Bartels AutoEngineer®
Version 7.2
Release Notes

This documentation contains information about the new features introduced with **Bartels AutoEngineer Version 7.2**. Forward compatibility from earlier versions to **Bartels AutoEngineer Version 7.2** is ensured, but not backward compatibility.

Bartels AutoEngineer Version 7.2 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.

1.2 User Interface and General Functions

Window Positions

Module and dialog window sizes and positions are not restored anymore unless they are fully within the boundaries of the current system viewport. This ensures that windows won't be positioned off the visible screen area anymore if the system's display configuration is changed between **AutoEngineer** sessions.

Zoom In

The + button in the toolbar has been modified to distinguish between left and right mouse button clicks. Left mouse button clicks activate a normal Zoom In. Right mouse button clicks zoom in at least to a level where the display grid becomes visible, unless the display grid is already visible in which case a normal Zoom In is caried out.

Mouse Functions

The toolbar mouse button icon has been modified to activate a dialog for directly setting the functions for right mouse button clicks and active element types.

User Defined Dialog Boxes

The Favorite Dialog Boxes function for managaing a database with user-defined dialogs has been added to the Utilities menu. The dialogs consist of a matrix of buttons and labels and stay open after activation ("modeless" dialogs). It is possible to assign menu functions, user functions, macros and grid favorites to the dialog buttons. This allows for the definition of user-specific permanent dialogs and toolbars outside the BAE window, and it is also possible to automatically activate these toolbars when starting a BAE module.

Command Repetition

The **`MOUSEREP_STD`** parameter for configuring mouse button command repetition behaviour has been added to the **`bae.ini`** file. This parameter can be modified with the Settings / Settings bae.ini function. A parameter option for including keystroke commands and right mouse button context menu functions in addition to normal menu functions has been added. Context function repetitions include the left mouse button click for element selections, thus potentially saving one mouse click when compared to standard menu function repetitions.

Undo/Redo

The Undo and Redo functions from the Edit menu have been modified to display the names of the undo operations with the menu text. In addition to that, the status line displays the undone function at the end of the operation and the name of the next function in the undo buffer if there is one.

The repeat function which can be activated through the left mouse button displays the next scheduled function rather than the previously undone function in the title bar of the BAE window. This allows for the controlled execution of multiple undo operations without having to go through the Edit menu.

The Edit|Undo/Redo List function has been added for listing all currently buffered undo/redo actions and for reverting all undo or redo steps up to a selectable action in one go.

The group select highlight wasn't displayed correctly when using Undo after deleting group elements and using Reset Group. This problem has been fixed.

Zoom and report functions without any relevance to the undo mechanism are not added to the undo queue anymore, thus eliminating redundant undo steps.

Grid Jumps

The **`CKEYSTEP_STD`** parameter for activating display pixel grid jumps rather than input grid jumps for mouse positioning through `Shift` with cursor keys has been added to the **`bae.ini`** file.

Grid Display

The Lines option for displaying the display grid using lines instead of dots has been added to the View / Settings function. With line display grid activated, the width of the element boundaries display is automatically set to 3 pixels and the workarea color is changed from white to dark grey if necessary to avoid any ambiguities.

Display Functions

The Zoom Window is now displaying a dotted rectangle during the selection of the second window corner point to indicate the resulting viewport of the current zoom window selection. This is helpful as the resulting viewport's dimension/proportion is dependent on the screen and/or BAE window aspect ratio and may well differ from the aspect ratio of the zoom window selection.

The Warp to Element Pick Position option for positioning the mouse pointer to the center of the zoom window when using Zoom Window whilst pressing the left mouse button has been added to the Mouse Warp setting in Settings / Settings bae.ini.

The Center/Pan Window function has been made available to the function key assignment facilities which can be activated through the toolbar mouse symbol. In addition to that, the Center/Pan Window function has also been added to the right mouse button Context Functions.

Origin Display

The origin of the currently loaded element is now displayed in the element overview window of the toolbar.

Color Table Name

The name of the last loaded color table has been added to the output of the View / Other Functions / Show Parameters function.

Angle Drawing

The Jump Relative and Jump Absolute context menu functions have been changed to support zero radius inputs when specifying Polar Coordinates. This allows for the interactive selection of a circle point at the specified and/or selected angle. The resulting position is adjusted to the closest X or Y input grid coordinate if an input grid is activated.

Grid Favorites

An option for setting a zoom factor has been added to the function for configuring grid favorites which can be activated through right mouse button clicks on the F toolbar button. This zoom factor will be used for zooming into the element if the selected grid is not visible at the current zoom factor. The minimum required zoom factor for displaying the grid is automatically loaded to the edit box of the zoom factor selector.

The key programming sequence `favorite:"!":"grid"` for activating the grid favorites menu has been implemented, and the User Defined Grids function for accessing the grid favorites menu has been added to the View menu which is also available through the middle mouse button. I.e., it is now possible to access the grid favorites while executing other menu functions and/or graphic interactions without toolbar access.

Grid Selection and Add Grid buttons for directly assigning grid favorites to keys and/or menu entries have been added to the Key Programming and Menu Extension functions.

Macro Definitions

The macro function editor has been modified to support the definition of keystrokes. This allows for the automated activation of keystrokes during the execution of macros and/or menu functions. Keystrokes are defined through the identifier `k` followed by a numeric key code or a quoted key character as in `#301:m:k"x":sl0` and/or `#301:m:k120:sl0`which defines a macro for selecting a part to be moved and then automatically activating the X key and the Crosspoint function for placing the selected part on a crossing point of two documentary lines.

Load History

Using the toolbar arrow buttons for switching between elements in the element history sometimes loaded incorrect zoom setting and/or the wrong element if more than 32 elements were loaded in a single BAE session. This problem has been fixed.

File Contents

The File / File Contents listings have been modified to display file element comments.

Multicolumn Selections (Windows)

Windows XP introduced automatic scrolling for multi-column list boxes when the left mouse button is held down inside the last list box column. This feature can cause unintended selections and has therfore been disabled in the **AutoEngineer**.

Product Information

The Help / Product Info function has been changed to display additional information such as the Default Setup Files Folder and any alternative links to configurations files which might be set through environment variables. This information is useful to trace problems caused by user-specific network installations and/or the installation of different BAE versions on the same system.

Command Prompt

The File / Operating System function for starting a operating system command prompt has been made available in the Windows version.

File Name Specification

File name parameter specifications have been modified to support the special **$projectplan** (currently loaded element name) variable and other variables according to the **$extappl:.xxx:** pattern for substituting applications registered for the **.xxx** file name extension. Windows automatically selects the application which is defined for the **.xxx** extension in the Windows registry. Under Linux and/or Unix, a **baeappl.xxx** command can be specified, and a link definition such as

```
ln -s /usr/X11R6/bin/gv /opt/bae/bin/baeappl.pdf
```

can be used to register an application for a file name extension (the **/opt/bae/bin** directory must be included in the **PATH** variable for this to work).

Command Calls

The call sequences **#9048** (start external program and wait for its completion) and **#9049** (start external program without waiting for its completion) have been added to allow for any external program calls to be configured and/or programmed in the BAE system. These call sequences can be extended using the new special variables for file name parameter specification (see above) and then assigned to keys and/or menu extensions. A typical call sequence example would be

```
#9049:"$extappl:.txt: $projectfile.txt"
```

for loading a project-specific text file into an external text editor.

Default Settings

A Save Defaults button for saving the current dialog parameter settings as default values to the **bae.ini** file has been added to many of the BAE dialogs. The dialog default parameter values are automatically reactived in subsequent BAE sessions.

1.3 Symbol and Part Libraries

New Library Elements

The following elements have been added to the symbol and part libraries:

Library	Type	Elements
AD	Symbol	ad5933, ad6620, ad6652, ad9779, adxl330
CONNECT	Symbol	x_magjack, x_wd8rev_led, x_zpack_a110_a, x_zpack_a110_b, x_zpack_a110_c, x_zpack_a110_d, x_zpack_a110_e, x_zpack_b125_a, x_zpack_b125_b, x_zpack_b125_c, x_zpack_b125_d, x_zpack_b125_e, x_zpack_c55_a, x_zpack_c55_b, x_zpack_c55_c, x_zpack_c55_d, x_zpack_c55_e
IDT	Symbol	idt70v5388, idt70v5388_ports, idt71024, idt71v3578, idt71v65602, idt71v65603, idt72v265, idt72v265_p, idt72v36100pf, idt72v36100pf_p
INTEL	Symbol	gcixf1002, gcixf1002_gmii
LAYLIB	Part	balun_we0805, bga297, bga372, cfps73, cfpt125, fibertransceiver_1x9, hmc1053, lfcsp24, lfcsp32, lqfp64, macom_sm22, mlp28, pqfn64, pqfp100_ed, pqfp80a, pulse_h5007, qfn16lp3, qfn24lp4, spd_111, ssop28ep, ssop28w, tqfn16, tqfp128rct, tqfp128s, tsot23_5, tsot23_6, tssop14fe, tssop16qs, tssop16w, tssop20fe, tssop66, vg96f, x_magjack, x_wd8rev_led, x_zpack_a110_fc, x_zpack_a110_ms, x_zpack_b125_fc, x_zpack_b125_ms, x_zpack_c55_fc, x_zpack_c55_ms
	Padstack	c1.400d0.8, c4.900d1.9, ep1.700, ep2.300, ep2.700, ep3.300, ep7.150, sr0.220x1.000, sr0.230x0.650, sr0.230x0.770, sr0.240x0.450, sr0.240x0.650, sr0.250x0.700, sr0.450x0.700, sr0.500x1.000, sr0.600x1.600, sr0.620x1.220, sr0.760x1.400, sr1.500x1.200, sr3.000x2.400, sr3.200x3.000, sr4.950x2.750, sr5.500x3.000, ss1.450, ss2.900
	Pad	c1.400, c1.600, c4.900, c5.100, d1.9, r0.220x1.000, r0.230x0.650, r0.230x0.770, r0.240x0.450, r0.240x0.650, r0.250x0.700, r0.330x0.750, r0.330x0.870, r0.340x0.550, r0.340x0.750, r0.420x1.200, r0.450x0.700, r0.500x1.000, r0.550x0.800, r0.600x1.600, r0.620x1.220, r0.700x1.200, r0.760x1.400, r0.800x1.800, r0.820x1.420, r0.960x1.600, r1.500x1.200, r1.700x1.400, r3.000x2.400, r3.200x2.600, r3.200x3.000, r3.400x3.200, r4.950x2.750, r5.150x2.950, r5.500x3.000, r5.700x3.200, s1.450, s1.650, s1.700_sp, s1.800, s2.300, s2.300_sp, s2.500, s2.700, s2.700_sp, s2.900, s3.100, s3.300, s3.300_sp, s3.500, s7.150, s7.150_sp, s7.350
LSC	Symbol	ispgal22v10av, lfecp6e_144
LT	Symbol	lt1460, lt1510_cs8, lt1630, lt1630_sup, lt1910, lt1956, lt1963_efe, lt1963_es, lt1993, lt3430, lt3431, lt5515, lt5527, lt5572, lt5575, lt6106, lt6230, lt6231, lt6231_sup, ltc2298, ltc3417_fe, ltc3413_fe, ltc3455, ltc5531
MAXIM	Symbol	max350
MEMORY	Symbol	m24c64, m24c64w, m25p20v
MICRON	Symbol	mt46v16m16, mt46v32m16, mt46v64m16, mt48lc32m16a2
MISC	Symbol	balun_we0805, cfps73, cfpt125, etc1_1_13, ft2232c, ft2232d, ft232rl, ft245rl, hmc221, hmc224, hmc270, hmc308, hmc311, hmc318, hmc408, hmc424, hmc427, hmc430, hmc431, hmc434, hmc438, hmc439, hmc466, hmc469, hmc495, hmc496, hmc497, hmc545, hmc597, hmc1053, irf7422, irf7509, lan91c111, m24c64, pulse_h5007, si4136_bm, spd1101, spd1102, spd1103
NSC	Symbol	dp83865
OPTO	Symbol	fibertransceiver_1x9
PASSIV	Symbol	l_ferrit
PDFPAGE	Layout	partlist_cntnames
ROUTE	Symbol	tag_sym_rbname, tag_sym_drcblk, tag_pin_powerpin
STDSYM	Symbol	bus_shift_2
TI	Symbol	tms320f2808, tms320f2808_ports, tms320f2812, tms320f2812_ports, tms320lf2406, tms320lf2406_ports, ths6022, ths6022_sup, ths6062, ths6062_sup

2 Schematic Editor

2.1 General

Save As

When specifying a destination file name different from the source file name, the Save As function is now asking the user whether Update Library should be carried out for the destination element. The **SAVEASLIBUPD_STD** parameter has been added to the **bae.ini** file for optionally deactivating the Update Library prompt or for deactivating Update Library altogether.

BAE ASCII Format

The BAE/ASCII Output function from the File / Import/Export menu has been moved to the new BAE/ASCII submenu, and the BAE/ASCII Input function for importing generic BAE ASCII schematic data has been added to that submenu.

The BAE ASCII format for schematic data has been modified to match the BAE ASCII format for layout data.

The **sbaedmp.ulp** ULP program for exporting BAE ASCII format schematic plans from **Eagle** is provided in the **eagleulp** directory of the BAE CD. The **sbaedmp.ulp** output is written to files named **Projectname_s.dmp** and **Projectname.def**. The BAE/ASCII Input function automatically removes the **_s** extension and saves the converted data including automatically compiled logical library definitions from **Projectname.def** to a project file named **Projectname.ddb**.

Redisplay

BAE screen redraws caused by other windows during interactive placement operations sometimes left graphic fragments of the currently placed element. This problem has been fixed.

Plot Visibility Display

The Plot Disabled entry for setting the color for elements which are disabled for plot outputs has been added to the View / Change Colors function. When loading old color tables without Plot Disabled color entries, Load Colors automatically assigns the Variant Attributes color entry to Plot Disabled .

Toolbar

The M (Move), D (Delete) and G (Group status) buttons for moving, deleting and changing group selection modes for different selectable elements have been added to the toolbar.

The toolbar buttons for drawing graphic and/or dotted lines have been modified to activate Add Connection and/or Point to Point Connection functions when clicked with the right mouse button.

Packager Error Messages

The new Utilities / Packager Error List function lists project-specific symbol error and warning messages from the last **Packager** run in a modeless dialog. The message list can be restricted to error and/or warning messages. Clicking an entry in the list loads the schematic sheet with the selected symbol and automatically zooms to that symbol.

DDB Element Comment

The functions from the File / Element Comment submenu have been changed to update currently loaded element comments when selecting DDB file elements. This prevents the system from resetting element comment changes when subsequently saving the currently loaded element.

Logical Definition Check

A library directory prompt and an option for automatically processing of library files from the selected directory has been added to the **CLOGDEFS User Language** program for verifying the existence of logical library definitions for SCM symbol libraries. The **CLOGDEFS User Language** program has been integrated as Check Definitions function to the File / Library Utilities menu.

Rule Assignments

String, Double and Integer buttons for directly setting and/or controlling rule predicates with the corresponding data types have been added to the rule assignment functions of the Settings / Rule Attachment submenu. Predicate name menus only display predicates suitable for the currently selected element and provide some help text about the purpose of the predicate. Single mouse-clicks on assigned predicate rules in the rules menu cause the system to display the current value together with predicate info text in the comment line above the rule menu box.

Element Rotation

The l and r keys are now activating functions for rotating multiple selectable texts and/or symbols when pressed while no other function is active.

Element Mirroring

Functions for mirroring multiple selectable texts and/or symbols have been added to the context menu which is activated when pressing the m key while no other function is active.

Variant Consistency Check

The function for loading schematic plans has been modified to check whether the actice variant in the layout previously processed by **Packager** or Backannotation matches that of the schematic plan. The system issues a warning message if this is not the case. Both schematic plan and layout must have been saved with the new BAE Version for this to work.

Workspace

The New Workspace Rectangle function for setting the element boundaries by selecting two rectangle corner points has been added to the Settings / Element Size submenu which can also be activated through the F12 function key.

The Origin Snap to Input Gridfunction for adjusting the origin of the currently loaded element to the internal system grid origin has also been added to the Settings / Element Size submenu.

White Window Background

The complementary color display during the placement of black (non-coloured) elements did not work correctly when using the **Schematic Editor** with white workarea/background configurations. This problem has been fixed. A very dark grey instead of white is now used as complementary colour for black elements on white background.

2.2 Symbols, Labels

Symbol Search

The Other Attribute button for selecting the attribute to be listed has been added to the View / Find Symbol / Search in list function which can also be activated through Ctrl-F.

Symbol Browser

The Symbols / Other Functions / Symbol Browse function has been modified to display the contents of selected libraries in a separate permanently open dialog box. This dialog provides a library element name listbox and displays the currently selected symbol in a preview window. The dialog also provides a Place button for placing the selected symbol on the currently loaded SCM sheet and a Load button for loading the symbol for editing.

Symbol Renaming

New options have been added to the Symbols / Other Functions / Renumber Parts / Update Names from $ function to allow not only for the renaming of group-selected symbols, but also for the renaming of all symbols of the currently loaded sheet or for the renaming of all symbols on all sheets of the current project file.

The Insert Prefix, Delete Prefix, Insert Suffix, Delete Suffix and Replace Pattern functions from the Symbols / Other Functions / Renumber Parts submenu can now be called from both SCM sheet and SCM symbol level and support options for simultaneously processing labels and texts and for restricting rename operations to groups.

Label Renaming

The Rename Labels function with options for assigning a new name to all group-selected labels or for renaming net names of the currently loaded sheet or all sheets of the current project file have been added to the Symbols / Other Functions / Renumber Parts menu.

Pin/Text Placement

The Import button for importing pin names and texts from an external text file with a pin and/or text definition in each line has been added to the Symbol Edit Functions, and the Place Pin List/Row and Place Texts/Labels functions which can also be activated through the e key.

Pin Marker Change

The File / Library Utilities / Symbol Edit Batch function has been updated to support pin marker macro swaps.

Tag Pin Mode

Tag pin modes got lost when applying the p key to tag symbol pins. This problem has been fixed and a control for directly manipulating tag pin modes has been added to the p key dialog.

Symbol Pin Movement

The Move Symbol Pin function for moving mouse-selectable symbol pins on SCM sheet level has been added to the Symbols menu and to the symbol pin context menu. On default, symbol pin positions are locked. The Permit Pin Movement mode from the p pin data dialog on symbol level must be activated to allow for symbol pin movements with Move Symbol Pin. Alternatively, the **scm_pin_move** rule can be assigned to pin marker macros to release such macros generally for pin movement operations on SCM sheet level.

Pin Marker Display

The No Mirroring and No Rotation options for excluding pins from mirroring and/or rotating when the symbol is mirrored/rotated on SCM sheet level have been added to the p dialog for pins on symbol level. These SCM symbol/pin settings are useful for defining special symbol types such as block symbols with pin rows on either side for which the pin text placement is fixed (e.g, above the pin connection segments), regardless whether the symbol is mirrored or rotated by 180 degrees.

A new **pin_move** predicate has been introduced to the BAE rule system. This can be assigned on plan marker level and allows for the deactivation of mirroring and rotation of selected marker macro symbols in general.

Label Name List

The label selection menu from the previously loaded project file was still active after creating a new schematic sheet. This problem has been fixed.

Symbol Attributes

The Attribute Default Values function has been modified to support the input of multiple attribute values without having to restart the function when using Add List and Add. This simplifies the definition of lengthy attribute lists.

Setting default values in Attribute Default Values to **++** causes the Add Symbol function to assign the attribute value **1** and the Next Symbol/Label function to assign the attribute value of the previously placed symbol incremented by one. This feature is very useful for automated **$gp** (gate pin) attribute value assignments on connectors consisting of single pin symbols.

The **VATTRMODE_SCM** parameter for activating alternative display modes for attribute values in active variants has been added to the **bae.ini** file. **!Base_variant_value!** causes base variant values to be marked. A Base Value checkbox can be configured for variant attribute value inputs. Variant attribute value inputs are only allowed if this checkbox is not ticked, otherwise the base variant attribute value is displayed as read-only text.

Plot Visibility

It wasn't possible to change symbol plot visibility modes through the p key if a variant was active. This has been changed. I.e., symbol plot visibility modes can now be changed through the p key if a variant is active.

Symbol Database

The Update and ID Replacement functions from Symbol Database have been changed to process all symbol attributes of all project variants. Previously, only the currently active variant was processed which could have caused unintentional base variant default value substitutions.

The database field which is configured through the **SSELPDF_SCM** parameter in **bae.ini** has been modified to accept other file types in addition to **.pdf**. The Doc function automatically activates the application which is registered for viewing the specified file type.

The **DEF2CSV User Language** program for converting logical library definitions to **.csv** and **.map** files as required for the creation of the symbol database has been modified to support the splitting of mapping file outputs according to **$gp** gate assignments. The new options are No $gp (default; previous processing mode), $gp for single pin gates, $gp for all gates and $gp if attribute text. Splitting mapping files can be very useful for connectors consisting of single pin symbols as it allows for the Symbol Pool to provide a selection of unused connector pins with automatic **$gp** attribute value assignment.

Symbol Data Consistency

The Symbols / Other Functions / Check $noplc Consistency has been added to check whether **$noplc** symbol attribute settings match symbol plot visibility status settings. Any inconsistencies in that respect are listed in a dialog box, and the check is carried out for all project variants, regardless of the currently active variant.

The **NOPLCCHK_SCM** parameter for activating automatic consistency checks during SCM plan save operations has been added to the **bae.ini** file.

Symbol Logic Edit

The Edit Symbol Logic function has been changed to include file names with file-spcific error messages. This makes it easier to recognize and fix certain problems such as a wrong library file selection.

A scroll box displaying the layout part macro pin name list has been added to the dialog for Table pin assignments. The pin names can be copied and pasted to the input fields for the layout pin names.

The pin assignment worksheets for Graphically with Lines and Graphically with Texts have been modified to display the layout part macro underneath the layout pin text area.

Layout Part Set (BAE HighEnd)

The Edit / Layout Part Set function has been modified to empty the part set if all layout parts are already selected. I.e., it is not necessary anymore to change to the layout for part set resets before selecting new part sets.

2.3 Connections

Context Functions

With Element Selection activated for the Pick Mode, it was sometimes necessary to reselect connection segments after selecting a context menu function. This problem has been fixed.

Net Highlight

The View / Highlight Net has been changed to allow not only for the selection of connections segments, but also for the selection of label and bus tap contacts. This allows for the net highlight to be activated for unconnected bus taps and labels which have been placed directly onto symbol pins (in Connectivity - Full Pin Check mode).

The contact areas of unconnected labels were not correctly displayed and/or included in nethighlights. This problem has been fixed.

Connection Routing

The signal router algorithm for rerouting symbol and group connections has been modified to allow for T-connections to be considered as valid connection points. Cost calculations have been introduced to better facilitate the use of existing connections when rerouting connections, thus resulting in more compact connection structures.

The signal router used to add surrounding rectangles of symbol pins, texts and graphic elements to blocked symbol areas. This caused unnessessarily complex routing results, especially alongside symbol outlines with attribute texts and/or values exceeding the outline. To solve this problem, the signal router collision check has been modified to consider symbol level elements separately.

The Move Group function did not change any connections outside the group. This behaviour has been changed. Connections which are positioned in line of the group movement vector and connected to group-selected connections and pins are now automatically shortened. This prevents antennas from being created and simplifies the job of moving groups of circuitry closer together.

The Group Antenna Optimization signal router parameter with the options None, First Segment and Complete Antenna has been added to Settings / Settings. First Segment (default) removes the first segment of connections which are not group-selected but are connected to the currently processed group. Complete Antenna removes connections up to the next connection point which are not group-selected but are connected to the currently processed group. These options prevent from unintentionally connecting to existing unselected connections when placing signal groups on such connections. The signal router is capable of removing and/or rerouting affected connections. The None option deactivates group antenna optimizations.

Bus Taps

Modifications in the currently loaded schematic plan were discarded without user prompt when applying the Load Macro context menu function on bus taps. This problem has been fixed.

The bus tap placement functions have been modified to allow for the bus tap to be moved over bus T-connection points of the selected bus segment.

Plot Visibility

Using group functions on T-connections with plot visibility settings sometimes transfered incorrect plot visibility modes to adjacent connection segments. This problem has been fixed.

2.4 Graphics

Angle Direction

The Insert Corner function has been modified to preset the angle direction to the side of the polygon segment which is closer to the pick point. With this feature and appropriate pick point selections, it is possible to eliminate otherwise necessary context menu interactions for toggling the angle direction.

Symmetric Polygons

The Mirror at X-Axis, Mirror at Y-Axis, Mirror at X/Y-Axis and Rotate Symmetrically functions have been added to the context menu which can activated through right mouse button clicks during interactive polygon drawing operations. These new functions create mirrored and/or rotated copies of the currently drawn polygon at a selectable reference point. Mirroring at a single coordinate axis appends a single polyline copy and X/Y axis mirroring or rotation appends three polyline copies. The time and effort required for the generation of symmetric polyline structures is obviously significantly reduced when using these new function. The polygon drawing function is automatically terminated by any of those symmetric polygon copy functions.

Note

It is recommended to draw the basic ("template") polyline in counter-clockwise direction and left to and/or above the mirroring axis to avoid the creation of invalid (filled or closed) polygons.

Draw Assistant

The Draw Assistant dialog for placing texts and standard polygons such as squares, rectangles, circles and lines has been added to the Graphic / Other Functions / Drawing Utilities. The Draw Assistant dialog is a (permanently visible) modeless dialog with buttons and controls for specifying polygon types, dimensions and line widths for the polygons and texts to be created. Either single or multiple elements can be placed. A radius for rounded corners can be specified for squares and rectangles. Those rounded corners are displayed during interactive placement operations. The Corner,Corner and Center,Corner buttons can be used to defined square and rectangles either by two cornerpoints or by a center and a corner point.

The Pin Text button can be used on symbol label to place texts derived from the names of mouse-selectable pins.

The Draw Assistant dialog also provides a section for selecting groups with preview from a library with optional X and Y input fields for a matrix placement of multiple instances of the selected group.

Drawing Utilities

The Area Measure, Angle Measure and Delete Measurement/Ruler functions have been added to the Graphic / Other Functions / Drawing Utilities submenu, and new options for measuring horizontal or vertical distance components have been added to the Distance Measure function.

The Jump Relative context menu function of the Draw Rectangles, Draw Circles and Draw Arrows functions from the Areas / Other Functions / Drawing Utilities submenu was behaving like Jump Absolute when selecting the second point. This bug has been fixed.

Closed Polygons

A user prompt verifying whether the polygon should stay closed is now activated when using Move/Delete Corner or Move Segment at the start and/or end point of closed polygons. The start and end point and/or the start and end segment are are automatically moved if the option for keeping the polygon closed is selected.

The **`CLINEEDIT_SCM`** parameter has been added to the **`bae.ini`** file. **`CLINEEDIT_SCM`** is also available through Settings / Settings bae.ini and can be used to deactivate the close polygon query and to leave polygons always open or to close polygons.

DXF Import

The parameter dialog box of the AutoCAD/DXF Input function has been extended to support additional settings which were previously only available through **bae.ini**. This allows for the import of DXF data with different parameter configurations without having to edit **bae.ini** and restart the **AutoEngineer**.

The AutoCAD/DXF Input function has been modified to create interpolated polylines for imported ellipses. Previously, DXF ellipses were imported as circles.

Long DXF input texts which have to be split into multiple strings are now converted to multiline texts to ensure that they can subsequently be processed as units.

Polygon Check

The polygon check routine which is activated at the end of the Add Graphic Area function has been changed and is now providing an option for saving the polygon as a graphic line rather than terminating with an invalid polygon error if the polygon contains crossing segments. This allows for the subsequent removal of crossing segments without having to recreate the polygon from scratch.

2.5 Text, Attributes

Text Placement

The text placement functions have been modified to display not only the text string of the currently placed text but also its text size and text mode in the status line.

Load Text Sheet

The Load Text Sheet function can now be applied to **$pltecomment:planname** sheet comment reference texts.

Project Sheet Count Display

A new system attribute **$pltpagecnt** for displaying the total number of project SCM sheets has been introduced.

Multi Line Texts

A context menu with the functions from the Text / Other Functions / Multi Line Text submenu has been implemented for multi-line texts.

External Document References

The Link to External File function for automatically loading a selectable file to the application which is registered for the file name extension has been added to the Text / Other Functions submenu and to the right mouse button text context menus.

Symbol Text Rotation

Between applications of the Disolve Rotations and Combine Rotations functions from the Settings|Rule Attachment submenu, the element set for right mouse button context functions is now automatically restricted to texts to prevent from selecting invalid elements for these functions.

2.6 Group Functions

Load Group

The **VARATTRCHK_SCM** parameter for activating automatic checks on variant-specific attribute value and plot visibility settings with Load Group operations has been added to **bae.ini**. The system checks for variant-specific data in the loaded group and suggests to delete such data as it might refer to variants which are not definied in the current project.

Group Selections

The number of modified elements and the total number of group-selected elements have been added to the confirmation messages of the group selection functions. With single element selections, the type of the processed element is also displayed.

2.7 Plot Output

EPS/PDF Output

The Control Output option for automatically passing PDF outputs to the system's **.pdf** file viewer is now also supported by EPS/PDF output batch definitions.

A new option for deactivating the fit to page option in the print function of **Acrobat Reader** has been added to the batch defintions for **.pdf** outputs.

The Variant Attribute+Extension and Variant Name/Attribute+Extension modes for automatically creating output file names according to variant-specific attribute values of specific symbol macros have been added to the output batch definitions. Batch definitions with variant-specific file names provide the new Single File for every Variant option for automatically creating output files for all project variants.

In special cases and for rather specific page setups, invalid PDF compression data was created for compressed PDF outputs. This problem has been fixed.

The Settings / Rule Attachment / Single Elements / Texts function has been modified to support the **envvar** String predicate for assigning environment variables to texts. The assigned environment variables are transferred to File / Import/Export / EPS/PDF Output batches. I.e., it is possible to compile output files names using environment variable values and/or attributes. E.g., with the **envvar** string predicate values **date** and **varname** assigned to the **$pltdateus** and **$?s:variant_name** texts/attributes on a plan header symbol, a specification such as **$projectfile_$varname_$date.pdf** can be used to include the project file name, the variant name, and the plot date in the batch output file name.

DXF Data Output

The **DXFFONT_SCM** parameter for specifying alternative character fonts for DXF outputs by specifying the target system font and/or font shape file (e.g., **monotxt.shx**) has been added to the **bae.ini** file.

Due to character font size and base line configurations, the BAE vector font looks significantly different from the AutoCAD default font. New text output size, aspect ratio and base line parameters have been added to the **bae.ini** file to provide options for tackling this problem. The default settings for these parameters have been chosen in such a way that texts don't cross surrounding graphics anymore.

The DXF output function has been modified to support the output of centered text reference points and corresponding text attributes. This ensures that text is correctly centered even if a character font with a different character aspect ratio is used in the target system.

The DXF output function has been modified to support text frames.

Multi-line/multi-part texts created with the Text / Other Functions / Multi Line Text / Add function are now concatenated to single strings for DXF outputs to avoid text gaps and/or overlaps in target systems with different font selections.

3 Packager

3.1 Error Messages

Error/Warning Counts

Error and warning counts are now displayed with the concluding messages at the end of **Packager** runs.

Error Database

Packager error and warning messages which are specific to schematic symbols are now written to a `projectname_pack.err` database to enable the SCM system to jump to any of the erroneous symbols.

Unused Gates

The **Packager** was issuing not only first pin but also redundant successive swap pin warning messages for unused gates. These redundant warning message have been eliminated. I.e., the number of unused gate warnings issued by the **Packager** is now identical to the number of unused gates.

Attribute Generation

The **Packager** sometimes issued confusing attribute value assignment warning messages when using tag symbols for automatically setting `$orgname`, `$pagename`, `$blkname` and `$blkrname` attribute values. This problem has been fixed.

Layout Load Check

A project `.lck` file check has been introduced prior to any **Packager** run to verify whether the target net list and the corresponding layout are currently loaded by a different user in which case the name of the other user is displayed together with information on how to prevent unintentional loss of layout or netlist changes.

Automatic Modul Switch

Upon successful execution without errors or warnings, the **Packager** now switches automatically to the next module when invoked from the **Schematic Editor** with either Packager and back or Packager and Layout Editor. Previously, a user interaction was required for this module switch.

3.2 Pin Attributes

Power Pins

The **Packager** has been modified to support the new **$powpin** pin attribute which causes the system to set a symbol pin's connection width to the power pin connection width defined through the **net** command and power width net attribute. The tag_pin_powerpin tag symbol for setting the **$powpin** pin attribute has been added to the ROUTE symbol library. Alternatively, the system supports fixed **$powpin** assignments through the logical definition of the symbol:

```
newattr "$powpin" = "1" : (pinname);
```

Pin Attributes

For pins connected through the **net internal** command, the pin attributes of the first symbol pin are assigned to all other **net internal** pins without symbol pin assignment.

Net Attributes

Attribute values from **netattr routwidth**, **netattr powwidth**, **netattr mindist** and **netattr priority** commands of logical net tag symbol defintions are not transfered to the net tags' target nets anymore. This prevents the system from issuing redundant warning messages when different net tags with the same attribute name are connected to a net (e.g., **tag_net_mindist** and **tag_net_routwidth** both with attribute name **$val**).

Constructive Pins

The physical netlist generator of the **Packager** has been modified to ignore the net named **n.c.** and any pins connected to that net. This feature is useful for constructive alternative part package type definitions with different constructive pins as it eliminates missing net list pin warning messages when switching such package types. The following logical library command can be used to define **n.c.** nets:

```
net "n.c." : (drl1,drl2);
```

3.3 Settings

Packager Parameter Settings Database

The Load Settings, Save Settings and Delete Settings functions for loading, saving and deleting **Packager** parameter settings have been added to the **Packager**'s Settings menu. The parameter sets are stored in the default layout library. Upon startup, the **Packager** automatically loads the parameter set named **default** (if available).

Test Point Generation

The prompt for the Test Points Logical Library has been modified to allow for the deactivation of automatic test point generation through the input of a **-** (hyphen).

4 Layout Editor

4.1 General

BAE ASCII Format

The BAE/ASCII Output function from the File / Import/Export menu has been moved to the new BAE/ASCII submenu, and the BAE/ASCII Input function for importing generic BAE ASCII layout data has been added to that submenu. Please note that BAE/ASCII Output does not include layout net list data. I.e., when transferring BAE ASCII from one project to another, it might be necessary to import net list data separately before importing generic BAE ASCII data into the destination project file.

The **lbaedmp.ulp** ULP program for exporting BAE ASCII format layouts from **Eagle** is provided in the **eagleulp** directory of the BAE CD. The **lbaedmp.ulp** output is written to a file named **Projectname_l.dmp**. The BAE/ASCII Input function automatically removes the **_l** extension and saves the converted data to a project file named **Projectname.ddb**. A complete **Eagle** project can be transferred to the **AutoEngineer** by first using the Single Project Library Only option for importing the layout part macros required by the **Packager**, then importing the schematic data and running the **Packager**, and finally importing the layout data with the Single Project All option.

DDB Element Comment

The functions from the File / Element Comment submenu have been changed to update currently loaded element comments when selecting DDB file elements. This prevents the system from resetting element comment changes when subsequently saving the currently loaded element.

Assistant Dialog Boxes

The Layer Browse, Part Browse, Net List Assistant and Draw Assistant functions have been added to the Utiltites menu from where they can be activated in modeless (permanently visible) dialog boxes for easy access.

Coordinate Snap

The X Coordinate Snap and Y Coordinate Snap options for snapping X and Y or Y and X coordinates has been added to the coordinate snap function menu which can be activated through the x key during interactive placement operations. The first snap coordinate is easily identified through its constant value display in the status line. This is useful in connection with the p key coordinate snap as it provides a facility for using gridless coordinates from different previously placed elements in the current placement operation.

Element Rotation

The l and r keys are now activating functions for rotating multiple selectable texts and/or parts when pressed while no other function is active.

Element Mirroring

Functions for mirroring multiple selectable texts and/or parts have been added to the context menu which is activated when pressing the m key while no other function is active.

Variant Consistency Check

The function for loading layouts has been modified to check whether the actice variant in the corresponding schematic plan matches that of the layout. The system issues a warning message if this is not the case. The schematic plans and the layout must have been saved with the new BAE Version for this to work.

Workspace

The New Workspace Rectangle function for setting the element boundaries by selecting two rectangle corner points has been added to the Settings / Element Size submenu which can also be activated through the F12 function key.

4.2 Display, Design Rule Check

Redisplay

BAE screen redraws caused by other windows during interactive placement operations sometimes left graphic fragments of the currently placed element. This problem has been fixed.

Bottom View

The Solder Side View option for switching to a mirrored display has been added to the View / Settings menu. The display is mirrored at the X axis, resulting in a view of the layout solder side (as if the layout was turned around). Mirror direction arrows are displayed at the origin in the element overview window of the toolbar to indicate that solder side view is activated. The default part placement mirror mode is automatically updated when switching to or from the solder side view.

The current solder side view setting is saved and restored with the toolbar design views. I.e., with solder side and part side views assigned to different toolbar design views it is possible to toggle quickly between those display modes.

Toolbar

The M (Move), D (Delete) and G (Group status) buttons for moving, deleting and changing group selection modes for different selectable elements have been added to the toolbar.

Element Layer Query

The function for querying element data which can be activated through View / Query Element or by holding down the Ctrl key has been modified to display layer names instead of the Top Layer signal layer number for elements placed on **Layer n (Parts.)**. This makes it easier to check whether an element is correctly placed on the top layer.

Layer Usage Scan

The **LAUTOSCAN_GED** parameter for activating an automatic layer usage scan for indicating the layers used on the currently loaded element through the Change Colors function has been added to the **bae.ini** file.

The + and - menu buttons of the View / Other Functions / Layer Browse function have been modified to ignore unused layers when stepping through the layer list. The **LBRWBUTN_GED** parameter for setting an arbitrary number of direct layer access buttons has been added to the **bae.ini** file. These buttons are displayed in rows of 5.

The **LBROWSEBOX_GED** parameter for automatically activating the Layer Browse dialog after starting the **Layout Editor** has been added to the **bae.ini** file.

Layer Focus

Through the new **bae.ini** parameter **TB_DOCFADEIN_LAY**, the layer display focus activated by double-clicking a layer name in the toolbar can now be restricted to signal layers to prevent previously faded-out documentary layers from being displayed when deactivating the focus.

Rule Assignments

String, Double and Integer buttons for directly setting and/or controlling rule predicates with the corresponding data types have been added to the rule assignment functions of the Settings / Rule Attachment submenu. Predicate name menus only display predicates suitable for the currently selected element and provide some help text about the purpose of the predicate. Single mouse-clicks on assigned predicate rules in the rules menu cause the system to display the current value together with predicate info text in the comment line above the rule menu box.

WRL Output

An option for selecting the **VRML V2.0 / VRML97** output format has been added to the File / Import/Export / WRL/VRML Data Output functions.

The WRL/VRML Data Output output functions have been modified to include external 3D part models through model name reference texts placed on part level on a special documentary layer. This allows for the generation of more realistic 3D models/views if external 3D part models are available.

DRC Distance Display

The **DRCDISTPATT_GED** parameter for configuring a pattern for the DRC Distance Display in View / Settings has been added to the **bae.ini** file. 32 different patterns numbered 0 through 31 are available as shown to the right of the three standard display modes in Change Colors.

Element specific distance check (BAE HighEnd)

Changed clearance settings through the Settings / Advanced DRC / Element DRC Block function are now immediately displayed when DRC clearance display is activated. Previously, a screen redraw was necessary to trigger a DRC clearance display update.

It is now possible to set part-specific DRC blocks by assigning **$drcblk** attributes to net list parts. The **$drcblk** attribute can be assigned through the new **tag_sym_drcblk** tag symbol or through **newattr** commands in the logical library.

DRC Error List

The Utilities / DRC Error List / DRC Error List dialog has been changed to a modeless dialog, and error list entries can be clicked to jump to the error position in the layout. This allows for different errors to be examined and/or fixed without having to restart the DRC Error List function. The Update and Batch-DRC buttons have been added to allow for error list updates.

Via Distance Check

The **lay_via_trcdist** layout rule for treating via copper areas like traces was only active when checking via pad to trace clearances. This has been modified. With the **lay_via_trcdist** rule assigned to the layout, the Trace/Trace clearance is now applied when checking via pads against via pads, and the Trace/Copper clearance is now applied when checking via pads against pin pads.

Grid Settings

The View / Settings dialog was internally rounding down the selected grid to 1/100000 mm units. This could cause the 1/60 Inch, 1/120 Inch, 1/240 Inch and 1/480 Inch grids to be slightly shifted at very large coordinate positions. This bug has been fixed. The grid functions from the Grids/Rotation context menu and the grid favorites toolbar function were not affected by this problem.

4.3 Parts, Placement

Part Browser

The Parts / Other Functions / Part Browse function has been modified to display the contents of selected libraries in a separate permanently open dialog box. This dialog provides a library element name listbox and displays the currently selected library part in a preview window. The dialog also provides a Place button for placing the selected part on the currently loaded layout and a Load button for loading the library part for editing. The system automatically names placed parts if a part name pattern is entered to the Base Name field, otherwise a part name prompt is activated when placing parts with Place.

Layout Part Set

The Parts / Add Part dialog has been modified to allow for name pattern inputs with Return key confirmation. I.e., part sets with part name patterns can now be selected without having to use the Select Pattern button.

Prior to part name pattern selections, the current part set is emptied if all net list parts are currently selected. I.e., it is not necessary anymore to manually reset the part set with Deselect All before carrying out a new part name pattern selection.

Part Renumbering

The Parts / Other Functions / Autoname Parts / All Prefixes function has been changed to allow for a start number prefix to be specified. The part numbering process can now be restricted to either the part side or the solder side to allow for different part number ranges to be created for the part and/or solder side. On default, the numbering is carried out according to the following sort order: mirror mode, x coordinate and y coordinate. These sort order priorities can now be changed.

Net list modifications can cause the **Packager** to change the automatically generated test point names for unnamed nets, thus converting previously placed test points into constructive parts. The Parts / Other Functions / Autoname Parts / Update Test Points function has been added to tackle this problem. Update Test Points analyzes test point net list connections and part package types and tries to assign unplaced test points to placed constructive parts. Successfully assigned constructive test points are automatically renamed and alternative test point package types are backannotated to the net list if necessary.

The Parts / Other Functions / Autoname Parts / Replace Block Number function for replacing **Packager** generated **[p1]** part name prefix patterns with block reference symbol names from **$blkrname** attribute settings for parts from hierarchical blocks has been added. This feature can be used to improve the traceability of parts in hierarchical designs by changing part name patterns such as **[p1]c100** into, e.g., **amplifier1_c100**.

Hierarchy Copying

The Parts / Other Functions / Copy Hierarchie functions created incomplete copies in certain cases where the source hierarchy block contained moved names and/or attributes. This problem has been fixed.

Pin Net Highlight

The Highlight Net has been added to the right mouse button context menu for part pins.

Part Pin Movement

The **lay_pin_move** rule for enabling part pin movements on layout level can now optionally be assigned as plan rule to padstack macros, thus enabling pin movements for all pin instances of that padstack macro.

Find SCM Symbol (BAE HighEnd)

The Parts / Other Functions / Find SCM Symbol functions has been added to the part context menu.

4.4 Traces, Routing

Point Snap

The Snap Start Point trace parameter has been added to Settings / Settings. Snap Start Point activates a gridless pin/trace position snap at the first point set with Add Trace. When picking an off-grid horizontal or vertical trace segment, the next orthogonal grid line cross point with the trace segment is chosen as the start point.

The p key position snap function for trace corner points has been modified to prioritize traces on the current layer over pins to allow for trace corner points on smd pins to be picked.

Angle Direction

The Insert Corner function has been modified to preset the angle direction to the side of the trace segment which is closer to the pick point. With this feature and appropriate pick point selections, it is possible to eliminate otherwise necessary context menu interactions for toggling the angle direction.

Via Definitions

The Select Via(s) has been moved from the Parts menu to the Traces menu.

The Add Trace function has been modified to activate the Select Via(s) dialog instead of displaying an error message if no standard via is defined for the current project.

Via Macro Change

The Trace Routes and Nets functions for repetitively changing the via macros of selectable traces and/or nets have been added to the Traces / Via Functions submenu which can also be activated through the v key.

Net Deletion

The **TRCNQRYLIM_GED** parameter for setting a minimum trace element count for activating confirmation prompts in the Delete Net function has been added to the **bae.ini** file. The default value for this parameter is 50.

The confirmation prompts and the status messages of the Delete Net are displaying deleted trace and via counts and the name of the deleted net. I.e., Delete Net can also be used for quickly querying the trace and vias counts of selectable nets.

Net Data Query

An Info button for querying detailed net data has been added to the element property dialog which can be activated by pressing the p key.

Net Attributes

The Net List Output and Net List Input functions from the File / Import/Export submenu have been modified to support the export and import of arbitrary net attributes. The format for the net attributes corresponds to that used for the part and pin attributes.

Logical definitions for fixed and user-specific net attributes which are not yet defined in the layout libraries are automatically created in the project file.

Net Colors

The Traces / Highlight Net / Color Nets function has been renamed to Color/Hatch Nets and supports not only color but also pattern assignments. With this feature, it is now possible to display nets on the same layer with the same color, yet and still distinguish those nets through different net display patterns.

The File / Import/Export / EPS/PDF Output has been updated to support coloured output for nets with Color/Hatch Nets settings. Net colours have priority over any other color settings.

Net Visibility

A list box column for displaying current net visibility mode settings has been added to the Set Net Visible and Set Net Invisible functions in Settings / Settings.

Parallel Traces

The Round corners checkbox for deactivating the creation of rounded corners (trace arcs) has been added to the Equidistant function of the Traces / Other Functions / Parallel Traces submenu. This simplifies subsequent trace processing procedures at the cost of slightly inreased gaps between parallel trace corners.

Differential Pairs

The Traces / Other Functions / Trace Length / Pair Trim Length has been modified to support not only start point length offsets but also end point length offset adjustments. This allows for correct length adjustments when parts/modules with phase-shifted input/output pins are connected. Trace meanders in non-parallel trace segments are inserted at the end of trace pairs if required for trace lengths synchronization. The system issues a warning message displaying the remaining trace length difference in cases where the trace geometry doesn't allow for full trace length synchronization. A new parameter has been implemented to tell the system whether in-trace phase synchronization is more important than total trace length synchronization (phase synchronization at the end of trace pairs).

The Layer Pair function for converting traces with large via macros into two traces on parallel layers with smaller vias placed instead of the large vias has been added to the Traces / Other Functions / Parallel Traces submenu. The via macro and layer assignments for the Layer Pair function can be set through the rule system.

Part Level Traces

Information about vias and traces on part level has been added to the element info tooltips on layout level.

On default, traces on part level are not subject to connectivity checks against each other to allow for the creation of, e.g., printed inductors. Assigning the **lay_trc_partcon** rule to traces overrides this behaviour and forces full connectivity checks for traces on part level.

Unroutes List

The Unroutes List button for listing unroutes with airline start and end coordinates has been added to the dialog of the Traces / Other Functions / Unroutes Report function. The unroutes list is sorted by net names, and double-clicks on unroutes list entries activate a net highlight with automatic Zoom Window to the selected airline. The + and - keys can be used to step through the airline positions.

Net List Assistant

The **NETASSIBOX_GED** parameter for automatically activating the Net List Assistant after loading a layout has been added to the **bae.ini** file.

Pick and Report Net Data buttons have been added to the Net List Assistant dialog. Pick allows for mouse-selecting a layout net. Report Net Data displays net data for the current net name. This allows for pin and trace net data queries without having to select a net and/or netname with another function.

Layer Stackup (BAE HighEnd)

Parameters for specifying isolation thickness tolerance and isolation type (core or prepreg) have been added to the Settings / Rule Attachment / Layer Stackup dialog.

When changing layer-specific thickness settings, the system automatically compares the total PCB thickness specification with the sum of the single layer thickness specifications and suggets an update in case these don't match

The Material button has been replaced with layer-specific material selectors. This doubles as a query function as these selectors are displaying the names of the selected materials. The **special** entry can be used to set user-specific epsilon r and tan delta values. The list of materials can be extended through the new **LAYIMATL_LAY** parameter in **bae.ini**.

4.5 Graphic, Copper Areas

Angle Direction

The Insert Corner function has been modified to preset the angle direction to the side of the polygon segment which is closer to the pick point. With this feature and appropriate pick point selections, it is possible to eliminate otherwise necessary context menu interactions for toggling the angle direction.

Symmetric Polygons

The Mirror at X-Axis, Mirror at Y-Axis, Mirror at X/Y-Axis and Rotate Symmetrically functions have been added to the context menu which can activated through right mouse button clicks during interactive polygon drawing operations. These new functions create mirrored and/or rotated copies of the currently drawn polygon at a selectable reference point. Mirroring at a single coordinate axis appends a single polyline copy and X/Y axis mirroring or rotation appends three polyline copies. The time and effort required for the generation of symmetric polyline structures is obviously significantly reduced when using these new function. The polygon drawing function is automatically terminated by any of those symmetric polygon copy functions.

Note

It is recommended to draw the basic ("template") polyline in counter-clockwise direction and left to and/or above the mirroring axis to avoid the creation of invalid (filled or closed) polygons.

Mirrored Polygons

Using the Mirror context function from within Move Area and Copy Area could cause erroneous processing of the changed area in the connectivity and DRC procedures of the currently active BAE session. This problem has been fixed.

Draw Assistant

The Draw Assistant dialog for placing texts and standard polygons such as squares, rectangles, circles and lines has been added to the Areas / Other Functions / Drawing Utilities. The Draw Assistant dialog is a (permanently visible) modeless dialog with buttons and controls for specifying input layers, polygon types, dimensions and line widths for the polygons and texts to be created. Either single or multiple elements can be placed. A radius for rounded corners can be specified for squares and rectangles. Those rounded corners are displayed during interactive placement operations. The Corner,Corner and Center,Corner buttons can be used to defined square and rectangles either by two cornerpoints or by a center and a corner point. The latter simplifies the construction of pad areas which have to be symmetric to their origin.

The Draw Assistant dialog also provides a section for selecting scalable groups with preview from a library with optional X and Y input fields for a matrix placement of multiple instances of the selected group.

Drawing Utilities

The Jump Relative context menu function of the Draw Rectangles, Draw Circles and Draw Arrows functions from the Areas / Other Functions / Drawing Utilities submenu was behaving like Jump Absolute when selecting the second point. This bug has been fixed.

Closed Polygons

A user prompt verifying whether the polygon should stay closed is now activated when using Move/Delete Corner or Move Segment at the start and/or end point of closed polygons. The start and end point and/or the start and end segment are automatically moved if the option for keeping the polygon closed is selected.

The **`CLINEEDIT_GED`** parameter has been added to the **`bae.ini`** file. **`CLINEEDIT_GED`** is also available through Settings / Settings bae.ini and can be used to deactivate the close polygon query and to leave polygons always open or to close polygons.

Power Layer Selection

The layer selection menus for new power planes have been changed to display power layer names instead of power layer numbers.

Polygon Combination

The functions from the Areas / Other Functions / Polygon Combination submenu can now also be applied to the board outline.

Tile Polygons

An option for the specification of a corner radius for the creation of tile polygons with rounded corners has been added to the Areas / Other Functions / Drawing Utilities / Tile Polygon function.

Polygon Check

The polygon check routine which is activated at the end of area and board outline polygon definitions has been changed and is now providing an option for saving the polygon as a documentary line rather than terminating with an invalid polygon error if the polygon contains crossing segments. This allows for the subsequent removal of crossing segments without having to recreate the polygon from scratch.

DXF Import

The parameter dialog box of the AutoCAD/DXF Input function has been extended to support additional settings which were previously only available through **bae.ini**. This allows for the import of DXF data with different parameter configurations without having to edit **bae.ini** and restart the **AutoEngineer**.

The AutoCAD/DXF Input function has been modified to create interpolated polylines for imported ellipses. Previously, DXF ellipses were imported as circles.

Long DXF input texts which have to be split into multiple strings are now converted to multiline texts to ensure that they can subsequently be processed as units.

4.6 Text, Drill

Text Mirroring

The **TXTLAYMIRR_GED** parameter has been added to **bae.ini** for configuring a mode where the text layer of a mouse-picked text is mirrored with the text. This mimics the bahaviour of the group mirroring functions. On default, no text layer mirroring takes place when mirroring texts.

Multi Line Texts

A context menu with the functions from the Text, Drill / Other Functions / Multi Line Text submenu has been implemented for multi-line texts.

Text Frames

For rotated **LOGICAL** texts, text frames with an open side were displayed with the opening on the wrong side of the text frame. This problem has been fixed.

External Document References

The Link to External File function for automatically loading a selectable file to the application which is registered for the file name extension has been added to the Text / Other Functions submenu and to the right mouse button text context menus.

Drill Placement

The Text, Drill / Place Drill Hole function has been made available on layout and part level where this function triggers a Parts / Add Part call. The drill hole part and/or padstack is automatically named using the Next free Number for Name setting with **drill1** as the first name and/or part name pattern. The drill hole macro dialog on layout and/or part level automatically provides a selection with **d*** and/or ***hole*** macro name patterns. New parameters have been added to the **bae.ini** file to allow for the specification of alternative drill hole macro name patterns to match customer-specific layout library naming conventions.

4.7 Group Functions

Group Mirroring

The system now accepts negative Scalefactor inputs for mirroring the currently moved/copied group at the Y axis. Contrary to X axis mirroring, Y axis mirroring does not imply a layer change. For macro references (placed parts, etc.), only the placement coordinates are mirrored at the Y axis.

Context Selections

Additional information about the layer and type of the processed element has been added to the status messages which are displayed when selecting texts, traces and polygons through right mouse button clicks.

Single element selections didn't update the selected elements count in the selection status message correctly. This problem has been fixed.

SCM Symbol Selection (BAE HighEnd)

The new Edit / Other Functions / Group in Schematic function examines the currently selected layout parts and group-selects the corresponding schematic symbols in other project-specific **Schematic Editor** windows.

Layer Stackup (BAE HighEnd)

Groups from other project files or from the clipboard were loaded with their layer stackup definitions causing the current layout's layer stackup to be overwritten. This problem has been fixed.

4.8 Automatic Copper Fill

Fill Area Problem Display

Fill areas which can't be reduced by the minimum structure size due to "hooks" in the fill area outline are causing **`WARNING: Areas possibly not automatically deletable!`** warnings. The copper fill functions are now displaying rectangular error markers around problematic segments in the fill area outline. This helps to locate and fix problems in fill area outlines.

Cutout areas which used to cause **`WARNING: problem areas approximated by rectangles!`** warnings are now automatically split into smaller areas to eliminate the need for rectangle approximations.

Copper Fill Performance

The performance of the copper fill algorithm has been improved, with significant performance gains noticable in large layouts.

Hatch Areas

Due to a compiler error, the hatching algorithms in the BAE Windows version didn't work properly when it came to the elimination of redundant horizontal lines in certain fill areas. This problem has been fixed.

Due to rounding errors, the hatch area algorithms sometimes failed to create correct hatch lines over polygon corner points. This problem has been fixed.

5 Autorouter

5.1 General

Status Display

To improve the facilities for monitoring the routing process, the **Autorouter** status window now displays a target connection count together with the total connection count when routing boards with nets excluded from the autorouting process due to airline display settings.

5.2 Autorouter Algorithms

Via Connections

Via with diameters larger than the routing grid were sometimes connected at odd angles. This problem has been fixed.

6 CAM Processor

6.1 General

Varianten

The Variants function for setting the current variant and displaying variant data has been added to the Settings menu. This allows for variant-specific CAM outputs without having to change to the **Layout Editor** for selecting the desired variant.

Batch Output

The Set Variable batch output command for setting an environment variable for the duration of the BAE session has been added to the batch output facilities. The user is prompted for the variable value at the beginning of the batch output. Environment variables can be referenced in file name specifications by prefixing them with a **$** character. With the specification of a variable such as, e.g., **ordernumber** and file names such as **$ordernumber_layer1.gbr**, batch output prompts for the order number and then creates output file names including this number.

Gencad Output

The **GENCADSSIDE_LAY** parameter has been added to the **bae.ini** file to force the Gencad 1.4 Output to retrieve the part insertion side from text on the insertion layer instead of the part mirroring mode. This allows for the correct output of part macros which have been defined on the solder side.

6.2 Control Plot

Layer Coverage

The Layer Area Statistics function for calculating plot output layer coverages has been added to the Control Plot menu. The calculations are carried out using bitmap floodfill operations for calculating the percentage of layout area pixels occupied by layer structures. The layout area is derived from the element boundaries if no board outline is defined for the layout area.

After selecting the test layer, the system prompts for a pixel resolution for the bitmap. Make sure to set the resolution high enough to represent the layout structures accurately on the bitmap. However, don't set the resolution too high as the memory requirements for the bitmap increase significantly with the bitmap resolution.

The bitmap floodfill operations take the standard plot parameters into consideration. Make sure that All Layers Mode is set to Plot Together to include all layer vias and pins when calculating the layer coverage.

The Layer Area Statistics feature can be configured as CAM-Batch Output step for generating a status line in the batch report.

EPS/PDF Output

Empty attribute texts caused batch outputs with the Part List Pages for Element page option and BAE character font to abort with a **`Scan error!`**. This problem has been fixed.

The part list template reference text for the first name entry allows now for the specificaton of a column width in millimetres (e.g., **`$:50.0:1:`**). With such column width specifications, the name list is not truncated to **`r01,...`** anymore, but contains all names. The names are listed in multiple lines if necessary. A template with the name partlist_cntnames has been added to the PDFPAGE library to provide an example for a part list template with name list column specification.

The Control Output option for automatically passing EPF/PDF outputs to the system's **`.pdf`** file viewer is now also supported by EPS/PDF batch output definitions.

The feature for specifying sheet sizes through markers with the names **`pdf_lx`** and **`pdf_uy`** is now also working for markers placed on part level, thus allowing for the specification of sheet sizes through marker pins on frame symbols.

A new option for deactivating the fit to page option in the print function of **Acrobat Reader** has been added to the batch defintions for **`.pdf`** outputs.

The Variant Attribute+Extension and Variant Name/Attribute+Extension modes for automatically creating output file names according to variant-specific attribute values of specific part macros have been added to the output batch definitions. Batch definitions with variant-specific file names provide the new Single File for every Variant option for automatically creating output files for all project variants.

The Settings / Rule Attachment / Single Elements / Texts function of the **Layout Editor** supports the **`envvar`** String predicate for assigning environment variables to texts. The assigned environment variables are transferred to File / Import/Export / EPS/PDF Output batches. I.e., it is possible to compile output files names using environment variable values and/or attributes. E.g., with the **`envvar`** string predicate values **`date`** and **`varname`** assigned to the **`$pltdateus`** and **`$?s:variant_name`** texts/attributes on a plan header symbol, a specification such as **`$projectfile_$varname_$date.pdf`** can be used to include the project file name, the variant name, and the plot date in the batch output file name.

In special cases and for rather specific page setups, invalid PDF compression data was created for compressed PDF outputs. This problem has been fixed.

CAM-Batch Output

The SCM EPS/PDF Batch Output option for automatically switching to the **Schematic Editor** and running the specified SCM EPS/PDF batch output after successfully finishing the **CAM Processor** batch outputs has been added to the CAM-Batch Output function.

The **cd** (change directory) command can now be used in Command Call batch steps. The target directory for the **cd** command must be entered in the Folder input field.

The Comment Line Output batch step has been implemented for adding user-specific text lines to the batch output report. This feature can be used to pass special instructions on to the PCB manufacturer.

DXF Data Output

The **DXFFONT_LAY** parameter for specifying alternative character fonts for DXF outputs by specifying the target system font and/or font shape file (e.g., **monotxt.shx**) has been added to the **bae.ini** file.

Due to character font size and base line configurations, the BAE vector font looks significantly different from the AutoCAD default font. New text output size, aspect ratio and base line parameters have been added to the **bae.ini** file to provide options for tackling this problem. The default settings for these parameters have been chosen in such a way that texts don't cross surrounding graphics anymore.

The DXF output function has been modified to support the output of centered text reference points and corresponding text attributes. This ensures that text is correctly centered even if a character font with a different character aspect ratio is used in the target system.

The DXF output function has been modified to support text frames.

Multi-line/multi-part texts created with the **Layout Editor** Texts / Other Functions / Multi Line Text / Add function are now concatenated to single strings for DXF outputs to avoid text gaps and/or overlaps in target systems with different font selections.

The Visible Layers and Layer Selection output options have been modified to support drill class specific outputs. The drill hole circles for the default **-** class are assigned to the DXF layer name **DRILLS_DEFAULT**, and the drill hole circles for non-default drill classes are assigned to DXF layer names **DRILLS_A**, **DRILLS_B** etc.

6.3 Drilling Data Output

Drill Data Output

The drill class selection control of the drill data output functions was deactivated for projects where only a single non-default drilling class was used, thus effectively prohibing drill data outputs for such projects. This problem has been fixed.

The CAM-Batch Output always prioritized fixed drill data and tool table file name settings from Drilling+Insertion / Settings over current batch configurations and didn't display those file names in the output report. This problem has been fixed. Batch configurations for drill output files have now priority over general **CAM Processor** settings.

6.4 Insertion Data Output

Insertion Data Output

The output data configuration file definition for the Generic Insertion Output has been modified to allow for a comma-separated specification of a second output layer with the **`OUTLAYER`** command. This allows for the generation of output files which contain insertion data for both sides of the printed circuit board. The **`MIRROR`** field command can be used to provide and/or generate insertion side indicators.

The Insertion Output and Generic Insertion Output functions have been modified to issue warning messages for centered and **`LOGICAL`** texts on the selected insertion data output layer as centered text positions are certainly and **`LOGICAL`** text positions are most likely modified using the Move Name function which invalidates the text coordinates for insertion pick reference.

7 CAM View

7.1 Data Import

Drilling and Gerber Data Import

Plus and minus signs in input coordinates caused incorrect coordinate length calculations when loading drilling and Gerber data with Trailing Zeros suppression. This problem has been fixed.

7.2 Gerber Data

Color Settings

The functions for loading Gerber data have been modified and are now automatically changing the color settings to ensure that the Gerber input layers are displayed.

8 Neural Rule System

8.1 General

Rule Comments

The rule definition syntax has been extended to allow for the specification of a rule comment. Rule comments are optional and can be entered as a comma-separated quoted string after the rule name. Rule comments are stored as element comments in the rule database and are displayed together with the rule name when performing rule assignments.

Rule comments (in German) have been added to the rule source code files which are provided with the system.

9 Utilities

9.1 LOGLIB

Pin Assignments

The **xlat** command has been extended to support pin-specific pin assignments in addition to the gate-specific pin asignments with **to** and **or**. Pin-specific pin assignments make it easier to read layout to symbol pin assignment lists which stretch over multiple source file lines. A pin assignment such as

```
xlat (clock,reset,enable) to (4,7,9) or (5,8,10);
```

can now also be coded as follows:

```
xlat ((clock,4,5),(reset,7,8),(enable,9,10));
```

The layout pin name list commands have been extended to support pin name range specifications. The pin assignment

```
xlat (1) to (1) or (2) or (3) or (4) or (5);
```

for a 5-pin connector with a single pin symbol can now also be coded as follows:

```
xlat ((1,1-5));
```

Swap Pin Check

Warning messages are now displayed for pins in **swap** commands which originate from different **xlat** levels and/or hierarchies as this is highly likely to be erroneous.

10 Bartels User Language

10.1 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.

Preprocessor Statements

The `#pragma` preprocessor statement for setting the caller type for the compiled **User Language** program has been extended to allow for the specification of the `ULCALLERNOUNDO` caller type. On default, the execution of a **User Language** program adds an undo step. `ULCALLERNOUNDO` can be used to prevent the system from adding an undo step for the execution of the compiled program. I.e., by declaring `ULCALLERNOUNDO` for programs which are not performing any operations relevant to the system's undo mechanism, it is possible to avoid redundant undo steps.

To retain the caller type specification option, **User Language** program sources can contain a second `#pragma` statement with a valid caller type specification in addition to the `#pragma ULCALLERNOUNDO` statement.

10.2 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**.

Compiler Warnings

The **User Language Compiler** issues now warning messages if function parameter and/or local variable names are matching global variable names.

Function names and variable/parameter names and/or system function parameter numbers are now included with the warning messages about function variables and function parameters.

The warning messages about unused global variables have been changed to include the name of the source file with the variable definition. This makes it easier to distinguish between less important warning messages about unused variables from include files and more important warnings about unused variables in the main program source file.

New **User Language Compiler** warnings for unused and/or redundant `#bnf` syntax definitions have been added.

Compiler Options

The option `-ld listingdirectoryname` for specifying a non-default output directory for listing files created with the `-l` has been added to the **User Language** compiler. This option is useful when applying `make` utilities for automatically compiling modified **User Language** programs as it allows to keep the source directories clean. With the BAE software, a `makefile` is provided in the `baeulc` directory. This `makefile` defines the dependencies between **User Language** programs and include files and works with listing files in a subdirectory (`lst`).

10.3 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_storecmdbuf	Store command to command history
	putenv	Set environment variable
CAP	cap_lastconseg	Get last modified SCM connection segment
SCM	scm_getdblpar	Get SCM double parameter
	scm_setpickconseg	Set SCM default connection pick element
	scm_setdblpar	Set SCM double parameter
GED	ged_getdblpar	Get GED double parameter
	ged_setdblpar	Set GED double parameter

Changed System Functions

The **bae_inpoint** and **bae_inpointmenu** have been modified to support a number of additional rubberband drawing modes.

Support for additional parameter queries/settings has been added to the **bae_getdblpar**, **bae_setdblpar**, **bae_getintpar**, **bae_setintpar**, **bae_getstrpar**, **bae_setstrpar**, **scm_getintpar**, **scm_setintpar**, **ged_getintpar**, **ged_setintpar**, **ged_getdblpar**, **ged_setdblpar**, **ged_getstrpar**, **ged_setstrpar**, **cam_getintpar**, **cam_setintpar**, **cam_getdblpar** und **cam_setdblpar** functions.

The **ddbsetelemcomment** function has been changed to set DDB element comments not only in DDB files but also in main memory if the processed DDB element is currently loaded in the **Bartels AutoEngineer**.

10.4 BAE User Language Programs

BAE installs some 220 pre-compiled **User Language** programs to the **`ulcprog.vdb`** file of the BAE programs directory. Additionally, the **User Language** *source* files (more than 8 Mbytes; some 280,000 lines) are installed to a special directory (**`baeulc`**). 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
SCM	PERRLIST	Packager Error List Display
	SCM_GRPL	SCM Group Load Action

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.