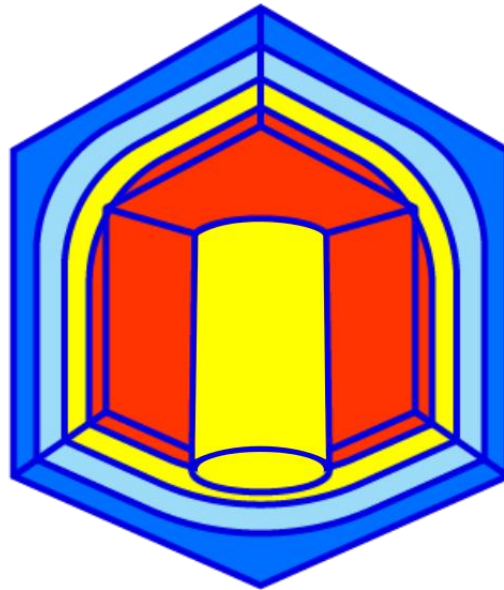




## SOLIDO v5 New program performances



[www.physibel.be/en/products/solido](http://www.physibel.be/en/products/solido)

# SOLIDO v5 – Overview

[overview](#)

## A [Improved STL file handling](#)

- A.1 Import of multiple STL files in 1 step
- A.2 Dragging of STL files (selecting any point)
- A.3 Improved algorithms for STL transformations
- A.4 Automatic colour index assignment to STL blocks
- A.5 Block points of the bounding box STL file available

## B [Geometrical modelling and graphic visualisation performance](#)

- B.1 Orthogonal and transparent views
- B.2 Rotate 3D object (pan 2D view) with mouse wheel
- B.3 New function to drag (multiple) block(s) with mouse
- B.4 New function 'Enable' to quickly include/exclude block(s) from model
- B.5 Improved graphic visualisation performance
- B.6 Miscellaneous

## C [Revision of Colours Window](#)

- C.1 Allows conformity with different EN standards
- C.2 Customisable Colour Database

## D [EN ISO standards](#)

- D.1 Cavities and layers according to EN ISO 6946
- D.2 Cavities according to EN ISO 10077-2

## E [Grid generation and calculation of view factors](#)

- E.1 Improved algorithm: "AutoGrid Generation"
- E.2 Improved algorithms for view factor calculations (RADCON)

## F [Graphic output and Text output](#)

- F.1 Legend
- F.2 New thermal Palette
- F.3 Export text output in .csv format
- F.4 Miscellaneous

## G [Compatibility with BISCO and TRISCO & Trisco2D](#)

- G.1 Areas and U-values from TRISCO files read
- G.2 Trisco2D and BISCO files can be imported and extruded in 3D according to user preferences

## H [Online Physibel Portal](#)

- H.1 User management
- H.2 Support
- H.3 Physibel Knowledge Base

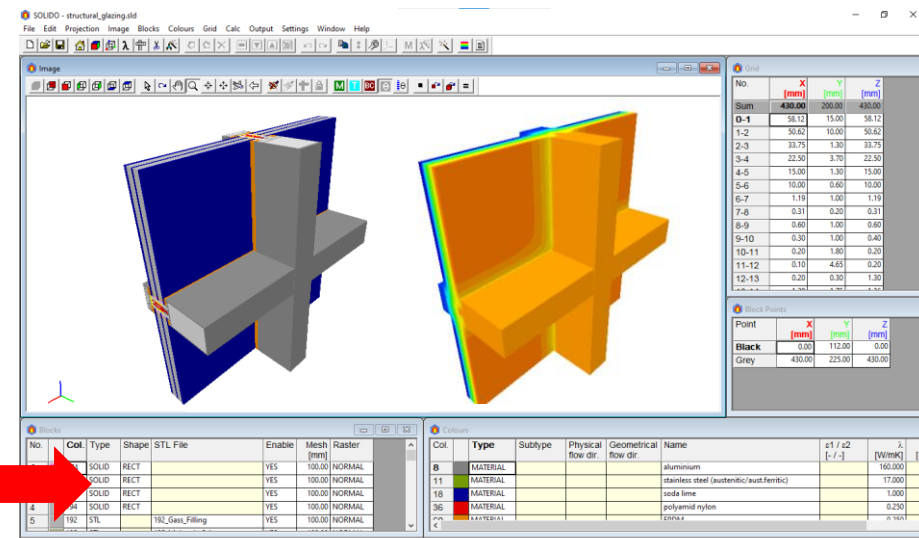
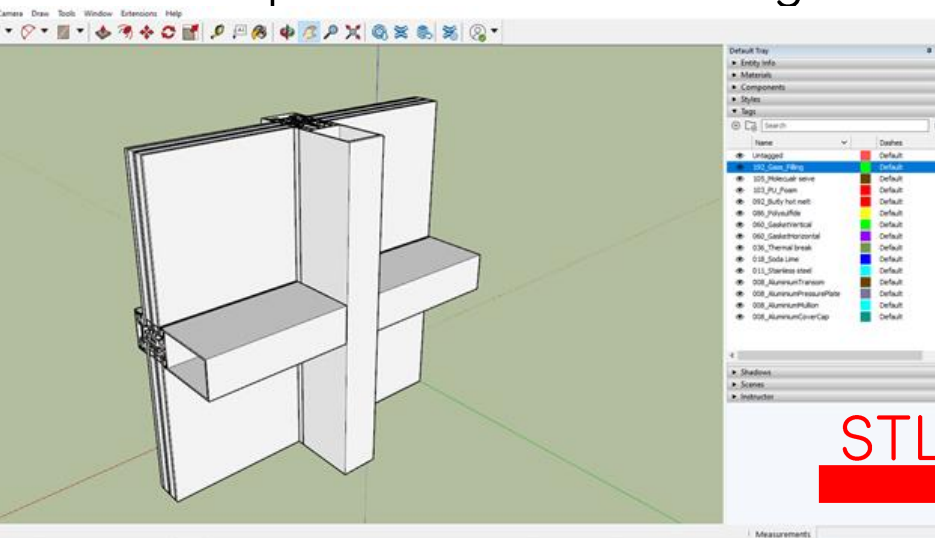
## I [Licencing](#)

- I.1 Perpetual licence (USB key)
- I.2 Subscription licence (software key)

# A. Improved STL file handing

Several new and improved functions **increase the speed to model** geometries imported **via STL files** (created by e.g. Revit, Rhino, Sketchup...)

- Import of multiple STL files in 1 step
- Dragging of STL files (selecting any point)
- Improved algorithms for STL transformations
- Automatic colour index assignment to STL blocks
- Block points of the bounding box STL file available

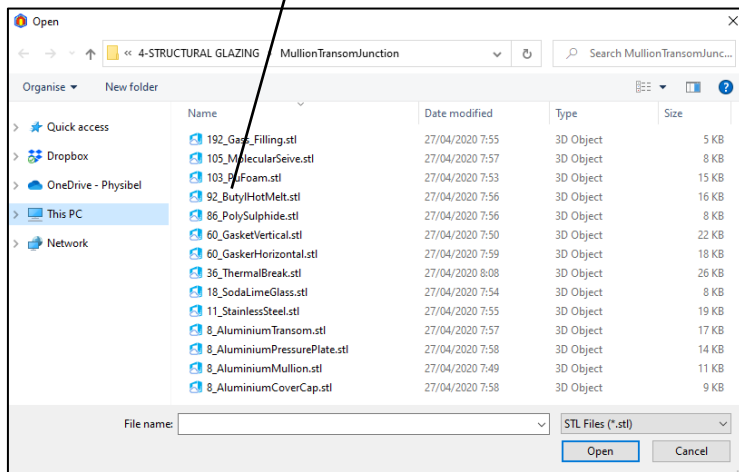
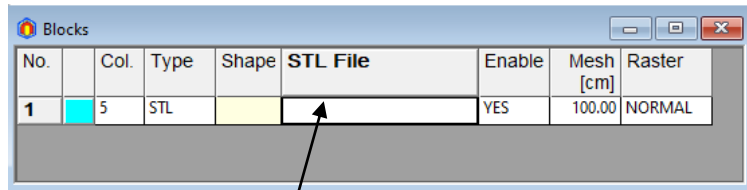


From SOLID-modelling software to thermal output in SOLIDO in a few clicks

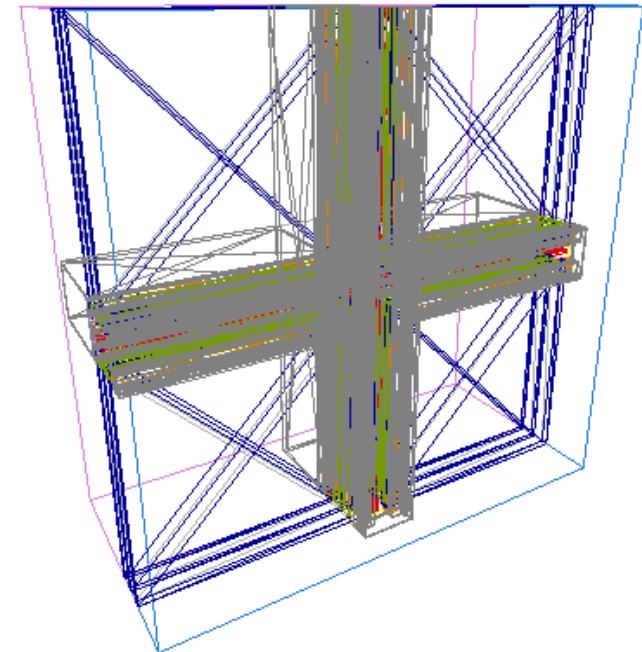
# A.1 Import of multiple STL files in 1 step

[overview](#)

Multiple STL files can be selected



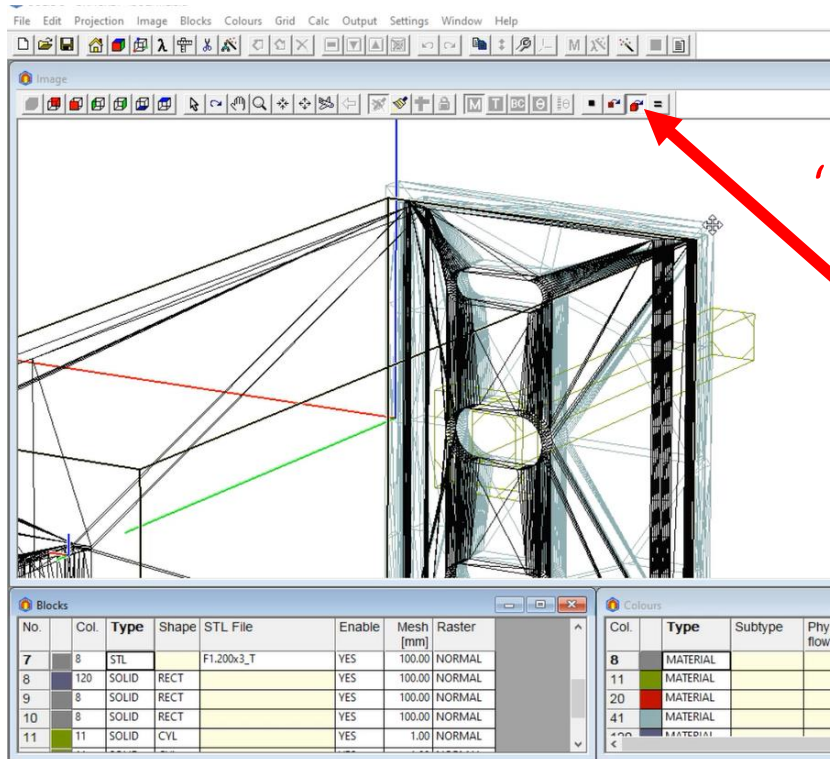
No.	Col.	Type	Shape	STL File	Enable	Mesh [cm]	Raster
1	192	STL		192_Gass_Filling	YES	100.00	NORMAL
2	105	STL		105_MolecularSeive	YES	100.00	NORMAL
3	103	STL		103_PuFoam	YES	100.00	NORMAL
4	92	STL		92_ButylHotMelt	YES	100.00	NORMAL
5	86	STL		86_PolySulphide	YES	100.00	NORMAL
6	60	STL		60_GasketVertical	YES	100.00	NORMAL
7	60	STL		60_GasketHorizontal	YES	100.00	NORMAL
8	36	STL		36_ThermalBreak	YES	100.00	NORMAL
9	18	STL		18_SodaLimeGlass	YES	100.00	NORMAL
10	11	STL		11_StainlessSteel	YES	100.00	NORMAL
11	8	STL		8_AluminiumTransom	YES	100.00	NORMAL
12	8	STL		8_AluminiumPressurePlate	YES	100.00	NORMAL
13	8	STL		8_AluminiumMullion	YES	100.00	NORMAL
14	8	STL		8_AluminiumCoverCap	YES	100.00	NORMAL



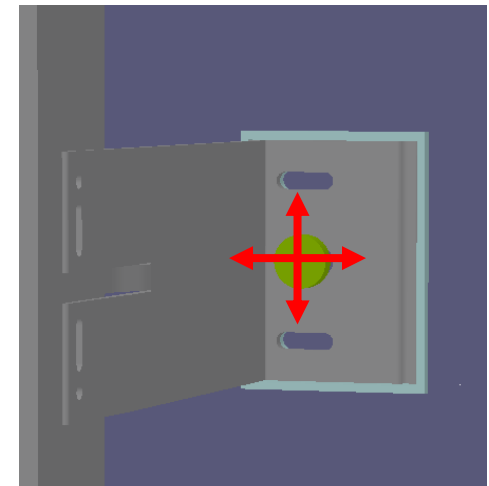
By using the colour index in the STL file, the properties are automatically recognized (see [A.4](#))

## A.2 Dragging of STL files (selecting any point)

- New function 'Drag block' allows to **quickly position** STL blocks with mouse
- Any STL point can be used for dragging
- New position of point in blue during dragging
- Snapping suggestions are given during dragging

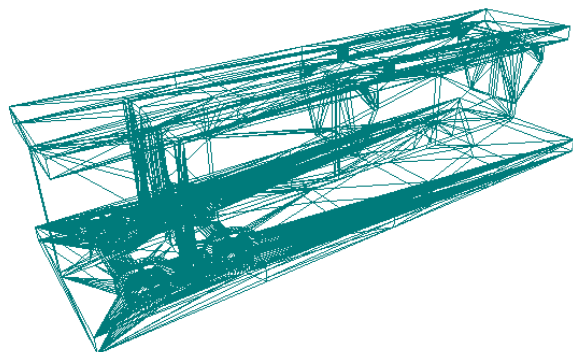


'Drag block'

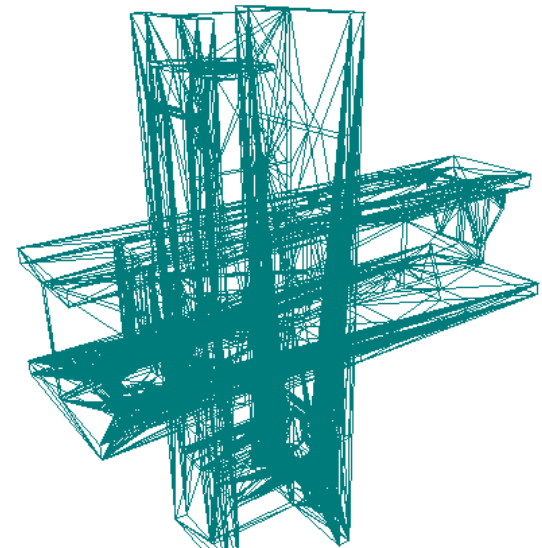


# A.3 Improved algorithms for STL transformations

- No need anymore to save the new STL file after every transformation
- A request to save to adjusted STL file is appearing when saving the project:
  - YES = file names + '\_T'
  - No = overwrite existing STL files
  - Cancel = do not save modified STL files
- Several bug fixes in STL transformation functions (translate, rotate, scale)



copy & rotate beam



No.	Col.	Type	Shape	STL File	Enable	Mesh [cm]	Raster
1	13	STL		BEAM	YES	100.00	NORMAL

No.	Col.	Type	Shape	STL File	Enable	Mesh [cm]	Raster
1	13	STL		BEAM	YES	100.00	NORMAL
2	13	STL		BEAM_T	YES	100.00	NORMAL

# A.4 Automatic colour index assignment to STL blocks

[overview](#)

Link material properties/boundary conditions via colour index to STL file name

The screenshot illustrates the workflow for linking material properties to STL blocks. It shows three main windows:

- Open Dialog:** Displays a list of STL files in the 'Tutorial\_c' folder. A red box highlights the first four files: '8\_AluminiumCoverCap.stl', '8\_AluminiumMullion.stl', '8\_AluminiumPressurePlate.stl', and '8\_AluminiumTransom.stl'. A red arrow points from this box to the 'Blocks' table.
- 3D Model:** A 3D rendering of a cross-shaped structure, likely representing the assembly of the selected STL files.
- Blocks Table:** A table listing the loaded blocks. The first four rows correspond to the highlighted STL files. A red arrow points from the 'Col.' column (index 8) to the 'Colours' table.
- Colours Table:** A table defining material properties. The first row, with 'Col.' 8 and 'Type' MATERIAL, is highlighted. A red arrow points from the 'Col.' column (index 8) in the 'Blocks' table to this row.

Colour index defined in adjustable **Colour database** with frequently used materials and boundary conditions ([see C.2](#))

No.	Col.	Type	Shape	STL File	Enable	Mesh [cm]	Raster
1	8	STL		8_AluminiumCoverCap	YES	100.00	NORMAL
2	8	STL		8_AluminiumMullion	YES	100.00	NORMAL
3	8	STL		8_AluminiumPressurePlate	YES	100.00	NORMAL
4	8	STL		8_AluminiumTransom	YES	100.00	NORMAL

Col.	Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	$\epsilon_1 / \epsilon_2$ [- / -]	$\lambda$ [W/mK]
8	MATERIAL				aluminium		160.000

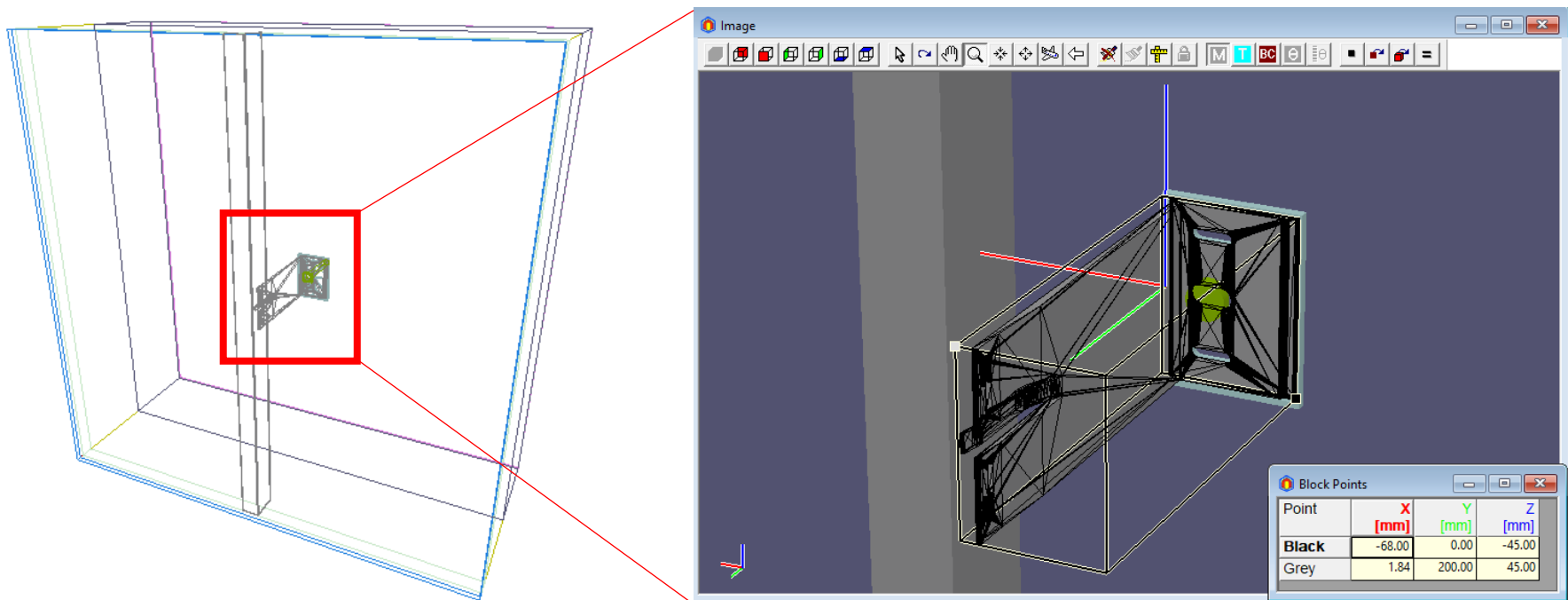


## A.5 Block points of the bounding box STL file

A bounding box with **block points** is now available for each STL-file which **simplifies positioning STL objects** in the coordinate system

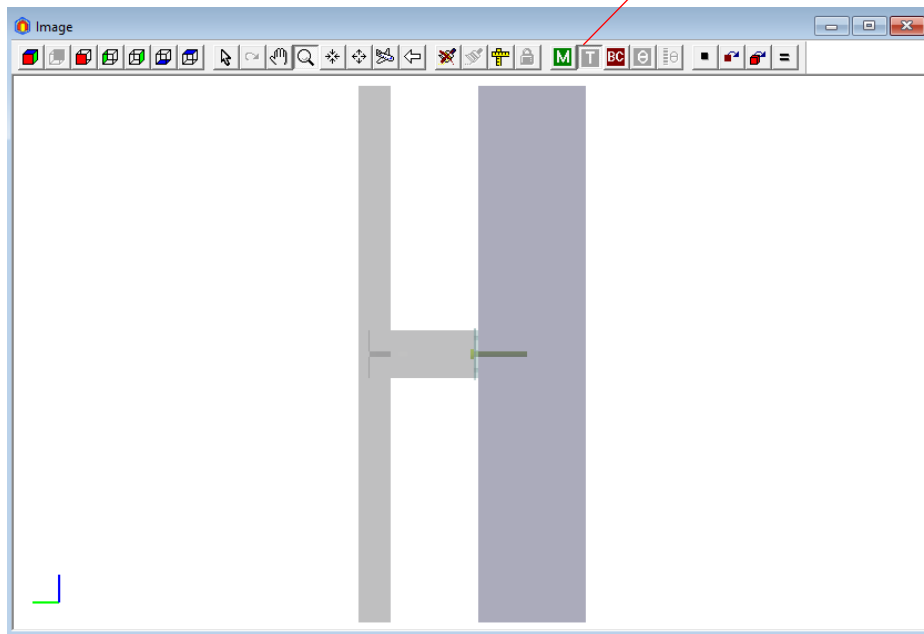
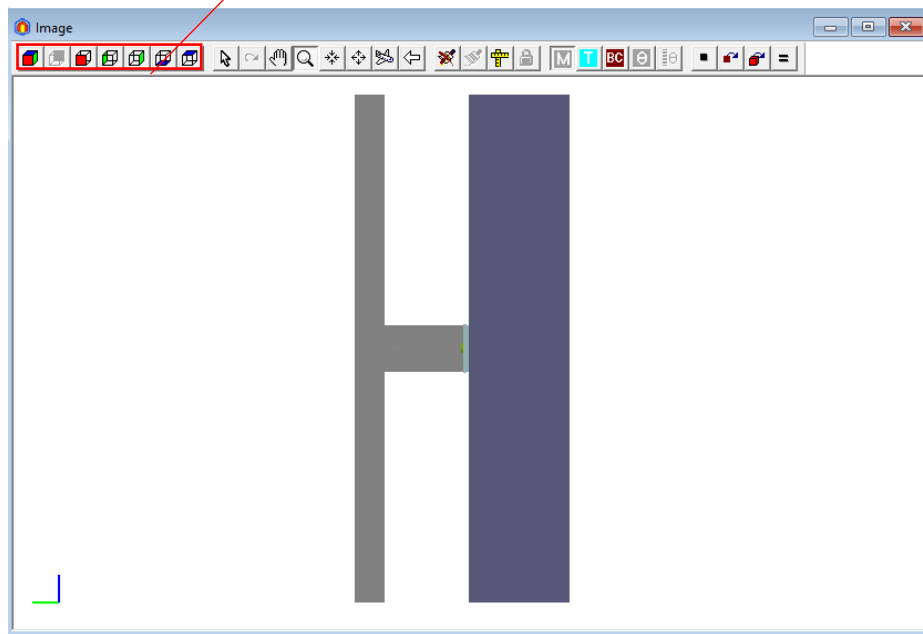
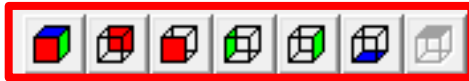
Example: rainscreen cladding wall

- Dragging the bracket and insulator via the block points of the STL-file





# B.1 Orthogonal and transparent views



## B.2 Rotate 3D object (pan 2D view) with mouse wheel

[overview](#)

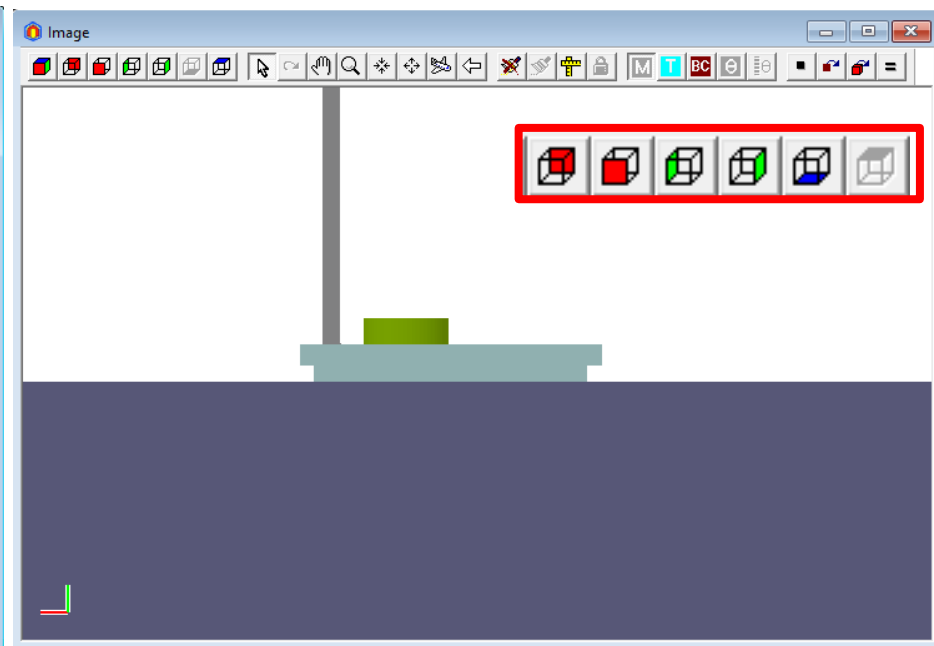
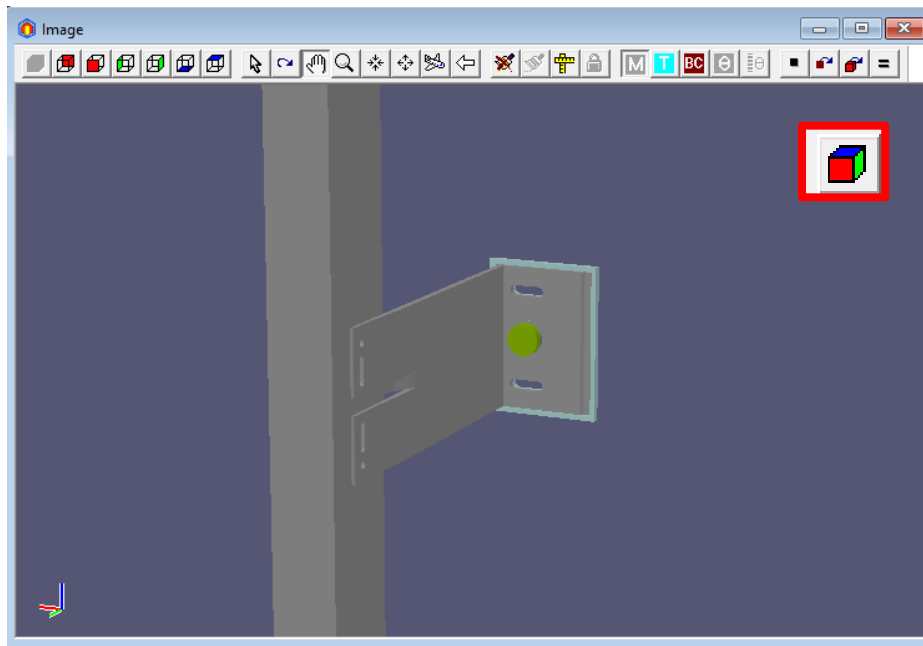
Mouse wheel actions:

Perspective view:

- Scroll to zoom
- Press to rotate

Orthogonal view:

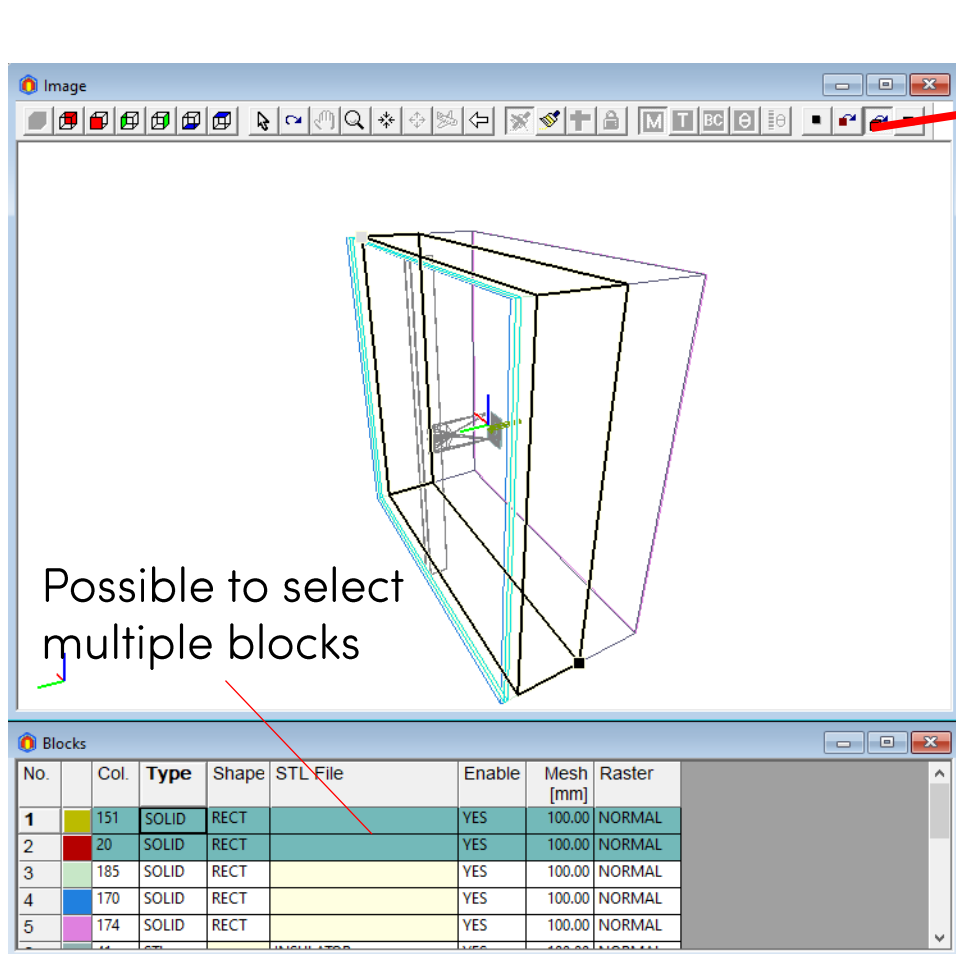
- Scroll to zoom
- Press to pan



# B.3 New function to drag (multiple) block(s) with mouse

[overview](#)

- New function 'Drag block' allows to **quickly position** 1 or more blocks with mouse
- Snapping suggestions are given during dragging



The screenshot shows a 3D modeling software interface. At the top, a toolbar contains various icons, with the 'Drag block' icon (a red cube with a blue arrow) highlighted by a red box and labeled 'Drag block'. Below the toolbar is a 3D view of a rectangular prism composed of several smaller blocks. A red arrow points from the text 'Possible to select multiple blocks' to the blocks in the 3D view. At the bottom, a 'Blocks' panel displays a table of block properties.

Possible to select multiple blocks

No.	Col.	Type	Shape	STL File	Enable	Mesh [mm]	Raster
1	151	SOLID	RECT		YES	100.00	NORMAL
2	20	SOLID	RECT		YES	100.00	NORMAL
3	185	SOLID	RECT		YES	100.00	NORMAL
4	170	SOLID	RECT		YES	100.00	NORMAL
5	174	SOLID	RECT		YES	100.00	NORMAL

Dragging restriction options:  
 <Shift> only in X  
 <Alt> only in Y  
 <Ctrl> only in Z

New position in status bar

New position: (-452.00,-51.00,-500.00) dx=48.00 dy=-46.00 dz=0.00

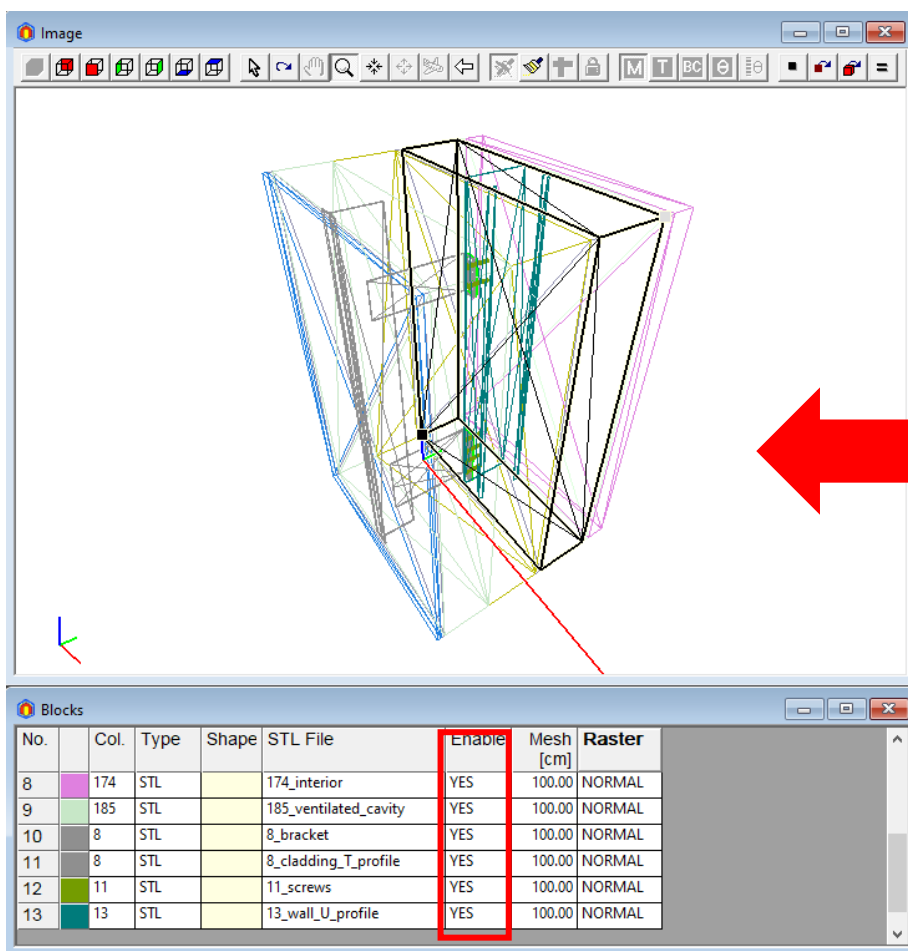
## B.4 New function 'Enable'

[overview](#)

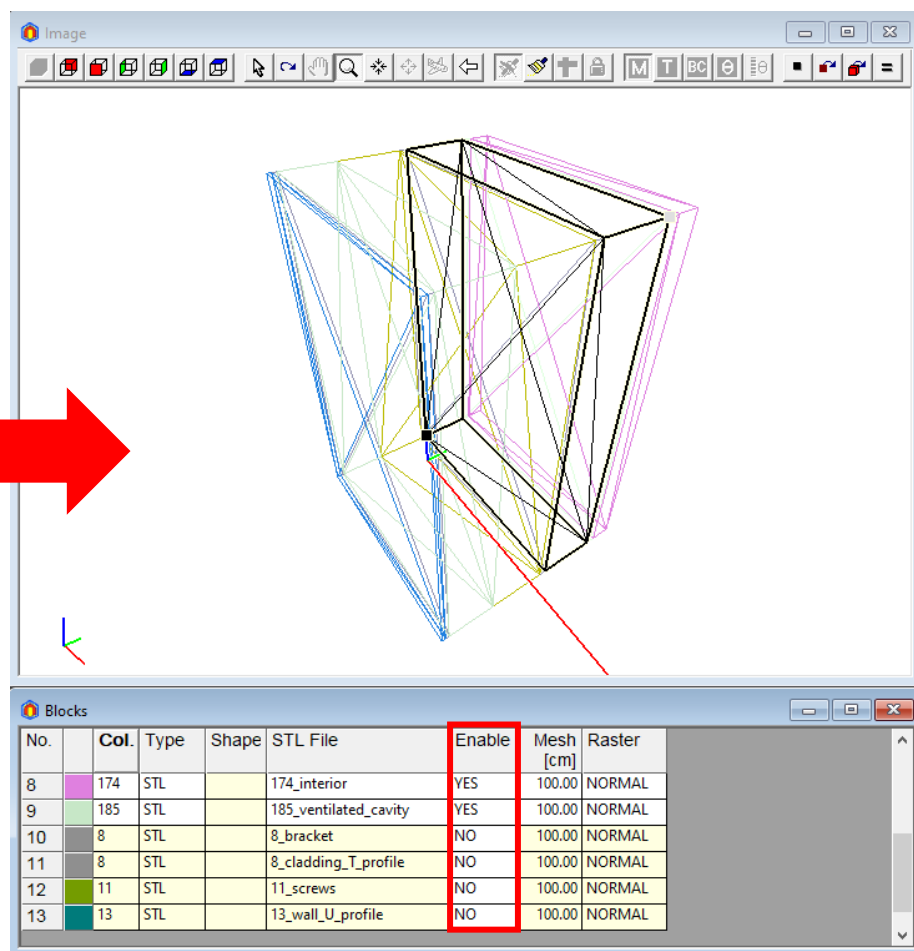
New function 'Enable' to quickly include/exclude block(s) from model

Example: rainscreen bracket wall

Simulation **with** bracket and screws



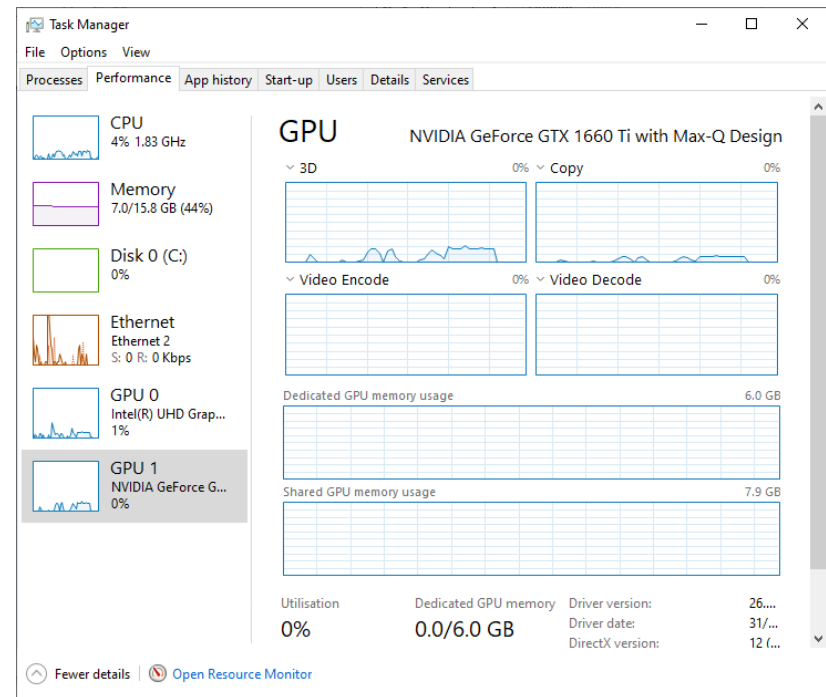
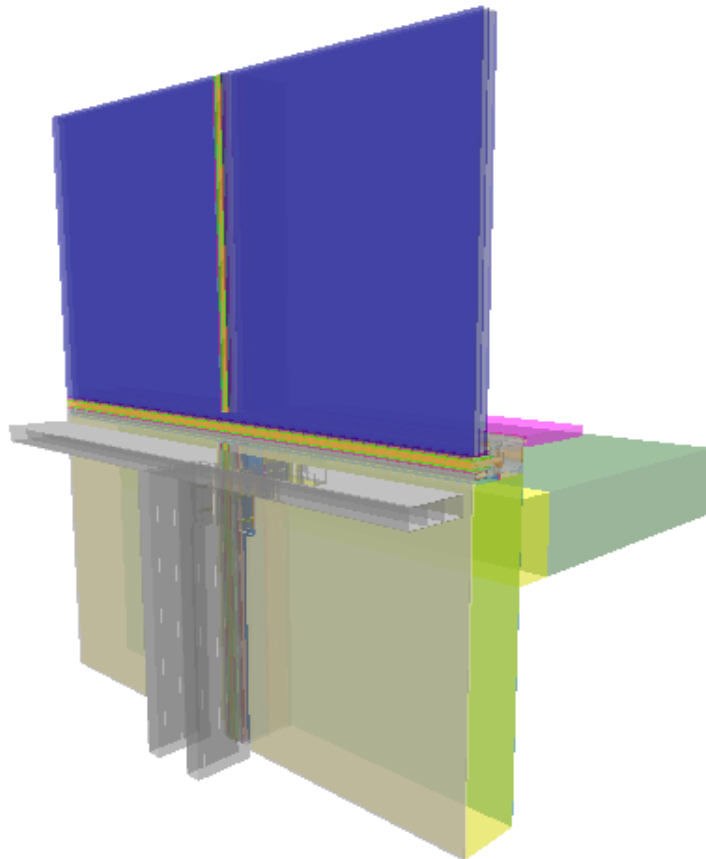
Simulation **without** bracket and screws



# B.5 Improved graphic visualisation performance

[overview](#)

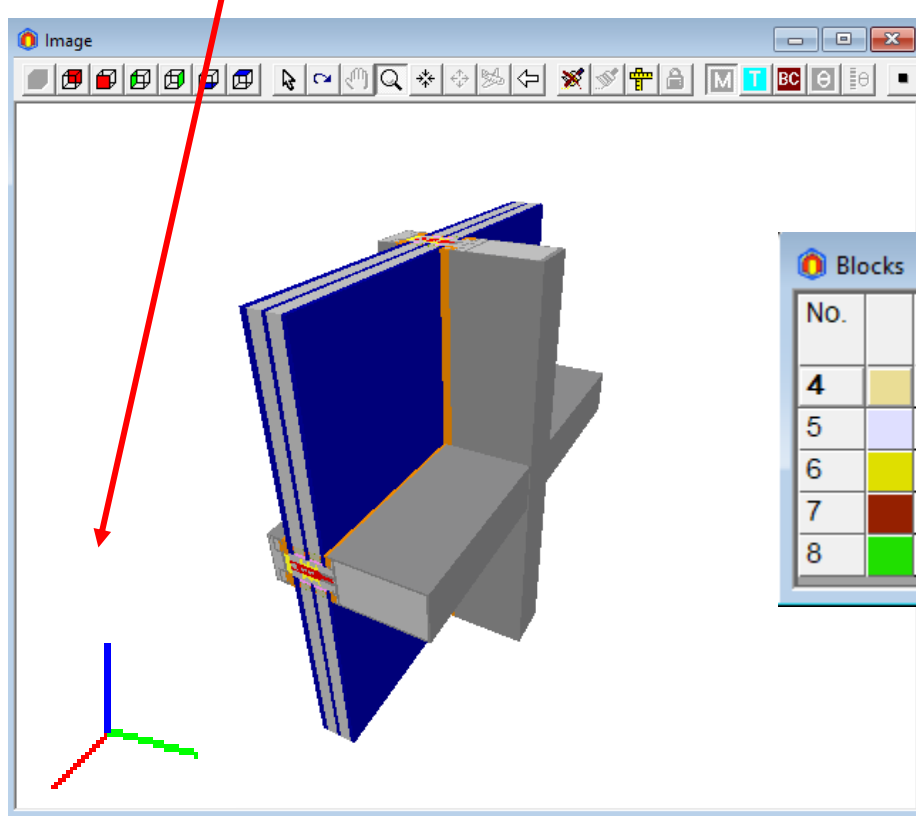
- Adjusted algorithm improves 3D visualization, avoiding sporadic crashes when relying on an integrated graphic processor (INTEL)
- Automatic selection of high-performance dedicated GPU (AMD or Nvidia) if present to ensure high quality 3D visualization of complex models



## B.6 Miscellaneous

[overview](#)

1. New function 'Make property global' to change a property for all the blocks in the Blocks window (e.g. changing Mesh Size for all blocks)
2. Non-consecutive blocks can be copied and moved
3. 'Raster' and 'Mesh' properties moved to Blocks window
4. Coordinate system in left corner of Image window



The Blocks window contains a table with the following data:

No.	Col.	Type	Shape	STL File	Enable	Mesh [cm]	Raster
4	15	SOLID	RECT		YES	100.00	NORMAL
5	129	SOLID	RECT		YES	100.00	NORMAL
6	135	SOLID	RECT		YES	100.00	NORMAL
7	148	SOLID	RECT		YES	100.00	NORMAL
8	131	SOLID	RECT		YES	100.00	NORMAL

A red arrow points from the first item in the list above to the 'Mesh [cm]' column header in the table.



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

- Rule  $\rightarrow$  Subtype
- Physical flow direction (**horizontal, up, down**): defined by the user (and standard)
- Geometrical flow direction (**X, Y, Z**)
- Standard (**EN10077, EN6946**)
- $\epsilon_1 / \epsilon_2$ : emissivities linked to a cavity ("single equivalent thermal conductivity method")
- $\epsilon$  emissivity linked to a material ("radiosity method")

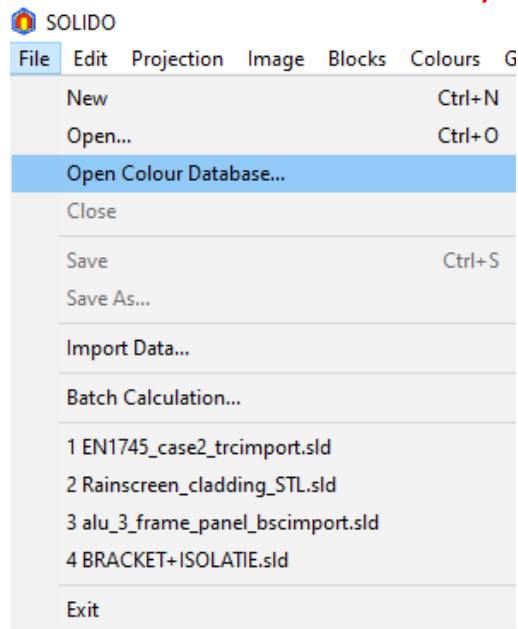
[illegible]



## 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.**



The 'Colours' window displays a table with the following columns: Col., Type, Subtype, Physical flow dir., Geometrical flow dir., Name,  $\epsilon_1 / \epsilon_2$  [- / -],  $\lambda$  [W/mK], and  $\epsilon$  [-]. The table lists 16 materials with their corresponding color swatches and thermal properties.

Col.	Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	$\epsilon_1 / \epsilon_2$ [- / -]	$\lambda$ [W/mK]	$\epsilon$ [-]
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/m3		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 EN ISO 6946 – cavities and layers

[overview](#)

Implementation of **air layers** according to **EN ISO 6946**

Example: wall junction with non-ventilated air layers in wall

SOLIDO - wooden\_frame\_corner\_psi\_M1\_trcimport.sld

File Edit Projection Image Blocks Colours Grid Calc Output Settings Window Help

Image

Grid

Block Points

Blocks

Colours

No.	X [mm]	Y [mm]	Z [mm]
Sum	1485.00	1270.00	1000.00
0-1	5.00	5.00	1000.00
1-2	5.00	5.00	
2-3	5.00	5.00	
3-4	5.00	5.00	
4-5	5.00	5.00	
5-6	5.00	5.00	
6-7	5.00	5.00	
7-8	5.00	5.00	
8-9	5.00	5.00	
9-10	5.00	5.00	
10-11	5.00	5.00	
11-12	5.00	5.00	
12-13	5.00	5.00	

Point	X [-]	Y [-]	Z [-]
Black	5	5	0
Grey	298	8	1

No.	Col.	Type	Shape	STL File	Enable	Mesh [mm]	Re
4	124	SOLID	RECT		YES	100.00	NO
5	124	SOLID	RECT		YES	100.00	NO
6	15	SOLID	RECT		YES	100.00	NO
7	151	SOLID	RECT		YES	100.00	NO

Col.	Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	$\varepsilon_1 / \varepsilon_2$ [- / -]	$\lambda$ [W/mK]	$\varepsilon$ [-]	$\theta$ [°C]	$h$ [W/m²K]	$q$ [W/m²]	$\theta_a$ [°C]	$h_c$ [W/m²K]	$P_c$ [W]	$\theta_r$ [°C]	Standard
151	MATERIAL				insulation 0.035 W/mK		0.035									
170	BC_SIMP	HE			exterior				0.0	25.00	0					EN6946
174	BC_SIMP	HI	HOR		interior (normal)				20.0	7.70	0					EN6946
192	EQUIMAT	LAYER	HOR	Y	cavity non-vent horizontal flow	0.90 / 0.90	-									EN6946
194	EQUIMAT	LAYER	HOR	X	cavity non-vent horizontal flow	0.90 / 0.90	-									EN6946

MATERIAL = material with user defined thermal conductivity

# D.1 EN ISO 6946 – cavities and layers

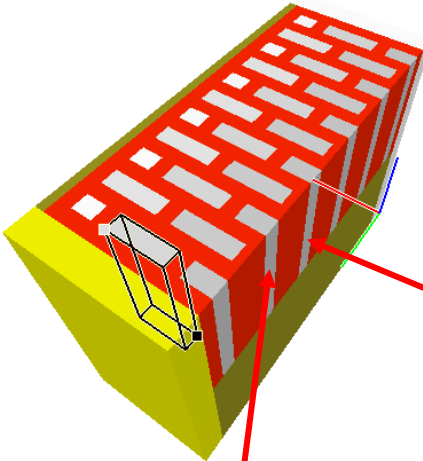
[overview](#)

Implementation of **cavities** according to **EN ISO 6946**  
 Example: air cavities in masonry (EN ISO 1745)

SOLIDO - EN1745\_case2\_trcimport.sld

File Edit Projection Image Blocks Colours Grid Calc Output Settings Window Help

Image



Grid

No.	X [mm]	Y [mm]	Z [mm]
Sum	132.50	365.20	250.00
0-1	2.00	2.00	26.33
1-2	2.00	2.00	21.06
2-3	2.00	2.00	16.85
3-4	1.50	2.00	13.48
4-5	2.00	2.00	10.78
5-6	2.00	2.00	8.63
6-7	2.00	2.00	6.90
7-8	2.00	2.00	5.52
8-9	2.00	2.00	4.42
9-10	2.00	2.00	3.53
10-11	2.00	2.00	3.00
11-12	2.00	2.00	3.00
12-13	0.30	2.00	3.00

Block Points

Point	X [-]	Y [-]	Z [-]
Black	19	161	15
Grey	45	169	25

Blocks

No.	Col.	Type	Shape	STL File	Enable	Mest [mm]
28	212	SOLID	RECT		YES	100.00
29	213	SOLID	RECT		YES	100.00
30	214	SOLID	RECT		YES	100.00
31	215	SOLID	RECT		YES	100.00

Colours

Col.	Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	$\epsilon_1 / \epsilon_2$ [- / -]	$\lambda$ [W/mK]	$\epsilon$ [-]	$\theta$ [°C]	$h$ [W/m²K]	$\alpha$ [W/m²K]	$\theta_a$ [°C]	$h_c$ [W/m²K]	$P_c$ [W]	$\theta_r$ [°C]	Standard
215	EQUIMAT	CAVITY	HOR	Yx	cavity type 2	0.90 / 0.90	0.078									EN6946
216	EQUIMAT	CAVITY	HOR	Yx	cavity type 2	0.90 / 0.90	0.078									EN6946
217	EQUIMAT	CAVITY	HOR	Yx	cavity type 2	0.90 / 0.90	0.078									EN6946
218	EQUIMAT	CAVITY	HOR	Yx	cavity type 2	0.90 / 0.90	0.078									EN6946
219	EQUIMAT	CAVITY	HOR	Yx	cavity type 2	0.90 / 0.90	0.078									EN6946

Ready

# D.2 Cavities according to EN ISO 10077-2

Implementation of **cavities** according to **EN ISO 10077-2**  
 Example: window frame in 3D

SOLIDO - alu\_3\_frame\_panel\_bscimport.sld

File Edit Projection Image Blocks Colours Grid Calc Output Settings Window Help

Image

Grid

No.	X [mm]	Y [mm]	Z [mm]
Sum	580.00	182.00	1000.00
0-1	2.00	2.00	1000.00
1-2	2.00	2.00	
2-3	2.00	2.00	
3-4	2.00	2.00	
4-5	2.00	2.00	
5-6	2.00	2.00	
6-7	2.00	2.00	
7-8	2.00	2.00	
8-9	1.00	2.00	
9-10	1.00	2.00	
10-11	2.00	2.00	
11-12	2.00	2.00	
12-13	2.00	2.00	

Block Points

Point	X [mm]	Y [mm]	Z [mm]
Black	0.00	8.00	0.00
Grey	228.00	190.00	1000.00

Blocks

No.	Col.	Type	Shape	STL File	Enable	Mesh [0.5 mm]
1	8	STL		008_alu_3_frame_panel	YES	100.00
2	28	STL		028_alu_3_frame_panel	YES	100.00
3	44	STL		044_alu_3_frame_panel	YES	100.00
4	60	STL		060_alu_3_frame_panel	YES	100.00
5	73	STL		073_alu_3_frame_panel	YES	100.00

Colours

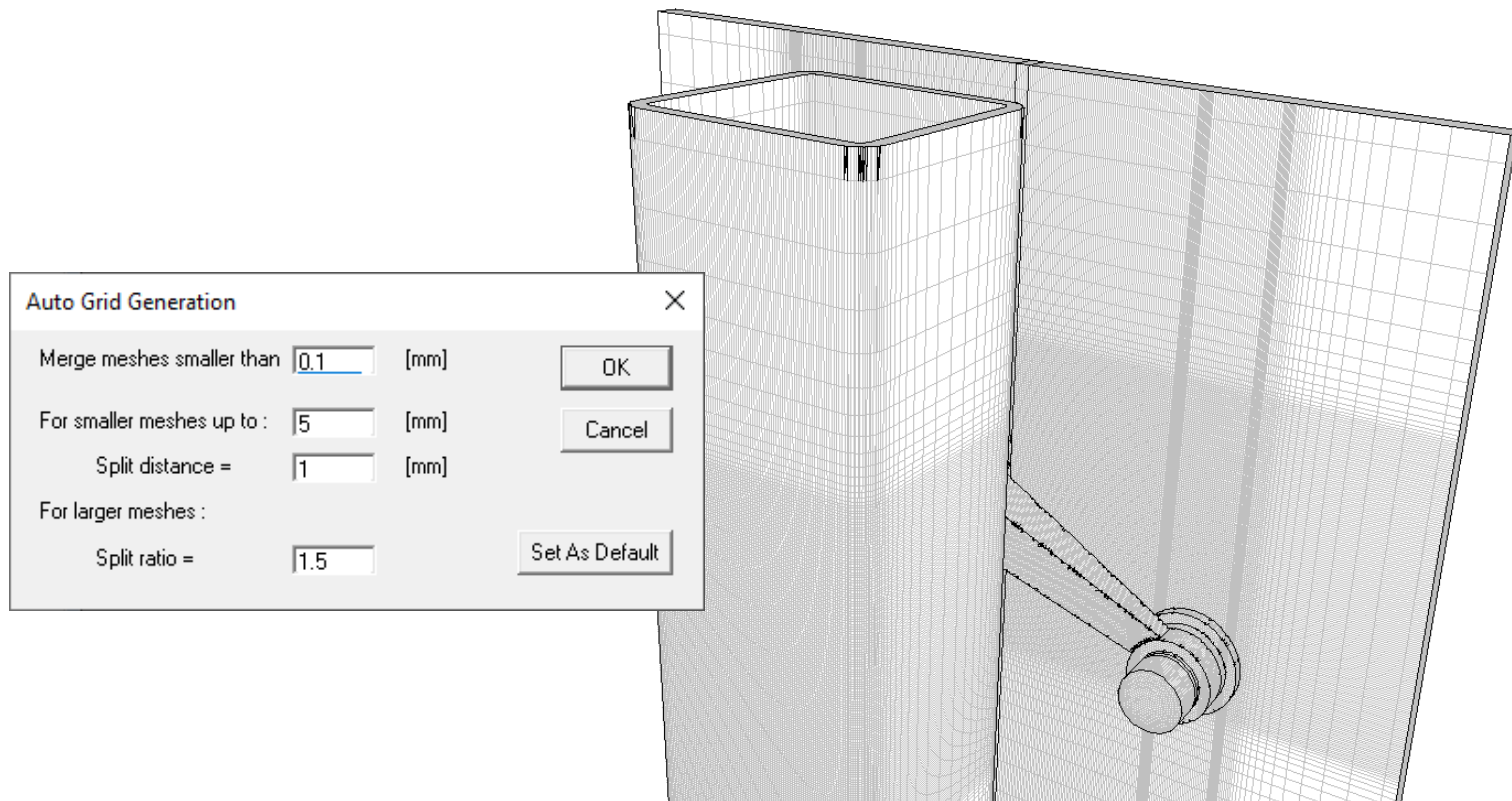
Col.	Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	$\epsilon_1 / \epsilon_2$ [- / -]	$\lambda$ [W/m²K]	$\epsilon$ [-]	$\theta$ [°C]	$h$ [W/m²K]	$q$ [W/m²]	$\theta_a$ [°C]	$h_c$ [W/m²K]	$P_c$ [W]	$\theta_r$ [°C]	Standard
60	MATERIAL				EPDM		0.250									
73	MATERIAL				aluminium		160.000									
192	EQUIMAT	CAVITY	HOR	Yx		0.90 / 0.90	0.030									EN10077
193	EQUIMAT	CAVITY	HOR	Yx		0.90 / 0.90	0.171									EN10077
194	EQUIMAT	CAVITY	HOR	Yx		0.90 / 0.90	0.147									EN10077

MATERIAL = material with user defined thermal conductivity

# E.1 Improved algorithm: "AutoGrid Generation"

[overview](#)

- "AutoGrid Generation" generates suitable calculation grid
- The algorithm is improved, speeding up the automatic grid generation process

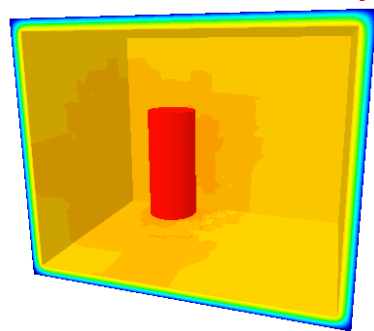


## E.2 Improved algorithm for view factor calculations

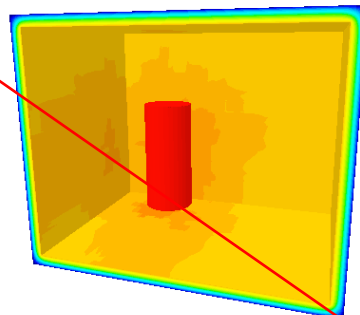
[overview](#)

Improvements in the RADCON-module (radiosity method for IR-radiation)

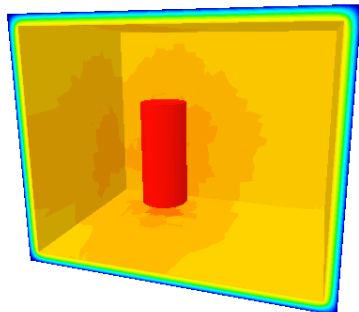
- Increased calculation speed due to improved neighbouring nodes algorithm for view factor zones (RADCON)
- Increased calculation speed due to improved algorithm when clustering viewfaces in viewfactor zone (RADCON)



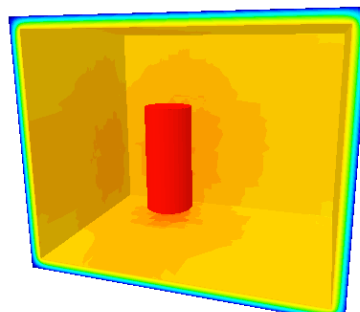
50 faces → 1125 VF



250 faces → 31 125 VF



500 faces → 124 875 VF



750 faces → 280 875 VF

Calculation Parameters

Iterations

Maximum number of iteration cycles

5

Maximum number of iterations within each iteration cycle

5000

Maximum temperature difference within each iteration cycle

0.0001

°C

Maximum temperature difference between iteration cycles

0.001

°C

Max. heat flow divergence for total object

0.001

%

Max. heat flow divergence for any node

1

%

Radiation

☒ Linear
 ☐ Non-linear

Black radiation heat transfer coefficient (linear radiation)

5.25

W/(m².K)

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

500

Automatic calculation of thermal properties

Recalculation of thermal values (before each iteration cycle)

☒ Yes
 ☐ No

Default temperature difference across airspace

10

°C

OK

Cancel

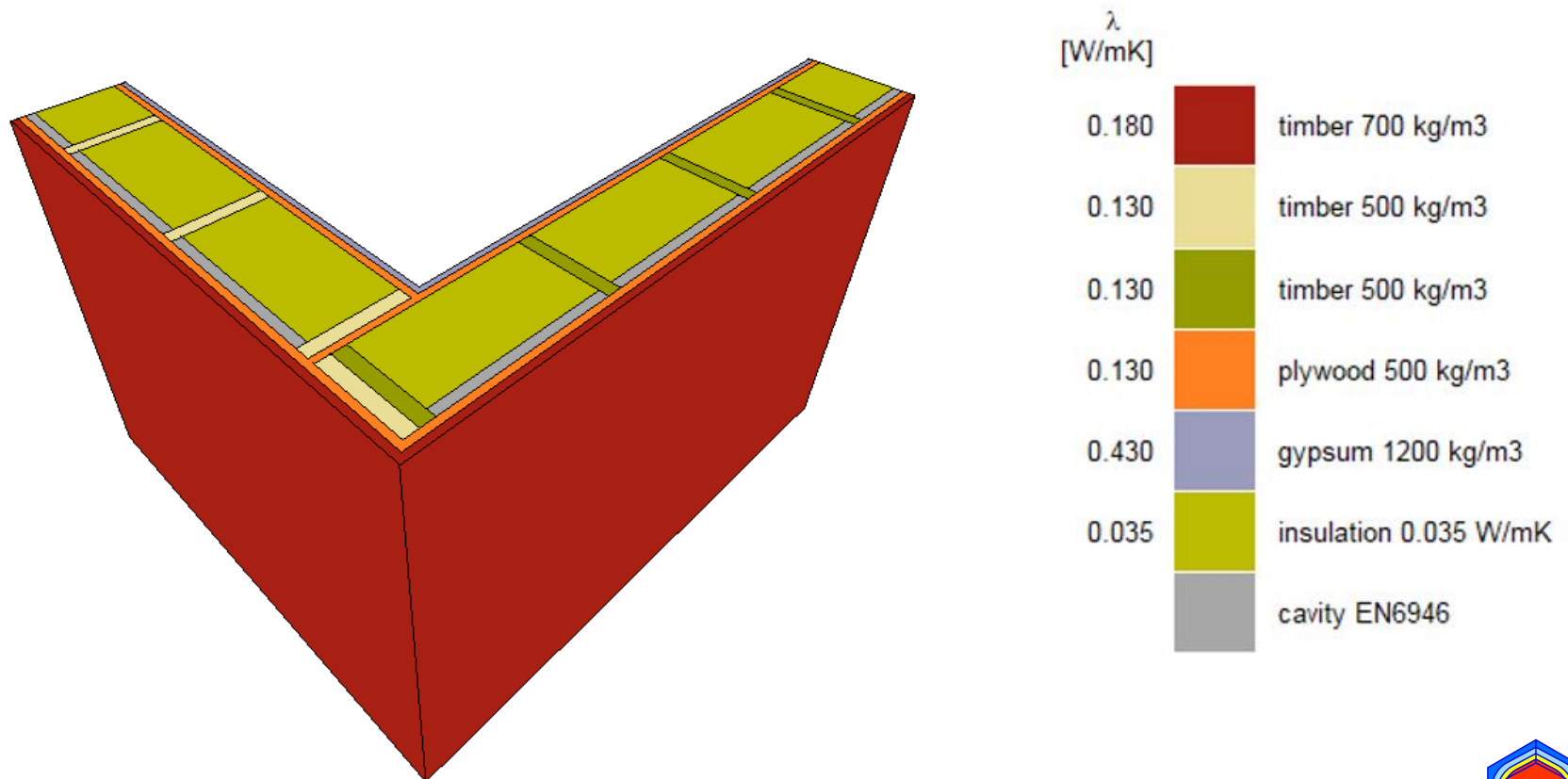
Set As Default

# F.1 Graphic output – Legend

[overview](#)

Fill materials

→ revised legend: material name + clustered cavities (with relevant standard)



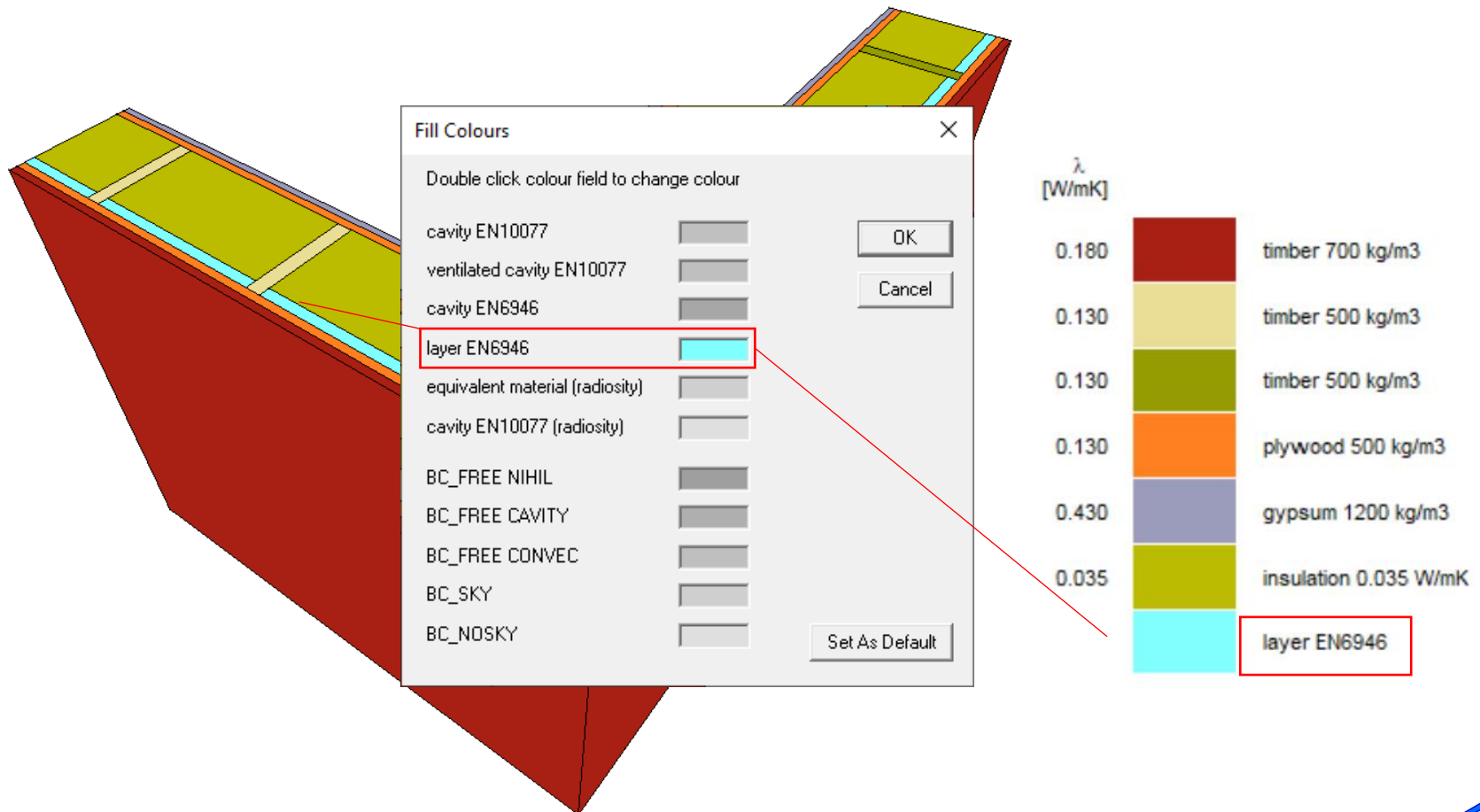


# F.1 Graphic output – Legend

[overview](#)

Fill materials

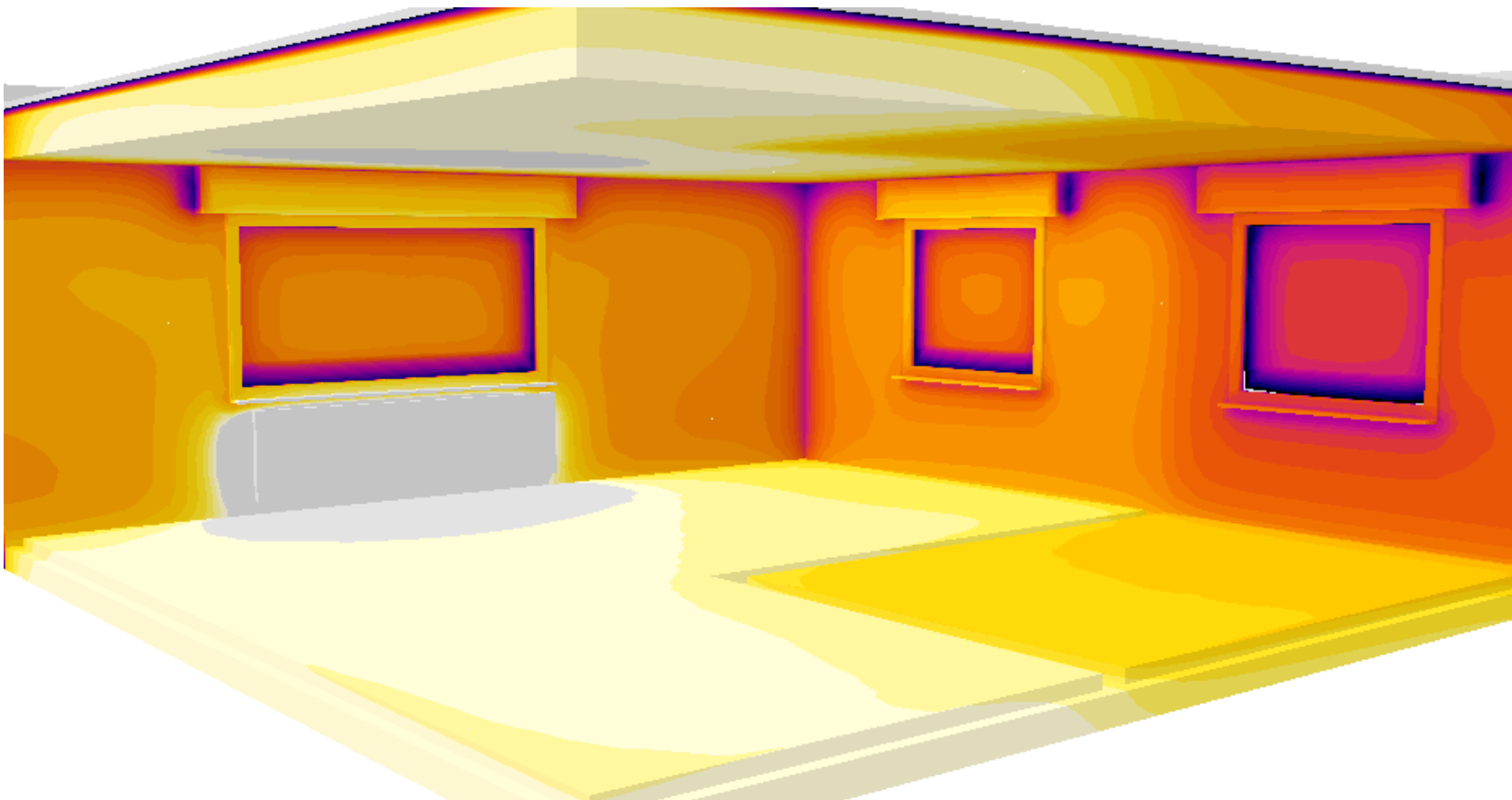
→ revised legend: material name + clustered cavities (with relevant standard)



## F.2 New thermal Palette – comparison with IR-images

[overview](#)

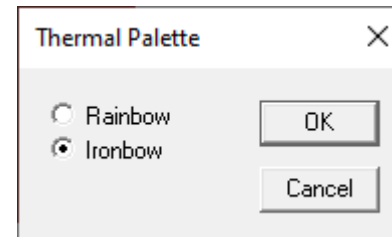
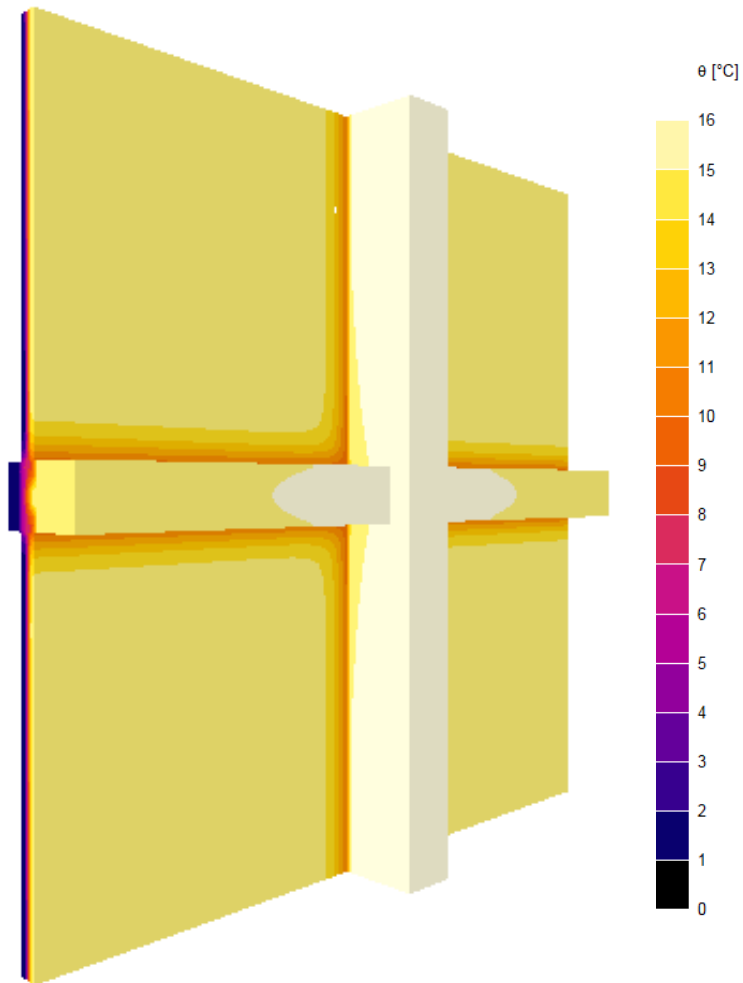
New thermal palette allows to compare simulation with IR-image



# F.2 New thermal Palette – comparison with IR-images

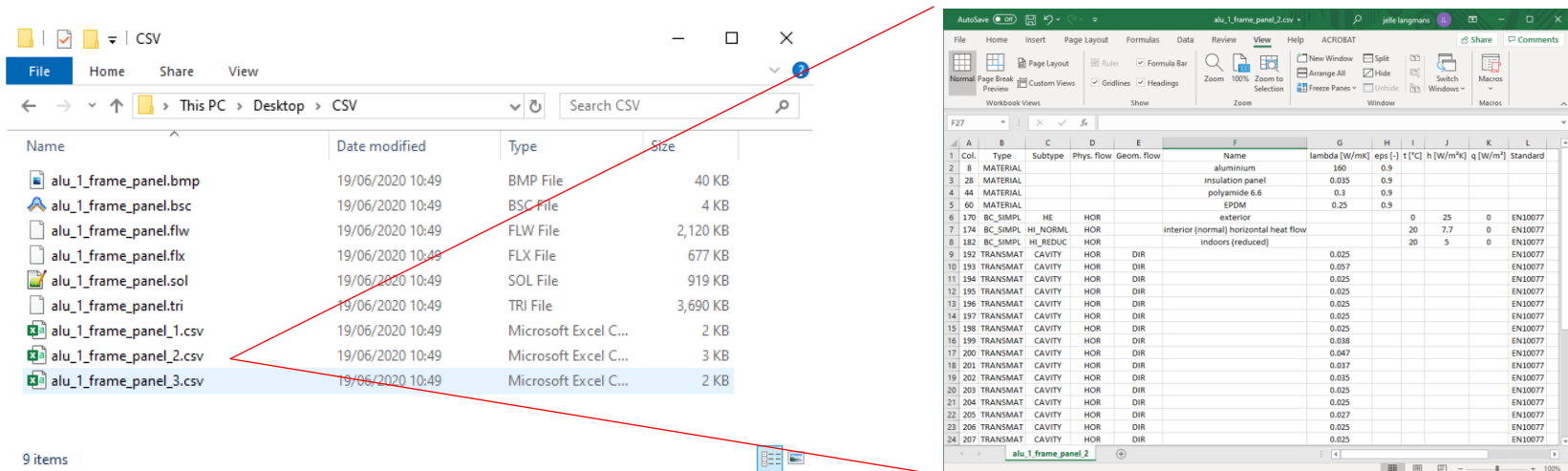
[overview](#)

Settings → Thermal Palette...



# F.3 Export text output in .csv format

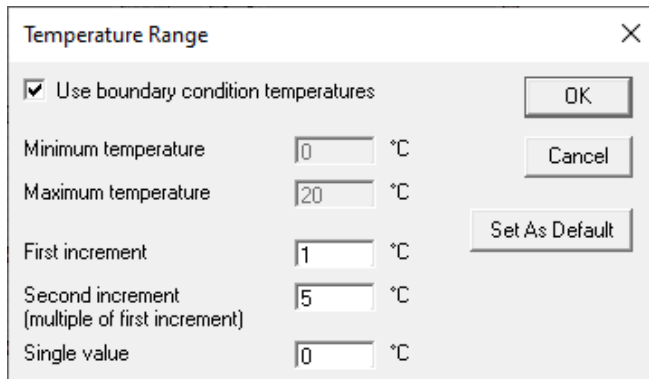
feature to save text output in .csv format (e.g. process data in MS Excel)



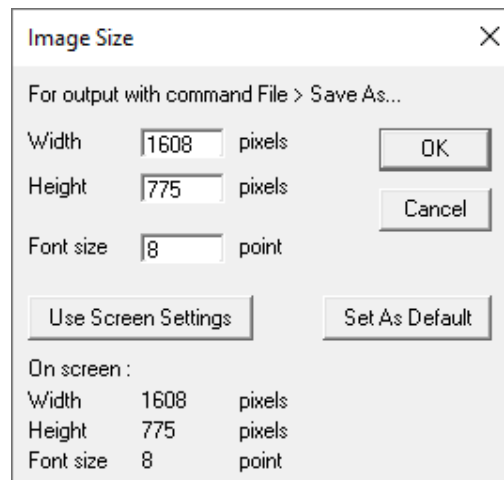
# F.4 Graphic output – Miscellaneous

1. Automatic selection of temperature range
2. Image Size: possible to use Screen Settings for image output
3. Areas and U-values available in Graphic output (derived thermal properties)

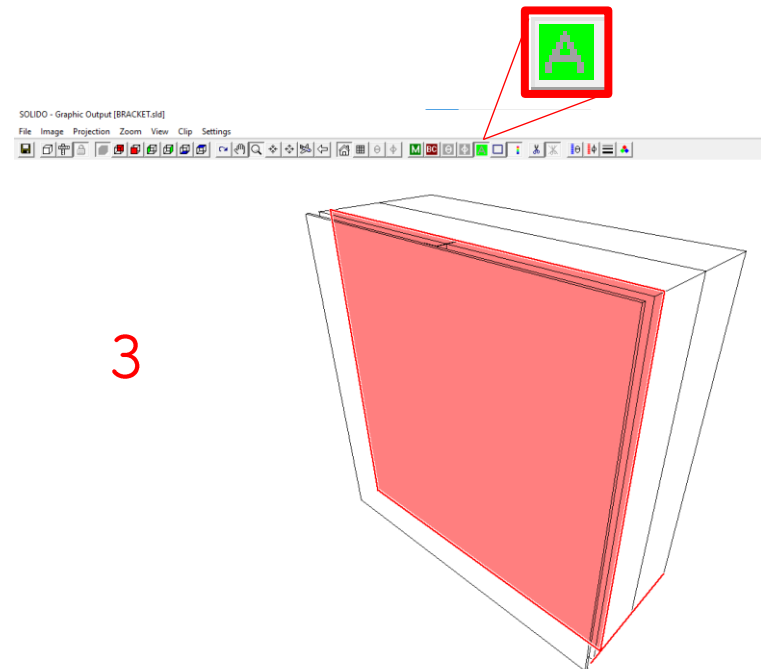
1



2



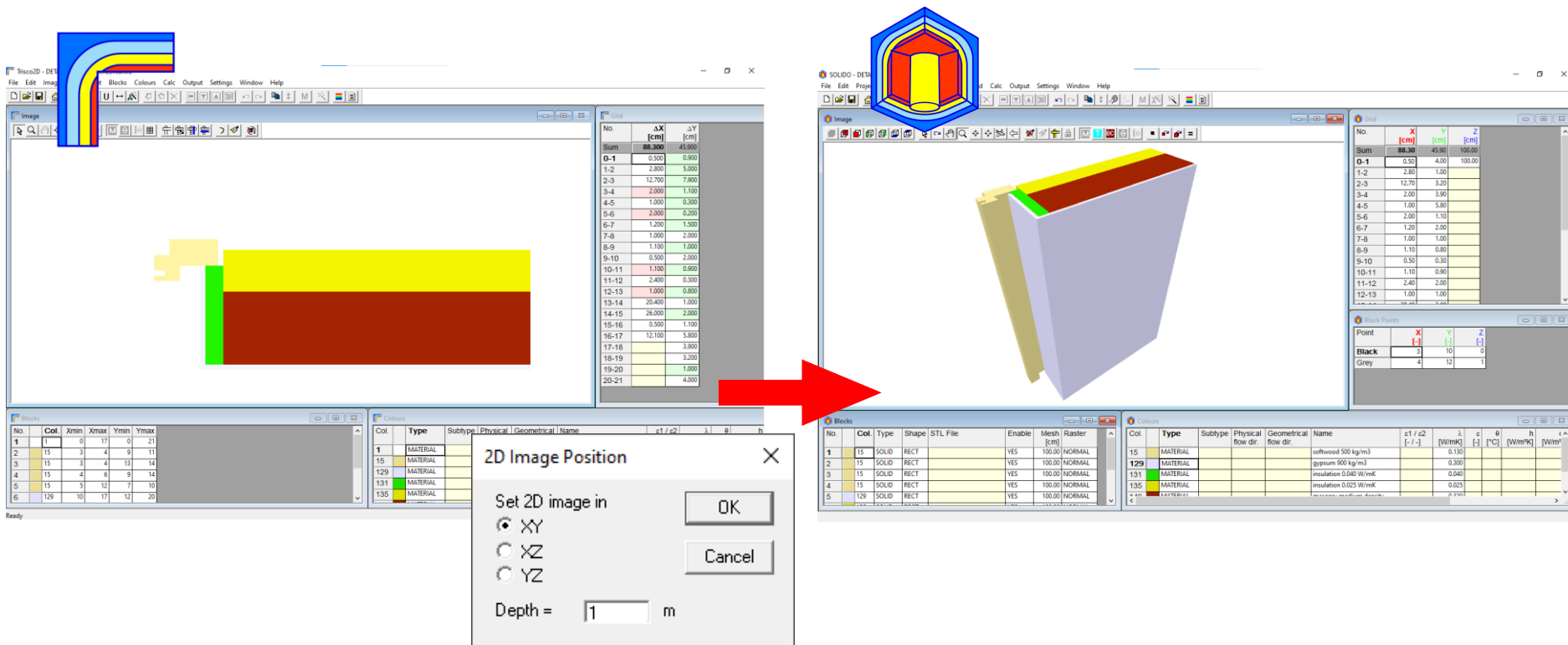
3



# G.1 Interaction between TRISCO/Trisco2D and SOLIDO

[overview](#)

- Trisco2D project files can be imported in SOLIDO



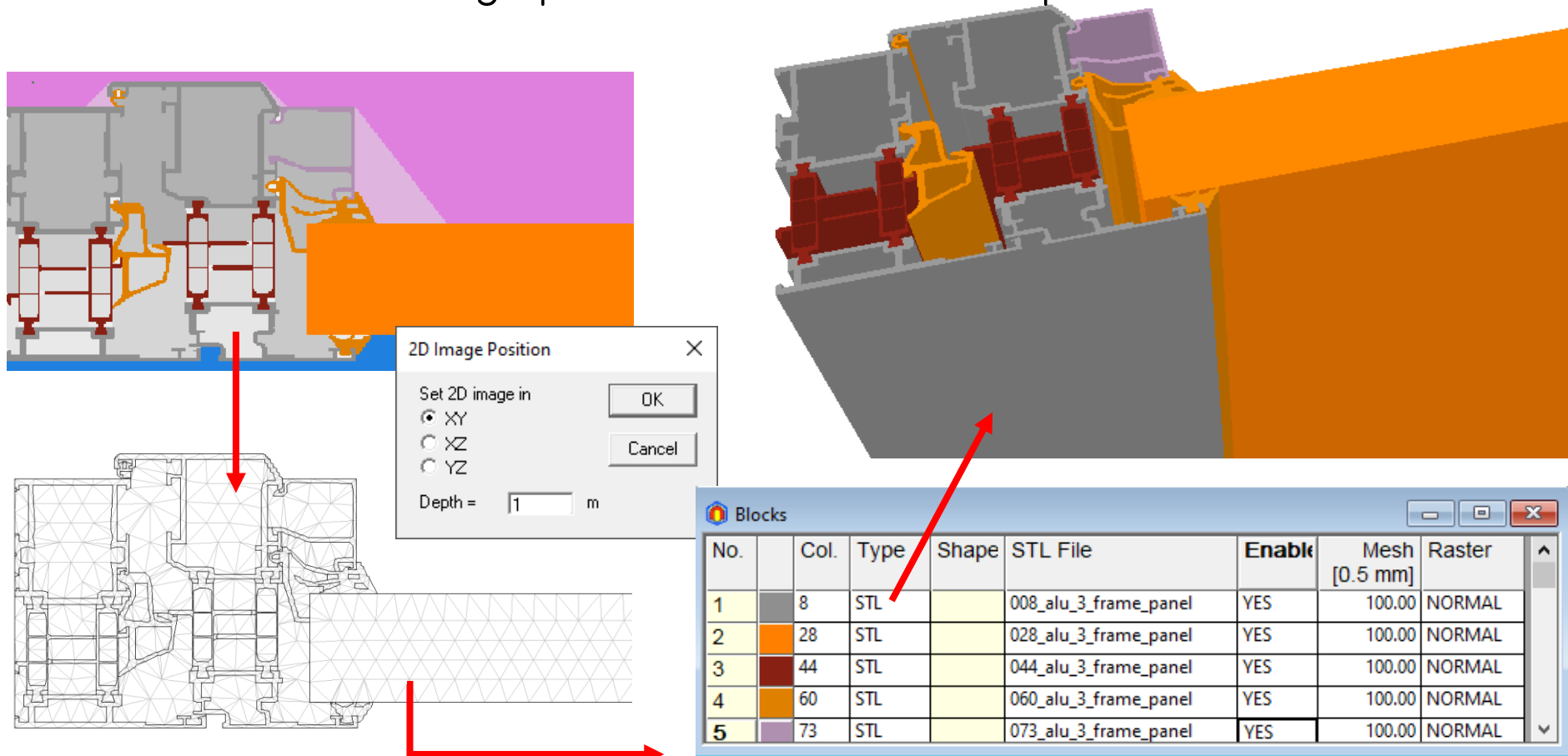
- Areas and U-values from TRISCO files read in SOLIDO

## G.2 Interaction between BISCO and SOLIDO

[overview](#)

### 3D extrusion of BISCO files in SOLIDO:

- Implementation of air cavities according to EN ISO 10077-2 (see [D.2](#))
- Fixed equivalent thermal conductivities (**clustered cavities**)
- Selection of 2D image position and extrusion depth



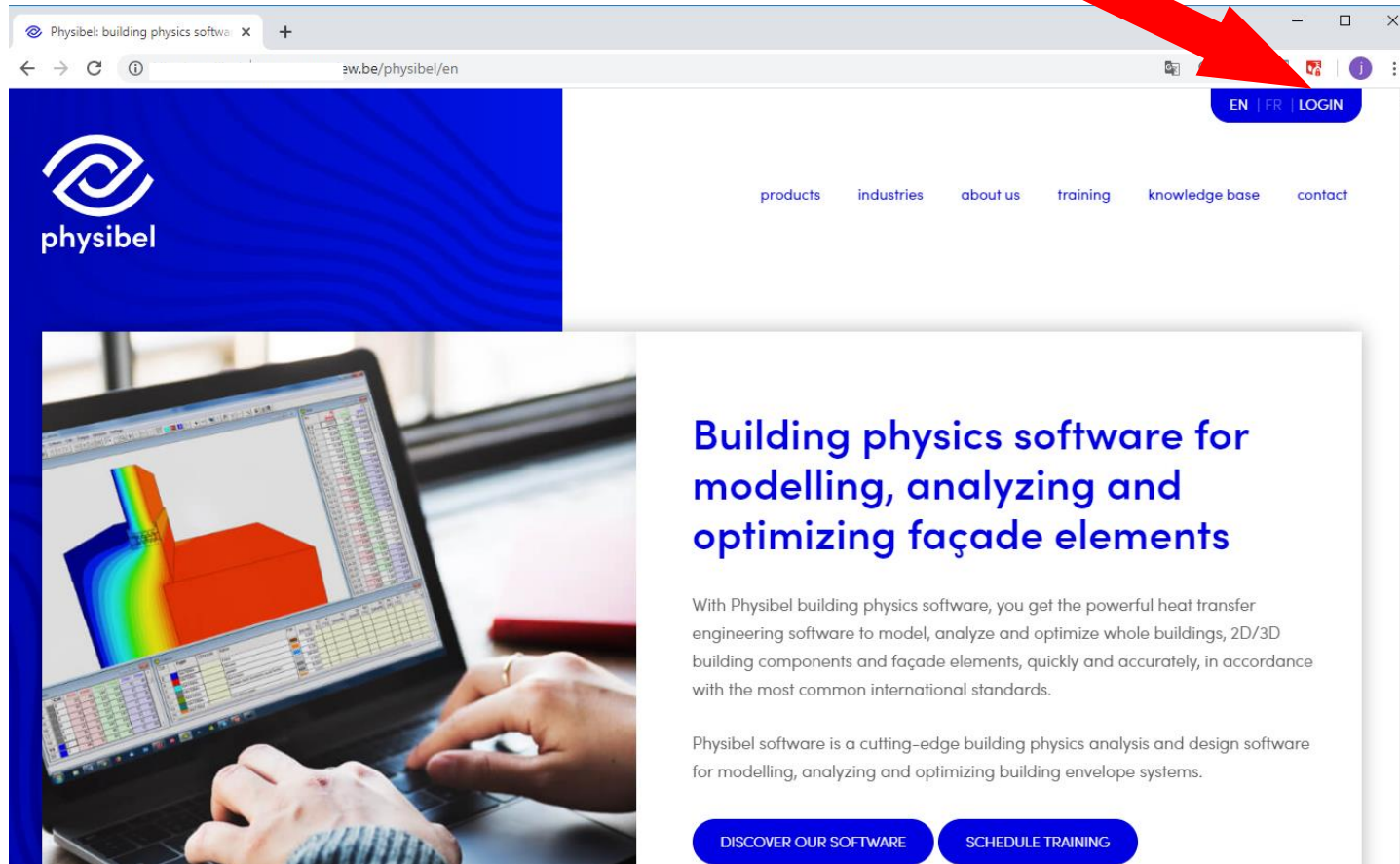
STL-file generated per colour using the **triangulation mesh** of BISCO



# H Online Physibel Portal

[overview](#)

log in to portal via [www.physibel.be](http://www.physibel.be)



# H Online Physibel Portal

[overview](#)

## Access to

- Knowledge Base with example projects, tutorials and videos

The screenshot displays the Physibel Knowledge Base portal. The browser address bar shows 'physibel-portal/public/knowledge'. The page header includes the Physibel logo and navigation links: 'Licences', 'Users', 'Knowledge base', 'Support', 'Website', and a user profile 'Jelle'. The main section is titled 'Knowledge Base'. A search bar contains the text 'floor', with a red arrow pointing to it from the text 'Search tool'. Below the search bar, there are filters for 'All software' and 'All categories'. The search results show two entries. The first entry is 'Bisco validation EN ISO 11855-2 floor heating', featuring a cross-sectional diagram of a floor heating system. A red arrow points from the text 'Access project files, document and/or video' to the 'Download Pdf' and 'Watch video' buttons located below the image. The second entry is 'Thermal analysis of a floor heating system', featuring a 3D perspective diagram of a floor heating system.

Search tool

Search tool

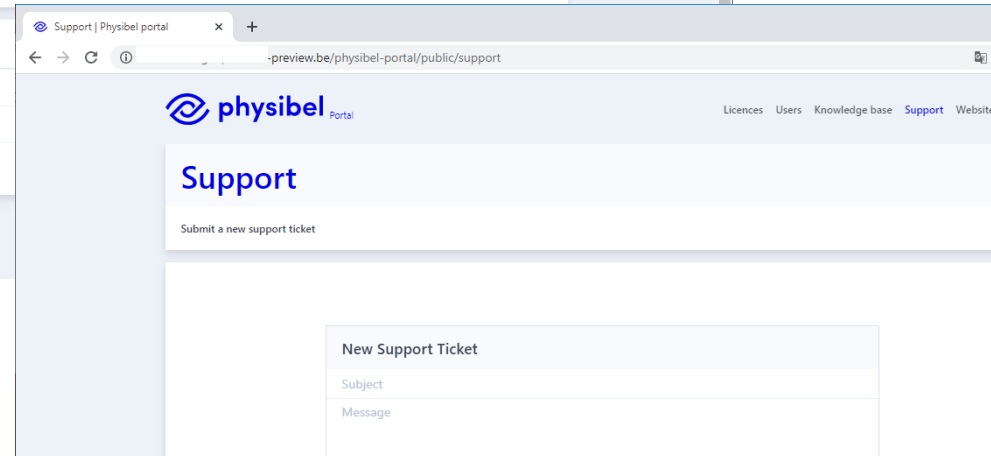
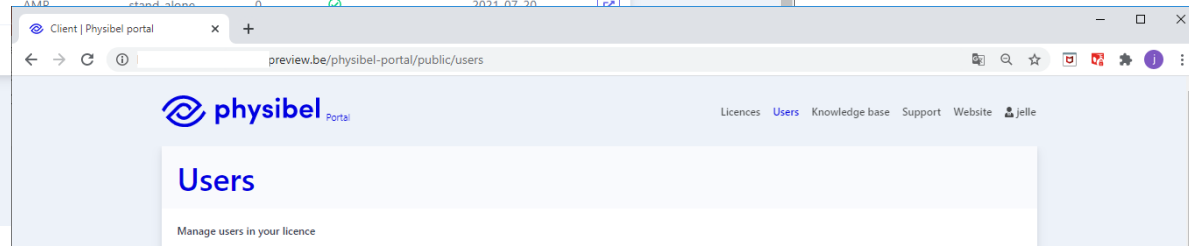
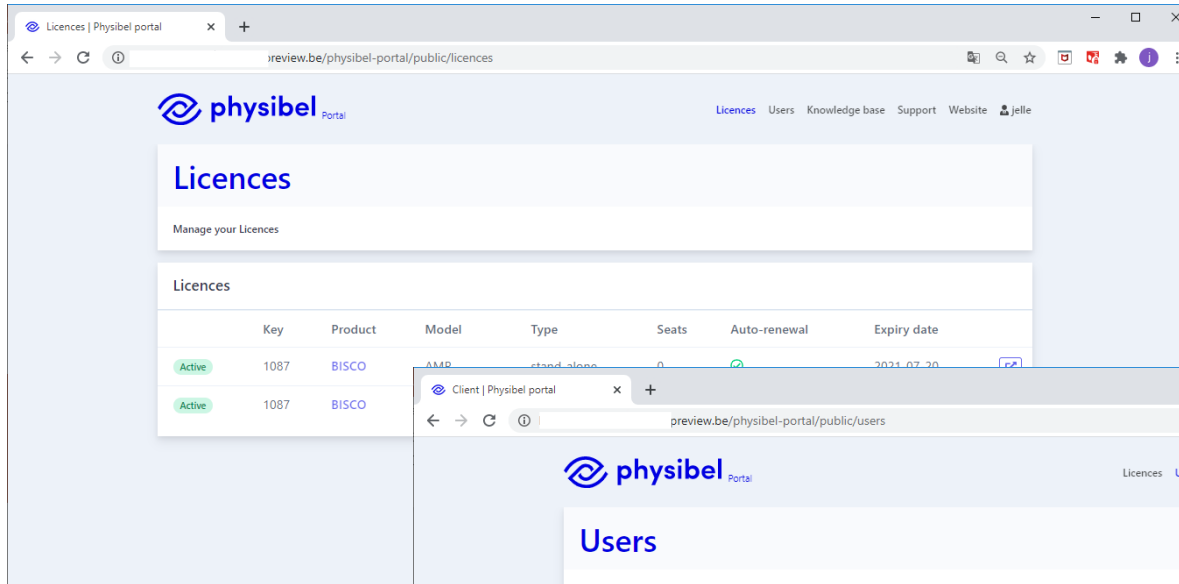
Access project files, document and/or video

# H Online Physibel Portal

[overview](#)

## Access to

- Licence and user management
- Support



# I Licencing options

[overview](#)

## Option 1: hardware key

- Stand-alone
- Model: perpetual
- Updates and support via Annual Maintenance Plan (AMP)



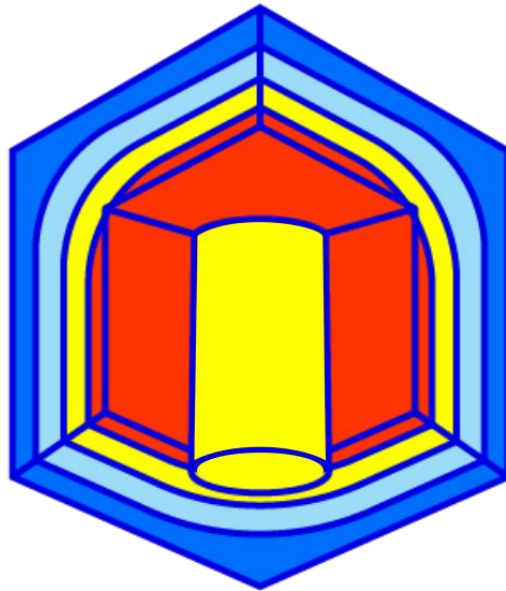
## Option 2: Software licence

- Stand-alone / network floating / cloud-based floating
- Model: subscription (1 or 3-yearly)
- Updates and support included in subscription





## SOLIDO v5 New program performances



[www.physibel.be/en/products/solido](http://www.physibel.be/en/products/solido)

downloadable program demo version