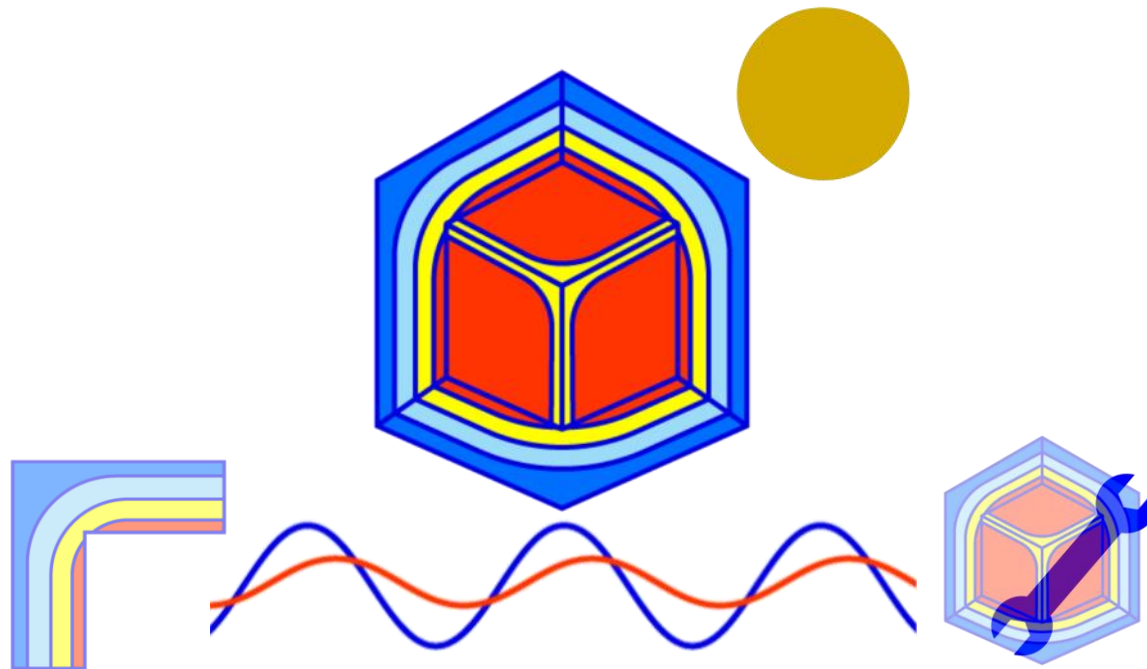




VOLTRA v9 New program performances



VOLTRA v9

A [Solar processor – feature RADCON](#)

- A.1 Handling of opaque materials in contact with transparent materials
- A.2 Revised Solar Data input – option to fix sun position
- A.3 Improved algorithms – reduced calculation time

B [Climatic data](#)

- B.1 Input of EPW and TRY files
- B.2 Handling sub-hourly solar data from hourly solar data
- B.3 User defined start time

C [EN ISO standards](#)

- C.1 Revision of Colours Window in line with TRISCO v16
- C.2 Customisable Colour Database

D [Graphic output and Image Window](#)

- D.1 Graphic output – Visualisation of sun obstacles
- D.2 Graphic output – Revised legend: clustered cavities
- D.3 Graphic output – Miscellaneous
- D.4 Image Window – Icons

E [Reporting: Text output](#)

- E.1 New report definitions: ΔT_{\max} , E_{tot} , E_{diff} , E_{dir} , E_{gr}
- E.2 Absorbed solar flux into materials (q_{sol})
- E.3 Option to save data as .csv
- E.4 Miscellaneous

F [Improved navigation of Tables in windows](#)

G [Introduction of the Physibel Toolbox](#)

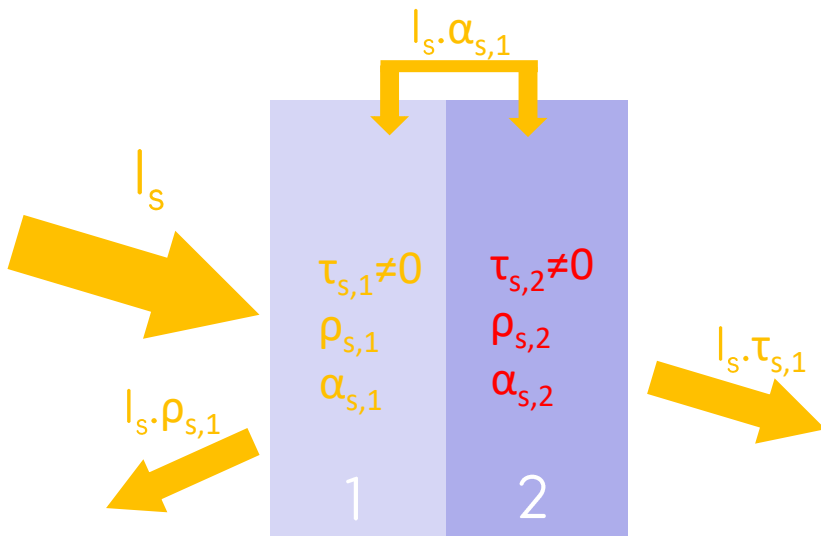
H [Online Physibel Knowledge Base and Portal](#)

A1. Contact between opaque & transparent materials

[overview](#)

Absorption and interreflections at opaque materials behind transparent material are considered.

Transparent materials

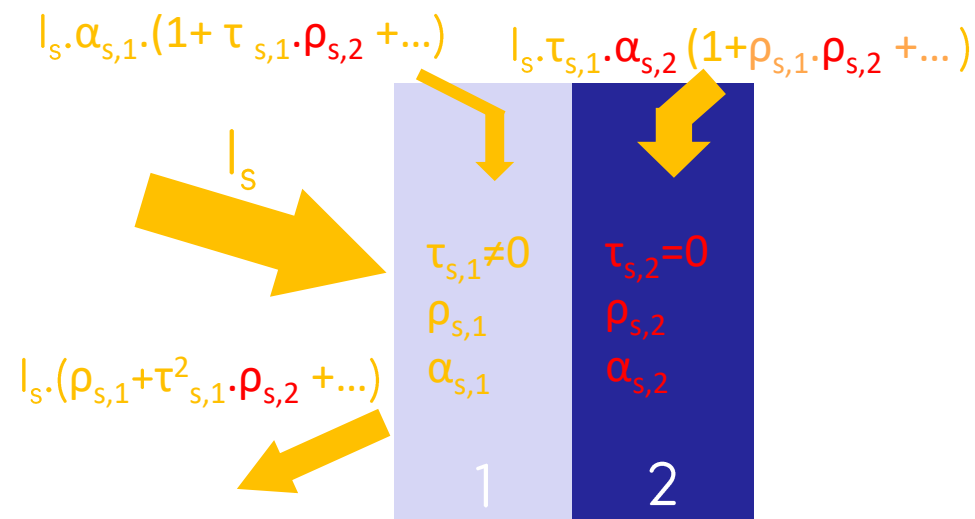


Solar properties at incident side are applied.

VOLTRA v8 (and BISTRA v4)

(VOLTRA v8: required trick with virtual layer of RADCON type to consider absorption in opaque material behind transparent material)

Opaque behind transparent material



Absorption and interreflections at intermediate opaque materials are considered.

New in VOLTRA v9 (and BISTRA v5)

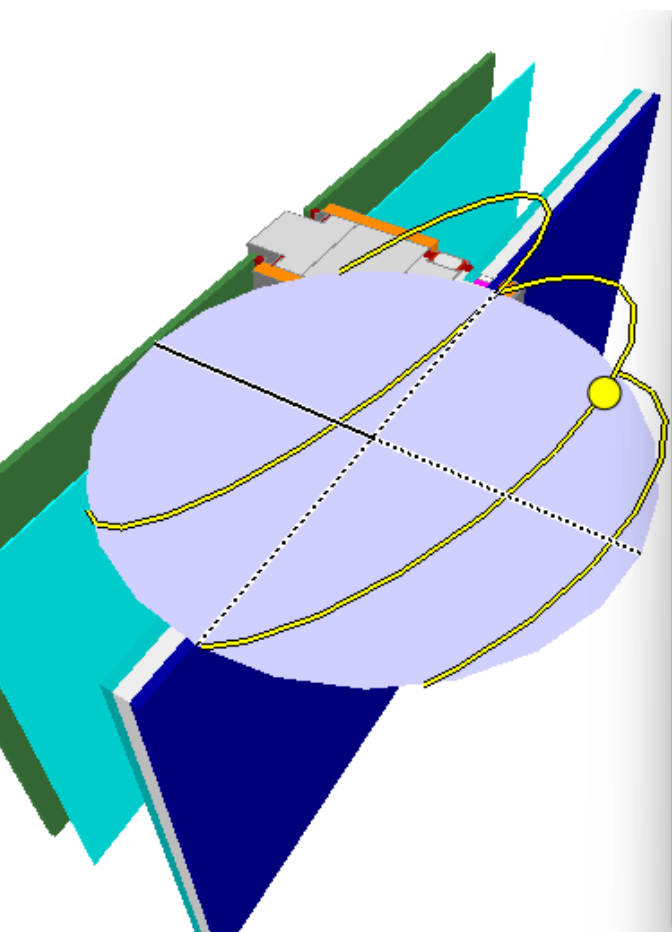
(adding a virtual layer has become unnecessary)

A2. Revised Solar data – option to fix sun position

Solar Data:

- Real sun path
- Fixed sun position

- Visualisation orientation
- Angles to define north orientation are now defined as rotating the object around its own axes, instead of as moving the coordinate system



Solar Data

Real sun path
 Fixed sun position

Position against north direction

1. Orientation
Rotate object around Z axis from X to Y
Orientation angle °

2. Inclination
Rotate object around X axis from Y to Z
Inclination angle °

3. Tilt
Rotate object around Y axis from Z to X
Tilt angle °

Earth position

Latitude ° N

Longitude ° E

Time zone h E

Solar radiation

Horizontal global solar radiation function

Horizontal diffuse solar radiation function

Ground reflection factor

Fixed sun position

Total solar radiation

Function
 Constant W/m²

Incoming solar radiation from direction:

X- Y- Z-
 X+ Y+ Z+

OK

Cancel

A2. Revised Solar data – Option to fix sun position

Solar Data:

- Real sun path
- **Fixed sun position**

- Total (direct) solar radiation via:
 - Function (I01)
 - Constant value
- User-defined fixed sun position

Solar Data ×

Real sun path
 Fixed sun position

Position against north direction

1. Orientation
Rotate object around Z axis from X to Y
Orientation angle °

2. Inclination
Rotate object around X axis from Y to Z
Inclination angle °

3. Tilt
Rotate object around Y axis from Z to X
Tilt angle °

Fixed sun position

Total solar radiation

 Function
 Constant W/m²

Incoming solar radiation from direction:

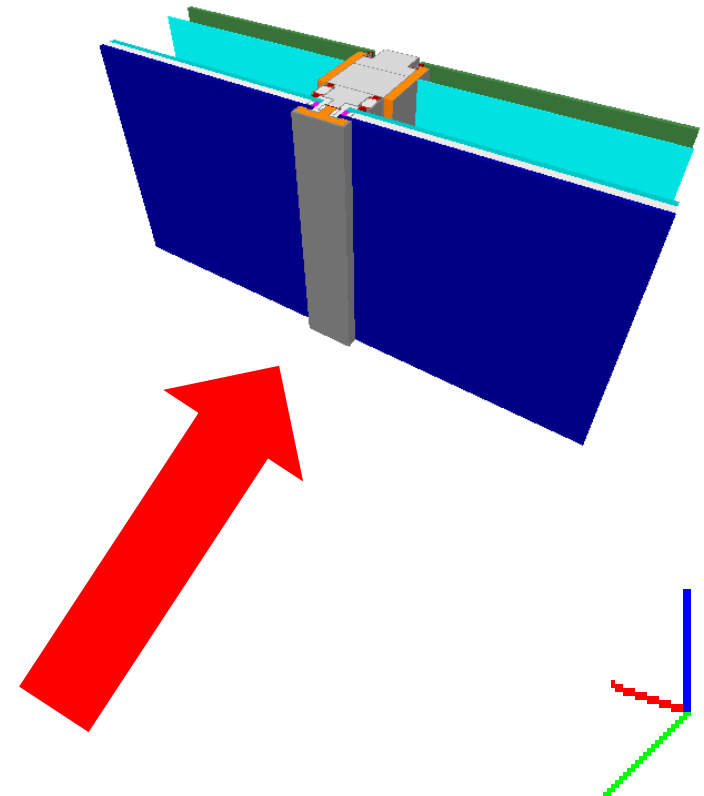
 X- Y- Z-
 X+ Y+ Z+

Earth position

Latitude ° N
 Longitude ° E
 Time zone h E

Solar radiation

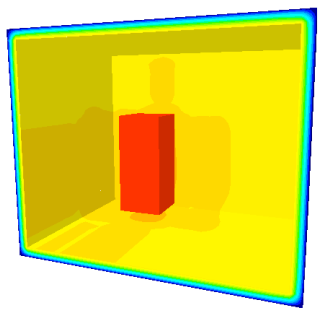
Horizontal global solar radiation function
 Horizontal diffuse solar radiation function
 Ground reflection factor



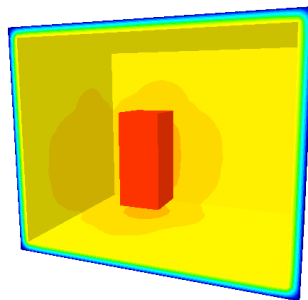
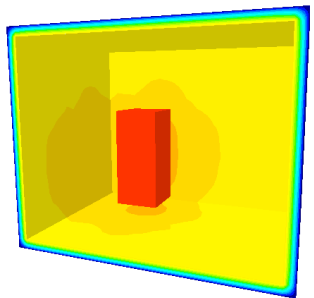
A3. Improved algorithms – reduced calculation time

Improvements in the RADCON-module and solar processor

- Improved solar processor calculation (speeding up calculation time)
- Increased calculation speed due to improved neighbouring nodes algorithm for view factor zones (RADCON)
- Increased calculation speed due to improved algorithm when clustering viewfaces in viewfactor zone (RADCON)



250 faces → ≈30 000 VF



500 faces → ≈ 125 000 VF 750 faces → ≈ 300 000 VF

Calculation Parameters ✕

Iterations

Maximum number of iteration cycles:

Maximum number of iterations within each iteration cycle:

Maximum temperature difference within each iteration cycle: °C

Maximum temperature difference between iteration cycles: °C

Max. heat flow divergence for total object: %

Max. heat flow divergence for any node: %

Radiation

Linear
 Non-linear

Black radiation heat transfer coefficient (linear radiation): W/(m².K)

Max. number of view factor faces (per view factor zone):

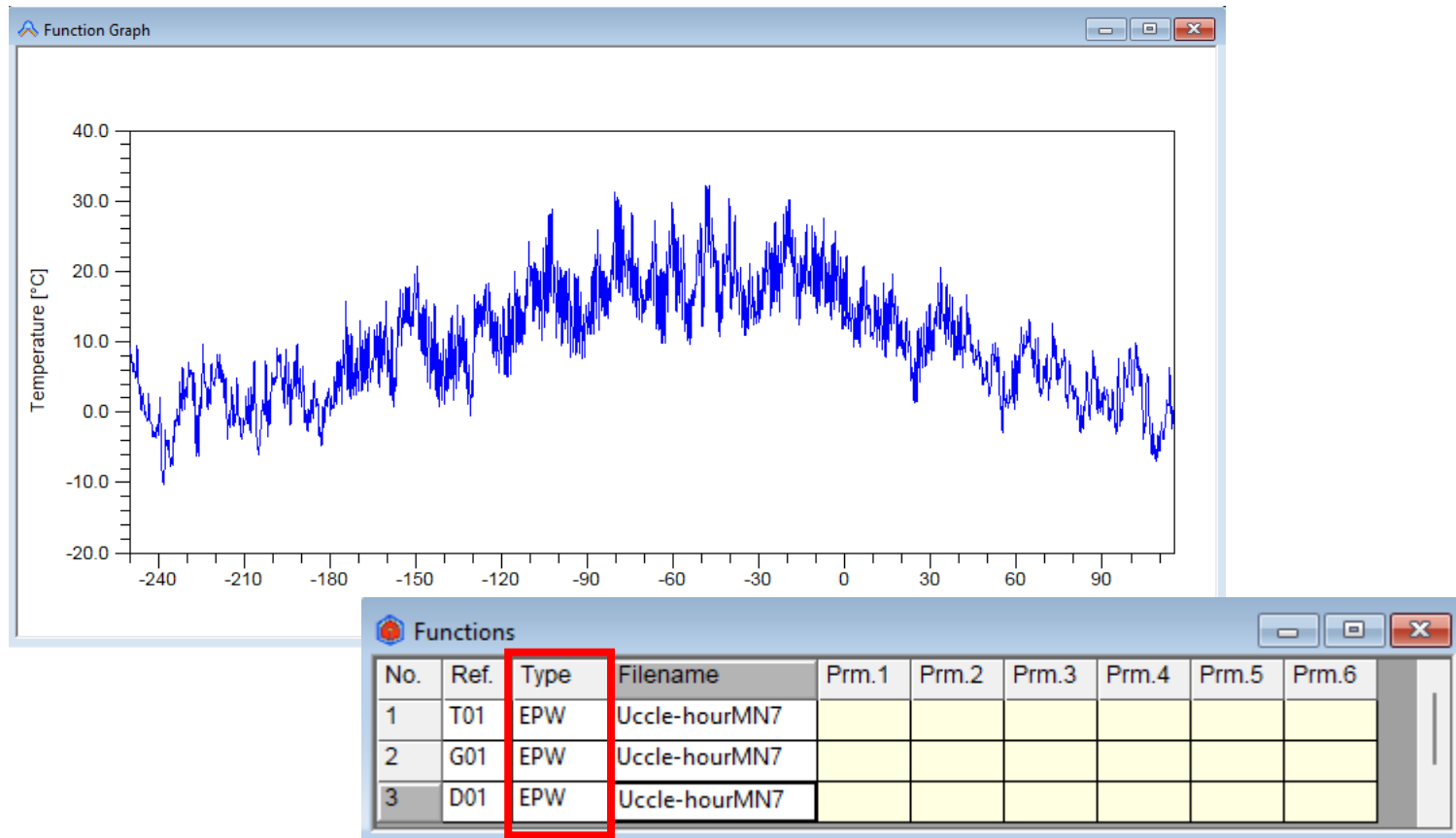
Automatic calculation of thermal properties

Recalculation of thermal values (before each iteration cycle): Yes
 No

Default temperature difference across airspace: °C

B1. Input of EPW and TRY files (climate files)

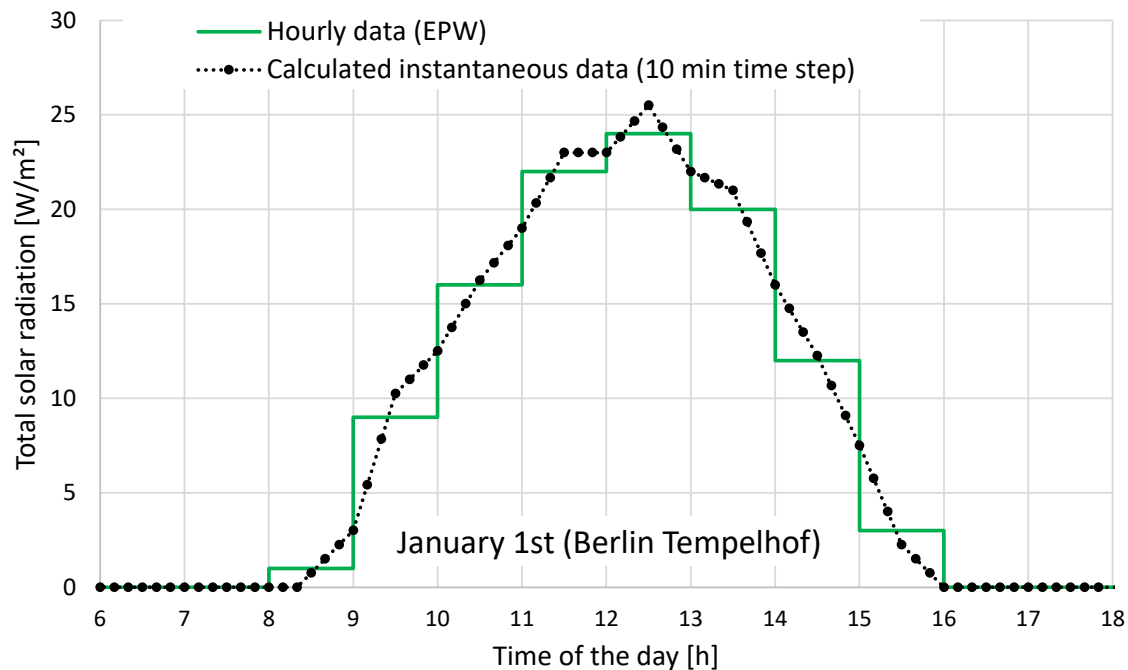
Standardised climate data formats **EPW** and **TRY3** are available as input for temperature, global and diffuse radiation



B2. Handling sub-hourly data from hourly solar data

Solar (climate) data is typically only available on hourly basis, where façades need often to be modelled with smaller time steps (e.g. 10 min).

An algorithm* to handle sub-hourly solar data when using stepped climate data is included.



B3. User-defined start time

Calculation Parameters are extended allowing to define start time (in addition to start day)

Calculation Parameters X

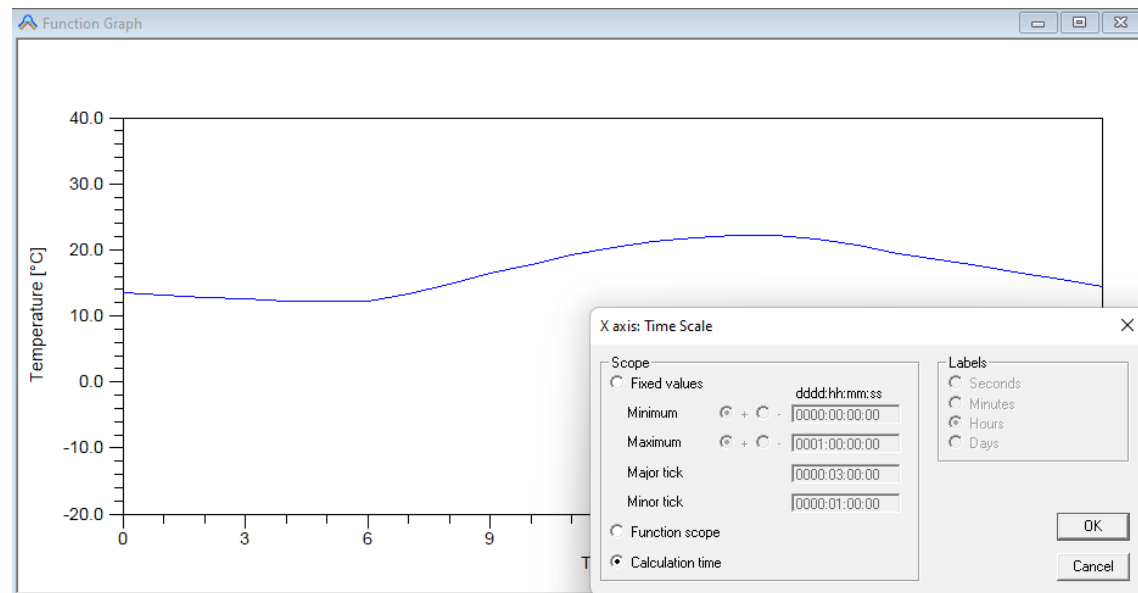
Time axis

Time step ddd:hh:mm:ss

Start-up calculation duration ddd:hh:mm:ss

Calculation duration ddd:hh:mm:ss

Calculation start Day Time hh:mm:ss



C.1 Colours window – revision (in line with TRISCO v16)

[overview](#)

The Colours window is revised to allow conformity with different EN standards:

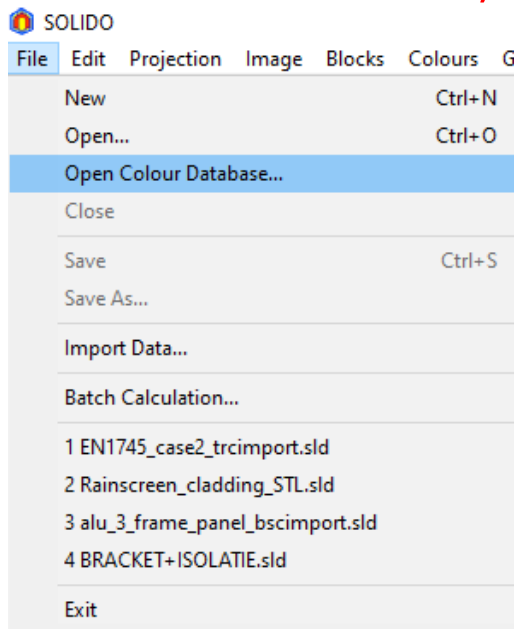
- Rule → Subtype
- Physical flow direction (**horizontal, up, down**): defined by the user (and standard)
- Geometrical flow direction (**X, Y, Z**)
- Standard (**EN10077, EN6946**)
- ϵ_1 / ϵ_2 : emissivities linked to a cavity (“single equivalent thermal conductivity method”)
- ϵ emissivity linked to a material (“radiosity method”)

Col.	Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	ϵ_1 / ϵ_2 [- / -]	λ [W/mK]	ϵ [-]	ρ [kg/m ³]	c [J/kgK]	θ [°C]	h [W/m ² K]	q [W/m ²]	θ_a [°C]	hc [W/m ² K]	P_c [W]	θ_r [°C]	Sun	ρ_s [-]	τ_s [-]	Standard
136	MATERIAL				reinforced concrete (steel 2%)		2.500		2500	1000									0.10	0.00	
151	EQUIMAT	LAYER	HOR	X	insulation 0.035 W/mK	0.90 / 0	0.273		1.2	1008											EN6946
164	MATERIAL				masonry semi-heavy		0.600		1350	840									0.10	0.00	
170	BC_SIMPL	NIHIL			exterior						T01	25.00	0					NO			NIHIL
174	BC_SIMPL	NIHIL			interior (normal)						T02	7.70	0					NO			NIHIL
180	MATERIAL				masonry heavy		0.900		1850	840									0.10	0.00	

C.2 Colours window – Colour Database

Customisable **Colour Database** with predefined colours

File → *Open Colour Database...* allows to quickly adjust **frequently-used materials and boundary conditions.**



Col.	Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	ϵ_1 / ϵ_2 [- / -]	λ [W/mK]	ϵ [-]
0	MATERIAL						1.000	0.90
1	MATERIAL						1.000	0.90
2	MATERIAL				aluminium untreated surface		160.000	0.10
3	MATERIAL				PVC rigid		0.170	0.90
4	MATERIAL				copper		380.000	0.90
5	MATERIAL				fibreglass (UP-resin)		0.400	0.90
6	MATERIAL				aluminium slightly oxidized surface		160.000	0.30
7	MATERIAL						1.000	0.90
8	MATERIAL				aluminium		160.000	0.90
9	MATERIAL				lead		35.000	0.90
10	MATERIAL				stainless steel (ferritic/martensitic)		30.000	0.30
11	MATERIAL				stainless steel (austenitic/aust.ferritic)		17.000	0.30
12	MATERIAL				hardwood		0.180	0.90
13	MATERIAL				steel		50.000	0.90
14	MATERIAL				brass		120.000	0.90
15	MATERIAL				softwood 500 kg/m ³		0.130	0.90

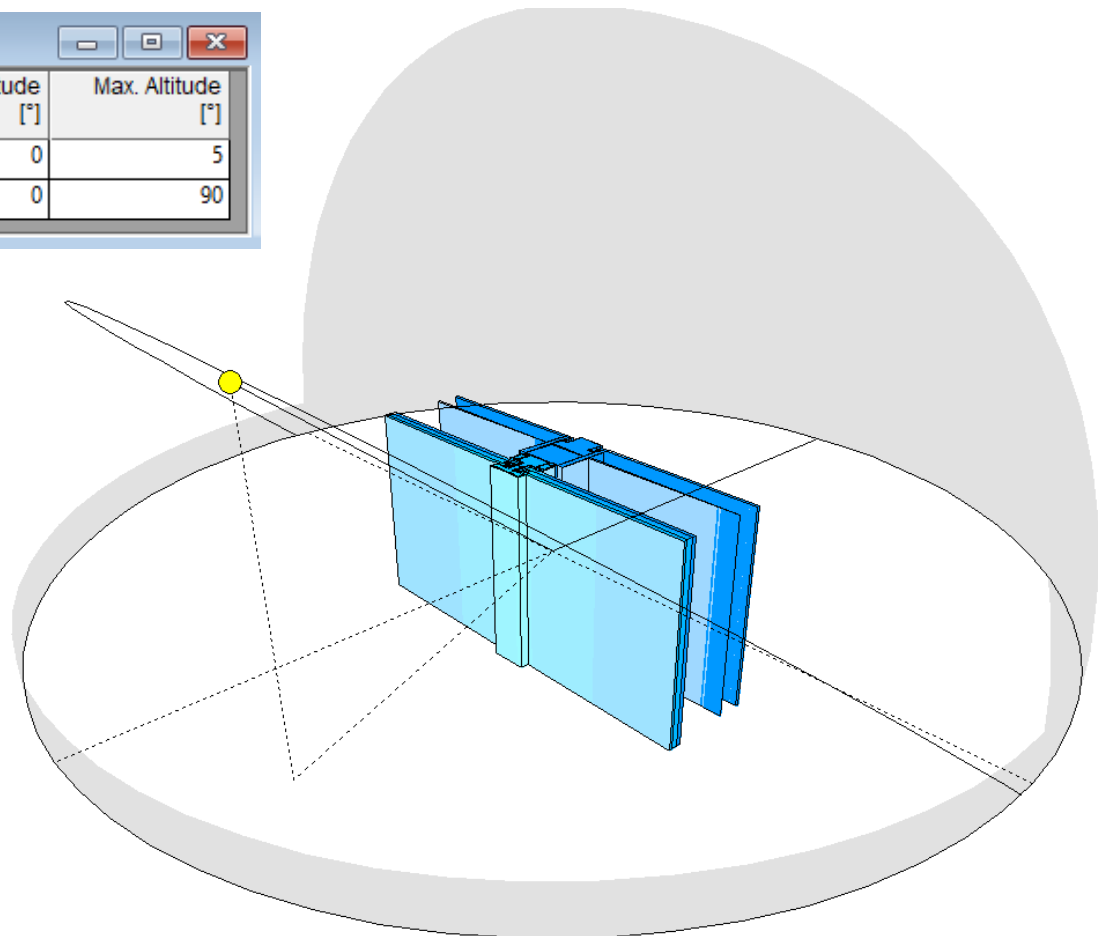
The default Colour Database delivered with the software is updated for EN ISO 10077-2, EN ISO 10456 and EN ISO 6946

D.1 Graphic output – Sun position

- Visualisation of Sun Obstacles in Sun Position view

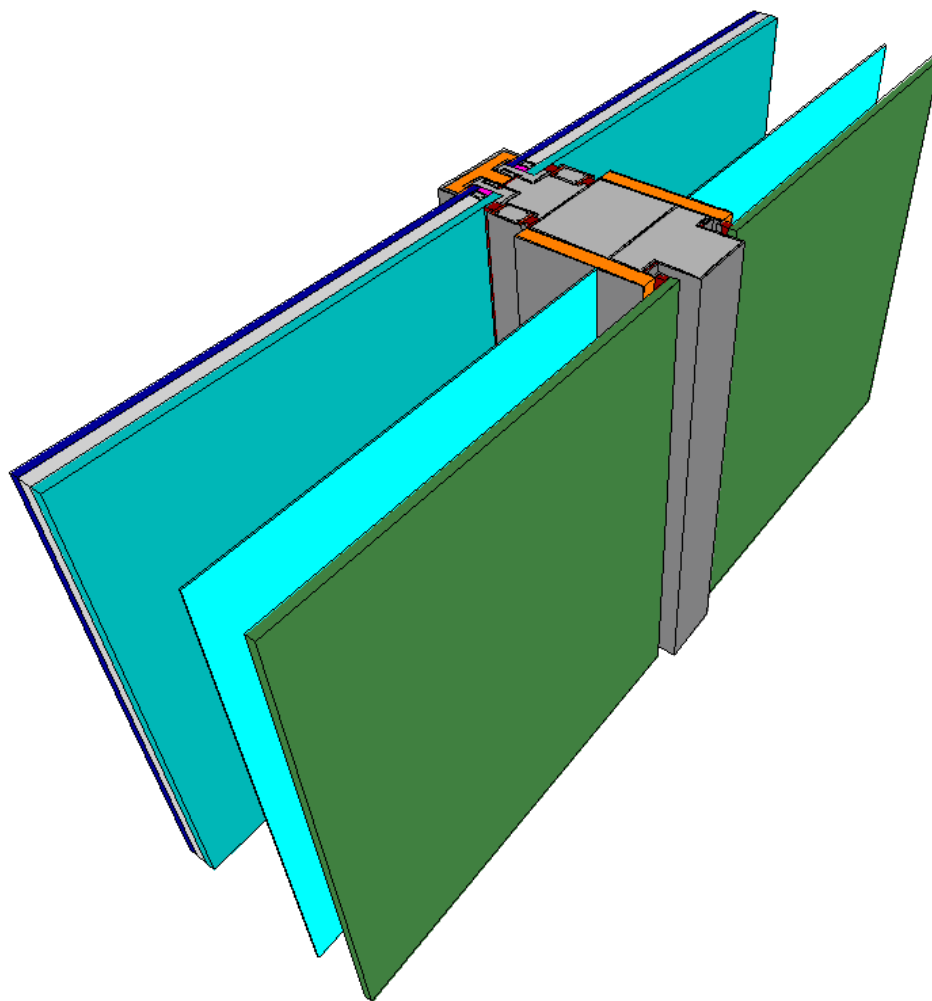


No.	Min. Azimuth [°]	Max. Azimuth [°]	Min. Altitude [°]	Max. Altitude [°]
1	-180	180	0	5
2	90	270	0	90



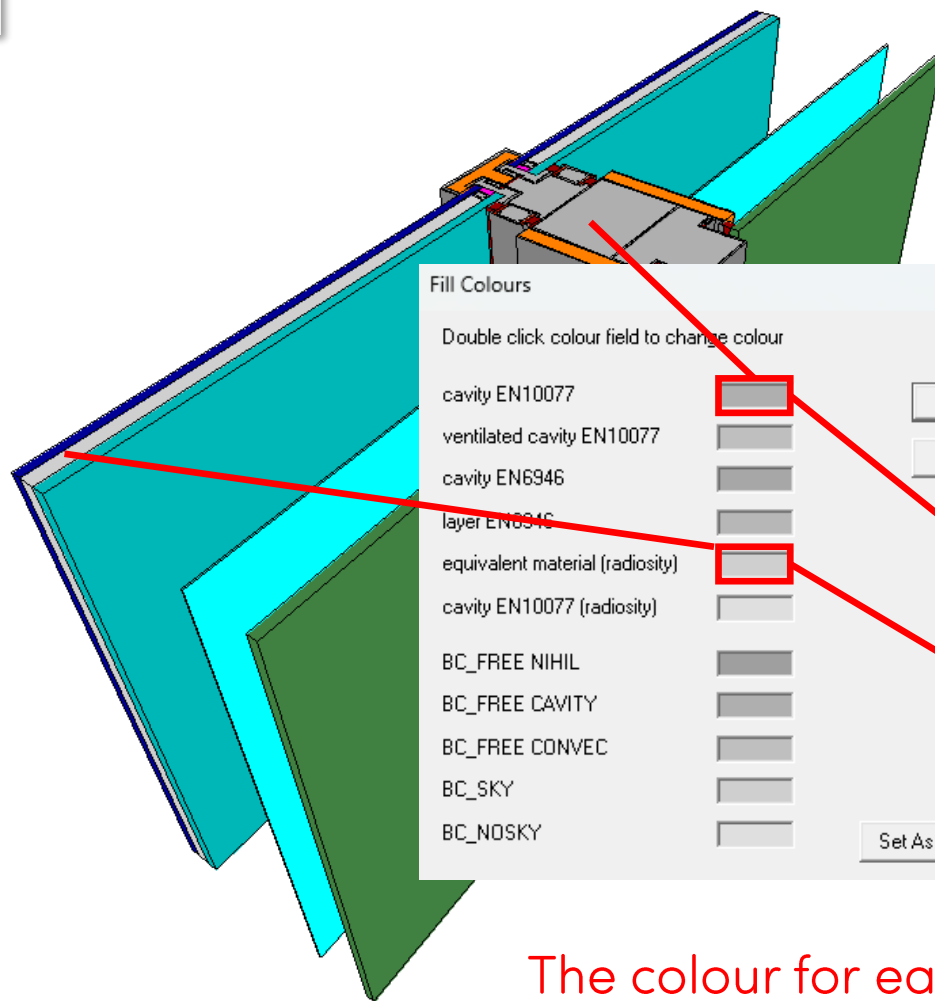
D.2 Graphic output – Revised Legend

Fill materials → revised legend: material name + clustered cavities



D.3 Graphic output – Revised Legend

Fill Colours → revised legend: material name + clustered cavities



Fill Colours

Double click colour field to change colour

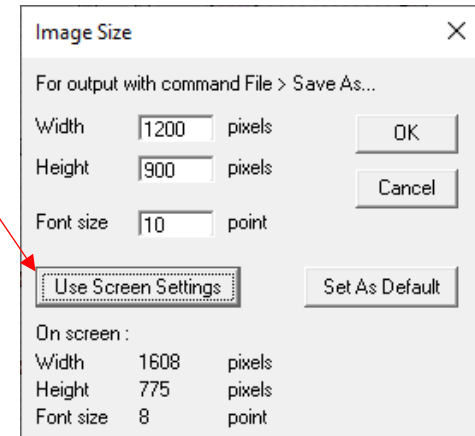
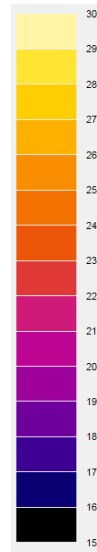
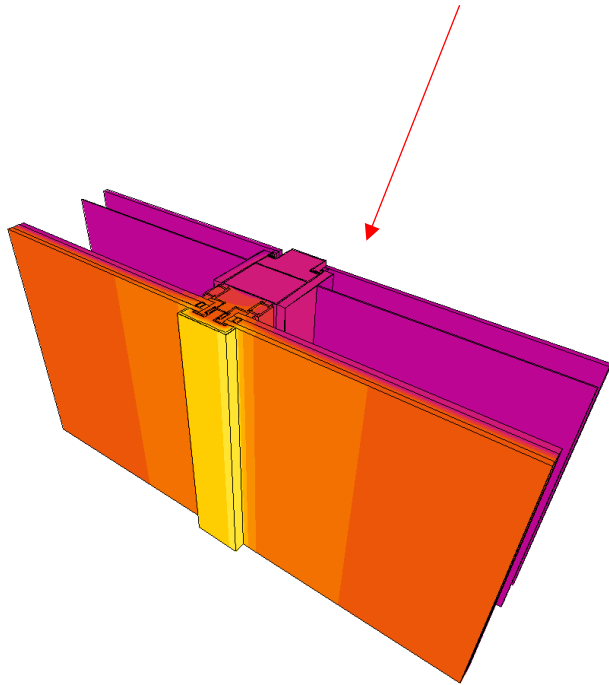
cavity EN10077	<input type="color"/>	OK
ventilated cavity EN10077	<input type="color"/>	Cancel
cavity EN6946	<input type="color"/>	
layer EN6946	<input type="color"/>	
equivalent material (radiosity)	<input type="color"/>	
cavity EN10077 (radiosity)	<input type="color"/>	
BC_FREE NIHIL	<input type="color"/>	
BC_FREE CAVITY	<input type="color"/>	
BC_FREE CONVEC	<input type="color"/>	
BC_SKY	<input type="color"/>	
BC_NOSKY	<input type="color"/>	Set As Default



The colour for each cluster of cavities can be defined by the user.

D.3 Graphic output – Miscellaneous

- Image Size: possible to use Screen Settings for image output
- Ironbow thermal palette

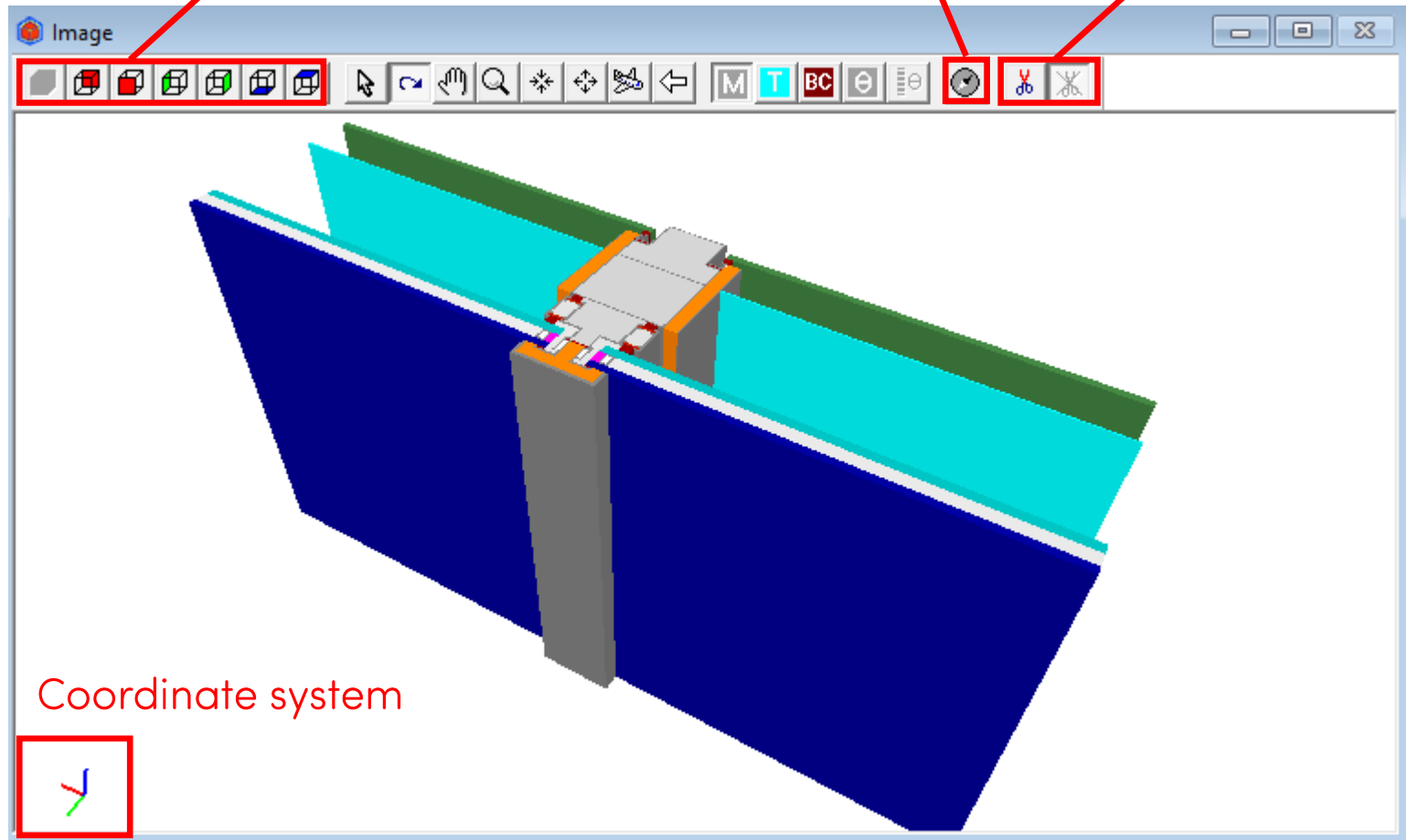


D.4 Image Window – Icons

orthogonal (2D) viewing options

Show North

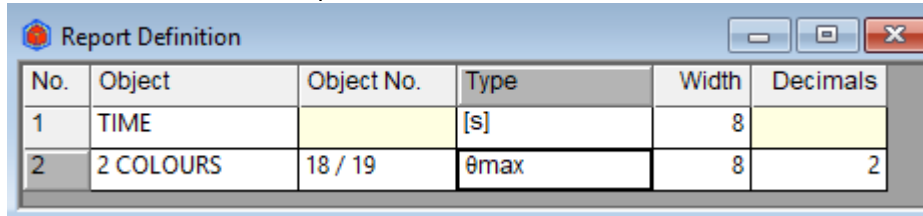
Clip Off



Coordinate system

E.1 New report definitions: ΔT_{\max} , E_{tot} , E_{diff} , E_{dir} , E_{gr}

- ΔT_{\max} : maximum temperature difference within 1 or 2 colours

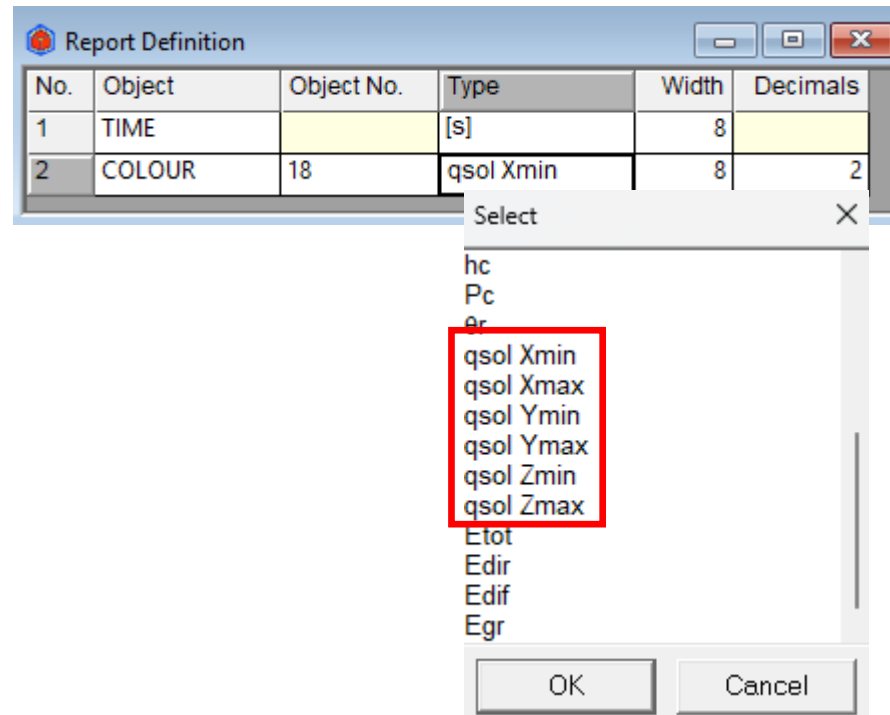


No.	Object	Object No.	Type	Width	Decimals
1	TIME		[s]	8	
2	2 COLOURS	18 / 19	θ_{\max}	8	2

Solar radiation received on materials exposed to a solar zone

- E_{tot} : Total irradiance (W/m^2)
- E_{diff} : Diffuse sky irradiance (W/m^2)
- E_{dir} : Direct irradiance (W/m^2)
- E_{gr} : Ground reflected irradiance (W/m^2)

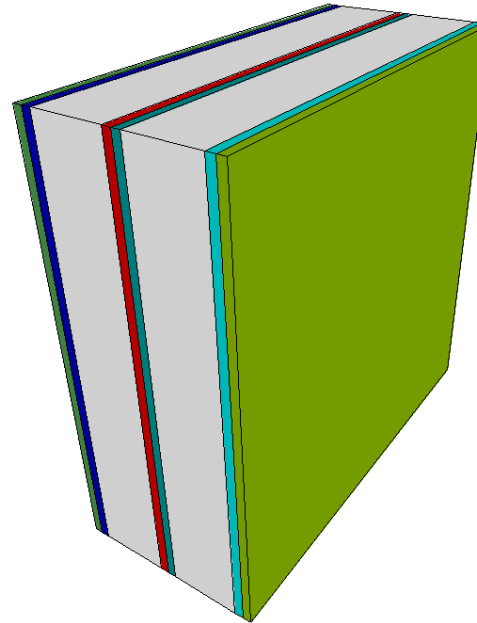
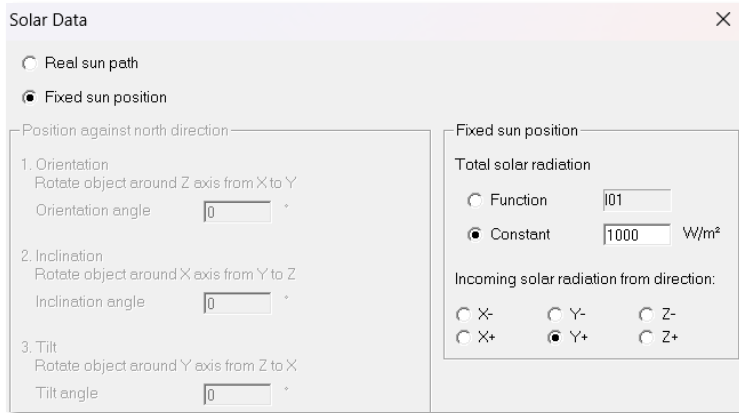
E.2 Absorbed solar flux/energy into materials (q_{sol})



The report definition q_{sol} to report the heat flux absorbed into materials is not limited anymore to materials facing the solar zone

E.2 Absorbed solar flux/energy into materials (q_{sol}, Q_{sol}) overview

Application: effect solar absorption according to EN 410



VOLTRA - Report Output

VOLTRA data file: glazed_bstimport.vtr

```

Column 1: Time [s]
Column 2: Colour 11 (pane 1 - side 1) - Absorbed solar flux on faces oriented to Ymax [W/m²]
Column 3: Colour 21 (pane 1 - side 2) - Absorbed solar flux on faces oriented to Ymin [W/m²]
Column 4: Colour 13 (pane 2 - side 1) - Absorbed solar flux on faces oriented to Ymax [W/m²]
Column 5: Colour 20 (pane 2 - side 2) - Absorbed solar flux on faces oriented to Ymin [W/m²]
Column 6: Colour 18 (pane 3 - side 1) - Absorbed solar flux on faces oriented to Ymax [W/m²]
  
```

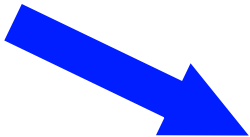
0	360.00	20.91	196.18	9.09	106.57
600	360.00	20.91	196.18	9.09	106.57

E.3 Option to save data as .csv

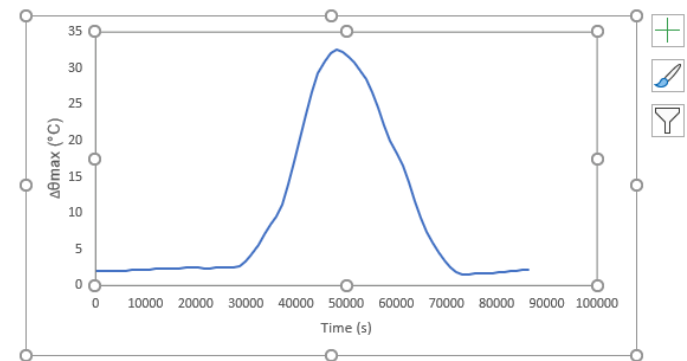
Report data is also saved in .csv format allowing to simplify post-processing

```

1 Time [s],Colour 10 (ext glazing ): temperature difference [°C]
2 0,1.96
3 1200,1.96
4 2400,1.96
5 3600,1.96
6 4800,2.00
7 6000,2.05
8 7200,2.11
9 8400,2.16
10 9600,2.21
11 10800,2.25
12 12000,2.27
13 13200,2.27
14 14400,2.26
15 15600,2.31
16 16800,2.41
17 18000,2.52
18 19200,2.53
19 20400,2.46
20 21600,2.39
21 22800,2.39
22 24000,2.43
23 25200,2.50
  
```

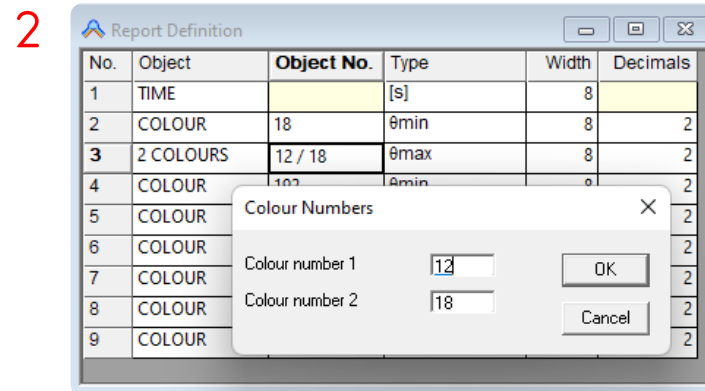
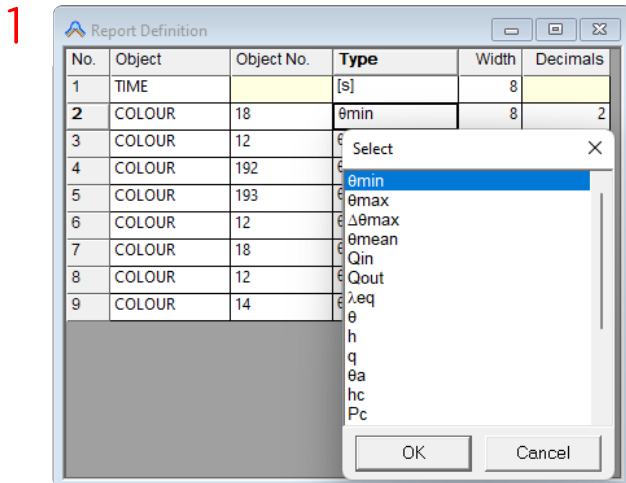


Time [s]	Colour 10 (ext glazing): temperature difference [°C]
0	1.96
1200	1.96
2400	1.96
3600	1.96
4800	2
6000	2.05
7200	2.11
8400	2.16
9600	2.21
10800	2.25
12000	2.27
13200	2.27
14400	2.26
15600	2.31
16800	2.41
18000	2.52
19200	2.53
20400	2.46
21600	2.39
22800	2.39
24000	2.43
25200	2.5

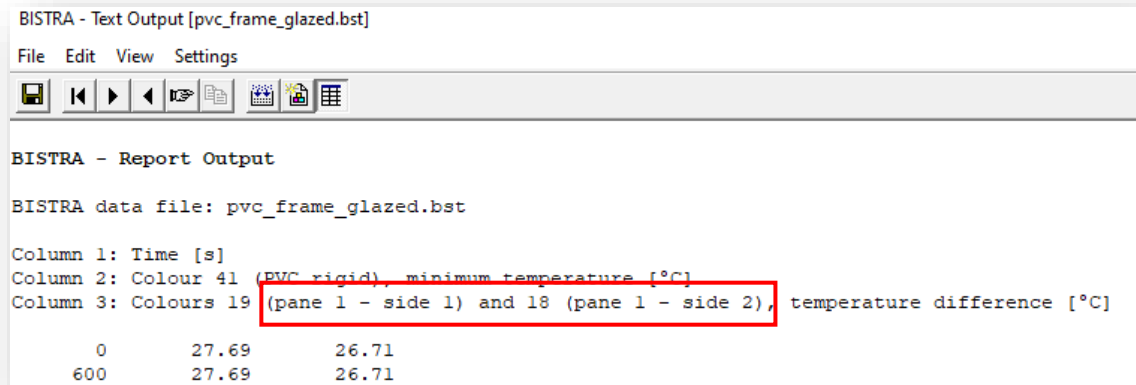


E.4 Miscellaneous

1. Introduction of Listbox to select Report Definition 'Type'
2. Temperature outputs of combination of 2 colours possible
3. Colour name included in header of Report output
4. Text output: always entirely visible (no memory caps)
5. Text output: column with non-valid results show '-' (e.g. θ_a for BC_SKY)



3



F.1 Improved navigation of tables in windows

Improved navigation of tables in windows in line with TRISCO/SOLIDO:

- Column and row header of active cell highlighted with changed background color instead of bold font.
- Row select (in Blocks window) by clicking (left mouse button) the row number (holding the <Shift> and <Ctrl> keys, a selection range can be defined).
- Cell select (Grid window) by clicking (left mouse button) the cell while holding the <Ctrl> key (holding the <Shift> key, a selection range can be defined).
- Column select (Grid window) by clicking (left mouse button) the column header.
- Block Window: non consecutive blocks can be copied and moved.
- 'Move before' function added for Blocks.

No.	X [mm]	Y [mm]	Z [mm]
Sum	1000.000	300.000	500.000
0-1	95.897	20.000	500.000
1-2	76.717	2.000	
2-3	61.374	6.000	
3-4	49.099	6.000	
4-5	39.279	9.000	
5-6	31.424	6.000	
6-7	25.139	4.000	
7-8	20.111	2.000	
8-9	16.089	7.000	
9-10	12.871	2.000	
10-11	1.000	2.000	
11-12	16.000	2.000	
12-13	2.000	10.333	

No.	Col.	Xmin	Xmax	Ymin	Ymax	Zmin	Zmax
1	8	10	56	1	51	0	1
2	215	23	43	2	15	0	1
3	215	13	23	12	15	0	1
4	215	43	52	12	15	0	1
5	216	21	45	25	26	0	1
6	216	26	40	26	34	0	1
7	216	31	35	34	39	0	1
8	52	12	17	5	6	0	1

G.1 Online Physibel Toolbox

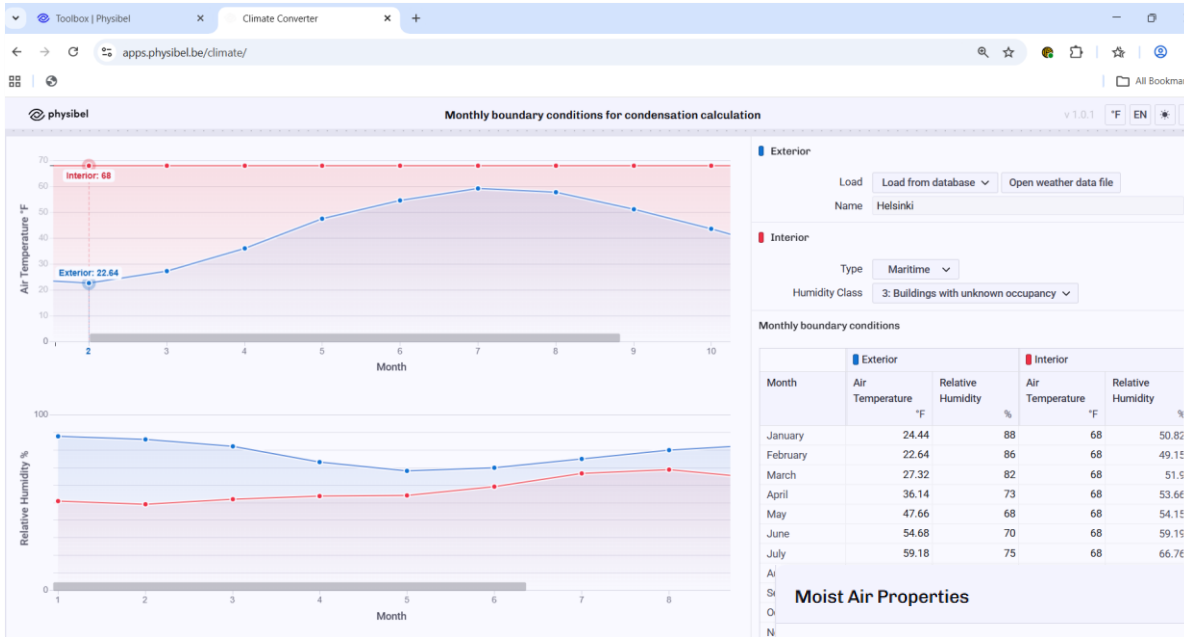
[overview](#)

The screenshot shows the Physibel website interface. The top navigation bar includes 'products', 'licence options', 'industries', 'training', 'support', 'company', and 'cont'. The 'support' menu is expanded, showing 'SUBMIT SUPPORT TICKET', 'KNOWLEDGE BASE', 'CONSULTANCY', and 'TOOLBOX'. A red arrow points to the 'TOOLBOX' link. Below the navigation, the main heading reads 'Building modelling, analyzing and optimizing façade elements'. The text below states: 'With Physibel building physics software, you get the powerful heat transfer engineering software to model, analyze and optimize whole buildings, 2D/3D building components and façade elements, quickly and accurately, in accordance with the most common international standards.'

The Physibel Toolbox is an online suite of practical pre- and postprocessing tools designed to support users throughout their (hygro)thermal analysis workflows.

- Unit Converter for interstitial condensation
- Psychrometrics Calculator
- Glass properties Converter
- Climate Converter for interstitial condensation
- Temperature dependent material property library

G.1 Online Physibel Toolbox

[overview](#)


Moist Air Properties

Input

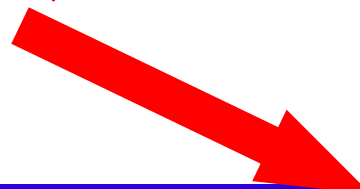
Atmospheric Pressure	101,325	Pa	▼
Air Temperature	20	°C	▼
Relative Humidity	50	%	
Dew Point	9.27	°C	▼

Output

Saturation Vapour Pressure	2,339.2	Pa
Vapour Pressure	1,169.6	Pa
Specific Humidity	7.26	g/kg
Specific Volume	0.84	m ³ /kg
Density	1.19	kg/m ³

Visit the [documentation](#) to learn more.

log in to portal via www.physibel.be



The screenshot shows the Physibel website homepage. At the top left is the Physibel logo. To its right is a navigation menu with links for 'products', 'licence options', 'industries', 'training', 'support', 'company', and 'contact'. Below the navigation menu is a large image of a laptop displaying a 3D thermal simulation of a building facade. To the right of the image is the main content area with the heading 'Building physics software for façade engineering'. Below the heading is a paragraph of text describing the software's capabilities. At the bottom of the content area are two blue buttons: 'DISCOVER OUR SOFTWARE' and 'SCHEDULE TRAINING'. To the right of these buttons is a small circular icon with a red arrow.

physibel

products licence options industries training support company contact

Building physics software for façade engineering

With Physibel software, you get the powerful heat transfer engineering software to analyze and optimize 2D and 3D façade elements - quickly and accurately.

Are you looking for calculations and reporting according to the international standards? Or do you want to gain deeper insight into the thermal behaviour of your façade systems? Physibel offers the most complete thermal façade simulation environment.

DISCOVER OUR SOFTWARE SCHEDULE TRAINING

Access to

- Knowledge Base with [example projects](#), [tutorials](#) and [videos](#)

Knowledge base

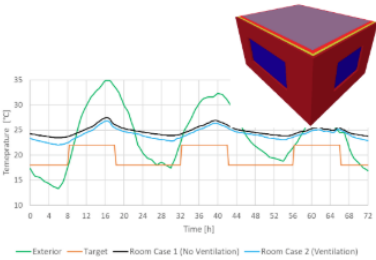
Use the following search fields to quickly find suitable documentation.

🔍

All software
▼

All categories
▼

SEARCH



C17 - Applications of control functions in VOLTRA: case studies on electric floor-heating and night ventilation systems

This document provides a step-by-step guide to implementing control actions in VOLTRA models. It outlines the general workflow for setting up temperature-driven control logic and demonstrates how these strategies can be applied in practice. The methodology is illustrated through two case studies: a 2D electric floor-heating model and a night-ventilation model. In the electric floor-heating case, the control parameters and their use within VOLTRA are explained in detail, offering a complete example applicable to any functions in the software. The second case study focuses on ventilation flow functions, which introduce additional parameters. Together, these examples show how target-temperature-based control can be configured and adapted for different system types.

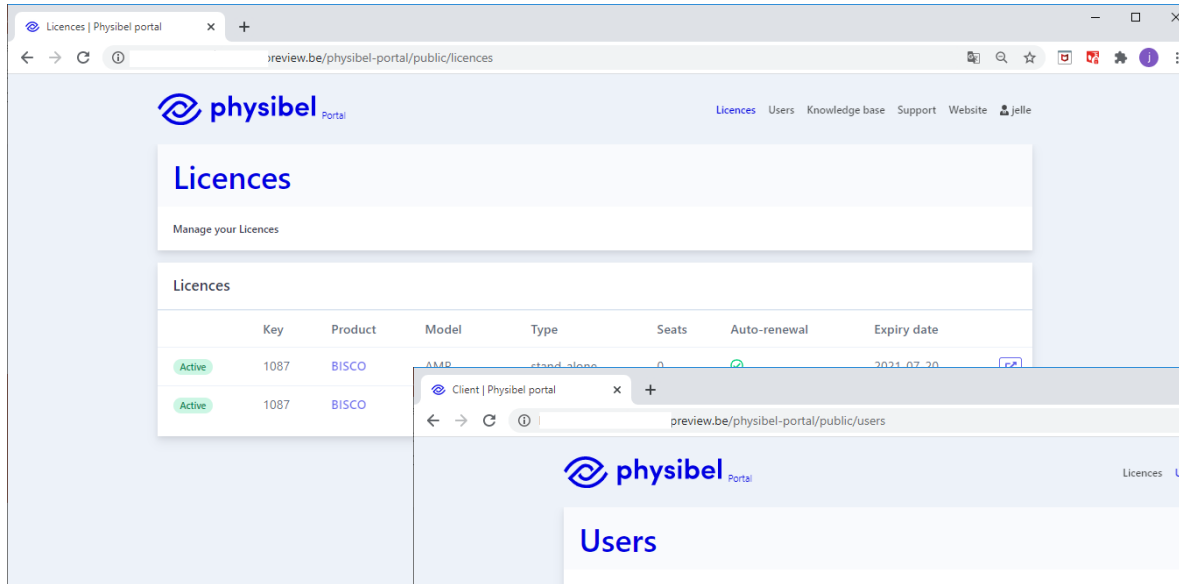
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H.1 Online Physibel Portal

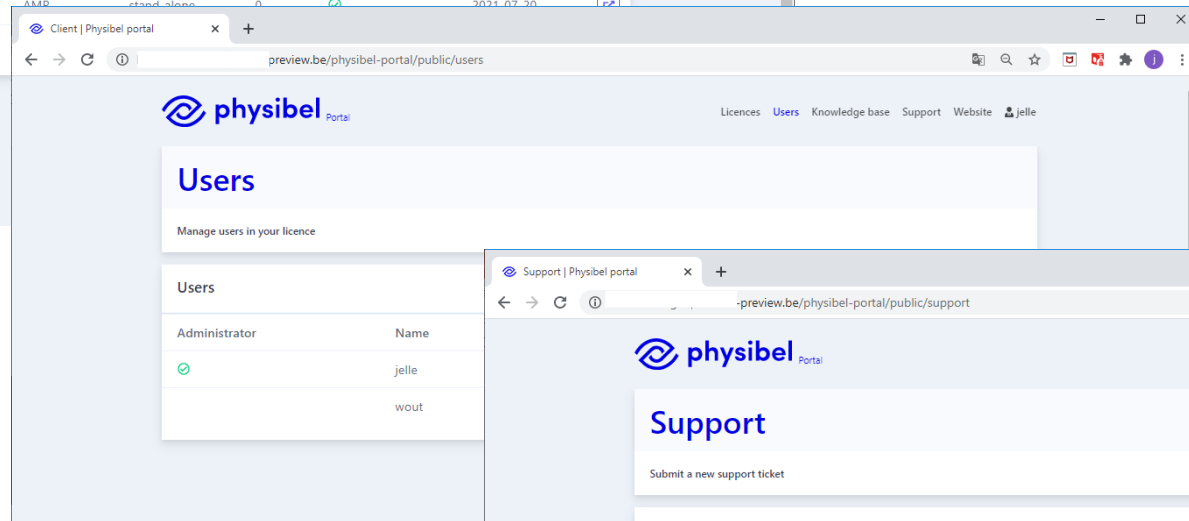
Access to

- Licence and user management
- Support



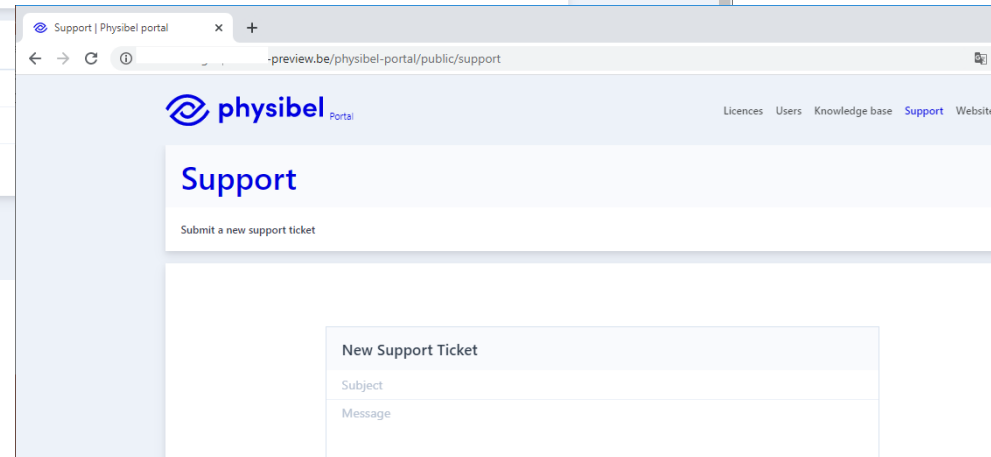
Screenshot of the Physibel Portal Licences page. The page title is "Licences" and the subtitle is "Manage your Licences". The page displays a table of licences with the following columns: Key, Product, Model, Type, Seats, Auto-renewal, and Expiry date. Two licences are listed, both with a status of "Active".

	Key	Product	Model	Type	Seats	Auto-renewal	Expiry date
Active	1087	BISCO	AMP	stand alone	0		2021-07-20
Active	1087	BISCO					



Screenshot of the Physibel Portal Users page. The page title is "Users" and the subtitle is "Manage users in your licence". The page displays a table of users with the following columns: Administrator and Name. Two users are listed: jelle and wout.

Administrator	Name
✓	jelle
	wout



Screenshot of the Physibel Portal Support page. The page title is "Support" and the subtitle is "Submit a new support ticket". The page displays a form for submitting a new support ticket with the following fields: Subject and Message.

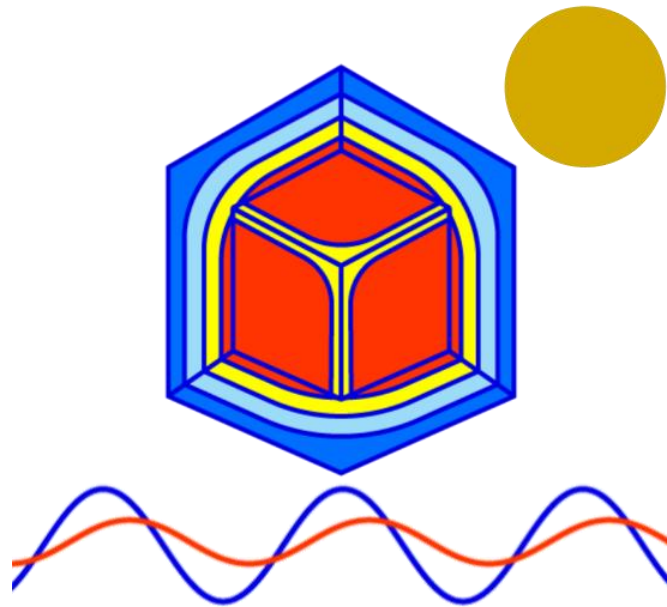
New Support Ticket

Subject

Message



VOLTRA v9 New program performances



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