



August 16, 2005

Dear Customer,

We We are pleased to enclose a major upgrade to our software suite, Version 15, with the following highlights:

(1) Limited alternate language options are provided for GT PRO, GT MASTER, PEACE, STEAM PRO, and STEAM MASTER to make the programs more friendly and understandable to users whose first language is not English. When selected from the Options\Set Preferences... menu, these translate the descriptor of each input parameter of the program from English to the selected language. Please understand that the guidance screens, the on-screen HELP, the printed manuals, and all of the output displays remain available only in English. Despite these limitations, we expect this addition will help users who are not fully fluent in English. This effort is ongoing, and its current status is summarized below.

| Language options: Status as of TFLOW 15 Release 1 |         |         |         |        |        |          |
|---|---------|---------|---------|--------|--------|----------|
|   | Chinese | Spanish | Italian | German | French | Japanese |
| GT PRO  | Yes     | Yes     | Yes     | Yes    | NA     | NA       |
| GT MASTER   | Yes     | Yes     | NA      | Yes    | NA     | NA       |
| PEACE   | Yes     | Yes     | Yes     | Yes    | NA     | NA       |
| STEAM PRO   | Yes     | Yes     | NA      | NA     | NA     | NA       |
| STEAM MASTER                                      | Yes     | Yes     | NA      | NA     | NA     | NA       |

(2) A cooling system optimization process has been implemented in GT MASTER and STEAM MASTER. The program determines the number of operating cooling water pumps and, if present, the number of operating full speed and half speed cells of a multi-cell cooling tower that should be running for best plant performance, or sets numbers of operating full and half speed fans of air-cooled condensers.

(3) An improved feedwater heater system design wizard has been implemented in STEAM PRO which will automatically adjust steam turbine bleed pressures and feedwater heater exit temperatures, allowing the casual user to alter steam turbine conditions with confidence that the feedwater heating system will follow appropriately. Disengage this wizard for full user-defined control.

(4) Several boiler design and simulation improvements have been added in ST PRO and ST MASTER.

(5) A "reference exchange rate" appears in the PEACE Regional Costs display for regions outside the U.S. This clarifies the basis of the suggested Regional Cost Multipliers, updated to mid-2005 conditions. You may wish to adjust the cost multipliers when the exchange rate you set in Preferences... deviates from this reference.

(6) New components added to THERMOFLEX: a Reducing Station, a Jet Ejector, and an Integral Pump. These major developments, along with numerous minor improvements, are summarised below.

**Please Note:** A major change has been made in the software setup procedure. This will ultimately make key refreshment simpler, and ensure better customer support. INSTALLATION of files from the CD will no longer use a floppy disk for the Site ID file, but the setup now requires REGISTRATION, by which an enabling file, like the earlier Site ID file, will be obtained directly from Thermoflow's website. If the computer you will use is isolated from the internet, and thus cannot contact our website directly, an alternative path is provided. The REGISTRATION procedure produces a file to be sent to our website, which promptly returns a file to be copied to your program folder, enabling the programs on your computer. As before, the enclosed CD will auto-start the INSTALLATION by default in a C:\TFLOW15 folder, deliberately placed so as to not over-write your existing installation. The hardware key need not be in place for the INSTALLATION of files, but it must be in place for the REGISTRATION process.

#### Gas Turbine Data Base Update

The GT data base used by the various Thermoflow products has been updated, as follows:

| <b>Newly Added Models</b> |                           |     |                                  |
|---------------------------|---------------------------|-----|----------------------------------|
| 296                       | Solar Taurus 70-10301S    | 300 | GE LMS100PA 60 Hz, Wet Cooled IC |
| 297                       | Solar Taurus 65-8400      | 301 | GE LMS100PA 60 Hz, Dry Cooled IC |
| 298                       | Siemens SGT-400 (Cyclone) | 302 | GE LMS100PA 50 Hz, Wet Cooled IC |
| 299                       | Solar Taurus 60-7900      | 303 | GE LMS100PA 50 Hz, Dry Cooled IC |

Renamed Models: All Siemens engines are now named according to Siemens' "Uniform Nomenclature for Siemens Power Generation Products". Our engine ID #290, for example, previously known as the Westinghouse 501F, was identified in Version 14 as 'Siemens W501F' and is now listed as "Siemens SGT6-5000F".

Connection to GE APPS: APPS is a new option on the GT Selection List in GT PRO, GT MASTER and RE-MASTER, and will be active for all users of APPS 3.3.0 (and greater) and TFLOW15 and greater.

#### Developments by Program

In the following, the §X.XX indicates the segment of the corresponding HELP file where you can read more of the details of these developments. While these developments have not been inserted in the printed versions of your manuals, the on-screen HELP has been updated to reflect them, making the HELP file the

most current manual for your use. You can summon the HELP file from within any of the programs by pressing the <F1> key while the program is active on your computer. Each HELP file now has a section, at the bottom of the Contents screen, labeled Updates for New Version, with direct links to sections describing new features. We suggest you insert the enclosed addendum pages in each manual as a reminder that newer developments are in place in the HELP files.

### **Developments in GT PRO / GT MASTER / PEACE**

Your GT PRO (or GT PRO and PEACE) inputs can now be made in four languages other than English, as we have added language selection options for Chinese, Spanish, Italian, and German GTP§1.7.3.4. GT MASTER inputs can be made in Chinese, Spanish, and German.

GT PRO, GT MASTER, and PEACE no longer require the use of the period as the decimal separator – Regional settings can be set as you please.

The System Summary, Gas Turbine, and Steam Cycle text output have all been updated and are more readily copied to other applications, particularly Excel GTP§1.9.1

Users with access to the General Electric APPS program for performance estimation of their aeroderivative gas turbine engines can now use that program's performance predictions directly in GT PRO and GT MASTER, GTP§5.1.5 and GTP§5.6

Inlet air pressure drop can be specified in GT PRO for evaporative coolers and foggers, GTP§6.2.3 and GTP§6.2.4, and simulated in GT MASTER, GTM§4.3.3 and GTM§4.3.4

Gas turbine compressor air recirculation, with control over inlet temperature or inlet temperature rise can now be specified GTP §6.2.5 and GTM§4.3.5

GT exhaust composition can now be explicitly specified by the user when using the User-defined gas turbine selection GTP §6.1.2

User-defined gas turbine specifications can now be made to include compressor air bleed flow GTP§6.3

You can now specify the cooling tower inlet air state, which may be different from the ambient condition when moist cooling tower discharge air recirculates GTP §11.1.2.2

Arbitrary additional cooling load can now be specified for cooling towers GTP §11.3.4

Entropy has been added to the properties displayed in the Stream Table.

For IGCC systems, the number of gasifiers, number of air separation units, and number of gas cleanup trains, can now be independently set GTP §15.1.4

Syngas export from IGCC systems is now accommodated GTP §15.4.1.5

For desalination systems, the user can specify chemical consumptions and costs GTP §16.1.1.2

Controls have been added to GT MASTER to optimize the operation of the cooling system. For water cooled condensers, sections GTM §10.1.1.6 to GTM§10.1.1.9 describe controls now available which will select the optimum number of operating circulating water pumps and cooling towers, and, when

available, the number of cooling tower fans to be operated at half speed. Similarly, sections GTM §10.1.2 and GTM§10.1.2.1 describe controls now available for air-cooled condenser optimization.

### **Developments in STEAM PRO / STEAM MASTER / PEACE**

Your inputs to STEAM PRO and STEAM MASTER (or STEAM PRO, STEAM MASTER and PEACE) can now be made in two languages other than English, as we have added language selection options for Chinese and Spanish, STP§1.3.6

We have improved the design procedure for the feedwater heating system. It now includes a more user-friendly Automatic mode, and is more robust than before to user-selected changes in the number of heaters, STP§4, STP §9.1 and STP §9.2.1

STEAM PRO, STEAM MASTER, and PEACE no longer require the use of the period as the decimal separator – Regional settings can be set as you please.

The Cycle Schematic diagram now shows all stream parameters, P, T, m, and h, in a single view.

You can now more easily specify a blend of fuels as you design the boiler STP §5.1.2 and as you simulate the boiler STM§7.2.1

Air supplied to the cooling tower can now be specified distinctly from the ambient air, allowing inclusion of the effects of moist air recirculation STP §6.1.2

You can now include the effect of non-condensable gases in the condenser STP §6.3.1.3

There are now more options available for specifying steam turbine exhaust loss, including an assumed constant loss and an option to eliminate the default correction for moisture STP §7.4.2

More options are now available for boiler configuration STP §11.1.3 and STP §11.3

Boiler convective path configuration is now more flexible and can include more convective heat exchangers STP §12.1.2, STP §12.2.5, and STP §12.2.7 Control over the distribution of gas flow through parallel heat exchangers has been improved in STEAM MASTER STM§7.3.1

There is now more control over desuperheating spray: independent sourcing of superheater and reheater desuperheating streams and distribution among desuperheating stations, STP§12.10 and STM§7.8

An alternative boiler air control method has been added to STEAM MASTER – you can now let a desired value of oxygen (O<sub>2</sub>) at the economiser exit govern the air flow STM§1.3.1.4

Controls have been added to STEAM MASTER to optimize the operation of the cooling system. For water cooled condensers, sections STM §9.1.1.3 through STM §9.1.1.5 describe controls now available which will select the optimum number of operating circulating water pumps and cooling towers, and, when available, the number of cooling tower fans to be operated at half speed. Similarly, section STM §9.1.2.1 describes controls now available for air-cooled condenser optimization.

### **Developments in THERMOFLEX / PEACE**

A new Reducing Station component has been added, combining the effects of a desuperheater with a pressure reducing valve §9.19

A new Integral Pump (PCE) component has been added to represent integral feedwater pumps with a high pressure (HP) discharge and an intermediate pressure (IP) take-off, or an HP discharge and IP and LP take-offs §10.4

A new Jet Ejector component has been added to represent steam jet air ejectors and similar gas-driven units §10.5

A provision has been added to the Steam Turbine component to let the user impose a user-defined variation of steam turbine efficiency at off-design §11.4.2.7 & §11.4.2.8

The PEACE Economiser, which already accommodated water recirculation at off-design, can now have recirculation imposed at the design point (TD and ED modes) §15.2.1.3

The PEACE HRSG Assembly can now accommodate PEACE heat exchangers as part of the Assembly that are beyond the constant duct cross-section path of the Assembly. Total weight and cost will be summed, but the appended heat exchanger, primarily intended for superheaters in a transition duct and economisers in the stack won't contribute to HRSG length §15.2.2.1

A new OVERALL table of PEACE output for the HRSG Assembly includes HRSG efficiency and other overall characterizations §15.8.3.3

PEACE cooling components can now be characterized with two-speed fans for Air-Cooled Condensers §17.3.3 and for Cooling Towers §18.2.3, §18.2.4, §18.3.3.1, §18.4.3.1

A correction capability has been added to account for noncondensables in the PEACE Water-Cooled Condenser §17.2.2.3

Heat Adders are now capable of exchanging heat with other Heat Adders §20.7

The Valve component has a more graphical, more intuitive input control §9.10

Any general variable can now be placed as a label on the graphic display, automatically updated with each completed computation §2.6.1.9

An improved display is now available for Generators and Motors §5.5

New Sample Files, S6-11 and S6-12, added to the Samples folder, illustrate use of the new Jet Ejector component and are described in the Appendix.