



Curtiss-Wright Nuclear Division

Announces New Version Release

PEPSE

Version 82

December 1, 2017

Curtiss-Wright is excited to announce the release of the new version of Scientech's PEPSE on December 1, 2017. The Version 82 release includes many new features and enhancements as requested by our clients and end users. These improvements are designed to enhance PEPSE's user productivity while increasing its thermal analysis capabilities. PEPSE's annual releases sustain its leading role as the most powerful predictive simulation and design analysis tool on the market.

The demand for optimization technology has advanced significantly over the past few years, driven by competitive generation, the environment, and the need to connect critical thermal performance data with end users who contribute to the thermal efficiency of the power plant. PEPSE with its annual upgrades is pushing the envelope and leading the industry with state-of-the-art, optimization technology through accurate modeling, analysis, and simulation software to improve the heat rate of generation assets. Accurate models producing a few tenths of one percent heat rate improvement can make a difference of hundreds of thousands of dollars in fuel reduction costs or in increased generation sales annually for a single unit. Additionally, there is a one-to-one relationship in the reduction of hazardous emissions as with the reduction of fuel costs.

Specifically, PEPSE's best achievable and "What-If" analysis allows performance engineers to establish key performance indicators (KPIs) when measured and controlled that produce the lowest cost of production for dispatch operations, e.g., capacity marketing. PEPSE also allows the evaluation of equipment and process changes required for justification of capital expenditures, e.g., coal to gas fuel conversion, capital-intensive equipment overhaul, or replacement and outage management. With the release of Version 82, PEPSE continues to be the industry bench mark for optimizing power plants' thermal efficiency and process cycle analysis. This has been proven by the selection of PEPSE by many utilities as their gold standard in its ability to realize improved heat rate and generation goals.

We have listened to our clients and have incorporated lessons learned from our technical support and services into our annual PEPSE upgrades. The markets are changing and Curtiss-Wright is listening and changing our software accordingly.

PEPSE's Version 82 provides engineers with the ability to readily and accurately analyze and optimize a system's efficiency, and the plant operation derives a number of direct and important benefits. PEPSE is your key to accurately analyzing plant performance and identifying ways to increase generation and reduce heat rate. PEPSE helps to eliminate causes of inefficiency allowing a plant to produce every possible kilowatt and conserve every possible BTU thus providing for reductions in plant emissions and carbon footprint. This also lowers operating costs through higher efficiency, fewer repairs, less down time, and lower fuel costs.

The PEPSE program enhancements have been improved to enrich its ease of use, e.g., speed, reporting capabilities, enhance displays/graphics, improve data reduction, help functionality, error corrections, and "user friendly" operation. These enhanced features complement its business value for a complete performance improvement program.

PEPSE V82 Enhancement Summary

PEPSE upgrades are implemented to enhance user productivity and introduce the latest calculation standards as provided by the power production industry. Outlined below is a summary of several of the major features of Version 82.

PEPSE Program Enhancements

- The speed of formulas in operations has increased significantly. Models with many formulas may have as much as an 85% reduction in run time.
- A "model data" window provides access to all data in a model. This allows easy access for editing, adding, deleting, and copying data.
- A variable name search function on the variable name window ("Help", "Variables Names..." on the menu) will list all locations in PEPSE where the variable name is defined.
- An engineering units conversion calculator is available on the right-click context menu for variables on the forms for components, streams, etc.
- A calculator for average specific volume is available on the input forms for pressure drop on heat exchangers, valves, and Type 7 streams.
- The enable/disable function has been added to right-click context menu (for adding and editing special features) for variables on the forms for components, streams, etc.
- A "Transfer Data to Excel (Transpose)" option has been added to the Special Output and Output Variable results windows. With this option, the data in Excel can be copied and pasted to a PEPSE schedule without the need to reformat that data first.

- The number of decimal places for display of pressure on the schematic for SI and metric units can now be set by the user.
- Additional ports are available at the top of the HRSG supercomponent for the splitter and mixer stages.
- A shape with one exhaust end is available for the LP turbine supercomponent.
- Inputs for the valves-wide-open N2 leakage flow rate and enthalpy have been added to the IP turbine supercomponent.
- Individual “additional locations” on a schedule variable set can be disabled. When additional locations are defined, the primary variable set can be disabled without disabling the additional locations. Also, an indication that additional locations are defined will be shown on the input form and on the data selection lists for schedule variable sets.

PEPSE Error Corrections

- The HRSG temperature profile plot was not drawn correctly when there was one or more mixer stages in the HRSG.
- The HRSG temperature profile was not drawn correctly when SI or metric units were selected and the HRSG had one or more split stages. In the associated table of HRSG output, the heat duty shown a split stage was also incorrect.
- The use of the HEI 7th Edition calculation mode on the condenser component required selection of 7th Edition from a list and deselection of another input. This has been modified by adding both the 7th Edition and the 8th Edition to the selection list.
- The “HEI Condenser Results” table was not written to the output file when the HEI 9th Edition (Addendum 1), 10th Edition, or 11th Edition calculation modes were selected.
- PEPSE would sometimes stop working during the loading of the results after a run finished. The program would either crash or just stop with an hourglass cursor displayed, requiring a restart of the program.
- PEPSE would crash when an external file was defined for output and one of the PEPSE special output variables had an incorrect component ID specified.
- PEPSE would sometimes crash when the HRSG effectiveness and efficiency calculation was active. This usually happened in the early iterates when the calculated flue gas temperature was very low.
- The formula processor would sometimes disable formulas in models that took a long time to converge.
- The trace function on the condenser supercomponent used the supercomponent ID instead of the condenser component ID.
- Many input forms had hints for dual-purpose variables (for example, (>0 psia, <0 inHg)). Dual purpose variables generally only apply for English engineering units input. The

hints incorrectly indicated that the dual-purpose variables also applied to SI or metric units input.

- The GT Load Corrections input (gas turbine engine, Type 77) incorrectly used the variable GTPOWL for the trace and other functions on the context menu.
- Under certain conditions, the text on the HRSG supercomponent input form did not display correctly.
- The explanation for using an air heater in the flue gas description was incorrect on the PTC 4.1 boiler efficiency input forms.
- The indicator for variables that are used in special features (blue highlight on a value on the input form) did not work for several variables (form loss on the radiant stage, shell length-to diameter ratio on the general heat exchanger, tube wall thermal conductivity on the steam generator, and, on the emissions input forms, several inputs for emission removal efficiency.)
- The input form for tube plugging in design mode was missing for heat exchangers in the HRSG supercomponent.
- The steam generator shroud outside diameter input variable (DDOSSG) incorrectly showed inches for the engineering units when SI or metric units were selected for input.
- On the LP turbine supercomponent input forms, the right-click insert menu (for schedules, controls, etc.) did not work for the tuning factors.
- When PEPSE was used on a computer with multiple monitors, the drop-down lists for some inputs would be displayed on the wrong monitor.
- In rare instances, the selection for using the 1997 steam tables for calculations was not available on the run option form.
- Checkboxes for “stream is connected to <some port>” on input forms were ignored because PEPSE gets that information from the stream connections on the schematic. The checkboxes were removed from the forms.
- Changes to data in grids on two of the cooling tower input forms would not be saved if the OK button was clicked unless a tab for a different form was clicked first.
- Tooltips showing results for the exhaust of HP, IP, and LP supercomponent turbines were in the wrong location.

PEPSE Version 82 will run on Windows 7 and newer operating systems, and Windows Server 2008 and newer operating systems, including 32-bit or 64-bit versions.

To upgrade to PEPSE Version 82 or to receive more information, contact Bob Holzworth. We look forward to working with you and continuing to provide the most powerful off-line thermal performance modeling tool available. Upgrading to Version 82 will provide enhanced functionality of the leading performance analysis and simulation tool, PEPSE, and demonstrate a valued return on your investment.

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