited net were erroneously considered to be obstacles. This problem has been fixed.

Net Coloring

A **C** button for setting net coloring and/or hatching has been added to the net name display in the element attribute dialog which can be activated through the **p** key.

Net List Assistant

The **NETASSIBOX_GED** parameter for specifying a delimiter other than the default space character between pin counts and net names in the net selection control of the **Net List Assistant** dialog has been added to the **bae.ini** file. This allows for net names to be more easily distinguished from pin counts.

The **Autofocus** control element for activating a mode which automatically changes the mouse input focus from the **Net List Assistant** dialog window to the **Layout Editor** window has been added. This allows for immediately using **Layout Editor** edit hotkeys after processing a **Net List Assistant** function.

Net Visibility

The **NETVISBW_LAY** (width) and **NETVISBT_LAY** (single-column or multi-column list) parameters for configuring the layout of the listbox control for displaying visible and/or invisible nets in the **Set Net Visible** and **Set Net Invisible** functions of the **Settings / Settings** dialog have been added to the **bae.ini** file.

A submenu with several options has been added to the **Part Nets Visible** and **Part Nets Invisible** buttons of the **Settings / Settings**. The **Pick Parts** option allows for the repeated selection of single parts. The **Part Set Parts** options allow for net visibility assignments to the currently defined part set. The **Group Parts** options allow for net visibility assignments to group-selected parts. Both **Part Set Parts** and **Group Parts** provide the sub-options **(1 Pin)** (net visibility assignment restricted to parts with at least one selected pin), **(All-1 Pins)** (net visibility assignment restricted to parts with all but one pin selected), and **(All Pins)** (net visibility assignment restricted to parts with all pins selected). These options provide a convenient feature for the generation of net visibility data sets for the **Autorouter** in order to include or exclude certain part groups in the routing process.

Layer Stackup (BAE HighEnd)

The `LAYSTKEXT_LAY` parameter for setting a project file name extension for the `Export` of the `Settings / Rule Attachment / Layer Stackup` (and thus eliminating the output file name prompt) has been added to the `bae.ini` file.

The trace length display facilities of the manual routing functions and the functions from the `Traces / Other Functions / Trace Length / Length Query` submenu have been modified to calculate and add length increases caused by layer changes through vias if a layer stack definition is activated.

Power Layer Setup

The `Traces / Other Functions / Power Layers / Load Power Layer Setup` function is not selecting activated power layer structures to the current group anymore to prevent from unintentionally modifying invisible power layer elements in subsequent operations.

4.5 Graphic, Copper Areas

Segment Editing

The **Insert Segment** function has been added to the **Areas** menu and the areas context menu which can be activated through the right mouse button.

Draw Assistant

Due to rounding errors, the **Utilities / Draw Assistant** sometimes created corner arcs in the wrong direction when generating vertical rectangles with rounded corners. This problem has been fixed.

The matrix origin for group element matrix placements is now set to the first group placement coordinate rather than the element origin to provide better visual guidance for group matrix placement operations.

Dimensioning

The **X Dimensioning**, **Y Dimensioning** and **X/Y Dimensioning** functions for labelling coordinates have been added to the **Graphic / Other Functions / Drawing Utilities** submenu. Coordinate labels are created by placing a text which displays the coordinates of the first selected position. The **X Dimensioning** and **Y Dimensioning** functions restrict the text placement to the X and/or Y position of the labelled coordinate.

Clicking the right mouse button during the selection of the coordinate label point activates a measurement line which will be drawn from the coordinate label point to the label text. It is also possible to set a measurement origin different from the element origin. The selected measurement origin stays active until a new element is loaded.

New **bae.ini** parameters for setting default values for label text size, measuring line display and coordinate units suffix have been added to **bae.ini**.

Polygon Editing

The functions for editing polygons have been modified to include the polygon type and the polygon layer in the polygon-specific info text which is displayed in the status line to provide better polygon editing guidance, even prior to placing the first polygon point.

Polygon Arcs

When drawing arcs, the current arc angle is now displayed as text at the graphic cursor, thus assisting in correctly setting specific angles such as 90 degrees even if a very fine input grid is selected.

The polygon property dialog which can be activated through the **p** key has been modified to display arc center points with arc angle span in addition to the arc type and the arc radius, the latter of which is now displayed in a separate dialog box line.

Documentary Lines

In special cases, the **Areas / Other Functions / Documentary Lines Join / Group** failed to connect all connectable group-selected lines. This problem has been fixed. A status message indicating the number of generated polylines is now also displayed.

Area Mirror Display

The **Fixed visible unmirrored** and **Fixed visible mirrored** options have been added to the **Graphic / Mirror Display** function. The visibility of areas marked with these options changes independently from the **Area Mirror Display** selection in **Settings / Settings**. This is useful for specific items such as drill plan drawings which have to be mirrored with their parts regardless of any soldering process selection.

DXF Import

The **AutoCAD/DXF Input** function has been modified to support multiple areas when importing polygons defined with the **HATCH DXF** command.

Bitmap Data Import

The **File / Import/Export / Bitmap Input** function sometimes skipped areas touching the upper edge of the bitmap. This problem has been fixed.

4.6 Text, Drill

Centered Texts

New options for center-aligning texts horizontally or vertically have been added to the text properties dialog which can be activated by pressing the **P** during text placement operations. These options are useful when creating measurement graphics consisting of lines and texts.

Clipboard (Windows)

The **Place Clipboard Text** function for placing texts from the **Windows** clipboard has been added to the **Text, Drill / Other Functions** menu. The **Place Clipboard Text** automatically recognizes and creates multiline texts.

The **Edit / Paste** function which can also be activated through the **Ctrl-V** key automatically checks whether the clipboard contains a BAE group or a text and activates the appropriate placement operation.

4.7 Group Functions

Group Selection

Some of the functions from the **Edit / Other Functions / Select** submenu carried out redundant drawing operations. This problem has been fixed, thus improving the performance of group selection functions.

Trace Selection

The **Part Trace Routes** function with the **Single Part** and **Group Parts** option for selecting or deselecting of traces connected to group-selected part pins has been added to the **Edit / Other Functions / Select/Deselect** submenus. These features simplify certain tasks such as the deletion of parts with connected traces.

Trace Width Change

The **Edit / Other Functions / Change Path Widths** submenu has been turned into a single function which queries the trace width and previous submenu functions through a common dialog box. The **Split Segments** option for trace width modifications with DRC has been added to split long segments which can not be modified throughout their whole length into partial segments at input grid lengths. This ensures that long segments can be partially enlarged where this is possible according to DRC settings.

Part Text Reset

The **Edit / Other Functions / Reset Part Texts** function has been converted to a submenu with the **Reset All** (previous function), **Reset Layer Texts** (reset attribute text position on a documentary layer only), **Reset Name Moves** (reset part name positions only) and **Reset Pin Moves** (reset pin text positions only) functions.

Attribute Selection

The **Edit / Other Functions / Select / Attributes** function for selecting parts by net list attributes has been modified to support not only base variant attribute selections but also currently active variant attribute selections.

Element PDF Colors

The **BAE-Selection** button for selecting RGB values from the BAE color table has been added to the color input dialog of the **Settings / Rule Attachment / Set Group Rules / PDF Color** function for assigning PDF output colors to elements. Upon completion, the **Set PDF Color** function reports the number of processed elements together with the assigned RGB value in the status line.

Element Group IDs

The **Copy Group** and **Load Group** functions have been modified to assign new unique element group ids to new multiline texts and distance labels to ensure that these elements can subsequently be edited as separate entities.

4.8 Automatic Copper Fill

Fill Algorithm

The copper fill algorithm sometimes created fill areas without rounded corners which caused distance violations to the remaining tip of the corner. This problem has been fixed.

The algorithm for heat-trap position checks has been modified to ensure that heat-traps are only placed at narrow positions where these narrow positions are completely filled.

Heat Trap Mode

The application of the `lay_pad_directconnect` and `lay_pad_heattrap` rules for selecting heat trap connection types independently from the current copper fill parameter settings has been extended from pads on padstack level to pins and vias and/or parts and vias on part and/or layout level. This allows for individual heat trap connection type settings without the need for specific padstack definitions. Heat trap connection rules from higher hierarchy levels have priority over rules from lower hierarchy levels.

Polygon Hatching

The fill area hatching functions sometimes left hatch trace gaps when processing structures which were positioned parallel to the hatching direction. This problem has been fixed. The hatching functions have been modified to avoid possible gaps by slightly shifting the hatch lines.

For hatching angles between 90 and 135 degrees and/or 270 and 315 degrees, the fill area sometimes wasn't completely filled with hatch lines and/or the hatching was carried out with a lower than specified hatch line distance. These problems have been fixed.

5 Autorouter

5.1 General

Error Messages

A new warning message with confirmation prompt has been introduced for parts which are placed with a part macro different from the netlist part macro assignment as the **Autorouter** won't be able to connect such parts.

The `Board outline not defined!` error message was prone to trigger program crashes or internal errors 1250. This problem has been fixed.

Routing Matrix Memory Requirement Query

The `Routing Matrix Size` entry for displaying the routing matrix memory requirement for the autorouting process with the current parameter settings has been added to the report which is displayed through the `1` key and the `i` toolbar button. This feature can be used prior to the start of the **Autorouter** to examine whether the host computer is sufficiently equipped for an **Autorouter** run. The routing matrix memory calculation considers additional requirements for net type routing areas and special keepout areas for traces and vias. Please note that the memory requirements for the layout itself and for the traces and vias to be routed add to the overall memory requirements for the autorouting process. I.e., the routing matrix memory requirement is only an indication for the minimum overall autorouting memory requirements.

Layer Browser

The `View / Other Functions / Layer Browse` function from the **Layout Editor** has been made available in the **Autorouter**.

5.2 Autorouter Algorithms

Partial Placement Autorouter

The **Autorouter** has been modified to allow for the routing of partially placed layouts. Previously, the **Autorouter** simply aborted if not all net list parts were placed on the layout. Now, the **Autorouter** issues a confirmation prompt for partial placement routing in such cases. This feature allows for the staged placement and autorouting of a board.

Router Performance

The **Autorouter** startup performance and the optimizer pattern search performance for nets with many pins has been significantly improved. The performance boost is most significant in projects with large numbers of power supply pins which are not connected through power layers.

Optimizer

The optimizer pattern search did not recognize horizontal obstacles properly when processing wide traces. This problem has been fixed. Consequently, the quality of the optimizer output has been improved.

Pin Entry

In special cases, the gridless router created a small "hook" when connecting offgrid pins to the next trace segment. This problem has been fixed.

Net Visibility Controlled Routing

The **Load Net Visibilities** operation for loading net visibility assignments to be used for routing net group selections has been added to the **Autorouter / Batch Setup** function. This allows for the setup of batches for automatically routing different net groups in a specific sequence.

Please note that the **all** option of the **Load Net Visibilities** operation always causes the system to consider all nets visible, even if a net visibility definition with that same name exists.

Advanced DRC (BAE HighEnd)

The **Advanced DRC** option for activating the advanced DRC for layer-specific minimum distances has been added to the **Autorouter / Options** dialog in **BAE HighEnd**. The **Advanced DRC** option is only available with gridless routing activated and considers net-specific DRC blocks, element-specific DRC blocks, layer-specific net type clearance settings from the net group DRC and via pad clearance parameters set through the `lay_via_trcdist` layout rule.

Please note that the clearance parameters from DRC block 0 are applied to nets without clearance settings if the **Advanced DRC** mode is activated. In that case, the **Minimum Distance** parameter setting is only used for the base grid configuration, and it is recommended to set this parameter to the smallest clearance setting used on the current layout.

The **Advanced DRC** function for setting advanced DRC parameters has been added to the **Settings** menu of the **BAE HighEnd Autorouter**.

6 CAM Processor

6.1 General

Hyperlynx Output

A new option for exporting copper areas using Hyperlynx Format 2.34 polygon commands has been added to the **File / Import/Export / Hyperlynx Output** function.

6.2 Control Plot

EPS/PDF Output

PDF batch definitions have been modified to support colon-enclosed output sort order number prefixes for layer level names. This allows for output layers to be sorted independently from layer level names (e.g., to display layers in **Acrobat Reader** according to the actual PCB layer stack). The sort order prefixes are not included in any layer level name output.

The part list output templates have been modified to allow for the definition of divider lines between between part names with different attribute value combinations through `$pdfp1sep` texts. The first `$pdfp1sep` text accepts a divider line length in millimetres before the part index (e.g., `$pdfp1sep:200.66:1:`). The divider line is drawn in the direction of the text placement angle and with the plot pen width of the text. The text height is irrelevant for divider line outputs. The part list template `partlist_cntnames_sep` with divider line definitions has been added to the **PDFPAGE** layout library.

The part list templates have been modified to provide an option for forcing uppercase or lowercase output columns by appending `u` or `l` to the line index of the first attribute or name text of an output column (e.g., `$.1u:` and `$plname:1u:` for uppercase part names and part macro names).

In special cases, invalid character font references were generated on PDF part list output pages which could cause special characters such as umlauts to be displayed incorrectly. This problem has been fixed.

The **Center Dot** option for drawing drill holes as circles with fixed diameters has been added to the batch parameters for drill outputs. This feature can be used for signal layer outputs to ensure that the total copper area of rest rings at manually drilled holes stays the same even if holes are drilled with a slight offset.

The **placed** and **unplaced** options have been added to the **Plot Visibility** layer parameter for batch output definitions. This allows for batch outputs to be controlled through the `$noplc` attribute without the requirement of explicit rule assignments to part graphic and text elements as with the **visible** and **invisible** options.

CAM-Batch Output

The **CAM-Batch Output** function has been modified to allow for multiple **SCM EPS/PDF Batch Output** steps per batch definition.

The **CAM View Call** batch output step for automatically changing to **CAM View** and loading generated Gerber and drill data files after batch output completion has been added to the **CAM-Batch Output** function. If a batch definition contains both **SCM EPS/PDF Batch Output** and **CAM View Call** batch steps, then the system changes to the **Schematic Editor** before changing to **CAM View**.

The **CAM Batch Call** command for adding CAM batch calls to CAM batch definitions has been added to the **CAM-Batch Output** function. This simplifies CAM batch management as it allows for recurring batch command sequences to be kept and maintained in separate batch definition files. Please note that the **Import** and **Export** functions for importing and exporting batch definitions are only copying CAM batch references but not the definitions of the copied CAM batch references.

DXF Data Output

The `DXFOVRWRITE_LAY` parameter for deactivating the overwrite confirmation prompt for existing DXF output files has been added to `bae.ini`. This is useful for including **DXF Data Output** in output batches without user interactions.

The **Mirror Mode** option for selecting one of the six **CAM Processor** mirror modes has been added to the **DXF Data Output** function. Automated DXF output call sequences must be extended accordingly (e.g., `:s10` needs to be inserted for **Mirroring Off**, etc.).

6.3 Insertion Data Output

Insertion Data Output

The `Generic Insertion Output` function has been modified to support part attributes set through `$(s:attributname)` part texts when processing layout attribute references.

The field definitions for names and attribute values have been modified to provide options for forcing uppercase or lowercase outputs by adding `UPPER` or `LOWER` after the `LEFT` or `RIGHT` commands.

7 CAM View

7.1 General

Layout Creation

The **File / Create Layout** functions in **BAE Economy** and **BAE Light** have been modified to omit the 5 millimetre element border expansion. This is to ensure that Gerber data created with **BAE Economy** or **BAE Light** can be re-imported using **File / Create Layout** without violating the PCB board size limitations of those systems.

7.2 Gerber Data

Metric Gerber Data Import

Loading extended Gerber data with metric coordinate units led to incorrect aperture scaling and display when subsequently loading more data in the same **CAM View** session. This problem has been fixed.

8 Utilities

8.1 LISTDDB

File Extensions

The **LISTDDB** utility program has been modified to append the default `.ddb` file name extension to the input file name only if the input file name does not yet have a file name extension. This allows for BAE system files with `.dat`, `.fnt` and `.vdb` file name extensions to be processed without having to rename them first.

8.2 LOGLIB

ID Generation

The `newattr` and `netattr` commands have been modified to trigger automatic ID attribute value generation by the **Packager** through the assignment of `?id?`, `?symid?extension` and `?partid?extension` values. `?id?` creates consecutive ID values (`id1`, `id2` etc.). The `?symid?extension` and `?partid?extension` values append the specified extension with underscore to the schematic symbol name and/or layout part name (`?partid?diffpair1` results in `ic1_diffpair1`, `ic2_diffpair1`, etc.).

Automatic ID generation is useful if a `newattr` and/or `netattr` command refers to multiple pins and/or nets, as this allows to create a reference between pins and/or nets as required for differential pair indication.

Gate Packaging

The `newattr` command has been modified to accept `!unique!` attribute value settings which prompt the **Packager** to assign gates to layout parts with matching `!unique!` attribute values only. The `swap` commands adhere to such assignments and swap gates only between layout parts with matching `!unique!` attribute values.

The `!unique!` setting can be used to control the packaging of gates with different attribute values without using `$rpname` attributes. This is useful for certain part types such as resistor arrays:

```
part ra_sol6r : sol6r {
  newattr "$val" = "!unique!";
  pin (1-16);
  swap (
    (( 1,16)),(( 2,15)),(( 3,14)),(( 4,13)),
    (( 5,12)),(( 6,11)),(( 7,10)),(( 8, 9))
  );
}
```

The following example illustrates the application of the `!unique!` value in the definition of an opamp with power supply assignments through attribute values:

```
part op_lm324 : dil14 {
  pin (/i,i,o);
  net "$vplus" : (4);
  net "$vminus" : (11);
  newattr "$vplus" = "!unique!";
  newattr "$vminus" = "!unique!";
  xlat (/i, i, o)
  to ( 2, 3, 1)
  or ( 6, 5, 7)
  or ( 9,10, 8)
  or (13,12,14);
  swap ((2,3,1),(6,5,7),(9,10,8),(13,12,14));
}
```

8.3 USERLIST

Case Conversion

The **PRINT** command syntax has been modified to allow for uppercase and/or lowercase name and/or attribute value outputs by adding blank-separated **UPPER** or **LOWER** keywords after name or attribute specifications.

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**.

Call by Reference

Function parameter changes were only returned to the caller if at least one variable modification was directly carried out in the called function. In such cases, any changes which were exclusively carried out in sub-functions which were called with such function parameters were ignored. This problem has been fixed.

9.3 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 `CHKDIST` (DRC minimum clearance distance) and `ERRDIST` (current element clearance distance) attributes have been added to the `L_DRCERROR` index variable type.

9.4 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_setclipboard | Store text string to (Windows) clipboard |
| LAY | lay_planmidlaycnt | Get layout inside layer count |
| AR | ar_getdblpar | Get Autorouter double parameter |
| | ar_setdblpar | Set Autorouter double parameter |

Changed System Functions

The [putenv](#) ignored the first character of the variable name parameter. This bug has been fixed.

The [strmatch](#) function returned 0 regardless of the value of the second parameter if an empty string was passed as first parameter. This problem has been fixed.

The [bae_inpoint](#) and [bae_inpointmenu](#) have been modified to support a centered zoom window rubberband drawing mode.

Support for additional parameter queries/settings has been added to the [bae_getintpar](#), [bae_setintpar](#), [bae_getstrpar](#), [bae_setstrpar](#), [scm_getintpar](#), [scm_setintpar](#), [scm_getdblpar](#), [scm_setdblpar](#), [scm_getstrpar](#), [ged_getintpar](#), [ged_setintpar](#), [ged_getdblpar](#), [ged_setdblpar](#), [ar_getintpar](#) and [ar_setintpar](#) functions.

The [ged_lemmirrchg](#) function has been extended to support mirror mode settings for fixed elements.

The [ged_getpickmode](#) and [ged_setpickmode](#) functions have been modified to support a new element pick mode for exclusive preference layer picks.

The [ged_getsegmovmode](#) and [ged_setsegmovmode](#) functions have been modified to support the new "Open End Points - Follow Segment" trace segment move modes.

The [ged_storepoly](#) function has been extended to support polygon mirror view modes for fixed polygons.

The [ar_lemmirrchg](#) function has been extended to support mirror mode settings for fixed elements.

9.5 BAE User Language Programs

BAE installs more than 220 pre-compiled **User Language** programs to the `ulcprog.vdb` file of the BAE programs directory. Additionally, the **User Language source** files (close to 9 Mbytes; some 300,000 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

Die folgenden **User Language**-Programme wurden neu implementiert:

| IP | Program Name | Short Description |
|-----|--------------------------|--------------------------|
| STD | RENAMEEL | Rename DDB File Elements |

Changed User Language Programs

The **User Language** programs already delivered with the previous BAE Version have been 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.