SES Software

New Features & Enhancements

Version 18.0 **2022**

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Introduction

SES Software Version 18.0 introduces significant enhancements to the SESCAD, Right-of-Way, RowCAD and CorrCAD interfaces and to the MALZ and HIFREQ computation modules. HIFREQ computation time is now substantially faster.

SESAmpacity was expanded and includes now SESAmpacityBM, a new application for calculating the temperature rise of bimetallic conductors. Also included are new beta versions of SESCAD and SESBatch, as well as an improved version of SESTrainSimulator.

This version is the first to use a software licensing system based exclusively on the more recent Sentinel protection keys, with a management system giving clients greater insight into and control over the use of their licenses.

Finally, all existing CorrCAD customers will be automatically upgraded to **CorrCAD Plus** at no charge, and the user interfaces of most applications now include a Portuguese language option. Multiple other new features and enhancements are summarized below.

New Applications

Version 18.0 of SES Software includes the following new applications:

Application	Description
SESAmpacityBM	A new tool named SESAmpacityBM can accurately compute the ampacity, temperature rise and other related values for Copperweld conductors, which are inadequately addressed by the present IEEE Standard 80 methodology implemented in the existing SESAmpacity tool. SESAmpacityBM provides a graph of temperature as a function of time throughout the conductor cross section.
SESTrainSimulator	SESTrainSimulator, which had been included as a beta version in the 17.1 SESTrainSimulator release of SES Software, has been enhanced with multi-route calculation support. The tool's algorithms were also improved, thereby increasing the overall reliability of the application.

New BETA Applications

Application	Description
SESCAD (beta)	This eventual successor to the current version of SESCAD features a 3D engine enabling components of complex systems to be displayed in greater detail, as well as an updated interface that, while significantly modernized, will remain familiar to users of the current version.
SESBatch (beta)	With the same core functionalities that enable multiple computation modules to run consecutively or simultaneously, this eventual successor to the current SESBatch program features a revamped user interface based on the WPF framework, as well as a Computation Issues panel where computation errors, if any, will be reported.

Enhancements

1. Main Software Packages (Programs)

Package	What's New
CorrCAD	• The energization method for MALZ has been modified to be compatible with that of HIFREQ (independent energization for each source). • Multi-region soil models are now supported for models that use MALZ as the Computation Module type. • The conductor segmentation process in the core computation engines (MALZ and HIFREQ) can now be controlled via an Advanced Options screen. • It is now possible to specify whether to include or exclude computation results when archiving individual scenarios. • An Upper Limit and a Lower Limit can now be specified in the Design Objective pane of the Plot Options panel. • Options for customizing plots, such as specifying axis captions and line color and width, can now be specified in a new Plot Display Options screen, accessed via the Rendering button in the Plot Options panel. • A button was added to the Options ribbon to load and unload the Scenario 3D Viewer. • It is now possible to import polylines from a scenario file (e.g., ScenarioName.CorrCAD). • 'Soil Marker' and 'Soil 3D Boundaries' are now available in the Display option's context menu in MALZ mode. • More plot quantities have been added to the Plot Data list. • Computations now take into account the cables that define an Entity. • It is now possible to display or hide the outlines of Entity models in the Scenario 3D Viewer. • A column displaying the Distance between two points has been added to the Polyline Coordinates Editor screen, enablng the user to better understand how to subdivide a segment. • The performance of the Polyline Coordinates Editor table has been greatly improved with respect to copying and pasting large amounts of data. • It is now possible to open or access the Cross-Section definition window from the Cross-Section submenu in the Context Menu. • A new tool, the Polyline Simplification Tool, has been implemented to help combining unnecessarily short conductor segments, which reduces computation times. • It is now possible to import soil data from other modules in multi-region soil mode. • Project management is facilitated with the addition of a Create Project from Scenario button in the backstage view. • Grid tables now allow multi-cell operations, such as removing multiple rows simultaneously. • Electric Fields are now available as a Data Type that can be selected in the Plot Options panel. • Now, the default option is showing a 3D view of the system configuration result in the Spot-3D Viewer.

Package	What's New
Right-of-Way	• The maximum number of conductors allowed in Right-of-Way was increased to 500. • Introduced the Multi-Region soil of MALZ to account for soil variations along the right-of-way in the Total Interference module. • Add an option to compute and plot the line-to-line voltage between two phases under fault and steady-state conditions.
SESShield-2D	• Undo/Redo actions are now available for the Transmission Line module. • An option to export the displayed risk calculated results to XLS or CSV has been added. • A warning is shown when input values change after a computation. • Tasks have been added to guide the user to input valid data for computation. • Keraunic Relationship can be specified by either the location or the coefficient and exponent. • To help the user retrieve invalid input, it is now possible to click on an Issues List entry and be redirected to the corresponding panel. Additionally, a visual indicator with a tooltip was added in the treeview for components that have invalid input. • The interface now limits the number of equipment checkpoints that can be entered by the user to three inside and three outside the station shielding system for compatibility with the underlying computation engine. SES has plans to remove this restriction from both the interface and computation engine. • In Version 17, the "Substation" module was available via a hidden link to the Legacy version. In this version the "Substation" module is an integral part of SESShield-2D and no longer requires access to the legacy version. However, an option is available to use the hidden link to the Legacy mode, if desired.

2. Computation Modules

Computation Modules	What's New
HIFREQ	• An option to perform part of the solution of the constraint matrix on multiple computer cores was introduced, improving the speed of the program by up to 20% in some cases. • The calculation of the current distribution in the network is now faster by a factor of two or more for cases with a large number of conductor segments. • The calculation of the current distribution in HIFREQ is substantially faster for large cases (with more than about 3000 segments); improvements by a factor of 15, compared to Version 17.1 of the program, can be achieved for cases of 7000 segments.
TRALIN	• Calculation of generalized symmetrical components in TRALIN - Circuit Mode was added.

3. Applications

Application	What's New
RowCAD	• The mouse right-click button can now be used to open the context menu and directly access the polyline's cross-section. • The new Polyline Simplification Tool has been implemented to help combining unnecessary conductor short segments in order to reduce computation times. • In the Create Circuit drop-down menu, the Include Transformer checkbox should be checked by default if transformers are defined. • A print status option is now available in the Advanced Options. • The application can now import polylines from .rowcad files. • It is now possible to define the Monitor Fault parameters and apply the computations directly in RowCAD. All the parameters and computations, except GPD (Ground-Potential-Difference) and Create SPLITS File Only, can be entered and used in the same manner as in the Monitor Fault screen in ROW. • A separate checkbox option gives the user the choice of copying TRASPL information or not when using the Save Scenario As functionality. • It is now possible to archive individual scenarios with or without including the TRASPL and Workspace folders.
SESAmpacity	• The Material Constants used in SESAmpacity were updated according to the 2013 edition of IEEE standard 80, table 1.
SESAmpacityBM	• New ampacity calculation tool for bi-metallic conductors.
SESCAD	• Transmission line structures can now be imported from the Structure Database of SESLibrary.
SESCPCalculator	• A Quick Access Toolbar was added, which includes Undo/Redo, Save/Save As, Open and Customize Quick Access Toolbar functions. • The workflow of the application has been greatly improved and provides the user with visual cues of the computation result status. • Two additional systems of units, Metric (radii in centimeters) & Imperial (radii in inches), were made available for selection in the application. • The data validation method has been greatly improved and provides a more accurate validation and better user experience. • The application now supports a 'Number of significant digits' option, made available in the Options ribbon tab.

Application	What's New
SESCircuitSimulator	• The context menu of the data grids now includes a Duplicate option, and there is a Duplicate button at the bottom of each data grid. • A context menu for data grids with Add, Remove, Copy Row, and Paste Row commands is now available. • Warnings are now displayed in the Issues List when a section overrides another. • The Span Scaling Options and the Advanced Options windows have been improved.
SESConverter	• Layer colors are now automatically imported to the Color Radius Mapping window. This eliminates the need to manually input the existing layer colors when a relevant 'def' file does not exist. • Colors specified in the True Color system are now interpreted as the nearest matching entry in the AutoCAD Color Index (ACI) system. This prevents out-of-range color number errors. • Instead of the font color number for the export and color mapping window, we now use color swatches in the data grid. This improves the color display. • When the input file unit is millimeter or inch, a warning is produced to prevent neglecting conductor sections unintentionally. • Support for converting ‘HATCH’ from the CAD file to SES Objects has been added. • The default size of the UI has been modified, and the ability to retain the previous size and location has been added. • By changing the language of SESConverter, the language of CADEditorX also changes. This uses the new feature of CADEditorX version 14.1.5.6942, which provides multiple language options. • Disabled layers can now be viewed, converted, and selected (check on/off). • A text file (*.LDEF) is created to preserve the layer-mapping parameters (layer name, radius and color) for Import and Export. • Values can now be added to the Color-Radius mapping window without the need to load a file. • It is now possible to launch SESCAD directly from SESConverter. This facilitates quicker inspection of the resulting F05 files. • A new unit selection drop-down list has been added for the user to select the unit. By default, the unit is detected from the CAD file, but the user can now change it in case a different unit is desired. • A contextual menu has been added with items 'Cut Row', 'Copy Row', 'Paste Row', 'Insert Row' and 'Delete Row' for the Color radius mapping Grid.

Application	What's New
SESCurvefitDigitizer	• Supports Undo/Redo functions. • 'Number of significant digits' is now fully functional throughout the application.
SESFFT	• Calculation of Worst-Spherical and Human-Worst step voltages in FFTSES.
SESFcdist	• Several data validations were added to detect invalid files and to prevent their creation.
SESImpedance	• It is now possible to select multiple materials in the Edit Material window. It is also possible to copy and paste them as well. • Users can specify the number of segments for shapes other than circles and ellipses. For more accuracy, several segments can be specified for rectangles, triangles, and polygons. The program will use this number to subdivide each side of the shape to obtain a more efficient mesh of the system and more accurate results. • 64-bit support is available now. • It is now possible to export computed equivalent conductor characteristics into SESLibrary. • The issue that would occur when launching a computation with an F09 file set to read-only has been fixed. The application will now ask whether the user wants to overwrite the file or not. • The Copy and Duplicate functions have been improved and provide better performance and shorter run time. • Improves the handling of small numbers in numerical comparisons in SESImpedance, preventing failures due to meshing problems under INTEL 18 - 64 bit.
SESLibrary	• A Resistivity database has been added to contain typical electrical resistivities for various materials. • A Native Potential database has been added to contain the potential series of various materials. • An Electric Strength database has been added to contain various typical electric strengths for materials such as insulating materials. • Added a 'User-Defined' category for each database, which allows the categorization of user-defined database items and differentiates them from SES-predefined items better. • Structures can be imported to SESCAD. • The search screen has been redesigned intuitively.
SESLicenseManager	• Allow multiple Sentinel network-based software protection keys to be installed on the same server.

Application	What's New
SESPlotViewer	• Every graphical item in the Plot panel can be edited through a mouse right-click menu. • The Copy to Clipboard button now expands to offer the choice of a transparent-capable graph, enabling its superposition on an image or on another graph. • The axes' Maximum, Minimum and Intervals fields now display 'Auto' when left unspecified. • A Save Image As method was implemented that offers a variety of different formats (.PNG, .GIF, .JPG, .TIF, .BMP, .WMF, .EMF, .SVG, .PDF), some of which support transparency (such as .PNG). • Data series tabs can be reordered, pinned, grouped and stacked side-by-side. Navigation arrows and a dropdown menu can reveal any series tab that may be hidden. • A two-part color swatch located within the Series tabs shows the line and marker colors associated with a given data series. Both halves of the color swatch can be clicked on to invoke the color selector dialog. • Series from a SESPlot file (PL_*.f05), Excel file (.xls, .xlsx, xlsm) or Comma-separated values file (.csv) can now be appended (imported) to the current plot. • An option to export data series to an Excel spreadsheet has been added. • The selection of marker types has been extended to include fill, no-fill, and bold versions of a standard variety of shapes. Arrow markers were also introduced to help emphasize certain features of a graph, such as limits, outliers, position of peak values, etc.
SESResap	• Sorting the data by clicking on a column header was rendered compatible with usual column selection. • The Show Legend control is now displayed not only in the ribbon but also directly above the plot. • Spreadsheet data following the SES format (e.g., see the Datasheet button under the Help ribbon) can now be imported as new traverses.

Application	What's New
SESResultsViewer	• It is now possible to specify Longitude and Latitude for Google Earth plot in Degrees, Minutes, and Seconds. • Improved navigation for SPLITS-generated 3D plots. • It's now possible to copy/paste text from a Report. • Opening of large F21 files takes less time now. • New 'Metal-to-Soil Potential' option has been introduced to Configuration and Computation (Conductor Data) plots for MALT, MALZ and HIFREQ. • Zone's coordinates can be used as a search area polygon in both SESResultsViewer and SESZoom. • In Contour plots, conductors are displayed in grey, to avoid possible confusion with the contour curves. • In Touch-Voltage and Step-Voltage plots using custom Safety Zones, the Safety Status of zones that do not enclose any observation points is displayed as 'No Points'. • The maximum number of points allowed for defining a zoom polygon was increased to 500 in SESResultsViewer (SICLW) for MALT, MALZ, and HIFREQ. • The phase of the leakage current density (per unit area or per unit length) can be incorrectly reported for metallic plates in HIFREQ. • The data report generated on plotting in SPLITS now contains all values including the negative ones. • In SESZoom, a new option is introduced to create an automatic polygon boundary based on a user-defined conductor group. • 64-bit support is available now.
SESSystemViewer	• New options were added to control the light sources in the drawing in SESsystemViewer.
SESTLC	• The calculation of capacitive effects for jagged transmission lines has been introduced. • Usage of Voltage energizations in the presence of a jagged transmission line for Steady-State Interference is now allowed.
SESTextEditor	• Next/Previous Error/Warning menu items and shortcut keys facilitate navigation between standardized warning and error messages in F09 files. • On loading a F09 file, all standardized warning, error and other informative messages are automatically given a colored highlight and wavy underline, for best visibility. They are also conveniently listed in the application’s Issues List.
SESThreshold	• UI rendering is optimized for laptops and low-resolution monitors. • Units of Surface Layer Thickness can now be customized. • Loading of large F21 files is much faster now.

Application	What's New
SESTrainSimulator	• SESTrainSimulator runs now in 64-bit on a 64-bit Windows Operating System. • A railway HIFREQ model can now be created from the track system cross-section (defined using SESCrossSection) and the route path contained in a .kml or .kmz file. • Train positioning algorithm reliability has been improved. • SESTrainSimulator now supports multi-route calculations. • New examples were added: Direct power supply with return line and Booster transformer traction system.
SESTralin	• The Advanced Options window has been added to the Home tab. • Create From Database and Create From Template buttons, under the Cross-Section tab, can easily import components from SESLibrary or create components from templates. • A copy of an existing component can be created by using the newly implemented Duplicate button located in the ribbon.

Application	What's New
SESTransient	• The calculation of step voltages is now carried out directly in the time-domain, allowing the determination of the largest possible step voltage at any computation point using criteria (Human-Worst or Worst-Spherical) like those used at power frequency in SESResultsViewer. • SESTransient runs in 64-bit on a 64 Windows OS, removing various limitations, for instance, in the results display. • At each computation cycle, SESTransient will try to spread the computation frequencies evenly among all available processor cores. • It is now possible to update the results for new Computation Quantities, or adapt the selection range of previously requested ones, without launching a new computation cycle, by using the 'Update Results' button. • HIFREQ run files can be generated from a button located in the Ribbon Home tab. The files are created based on the current input signal specifications. • Selecting Computation related quantities (i.e., quantities associated with observation points) is now only possible in SESTransient if the HIFREQ template contains observation points, avoiding the possibility of computation errors. • SESTransient can now automatically account for the presence of the lightning channel when computing the transient response of a network struck by lightning. The electromagnetic fields radiated by the lightning channel can have important effects on nearby structures, especially for structures that are not directly hit by the stroke; this new feature makes it easy to account for such effects. • Computation of energy and RMS current flowing through a body or a conductor segment is now limited by default to 95% of the input signal energy, as per the IEC 60479-2 standard. However, this value can also be specified by the user.
SoilModelEditor	• The SoilModelEditor now allows for the deletion of multiple selections of soil volumes. • The Multi-Region soil model is now enabled for MALZ computations. • The import or export of MALZ multi-region soil is now supported. • Two more soil configurations, CorrCAD MALZ and CorrCAD HIFREQ, are added to support CorrCAD multi-region soil.

Documentation

1. Introduction

Version 18.0 includes a new online help document for both SESTrainSimulator and SESAmpacityBM, and multiple online help documents that have been translated to Portuguese. There have also been updates to several manuals.

2. Interfaces

For most applications, including all whose interfaces are based on the WPF framework, there is now support for the Portuguese language. This is in addition to previously supported languages: English, French, Spanish, and Chinese.

3. Quick Start Guides

Quick Start Guides cover a broad range of topics at a level suitable for all users. The following Quick Start Guide has been updated in: English, French, Spanish, and Chinese:

Quick Start Guide (Updated) - English, French, Spanish, and Chinese
• CorrCAD (Onshore)

4. Mini How-to Manuals

Mini How-to Manuals provide detailed information about the individual steps required to complete specific tasks. The Spanish version of the following Mini How-to Manual has been updated:

Mini How-to Manual (Updated) - Spanish
• SESTransient - Transient Ground Potential Rise of a Metallic Pole

5. How-to Manuals

Our How-to Manuals include instructions for completing a variety of studies from start to finish. The following How-to Manual was updated in English, French, Spanish, and Chinese:

How-to Manual (Updated) - English, French, Spanish, and Chinese
• Large Suburban Substation Grounding System Analysis: Measurements & Computer Modeling

6. Online Help

The context-sensitive online help documents for many applications were updated, and there are new online help documents for SESTrainSimulator as well as for the new application, SESAmpacityBM:

Online Help (New) - English, French, Spanish, and Chinese
• SESTrainSimulator • SESAmpacityBM • SESCAD (beta)

Multiple online help documents are now available in Portuguese:

Online Help (New) - Portuguese
• SESCDEGS • SESCAD (beta) • SESResap • SESTralin • SESResultsViewer • SESSystemViewer