



March 11, 2011

Dear Customer,

We are pleased to release Version 21 of the Thermoflow suite, with the following highlights:

- (1) New THERMOFLEX user interface for improved productivity and aesthetics.
- (2) Reorganised STEAM PRO input sequence, with automated logic comparable to GT PRO in logical initialisation of input parameters based on high-level user choices.
- (3) Revised steam turbine efficiency estimates, in all programs, to better align with current practice.
- (4) Revised PEACE defaults for cost estimates, currency conversion factors, and regional cost modifiers; generally resulting in higher costs relative to TFLOW20.

These developments along with other improvements are described in more detail below.

#### **VERY IMPORTANT NOTE**

*Don't uninstall Version 20 when you install Version 21!* Different versions of the Thermoflow Suite can harmoniously coexist on one computer, with the single exception that only the most recently installed version of E-LINK is functional.

The new THERMOFLEX interface and the changes to STEAM PRO have a learning curve for long standing users accustomed to previous versions. So, if you have something to finish urgently, especially with THERMOFLEX, you may prefer using the familiar Version 20, and postpone using the new and much improved version until you have time to master the new features.

THERMOFLEX Help Chapter 2 and Appendix B is required reading for users wanting to transition to the new version. In addition, we will hold several webinars in coming weeks to help users transition from previous versions of THERMOFLEX to the new one. Please watch for emails on when to tune in.

#### **THERMOFLEX NEW INTERFACE**

The graphical user interface (GUI) was reinvented, for the first time since THERMOFLEX was made available in 1995. The main improvements are:

- (a) Vast improvement in input and output aesthetics.
- (b) Vast improvement to drawings created automatically from GT PRO or STEAM PRO files.

(c) Icons reorganised more logically in the selector; and alternate icon visages (“looks”) were added to make it easier to draw attractive flowsheets.

(d) Icon-to-icon connections easier to establish, and automatically persist when icons are repositioned. Icon sizes are now user-adjustable to allow emphasis on significant elements of a model. The Cut, Copy, Paste, and Move features for graphical elements are implemented in a more standard Windows manner; and the user can draw simple geometric shapes on the flowsheet. Component input menus remain largely unchanged, but all outputs were reorganised so they’re easier to find.

(e) In closed loops, fluid types are established automatically during the Edit Drawing stage to reduce ambiguity and fluid type mismatches during Check Drawing.

(f) The main menu bar was simplified and reorganised. A new navigator strip clearly indicates current program stage, and makes it easy to move from stage-to-stage. The Component Mode dropdown box was replaced with a true current mode display and companion menu used to change modes.

(h) A new stream table graphic element is available to display stream data on the flowsheet; and overall model results are centrally located and easier to navigate.

Please beware that flowsheets loaded from previous versions are translated to the new system with good, but not perfect, fidelity. Icon images, connection line paths, and icon locations are preserved, but display of text labels and state data may overlap other graphic items in some cases, requiring some user adjustments to improve aesthetics.

#### **OTHER THERMOFLEX/PEACE CHANGES**

A bubbling fluidized bed furnace component was added. This icon, representing one part of a complete bubbling fluid bed boiler, is available in the Icon Selector’s Boilers/HRSGs group.

A PEACE Fan component was added. This is functionally equivalent to the Fan component, but also provides size, weight, and cost estimates; as well as a more elaborate off-design model.

NIST REFPROP Version 9 is now used to provide property evaluation for all NIST-modeled fluids. Siloxane was added to the Refrigerant selection list.

The online help was reorganized to reflect program changes. It is now published in a format that is inherently compatible with Windows 7, and backwards compatible with Vista and XP.

#### **ST PRO / STEAM MASTER / PEACE**

The STEAM PRO user interface was reorganized to support improvements in the automated plant design logic, intended to improve STEAM PRO’s capabilities for scoping studies on plant configurations across the spectrum; from smaller biomass-fueled systems to large advanced coal-fired plants. The steam cycle design process is affected most. There is now *dynamic* coupling between executive level inputs (such as plant power and steam turbine configuration), and proposed steam conditions, feedwater heater count, configuration, and port pressure selection. In previous versions, this coupling was mostly static, and established solely based on choices made at the programs onset.

#### **GT PRO / GT MASTER / PEACE**

GT TEMPLATE was extended for modeling engines with overspray fogging and compressor water injection, to facilitate modeling Rolls-Royce TRENT engines equipped with their “ISI” technology. Improvements in messages issued to alert user to cases running outside data range were added.

Automatic selections of tubing parameters for once-through HRSGs with nominal exhaust flows below 475 lb/s (215 kg/s) were modified to make them consistent with typical practice for this size range.

The online help is now published in a format inherently compatible with Windows 7 as well as Vista and XP.

### Gas Turbine Data Base

The gas turbine data base, used by various Thermoflow products was updated, as shown below.

Engines added to the database			
406	Westinghouse W 251 AA (old spec)†	414	RR TRENT 60 WLE ISI (50 Hz)
407	Westinghouse W 501 AA (old spec)†	415	RR TRENT 60 WLE ISI (60 Hz)
		416	RR TRENT 60 WLE (60 Hz)
408	RR TRENT 60 WLE	417	RR TRENT 60 DLE (50 Hz)
409	Solar Taurus 60-7901S	418	RR TRENT 60 DLE (60 Hz)
410	Solar Taurus 65-8401S	419	RR RB211 G RT62
411	Solar Taurus 70-10301S	420	RR RB211 GT RT61
412	Solar Titan 130-20500S	421	RR RB211 GT RT62
413	Solar Titan 250-30000S		
		422	Mitsubishi 501 GAC
		423	NPO SATURN GTE-110

† These models were previously released in web revisions since the January 2010 TFLOW20 release.

### STEAM TURBINE MODELING

In all programs, the automatic steam turbine group efficiency and exhaust loss estimating procedures were revised to better align results with modern practice. The updated procedures typically result in steam turbine output 0.5-1.5% higher than with older versions, depending on specifics.

A new method to account for effects of moisture on exhaust loss was added to GT PRO and STEAM PRO. This method, similar to that used by Siemens, had been part of THERMOFLEX for a number of years.

A nuclear turbine configuration with reheat before IPT (promoted by ALSTOM as the ‘Arabelle’ turbine) was added as an alternative to traditional reheat before LPT. Moisture separators are now automatically included and initialized for nuclear cycle turbines. Previously, moisture separation was available as an entirely user-defined feature.

Methods to estimate turbine mechanical loss and generator loss were revised.

Automatic leakage estimate for back pressure steam turbines was revised, possibly leading to slight increases in estimated ST output.

A specific choice to use a high speed HPT coupled via a gearbox to the synchronous IP/LP turbine was introduced. Previously, this was accomplished by the user via manual changes to mechanical losses and HPT expansion efficiency.

#### **GENERAL**

Currency conversion factors and regional cost multipliers were updated based on currency data from the beginning of 2011. PEACE costs were revised, upwards in most cases, leading to increases in estimated plant costs in all programs. Gas turbine prices were increased by approximately 10% over data listed in 2010 GTW Performance Handbook. Significant increases were made to IGCC plants to bring those cost estimates in line with current experience and expectations.

STEAM PRO help is incomplete at this time. It will be available in a revision within one month of this initial release.