Welcome!

Webinar #2: SCRIPTS in Thermoflow Programs

- Introduction: Why Scripts?
- Scripts in GT PRO, GT MASTER and THERMOFLEX
- Script Definition
- Managing Script Variables
- Examples

* Q & A Session

Presenter: IGNACIO MARTIN (SPAIN)
Support: Meritt Elmasri (U.S. HQ)

Thermoflow Training and Support

- Standard Training
- On-site Training course
- Advanced Workshop
- Webinars when new version is released
- Help, Tutorials, PPT, Videos, …
- Technical Support

→ **Feature Awareness Webinars**

Feature Awareness Webinars

1- Assemblies in THERMOFLEX

2- Scripts in Thermoflow Programs

3

INTRODUCTION: Why Scripts?

- Philosophy of Thermoflow software

- How to interact with Thermoflow programs
  - ELINK
  - ULINK
  - User Defined Components in TFX
  - Adjustment methods, Correction factors,…
  - **Scripts**

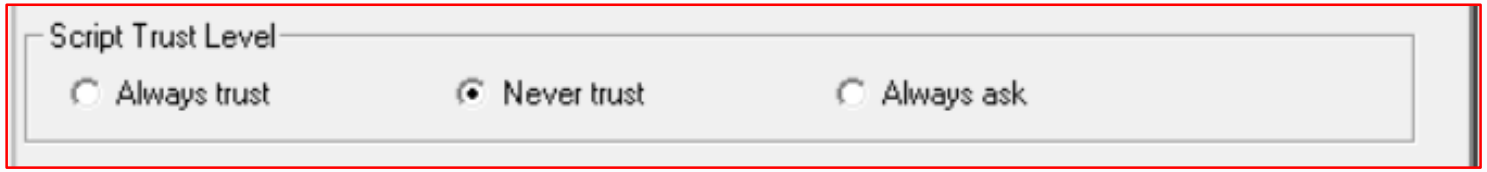
SCRIPTS in:

- THERMOFLEX, Version 23, since 2013
- GT MASTER, Version 24, since 2014
- GT PRO, Version 26, since 2016

SCRIPTS:

Scripting functionality allows users to create and compute custom outputs or to set certain inputs using code written in the scripting language Lua

Special Note: Scripts can be dangerous. They can link to and run code and other programs that are not immediately visible from the script editing Do not run a script that you think may contain malicious or harmful code.



Basic Lua Documentation

THERMOFLEX uses the scripting language Lua, version 5.1.4.

Documentation in → http://www.lua.org/

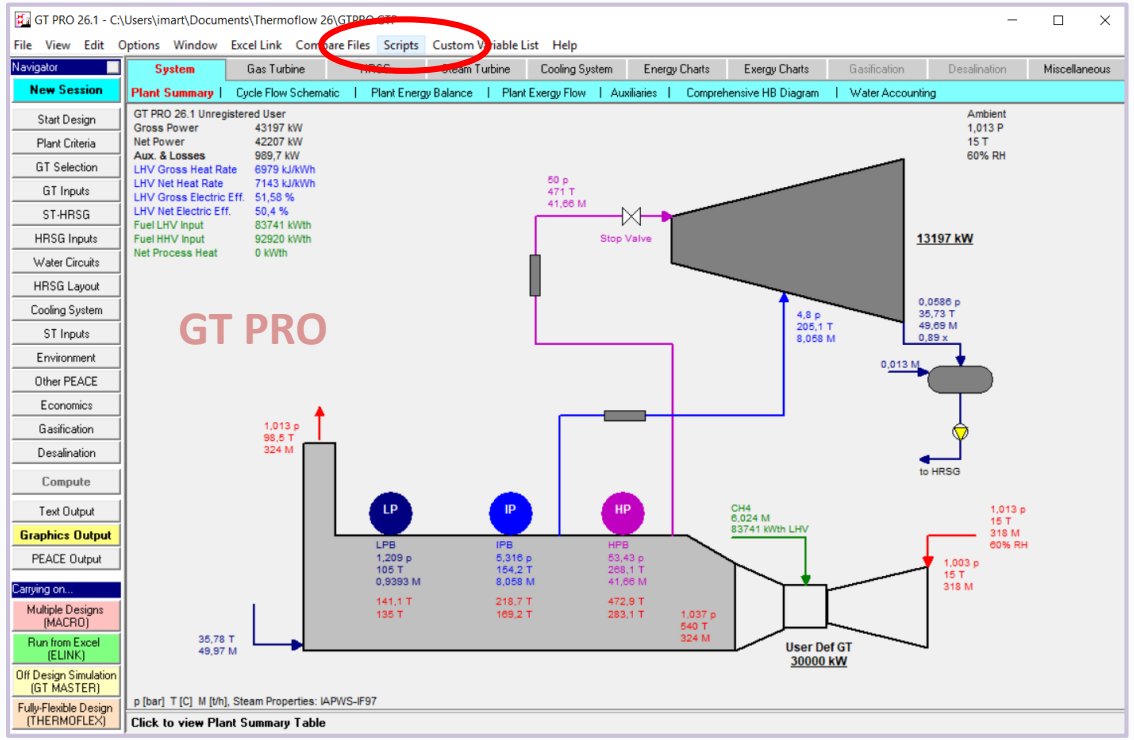
Compiled Windows binaries, libraries, and a code editor
→ https://github.com/rjpcomputing/luaforwindows

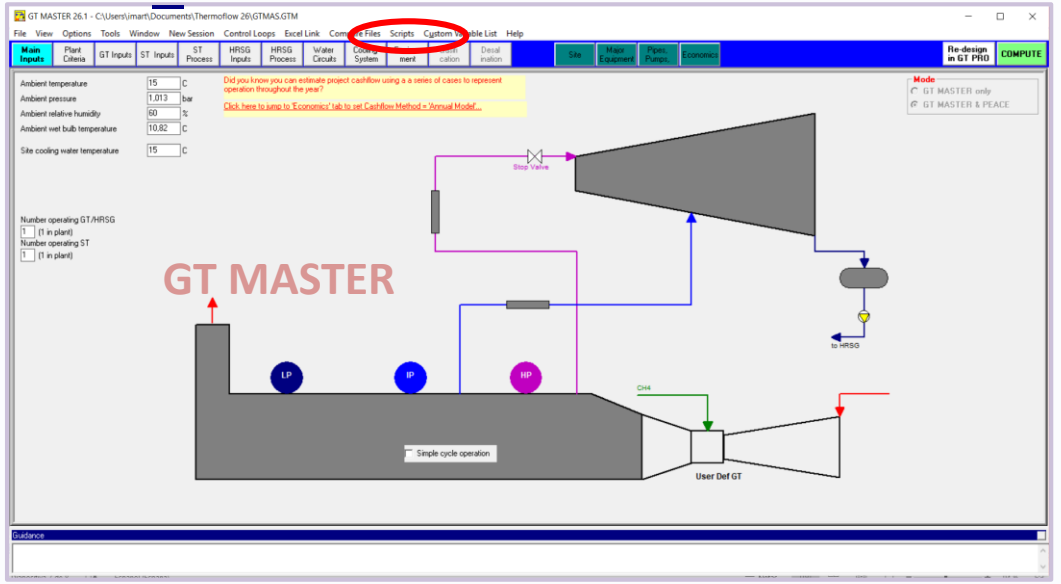
Lua and Lua for Windows available under the terms of the MIT license
→ http://opensource.org/licenses/mit-license.php.

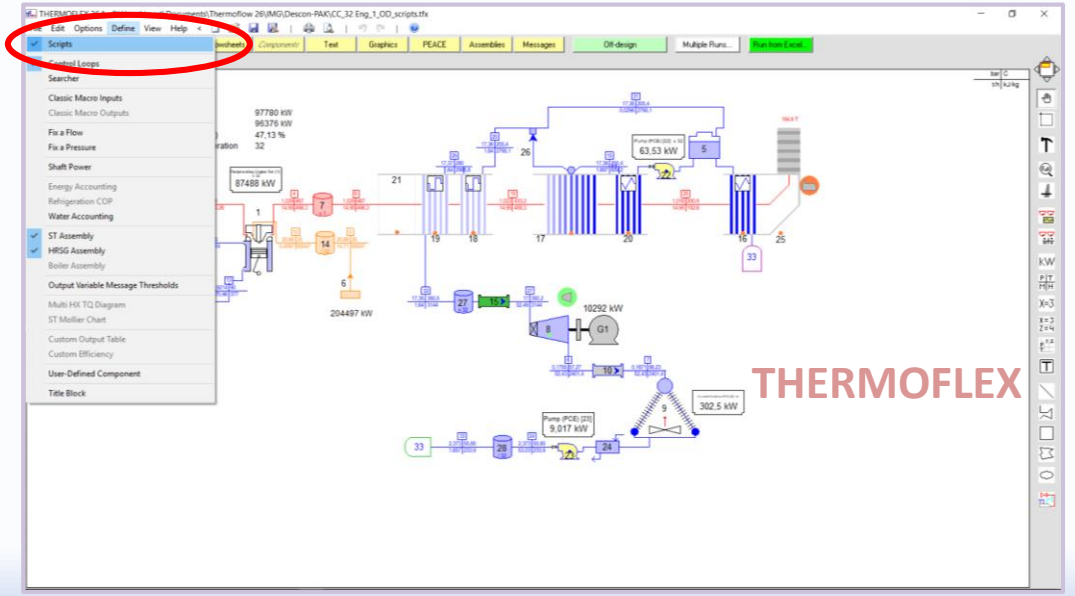
Full online documentation for version 5.1:
→ http://www.lua.org/manual/5.1/manual.html

website: www.Thermoflow.ir
Telegram: @Thermoflow_users

SCRIPT Activation:

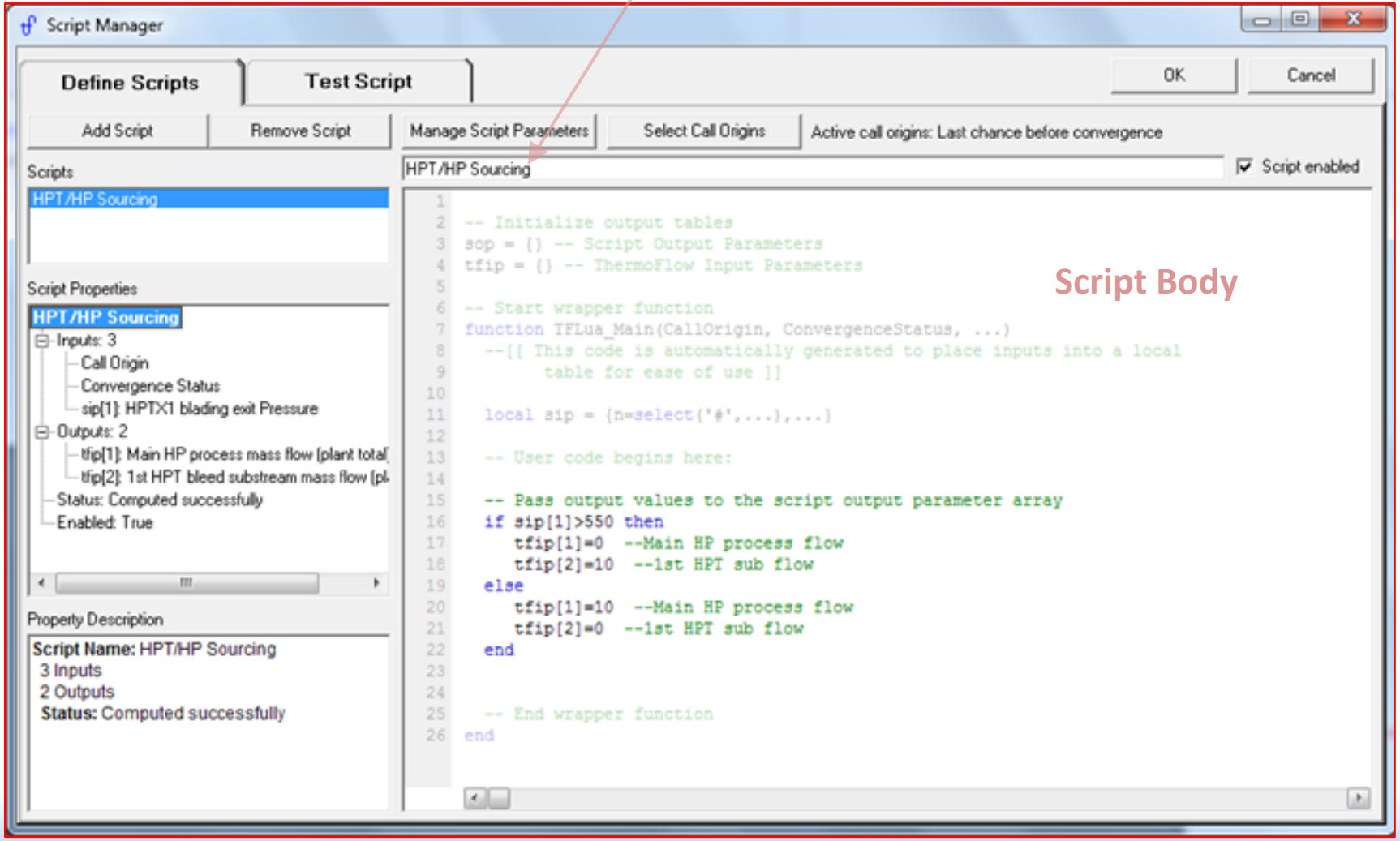






SCRIPT Definition:

Script Name



Script Body

SCRIPT Parameters:

Custom Script Inputs: name, description and Units (TFIP)

Script Inputs from program (GTP-GTM-TFX) : input parameters to be determined by the Script (TFIP)

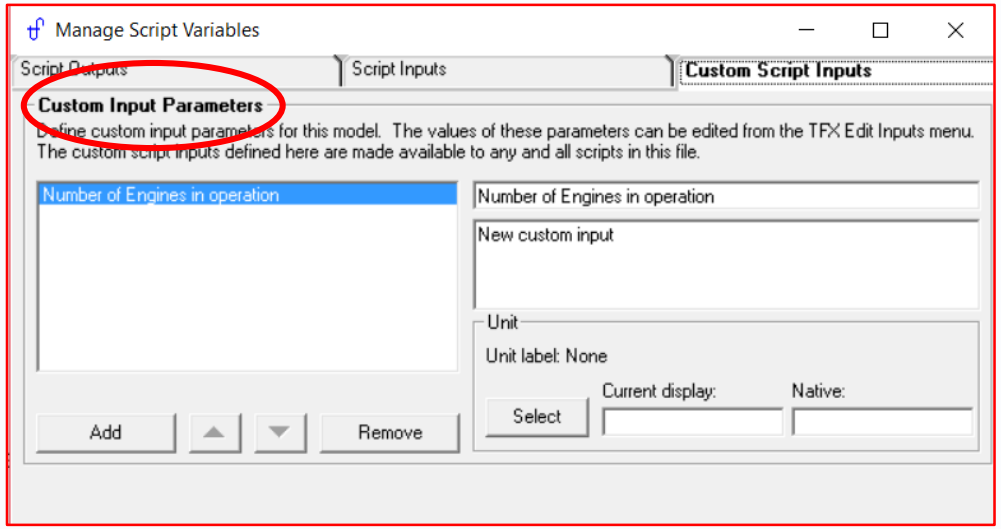
Script Outputs: custom output parameters to be computed by the Script (SOP)

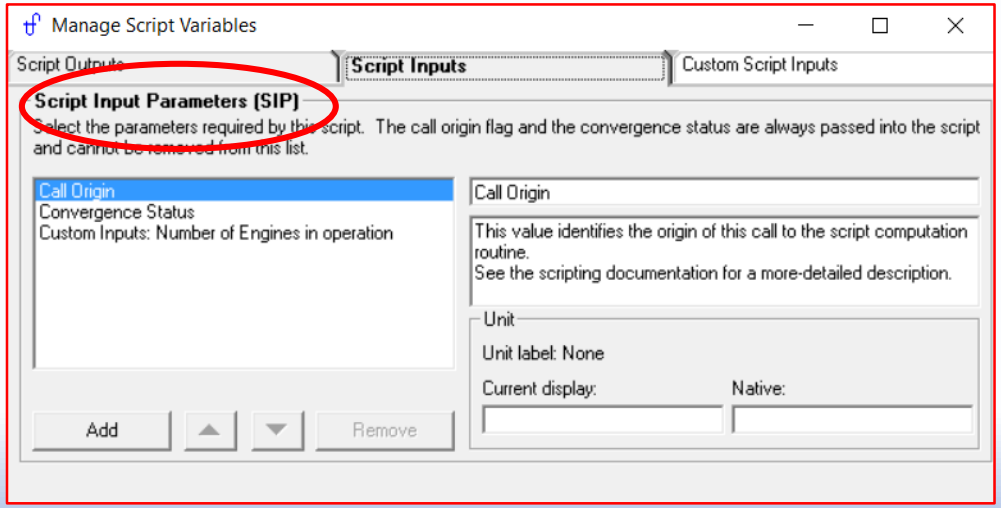
Script Inputs: inputs and outputs from the program required by the Script (SIP)
(Custom Script Inputs must be added here)

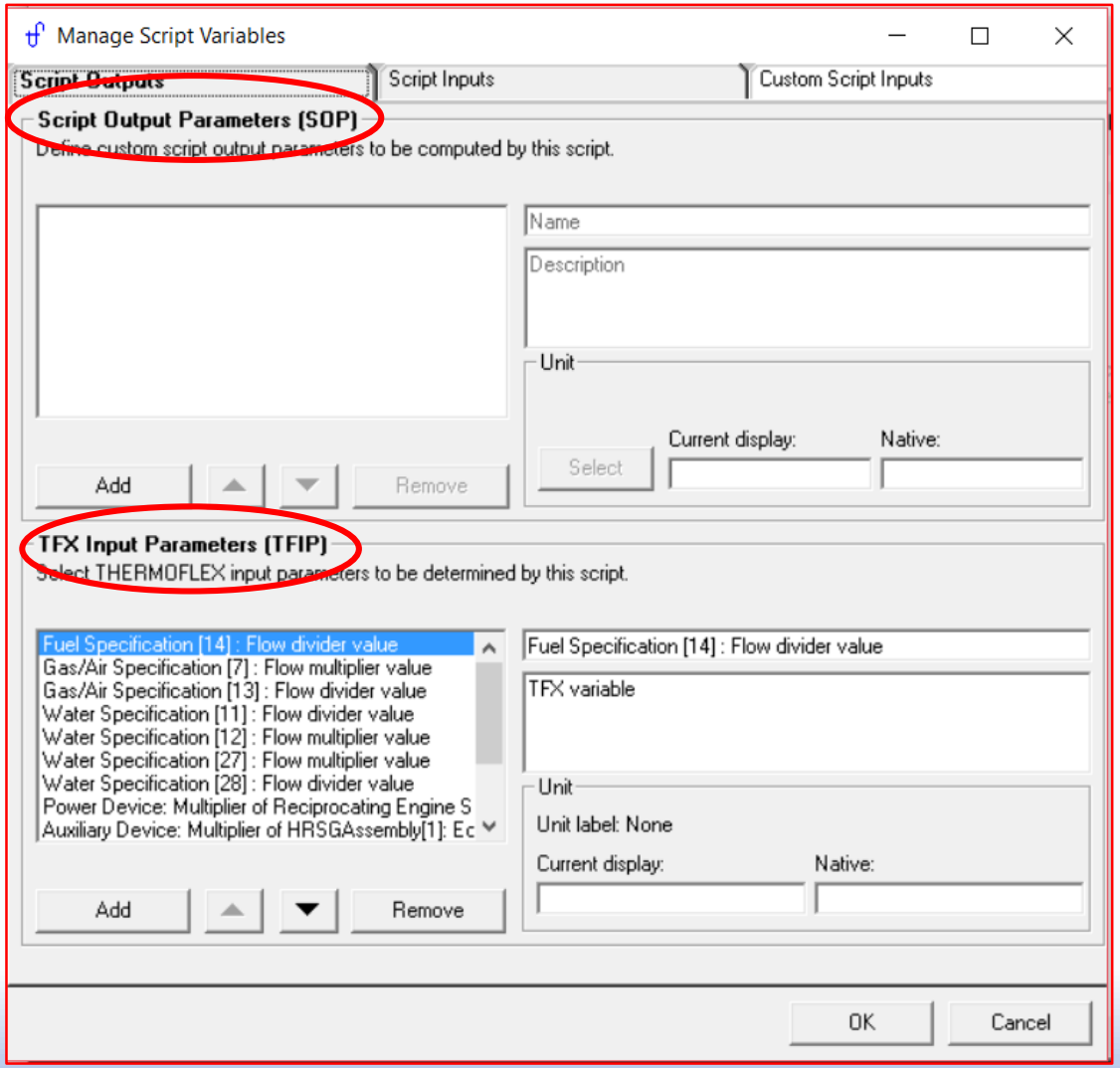
→ Caution: notice the difference on Units: "Current display" and "Native"

Unit conversion within the script is left to the user

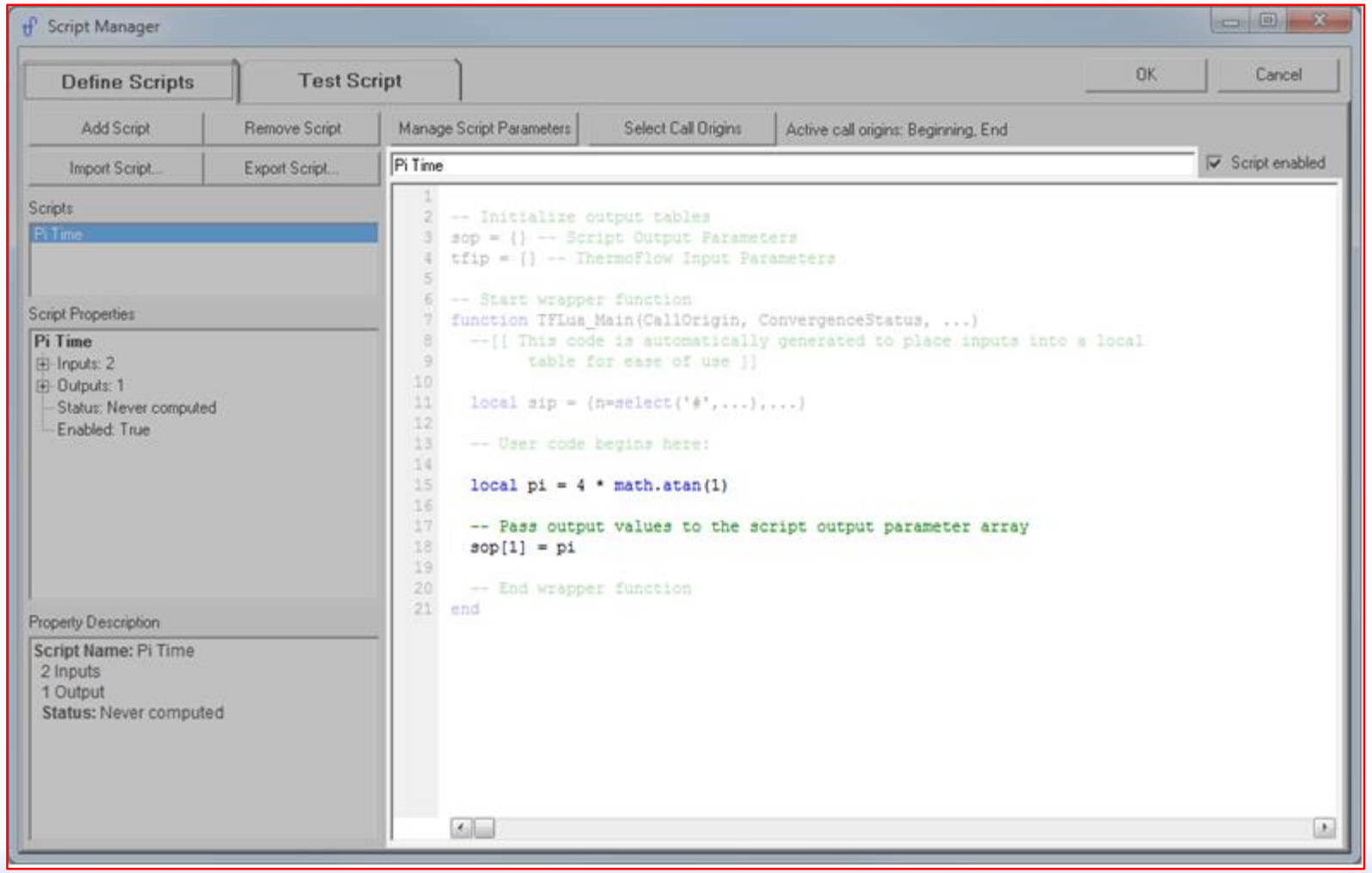
SCRIPT Parameters:



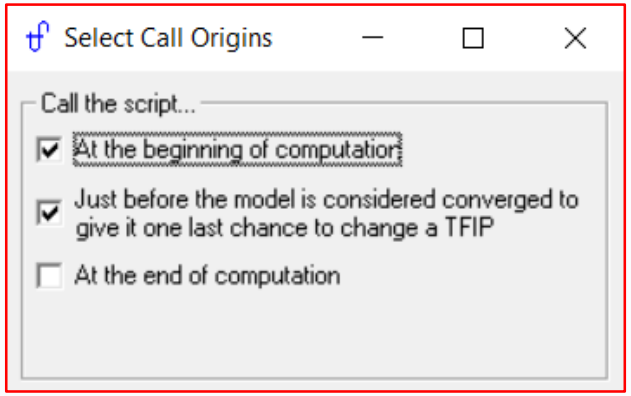




SCRIPT “Code”:


Script Manager
Define Scripts
Test Script
OK
Cancel
Add Script
Remove Script
Manage Script Parameters
Select Call Origins
Active call origins: Beginning, End
Import Script...
Export Script...
Pi Time
Script enabled
Scripts
Pi Time
Script Properties
Pi Time
Inputs: 2
Outputs: 1
Status: Never computed
Enabled: True
Property Description
Script Name: Pi Time
2 Inputs
1 Output
Status: Never computed
-- Initialize output tables
sop = {} -- Script Output Parameters
tfip = {} -- ThermoFlow Input Parameters
-- Start wrapper function
function TFLua_Main(CallOrigin, ConvergenceStatus, ...)
--[[This code is automatically generated to place inputs into a local
table for ease of use]]
local sip = {n=select('#',...),...}
-- User code begins here:
local pi = 4 * math.atan(1)
-- Pass output values to the script output parameter array
sop[1] = pi
-- End wrapper function
end

SCRIPT “Call Origin”



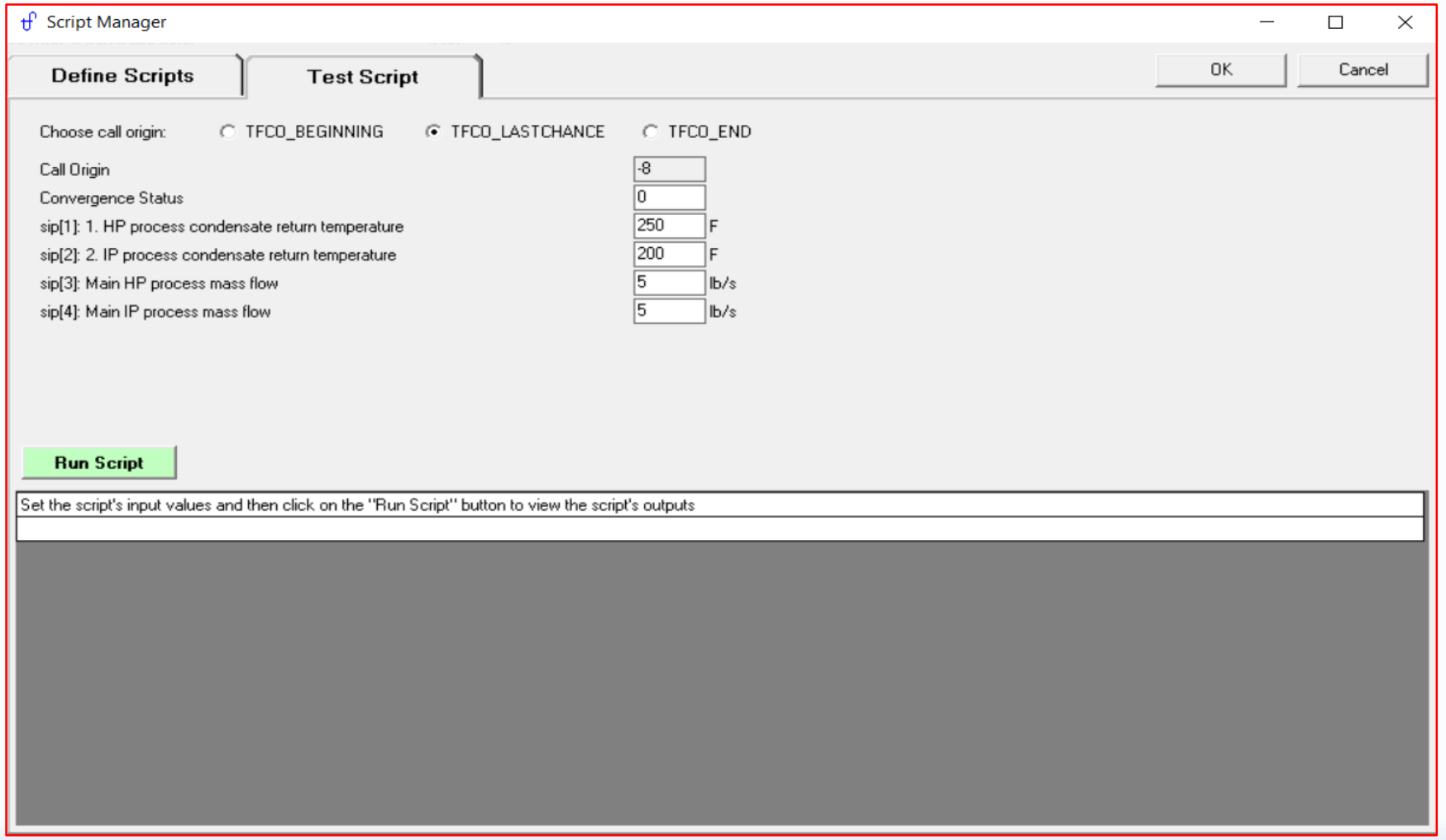
1. **At the beginning of computation** before anything else has been computed
Allows a script to set THERMOFLEX input parameters before beginning the computation.

2. **During the main computation loop**
Allows a script to set inputs during the computation instead of waiting for convergence. This can give a result faster, but is also more likely to make the model unstable.

3. **Just before the model is deemed converged** to give the script one last chance to change THERMOFLEX input parameters (TFIPs)
Allows a script to set inputs that change the flow or pressure relational matrices

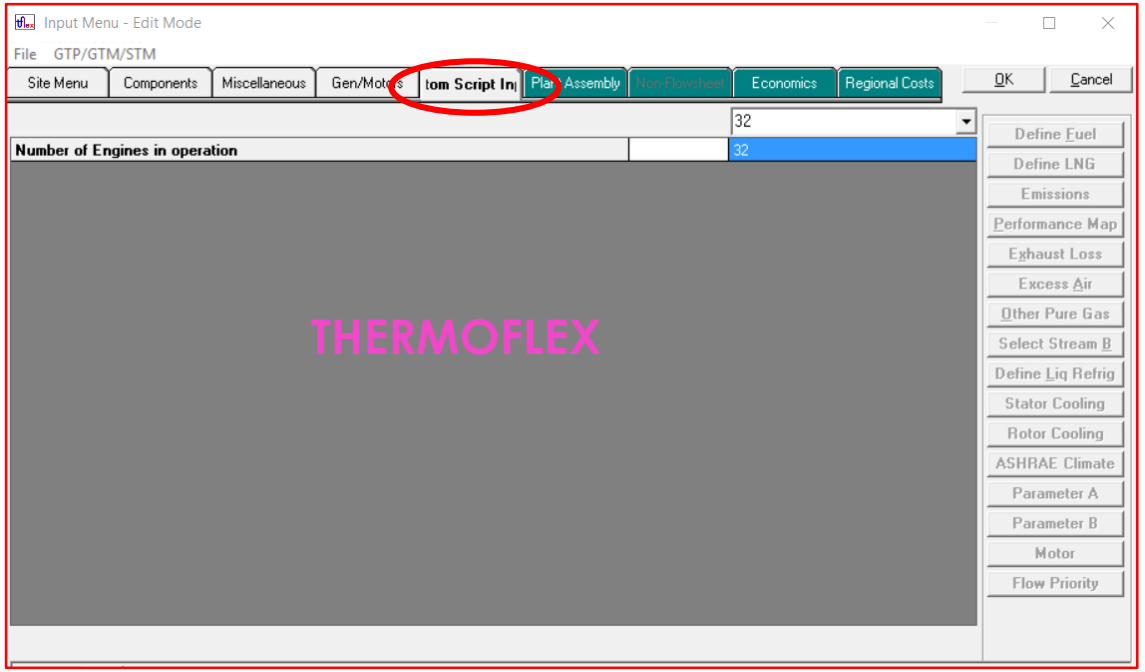
4. **At the end of computation** after all other outputs have been computed
Allows a script to compute custom outputs using the final results of the computation.
THERMOFLEX input parameters are not set at this time. Computation is over, so setting TFIPs to new values at this point would have no effect on the results.

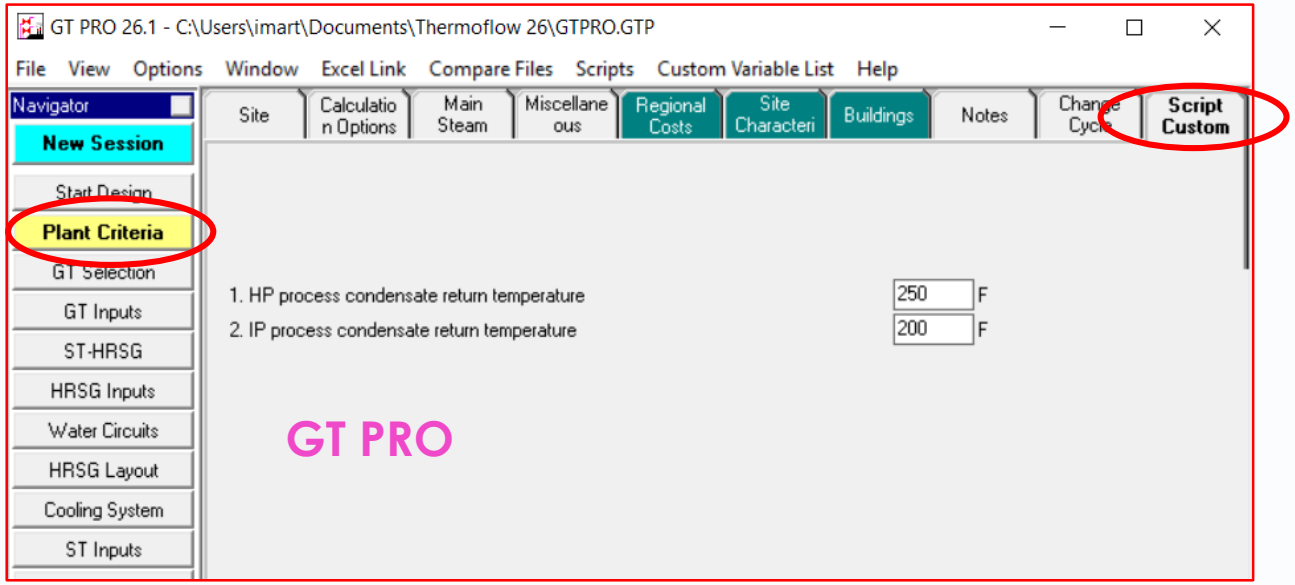
Test SCRIPTS

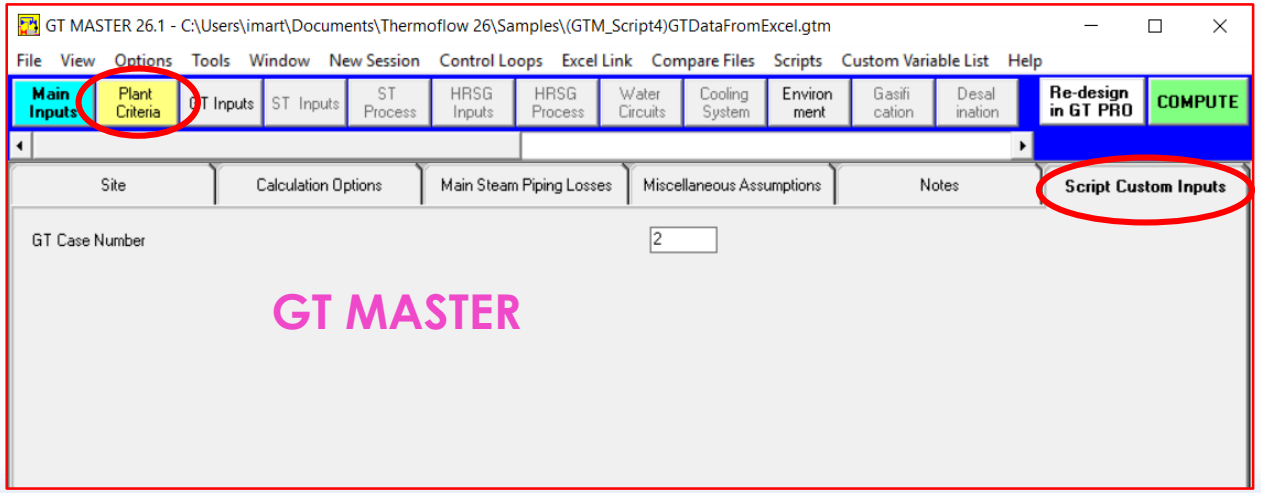


website: www.Thermoflow.ir
Telegram: @Thermoflow_users

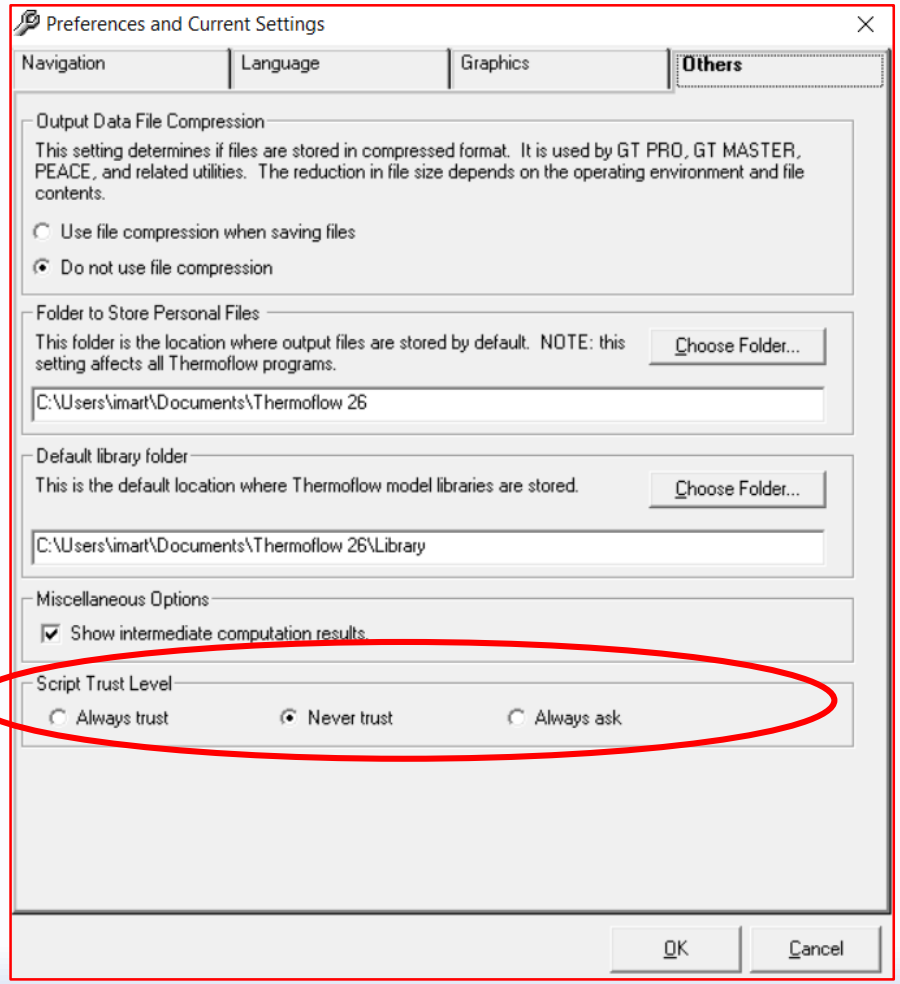
Edit SCRIPT Inputs



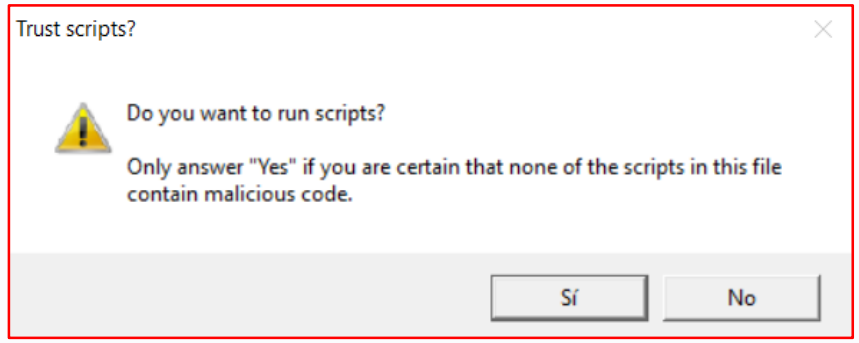


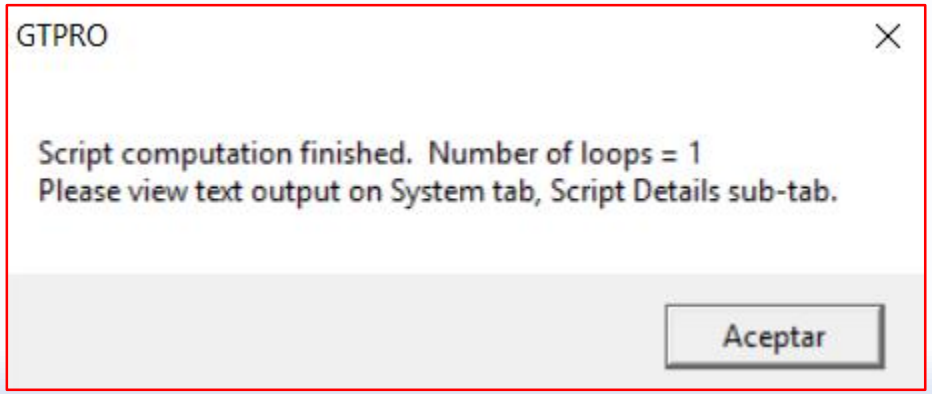


Run SCRIPT


Preferences and Current Settings
Navigation
Language
Graphics
Others
Output Data File Compression
This setting determines if files are stored in compressed format. It is used by GT PRO, GT MASTER, PEACE, and related utilities. The reduction in file size depends on the operating environment and file contents.
Use file compression when saving files
Do not use file compression
Folder to Store Personal Files
This folder is the location where output files are stored by default. NOTE: this setting affects all Thermoflow programs.
Choose Folder...
C:\Users\imart\Documents\Thermoflow 26
Default library folder
This is the default location where Thermoflow model libraries are stored.
Choose Folder...
C:\Users\imart\Documents\Thermoflow 26\Library
Miscellaneous Options
Show intermediate computation results.
Script Trust Level
Always trust
Never trust
Always ask
OK
Cancel

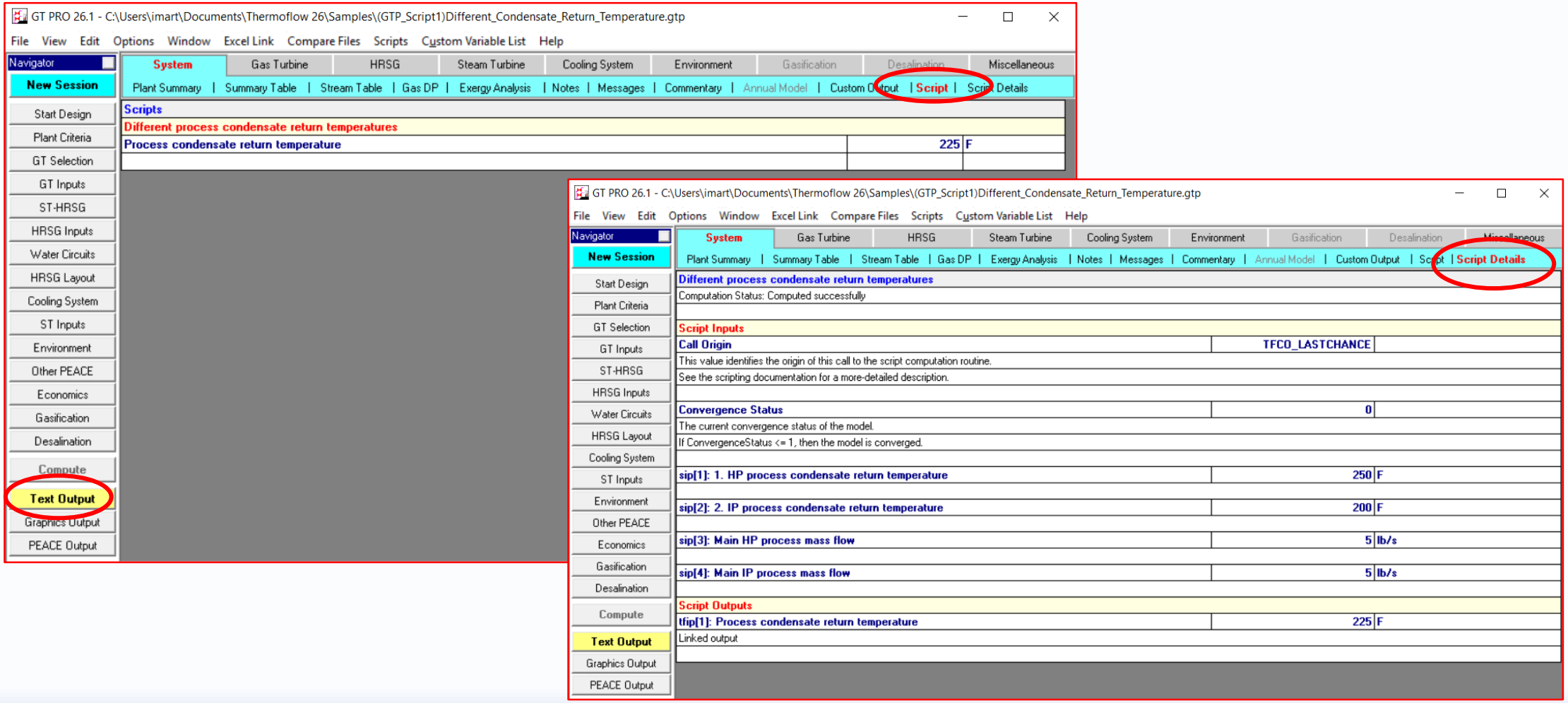

Compute


Trust scripts?
Do you want to run scripts?
Only answer "Yes" if you are certain that none of the scripts in this file contain malicious code.
Sí
No


GTPRO
Script computation finished. Number of loops = 1
Please view text output on System tab, Script Details sub-tab.
Aceptar

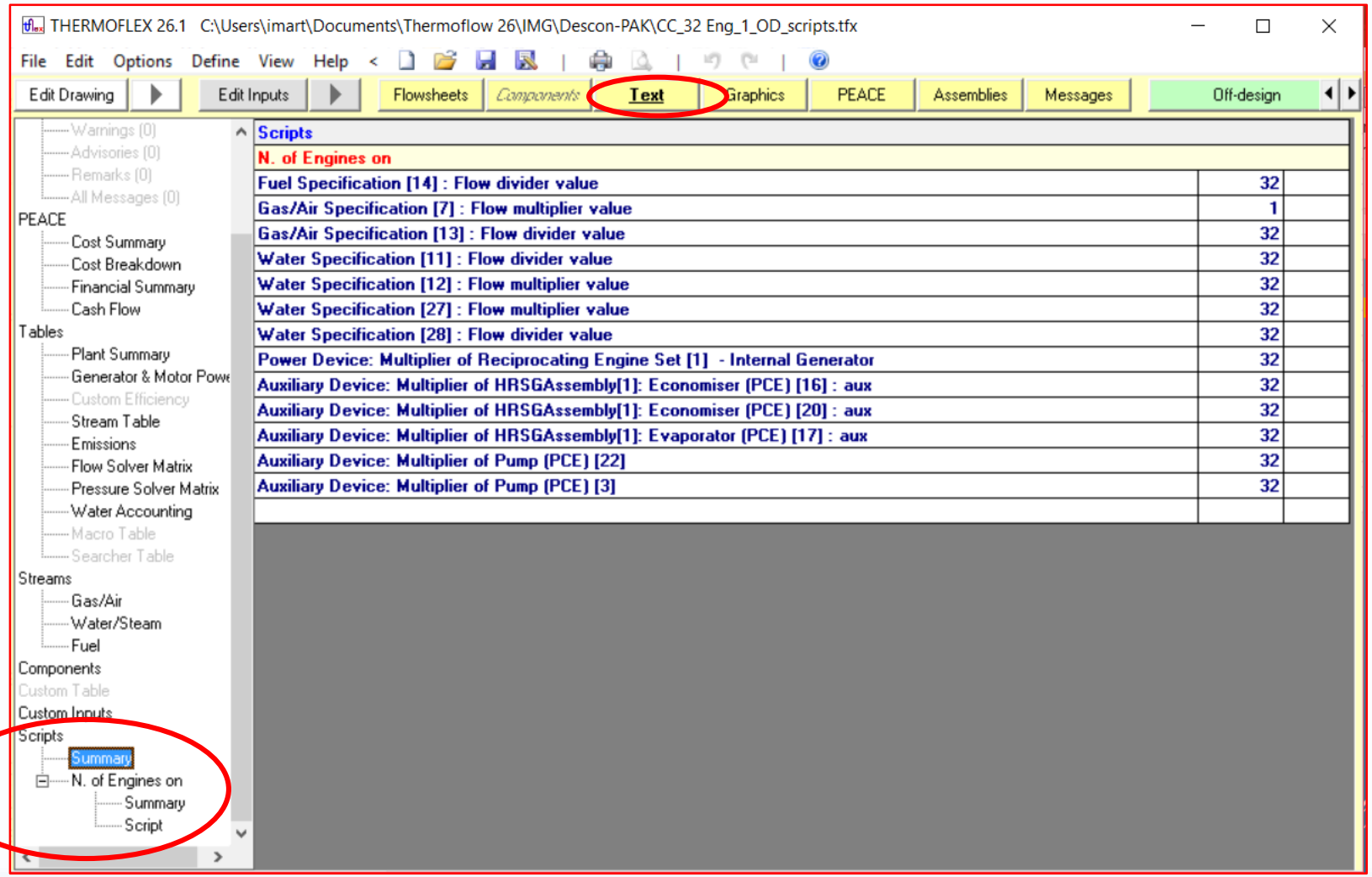
SCRIPT Outputs

GT PRO – GT MASTER



SCRIPT Outputs

THERMOFLEX



SCRIPTS Compatible with

- Multiple Runs
- ELINK
- TFX: “Classic” Macros, Searcher

Import and Export SCRIPTS

Importing: Things that are always preserved

The following properties of an imported script are always preserved:

- Name and body
- Call origins
- Script Output Parameters

Importing: Things that are never preserved

The following properties of an imported script are never preserved:

- Script Input Parameters (sips) that refer to custom inputs
- Custom inputs, file-specific.

Importing: Things that may be preserved

Script Input Parameters (sips) and Thermoflow Input Parameters (tfips) are links to variables in the main program hosting the script. When a script is imported, the script will ask the main program (e.g. THERMOFLEX, GT PRO, or GT MASTER) if its sip and tfip variables are still available in the current file. If they are, the variables will be preserved. If they are not, then the variables will be cleared and the script itself will also be disabled.

This process may not be perfect. It is up to the user to ensure that all of an imported script's sips and tfips have been properly assigned, and to reassign them if necessary.

When importing a script exported from a different program (i.e. importing a script exported from THERMOFLEX into a GT PRO file, or a script made in GT PRO into a THERMOFLEX file, etc.), all sips and tfips will be cleared.

SCRIPTS Samples

GT PRO:

- (GTP_Script1)Different_Condensate_Return_Temperature
- (GTP_Script2)Different_Steam_Export_Prices
- (GTP_Script3)Script_DB_STkW

GT MASTER:

- (GTM_Script1)ExtractionSelector
- (GTM_Script2)ACC_Scheduling
- (GTM_Script3)CustomOutputs
- (GTM_Script4)GTDataFromExcel & (GTM_Script4)GTDataFromExcel.xls

THERMOFLEX:

- (S2-36)Load Scheduling 6-on-1 CC Plant
- (S2-37)Modeling M-on-N Plant Using Scripts
- (S5-22) SolarPV with Gas Turbine Backup using Scripting
- (S5-23) WindFarm with Gas Turbine Backup using Scripting

SCRIPTS Help:

GT PRO: Chapter 24

GT MASTER: Chapter 24

THERMOFLEX: Chapter 3.3

Contact THERMOFLOW Support at **info@thermoflow.com**