

Quick CT

Subject	Run cycle tempo simulation for varying apparatus parameter values
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Preparation

Preparation steps only have to be repeated when simulating a new Cycle Tempo model.

1. Start usual Cycle-Tempo graphical user interface and open the to be simulated model (.gui file)
2. Run the model (by using ctrl+r, lightning button or click calculation->run), but do not click OK when calculation is finished!
3. Using windows explorer go to the location of your model (.gui file).
4. While OK button is not pressed temporary files INFILE1, INFILE2, INFILE3, OUTFIL1, OUTFIL2, OUTFIL3, and OUTFIL4 are in the current folder. Copy INFILE1, INFILE2, INFILE3 and put them in the same directory as quickCT.exe. These contain the input parameters of your Cycle Tempo model.

Executing simulation

1. Run QuickCT.exe
2. Use file search button to enter WinTempo.exe which is usually located in program files C:\Program Files (x86)\Cycle-Tempo. When no entry is given, this is the default. Cycle Tempo uses WinTempo.exe to execute its calculations, so this is the application that opens Cycle Tempo.
3. Enter the name of the parameter that you want to vary (case-sensitive) and the apparatus number it belongs to.
4. Define the option to supply input to the simulation. There is a radio button choice between Excel and using a defined range to give input.
 - a. Excel: define the path of your input file. The excel file should start at A1 with a column title, followed by the data. CT_input.xlsx is supplied with the program and can be used to define input. When no path is defined CT_input.xlsx is used (when stored in the same folder as QuickCT.exe)
 - b. Range: Enter starting value, end value and step size.
5. When all required information has been entered, press the start button. This will iterate the following steps over the used range of parameter values:
 - a. Retrieve parameter value
 - b. Find place of parameter in INFILE1 and substitute current parameter value
 - c. Run WinTempo.exe from given path
 - d. Find and retrieve results in OUTFIL4
 - e. Delete OUTFIL1 – OUTFIL4
6. Results will be exported to a new worksheet in CT_output.xlsx in the same folder as QuickCT.exe. The new worksheet is named with current date and time. When CT_output.xlsx does not exist, a new file will be created.
7. Close all Cycle Tempo calculation windows (by pressing OK or close all at windows bar).

Work principles

1. Search and substitution algorithm for INFILE1. The algorithm reads the INFILE and searches for the following:
 - a. "APPDATA\tNO=4" where 4 is an example of an entered apparatus number. This creates an index of the start point of the concerned apparatus.
 - b. In the line of the apparatus index, the index of the variable name is found.
 - c. The first number after the variable name index is found, which corresponds with the number that will be substituted.
 - d. A new INFILE1 is created with the substituted parameter value and overwrites the existing INFILE1.
 - e. When the variable is not in the line of the apparatus number, the same variable name could be found for another apparatus and an error is given. The indexes of apparatus, variable name and variable value are provided in the output to check whether the right value is found and substituted.
2. Search and extraction algorithm for OUTFIL4.
 - a. The last two lines contain the electrical and exergy efficiencies of the system. OUTFIL4 is imported and the last two lines are extracted.
 - b. The last two lines are process to a one-line data frame.

Problem solving

- The program does not work if INFILE1, INFILE2, and INFILE 3 are not in the same folder as QuickCT.exe. The to be simulated Cycle Tempo file (.gui) is not required to be in the same folder.
- For the range input: when the range between start and end value does not correspond with an integer times the step size, the end value will be different to make sure the step size is still correct.
- The last two of OUTFIL4 contain the efficiency results. When the exported results in CT_output do not correspond with the efficiency results, it might be the case that your computer is such slow that the results were already retrieved while your computer was not done with writing OUTFIL4. Turn off parallel processing to solve this problem.
- If you do a new simulation in the same minute, it will overwrite the last one, since the excel worksheet name defined up to minutes.

Other

- INFILE1, INFILE2, INFILE3 are rewritten in every iteration. OUTFIL1, OUTFIL2, OUTFIL3, and OUTFIL4 are generated and deleted in every iteration.
- When a file named OUTFIL already exists in the QuickCT.exe, it will be deleted before the simulation is run, because OUTFIL cannot be overwritten.
- In this version, only all efficiency results are shown, more results might be added later.
- When no apparatus and parameter is defined, it is defaulted to apparatus 4 and parameter ETHAI.
- It is possible to extract to additional information than just system efficiencies, however this needs to be added to the script. 'QuickCT extra input' is added to provide an example how to achieve this.