



Advanced Scripting: Running Excel from Lua

Harvesting GT Data from Excel

Scripting: Brief Overview

- Use your own logic to:
 - Create a new, custom output parameter
 - Programmatically set existing model inputs
- Define your own functions, call external programs...
- Thermoflow programs use the open-source scripting language Lua
 - <https://www.lua.org/>

Script Definition

- Need to define:
 - What it produces:
 - New, custom outputs
 - Choose model input(s) to set
 - What it needs:
 - Model inputs or outputs
 - When it happens:
 - Before calculation begins (initialization / to set inputs once)
 - During the loop (to set inputs each loop)
 - THERMOFLEX only!
 - After convergence (to set inputs after the model converges)
 - After calculation ends (final cleanup / to compute pure outputs)

Example: Harvesting GT Data from Excel

- **Situation:** We have an Excel workbook that computes GT performance as a function of its Compressor Inlet Temperature (CIT). We want to harvest values from this workbook and update our GT MASTER model's gas turbine during computation.
 - Note: This same method can be used in GT PRO and THERMOFLEX as well!

Script Plan, Part 1

- **What** will it produce
 - Thermostat Input Parameters (TFIPs)
 1. GT gross power
 2. GT heat rate (LHV)
 3. GT exhaust gas mass flow
 4. GT exhaust gas temperature
- **What** does it need
 - Script Input Parameters (SIPs)
 1. Compressor Inlet Temperature

Script Plan, Part 2

- **What** it needs to do:
 1. Launch Excel
 2. Load our workbook
 3. Pass **CIT** to the workbook
 4. Let the workbook compute GT performance
 5. Harvest the GT performance parameters (**GT power, heat rate, and exhaust gas mass flow and temperature**)
 6. Close Excel
- **When** these steps need to be done:
 - Before computation: Steps 1 & 2
 - During computation: Steps 3 – 5
 - After computation: Step 6

Automating Excel

- Excel exposes a COM interface to allow for both in-process and out-of-process automation
 - In-process: VBA
 - Out-of-process: External program running and interacting with Excel

LuaCOM

- <https://github.com/davidm/luacom>
- LuaCOM is a library that allows Lua to easily use and create objects that follow Microsoft's Component Object Model (COM) specification.
- Open source, permissive licensing

Lua for Windows

- <https://github.com/rjpcomputing/luaforwindows>
- Provides many useful libraries when using Lua on Windows, including LuaCOM
- Open source, permissive licensing