Appendix R

SYSTEMA – THERMICA 4.7.0 & THERMICALC 4.7.0

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Abstract

SYSTEMA – THERMICA 4.7.0

The new 4.7.0 release includes new major functionalities.
A new CAD library is now embedded into SYSTEMA allowing the management of heavier CAD files.
Thanks to several defeaturing options, it is possible to simplify a geometrical model with holes, chamfers and small volumes suppression. CAD shapes and SYSTEMA native shapes can then be used for thermal analysis.
A Post-Processing tab is now dedicated to the management of results. Mathematical operations, comparisons, min/max, margins, power budgets etc. can be linked together. The complete post-processing workflow can also be batched, including the generation of results into tables and graphs.

THERMICALC 4.7.0

THERMICALC is a new product of the THERMICA suite which is designed to solve small thermal problems (up to 100 nodes). It has the powerful capabilities of THERMISOL accessible from an Excel spreadsheet.
Setting and running a thermal model within THERMICALC is very easy: declaration of nodes, couplings, plus a wizard mode to help setting thermostats, temperature or time dependencies.
THERMICALC also proposes the import of THERMICA outputs (such as nodes, couplings and external fluxes) and even THERMISOL inputs.
An advanced mode may be activated so to be able to set any user’s code and so to perform more complex analysis.
Current status

- Long Time Support current version: v4.5.3a 04/2014
- Next Release: v4.7.0 11/2014

- Integrates new major features:
  - CAD management
  - Post-Processing Tab
  - Extended Python interface to all SYSTEMA Tab
  - Upgrade of 3D performances

- 64bits version for Windows and Linux
- And lots of evolutions and corrections:
  Search tool on browser, Integrated help, Archiving option, New volumic shapes,…
Content

- CAD management
  - New library
  - Defeaturing

- Post-Processing Tab
  - Toolboxes
  - How to use it in SYSTEMA

- ThermiCalc
  - Perform easy thermal analysis from Excel

Systema-Thermica

**CAD Management**

28th European Space Thermal Analysis Workshop - 14–15 October 2014
CAD management

- Roadmap of CAD Management

- open of step-AP203 files

- simplification

- open of step file (AP203, AP214)
- simplification
CAD management

- Roadmap of CAD Management

- Analyse directly from a step file
- Save of step file

Time and Cost saving

<table>
<thead>
<tr>
<th>Phase 1: Update of the CAD library</th>
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<tbody>
<tr>
<td>Elysium → Japanese - US company providing libraries and end-user software to perform CAD translation</td>
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- CAD file import
- Model simplification
- 3D Performances: *Load CAD files beyond 200Mb*
CAD management

- Phase 1: Opening Step files + defeaturing
  - Remove of
    - small shapes
CAD management

- Phase 1: Opening Step files + defeaturing
  - Remove of
    - small shapes
    - holes
CAD management

- Phase 1: Opening Step files + defeaturing
  - Remove of
    - small shapes
    - holes
    - chamfers
CAD management

Phase 1: Opening Step files + defeaturing

- Remove of
  - small shapes
  - holes
  - chamfers
  - fillets
CAD management

**Phase 1: Opening Step files + defeaturing**

- Remove of
  - small shapes
  - holes
  - chamfers
  - fillets
- Tessellation

  ➢ *Python API available*
CAD management

Demonstration

Systema-Thermica

Post-Processing Tab
Post-Processing

- Roadmap of Post-Processing

Display of H5 results
- On 3D view
- On 2D curve view
- Use of Posther and BPlot

4.6

4.7

4.8

Roadmap of Post-Processing

- Collaboration with users
- Addition of Post-Processing tab
- Generation of tables and curves
- Automatisation

4.6

4.7

4.8
### Post-Processing

**Roadmap of Post-Processing**

- New toolboxes
- Generation of 3D views
- Generation of synthetic view
- Improvement on group management

### Post-Processing Tab

**New tab integrated in SYSTEMA**

- Diagram of Tool box
  - Drag&drop
  - Link
- Group definition from node id

[Python API available](#)
### Post-Processing Tab

#### Post-Processing Tool boxes

- **Input**
  - H5 files
  - Entities from H5

- **Filters**
  - On a defined node range or group of nodes
  - On a defined time range

#### Visualization box

- Generation of Tables and Curves
  - Result by nodes according to the time
  - Result for each node at one defined time

- “Set of graph” option: Automatic generation of graphs from values defined in a file

- Import/export from the 2D Curve View
Post-Processing

- Post-Processing Tool boxes
  - Create your own toolbox in Python
  - File Templates:
    - .sysppb → definition of the box in XML file
    - .py → actions of the box in Python file
  - Available Python library to open/read/write H5 file

Demonstration
- An Excel Interface to solve thermal analysis

- Create your thermal model into Excel with two different modes:
  - Standard Mode: Nodes, Couplings
  - Expert Mode: + Variables, Arrays, Subroutines, Dependencies…
ThermiCalc

- Import:
  - Thermica outputs: Nodes, Couplings, Fluxes...
  - Thermisol inputs: All model being loaded into Excel

- Use Wizard Modes:
  - Time / Temperature dependencies using tables or functions
  - Thermostat settings

ThermiCalc

- Execute:
  - Thermisol is used in background to solve the thermal analysis
  - No embedded solver, No Excel memory increase, …
ThermiCalc

- **Post-Process:**
  - Get results from Thermisol
  - Create graphs...

- **Objectives**
  - Ease the creation / execution of small / medium thermal analysis
    - For thermal engineers / architects
    - For space and non-space applications
  
  - Delivered with Thermisol 4.7.0
    - Without additional cost
    - Or as a stand-alone tool
    - Posther and B-Plot are still supported
ThermiCalc

Demonstration

THERMICALC
Thermal Analysis Solver for Excel

SYSTEMA – THERMICA 4.7.0 & THERMICALC 4.7.0

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