physibel

BISCO v12 New program performances

www.physibel.be/bisco

BISCO v12 – Overview

overview

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- A.2 Visualisation of infra-red radiation
- A.3 Model labelling
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- B.3 New feature: Cluster EQUIMAT

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- C.2 Cavities and layers according to EN ISO 6946
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  - Visualisation 'radiosity' method
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- F.4 Miscellaneous

G Online Physibel Portal

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- G.2 Support
- G.3 Physibel Knowledge Base
  - Documentation
  - Tutorials and examples
  - Videos

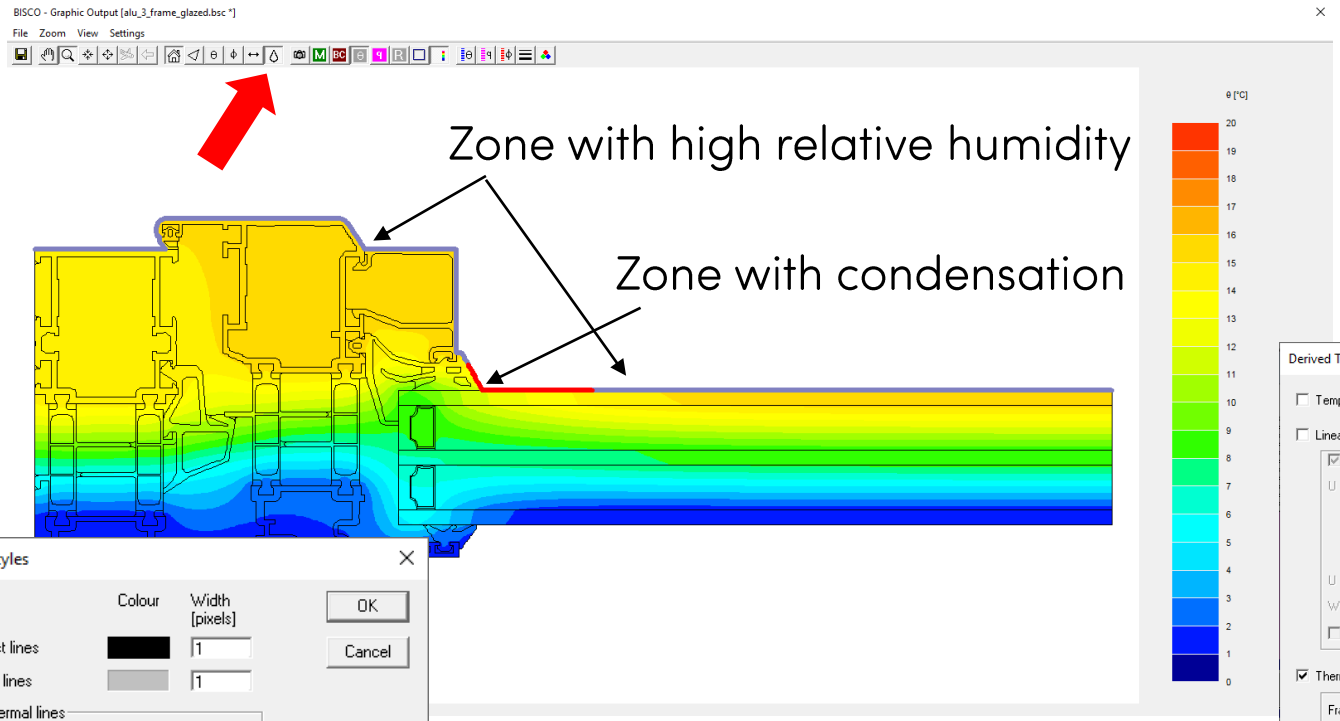
H Licencing

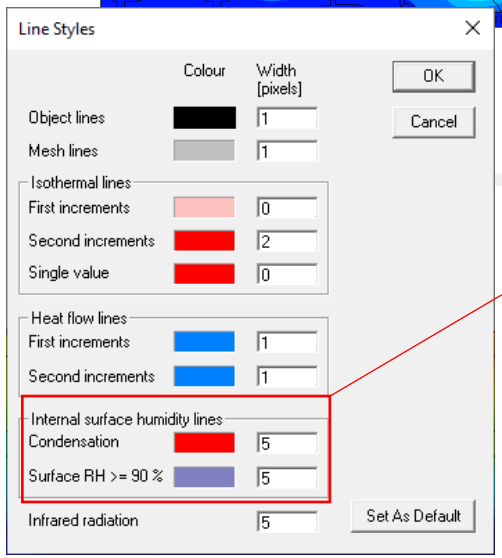
- H.1 Perpetual licence (USB key)
- H.2 Subscription licence (software key)

A1. Graphic output – condensation

overview

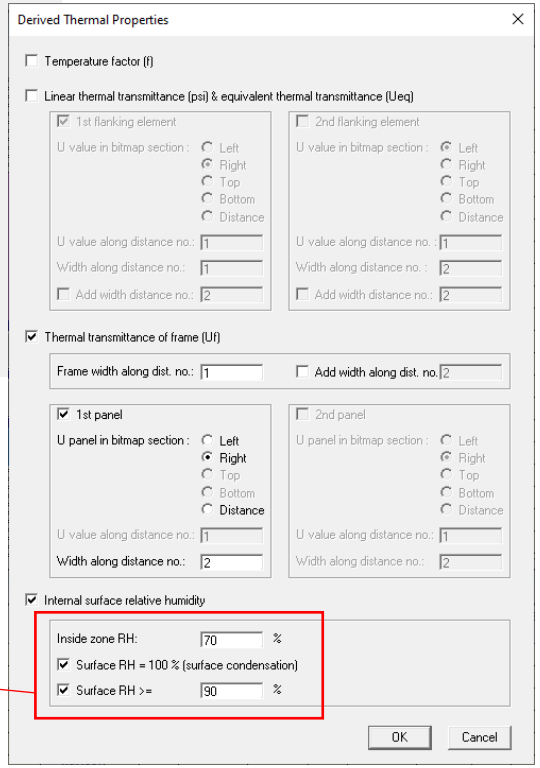
Visualisation of surface condensation + threshold relative humidity zone





Definition of lines

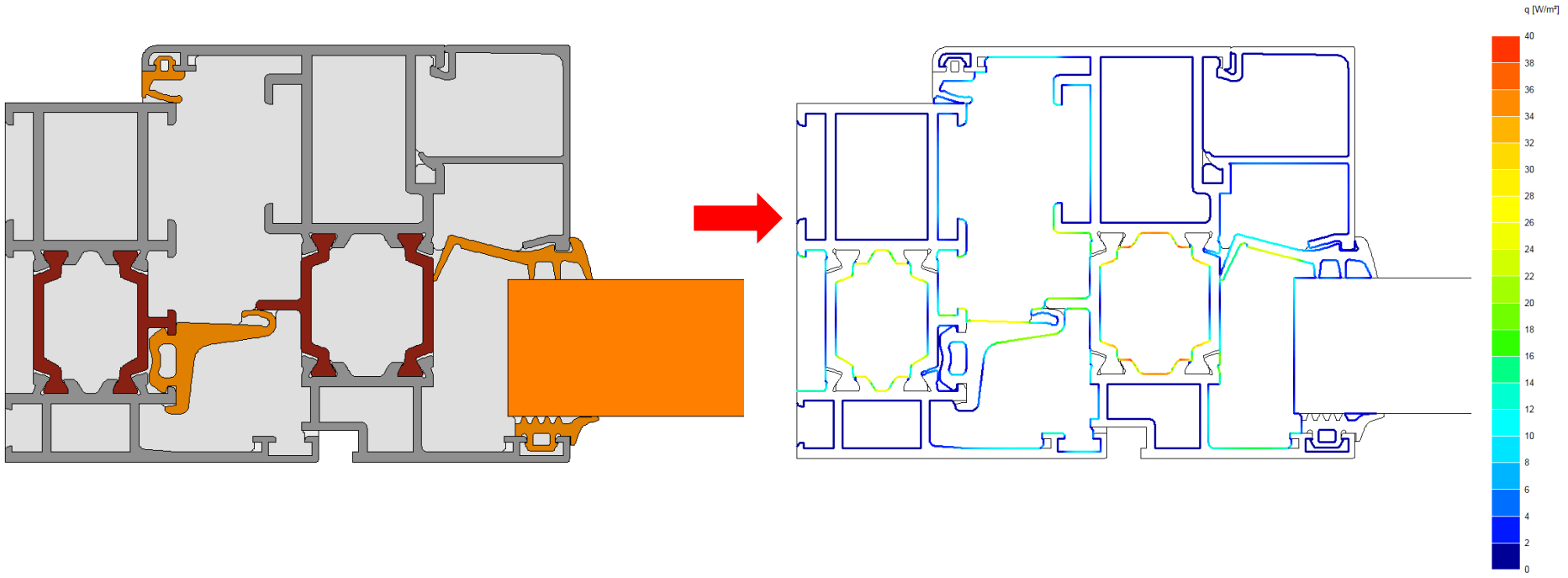
Definition internal relative humidity
+ threshold level to be visualised



A2. Graphic output – IR radiation

overview

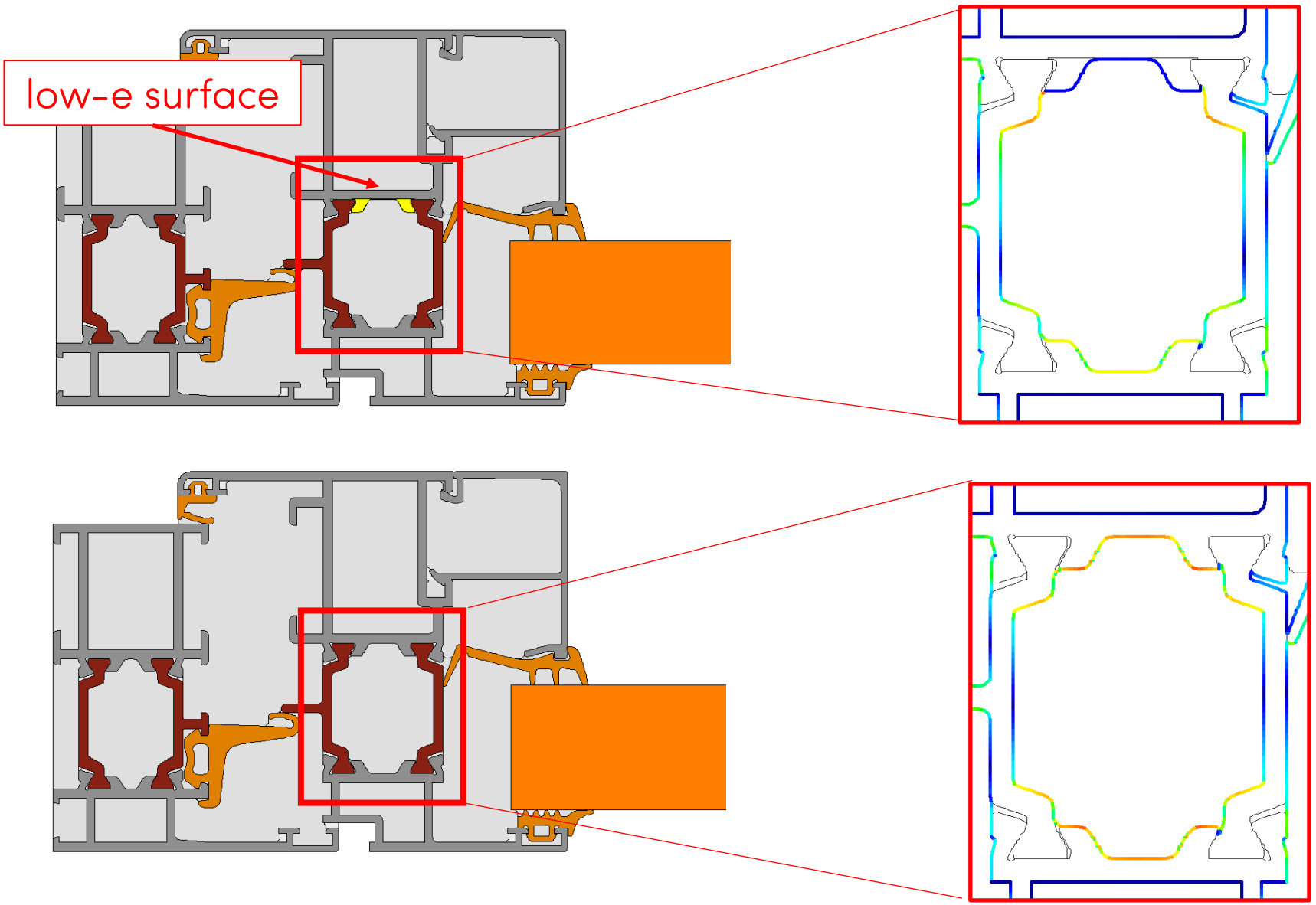
Visualisation of infra-red radiation



(requires RADCON)

A2. Graphic output – IR radiation

overview



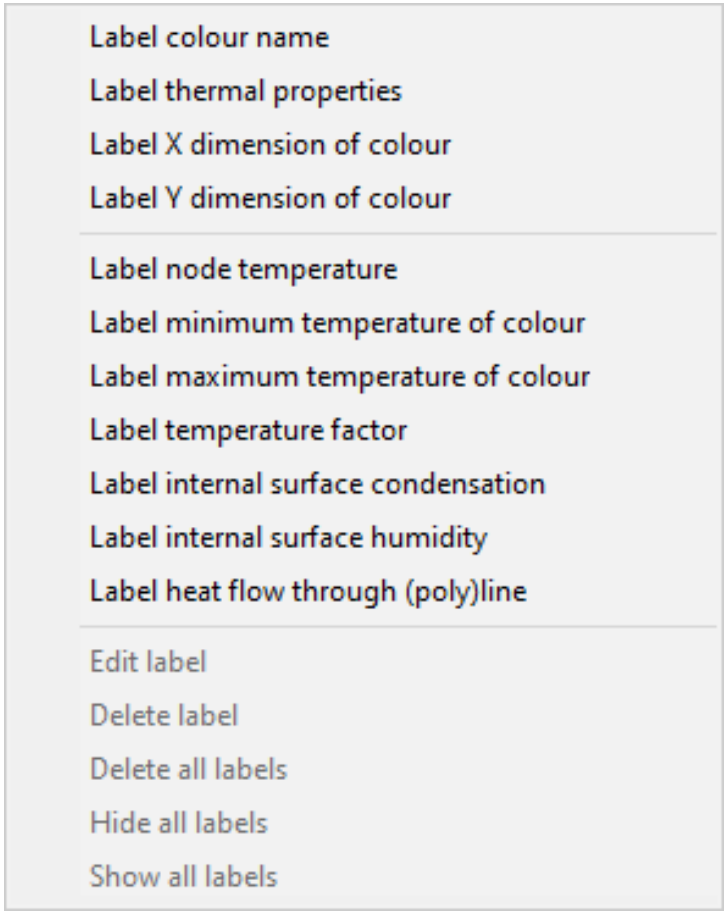
Investigate efficiency of low-e zones

A3. Graphic output – Model labelling

overview

Add labels to the figure: a right mouse click within the figure opens a popup menu (cf. below right):

- Colour name
- Thermal properties
- X dimension
- Y dimension
- Node temperature
- Min./max. temperature of colour
- Temperature factor f
- Internal condensation
- Internal surface humidity
- Heat flow through a (poly)line



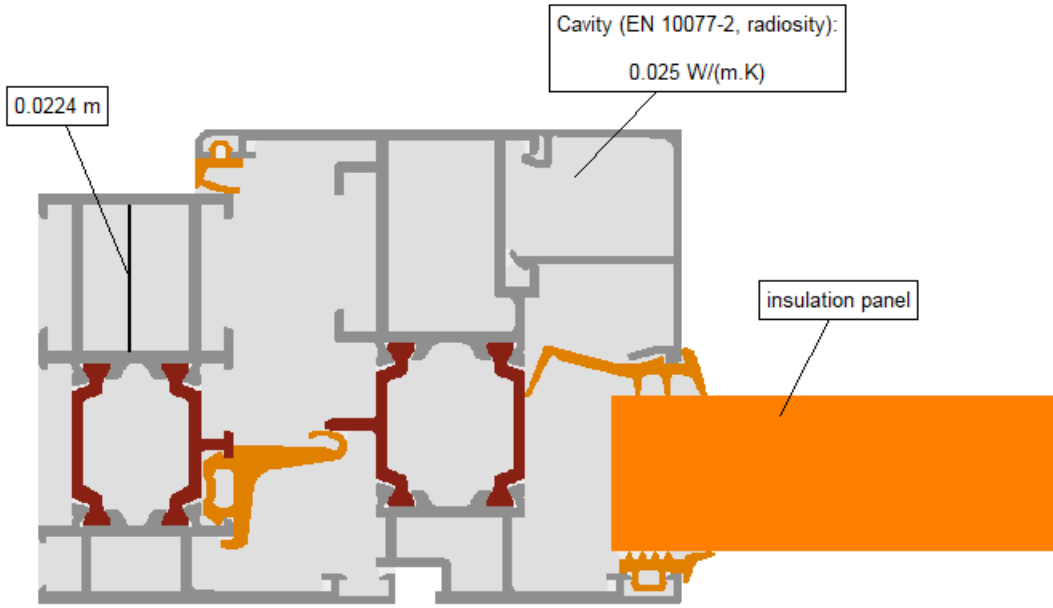
The labels can be replaced on the screen by mouse dragging.

A3. Graphic output – Model labelling

overview

In the Graphic output Window the user can add following labels to the figure:

- Colour name
- Thermal properties
- X dimension
- Y dimension
- Node temperature
- Minimum temperature of colour
- Maximum temperature of colour
- Temperature factor f
- Internal condensation
- Internal surface humidity
- Heat flow through a (poly)line



A3. Graphic output – Model labelling

overview

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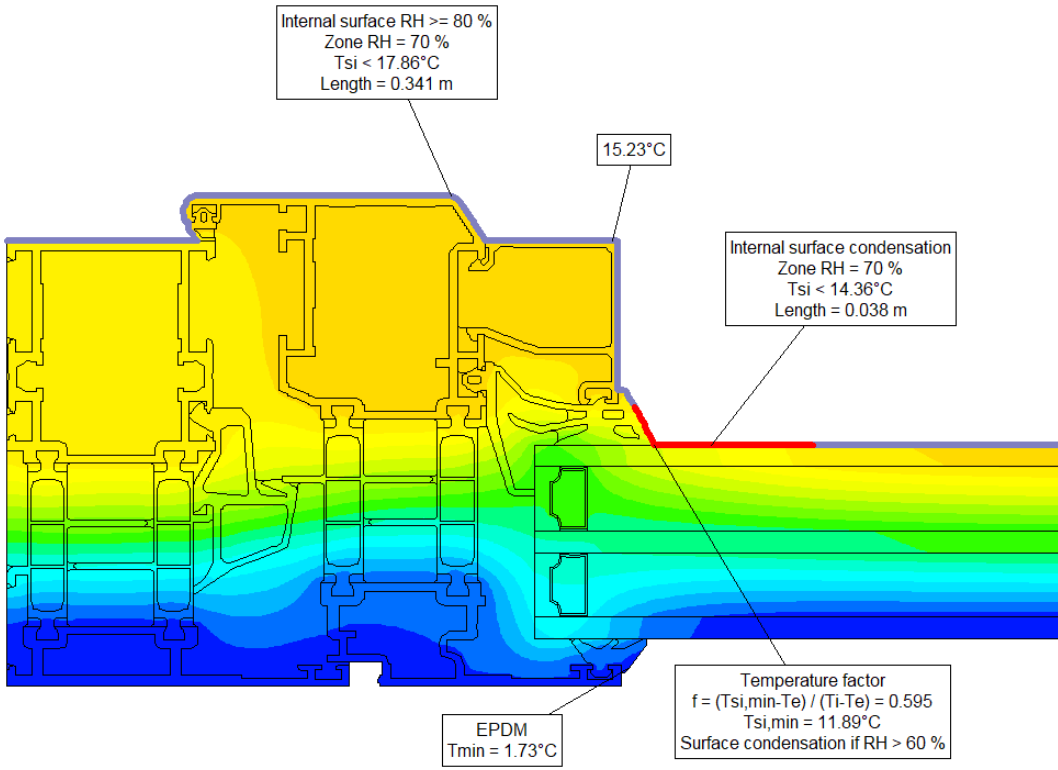
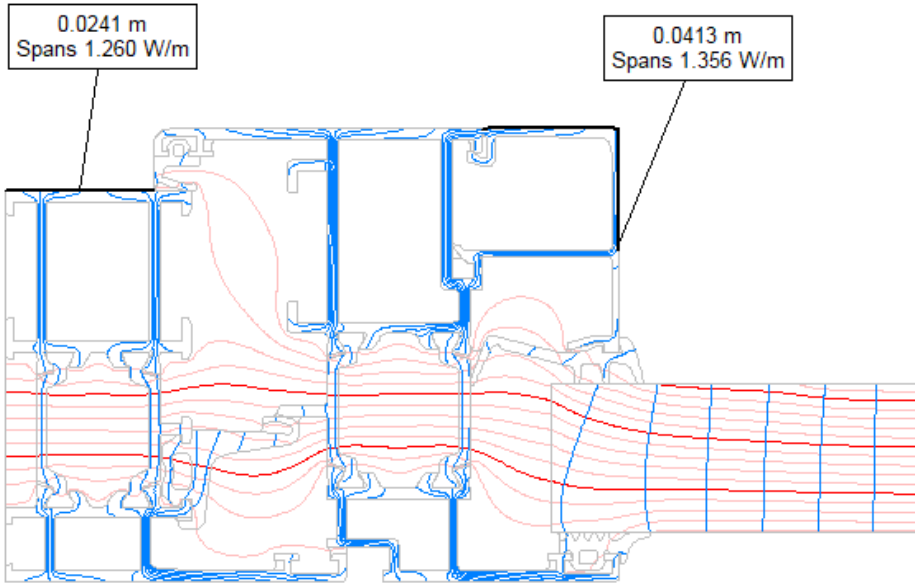


A3. Graphic output – Model labelling

overview

In the Graphic output Window the user can add following labels to the figure:

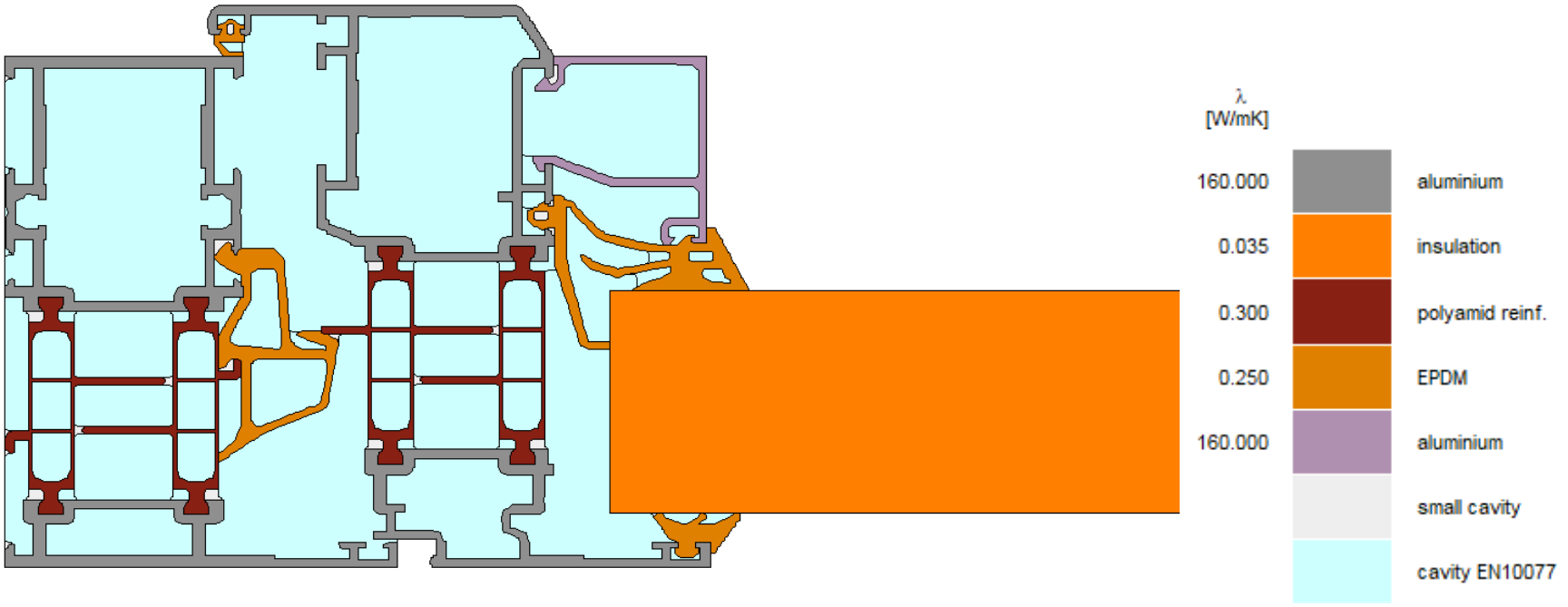
- Colour name
- Thermal properties
- X dimension
- Y dimension
- Node temperature
- Minimum temperature of colour
- Maximum temperature of colour
- Temperature factor f
- Internal condensation
- Internal surface humidity
- Heat flow through a (poly)line



A4. Graphic output – Legend

overview

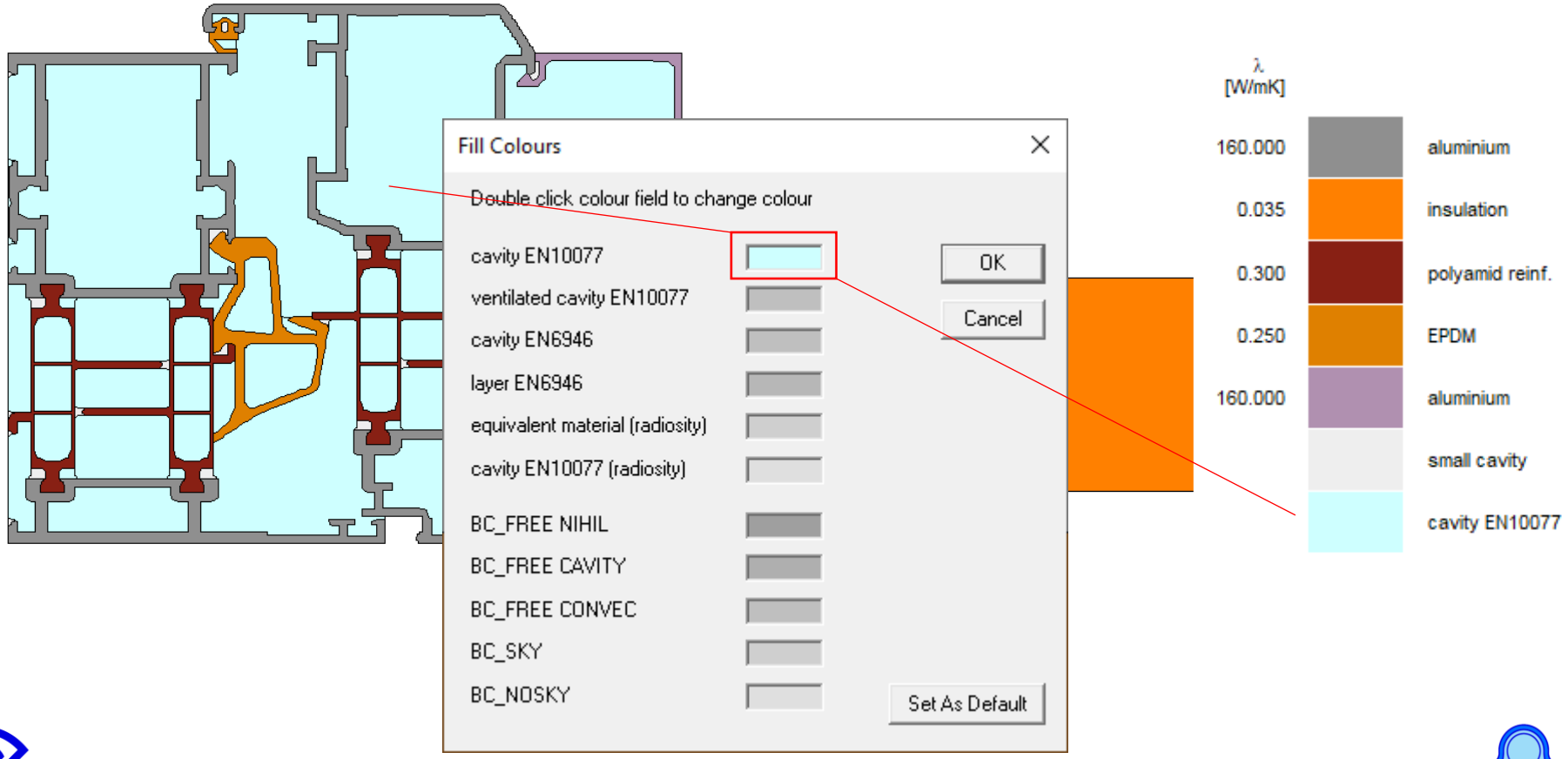
Fill materials → revised legend: material name + clustered cavities



A4. Graphic output – Legend

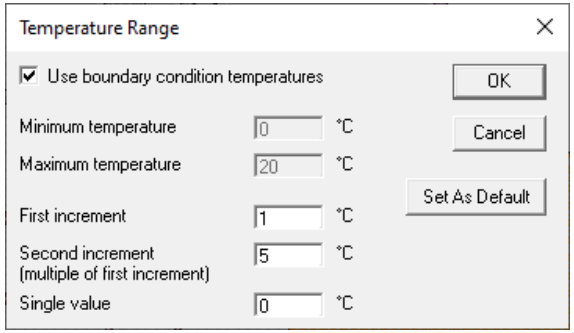
overview

Fill materials → revised legend: material name + clustered cavities

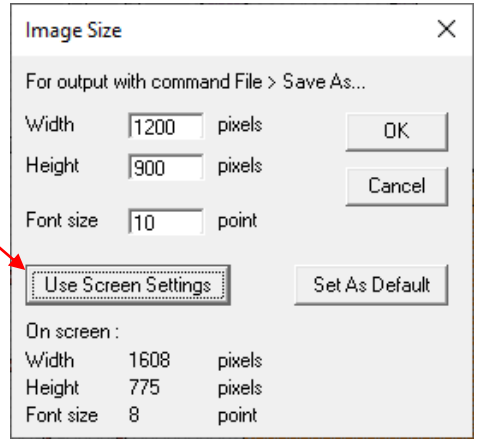


A5. Graphic output – Miscellaneous

overview



- Automatic selection of temperature range
- Triangulation mesh only visible when image has relevant scale
- Faster image processing algorithm (for complex files)
- Image Size: possible to use Screen Settings for image output



B1. Colour window – revision

overview

The Colour 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): automatically detected (during calculation)
- Standard (EN10077, EN6946, EN12631)
- ε1/ ε2: emissivities linked to a cavity ("single equivalent thermal conductivity method")
- ε emissivity linked to a material ("radiosity method")

Colours

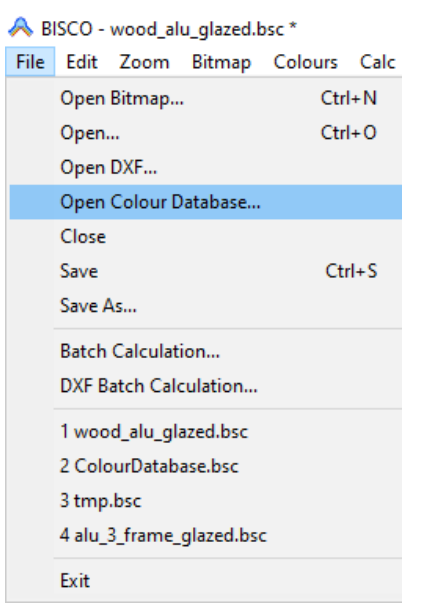
Col.		Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	ε1 / ε2 [- / -]	λ [W/mK]	ε [-]	θ [°C]	h [W/m²K]	q [W/m²]	θa [°C]	hc [W/m²K]	Pc [W/m]	θr [°C]	Standard
18		MATERIAL				soda lime		1.000									
60		MATERIAL				EPDM		0.250									
86		MATERIAL				polysulfide		0.400									
92		MATERIAL				butyl hot melt		0.240									
105		MATERIAL				molecular sieve		0.100									
170		BC_SIMPL	HE	HOR		exterior				0.0	25.00	0					EN10077
174		BC_SIMPL	HI_NORML	HOR		interior (normal)				20.0	7.70	0					EN10077
182		BC_SIMPL	HI_REDUC	HOR		interior (reduced)				20.0	5.00	0					EN10077
192		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.079									EN10077
193		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.052									EN10077
195		EQUIMAT	CAVITY	HOR	X	cavity (CEN)	0.90 / 0.90	0.037									EN10077
214		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.065									EN10077
215		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.102									EN10077

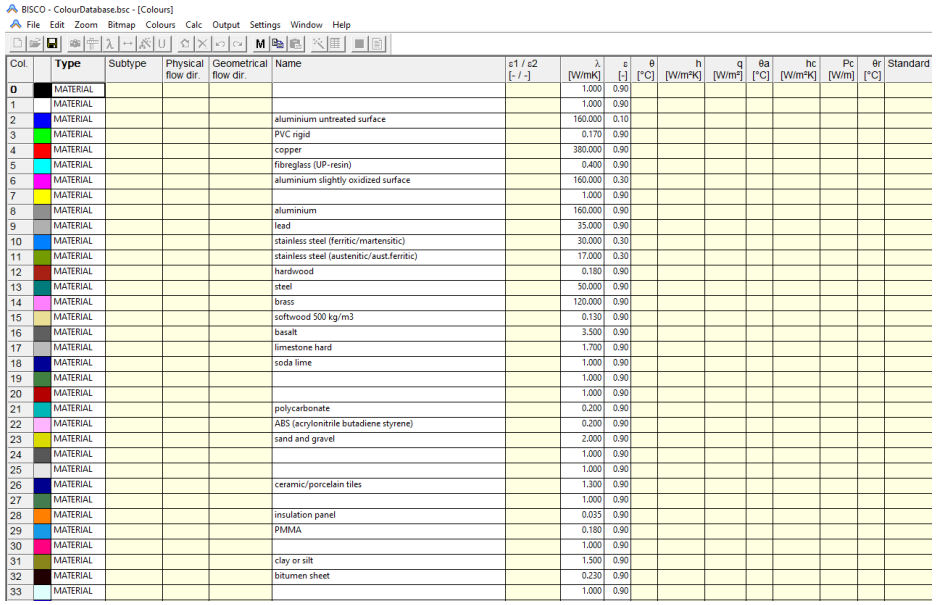
B2. Colour window – Colour Database

overview

Customisable Colour Database with predefined colours

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





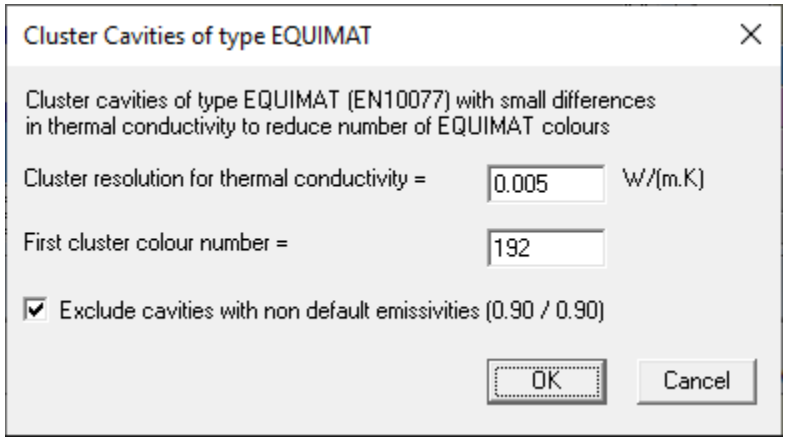
Col.		Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	ε1 / ε2 [- / -]	λ [W/mK]	ε [-]	θ [°C]	h [W/m²K]	q [W/m²]	θa [°C]	hc [W/m²K]	Pc [W/m]	θr [°C]	Standard
0		MATERIAL						1.000	0.90								
1		MATERIAL						1.000	0.90								
2		MATERIAL				aluminium untreated surface		160.000	0.10								
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								
16		MATERIAL				basalt		3.500	0.90								
17		MATERIAL				limestone hard		1.700	0.90								
18		MATERIAL				soda lime		1.000	0.90								
19		MATERIAL						1.000	0.90								
20		MATERIAL						1.000	0.90								
21		MATERIAL				polycarbonate		0.200	0.90								
22		MATERIAL				ABS (acrylonitrile butadiene styrene)		0.200	0.90								
23		MATERIAL				sand and gravel		2.000	0.90								
24		MATERIAL						1.000	0.90								
25		MATERIAL						1.000	0.90								
26		MATERIAL				ceramic/porcelain tiles		1.300	0.90								
27		MATERIAL						1.000	0.90								
28		MATERIAL				insulation panel		0.035	0.90								
29		MATERIAL				PMMA		0.180	0.90								
30		MATERIAL						1.000	0.90								
31		MATERIAL				clay or silt		1.500	0.90								
32		MATERIAL				bitumen sheet		0.230	0.90								
33		MATERIAL						1.000	0.90								

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

B3. Colour window – Cluster EQUIMAT

overview

New function 'Cluster EQUIMAT...' to group EQUIMAT colours with a user defined resolution.



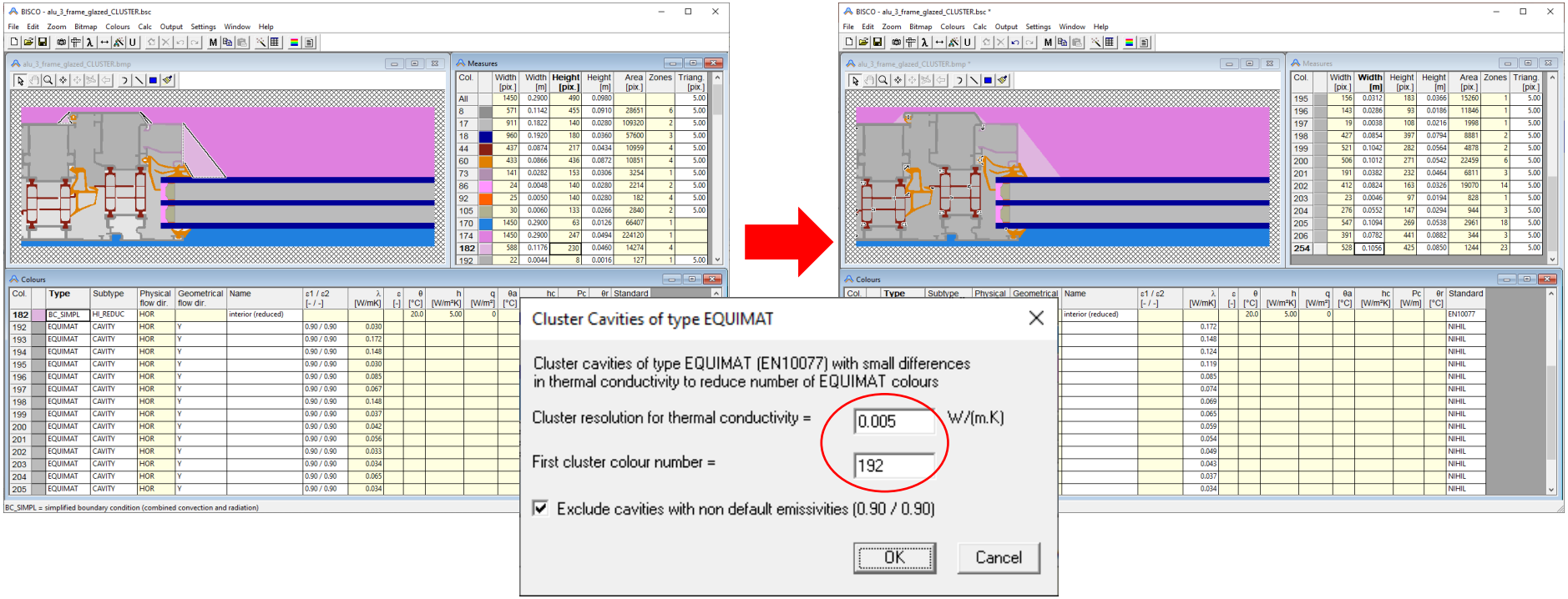
B3. Colour window – Cluster EQUIMAT

overview

Example: window frame

60 different colours for cavities (EQUIMAT)

16 different colours for cavities (EQUIMAT)
(resolution of 0.005 W/mK)



The deviation on the overall heat flow is less than 0.3% for this example

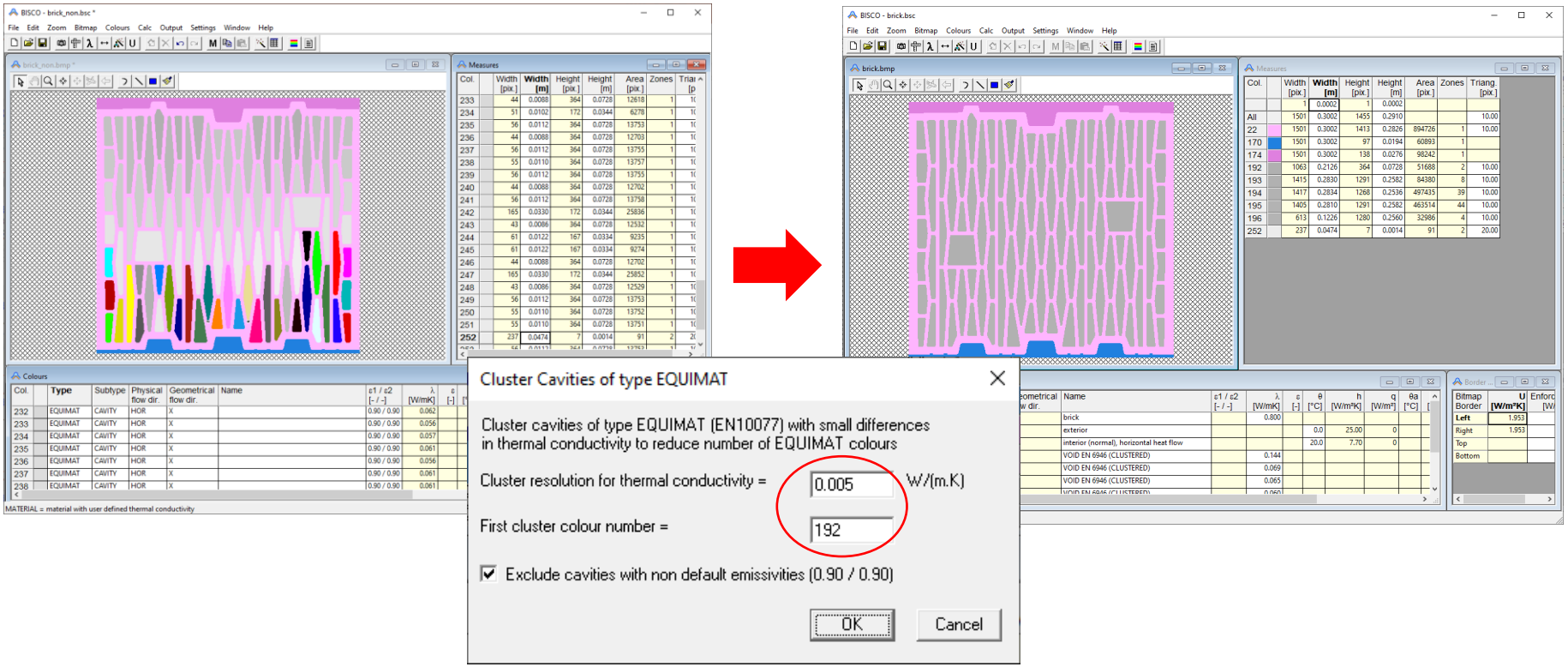
B3. Colour window – Cluster EQUIMAT

overview

Example: masonry

114 different colours for cavities (EQUIMAT)

6 different colours for cavities (EQUIMAT)
(resolution of 0.005 W/mK)



The deviation on the overall heat flow is less than 0.5% for this example

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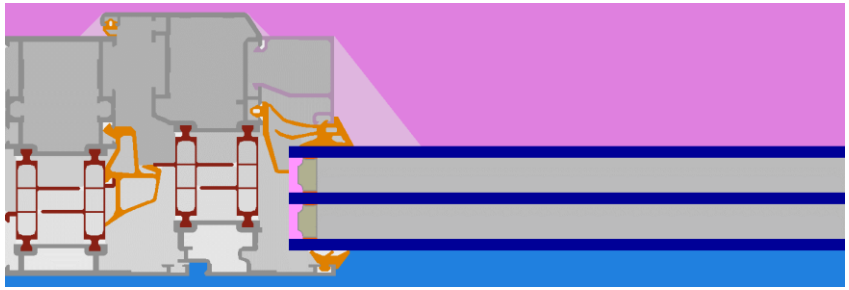
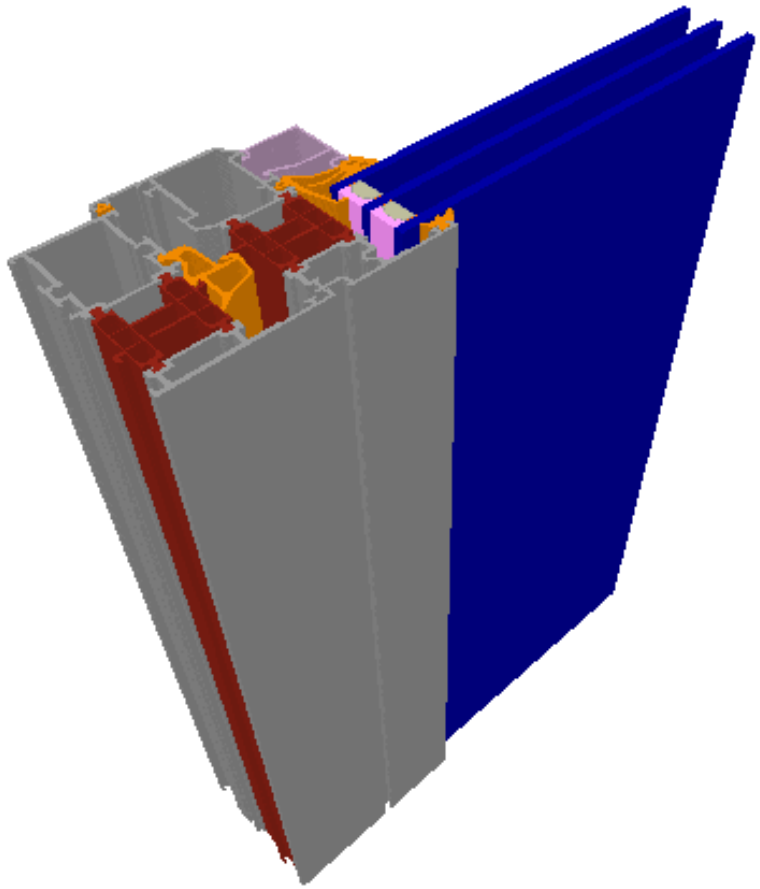
B3. Colour window – Cluster EQUIMAT

overview

Fast 3D extrusion of BISCO files (TRISCO/SOLIDO):

- fixed equivalent thermal conductivities (EN ISO 10077-2)
- number of STL files is reduced (SOLIDO)





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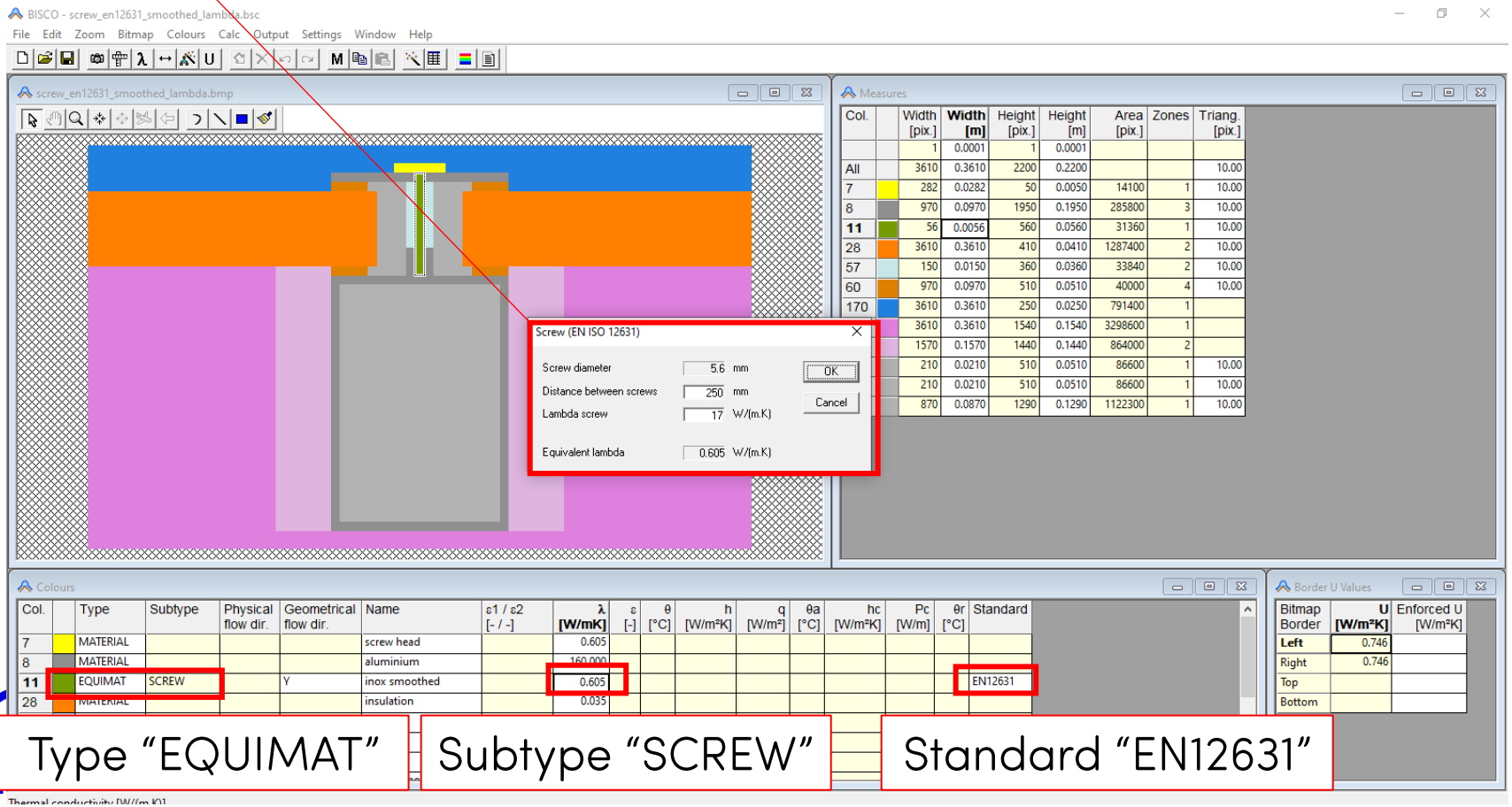
C.1 EN ISO 12631 – Screw

overview

Automatic calculation of the "smoothed" thermal conductivity according to method described in EN ISO 12631

Input parameters:

- distance between screws
- thermal conductivity of screws

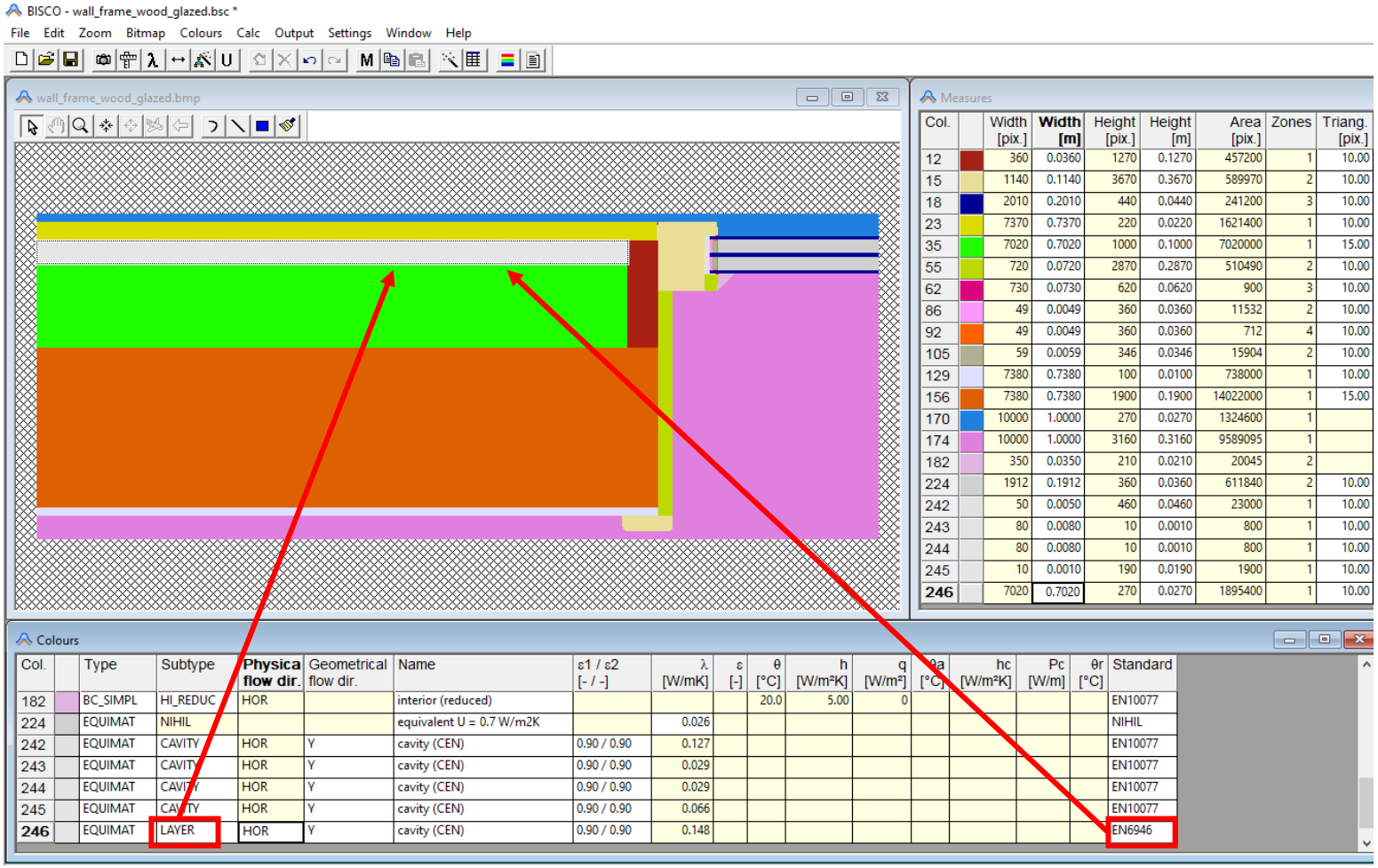


Type "EQUIMAT" | Subtype "SCREW" | Standard "EN12631"

C.2 EN ISO 6946 – cavities and layers

overview

Example 1: window-wall connection: air layer in wall → EN ISO 6946



Col.		Width [pix.]	Width [m]	Height [pix.]	Height [m]	Area [pix.]	Zones	Triang. [pix.]
12		360	0.0360	1270	0.1270	457200	1	10.00
15		1140	0.1140	3670	0.3670	589970	2	10.00
18		2010	0.2010	440	0.0440	241200	3	10.00
23		7370	0.7370	220	0.0220	1621400	1	10.00
35		7020	0.7020	1000	0.1000	7020000	1	15.00
55		720	0.0720	2870	0.2870	510490	2	10.00
62		730	0.0730	620	0.0620	900	3	10.00
86		49	0.0049	360	0.0360	11532	2	10.00
92		49	0.0049	360	0.0360	712	4	10.00
105		59	0.0059	346	0.0346	15904	2	10.00
129		7380	0.7380	100	0.0100	738000	1	10.00
156		7380	0.7380	1900	0.1900	14022000	1	15.00
170		10000	1.0000	270	0.0270	1324600	1	
174		10000	1.0000	3160	0.3160	9589095	1	
182		350	0.0350	210	0.0210	20045	2	
224		1912	0.1912	360	0.0360	611840	2	10.00
242		50	0.0050	460	0.0460	23000	1	10.00
243		80	0.0080	10	0.0010	800	1	10.00
244		80	0.0080	10	0.0010	800	1	10.00
245		10	0.0010	190	0.0190	1900	1	10.00
246		7020	0.7020	270	0.0270	1895400	1	10.00

Col.		Type	Subtype	Physica flow dir.	Geometrical flow dir.	Name	ε1 / ε2 [- / -]	λ [W/mK]	ε [-]	θ [°C]	h [W/m²K]	q [W/m²]	θa [°C]	hc [W/m²K]	Pc [W/m]	θr [°C]	Standard
182		BC_SIMPL	HI_REDUC	HOR		interior (reduced)				20.0	5.00	0					EN10077
224		EQUIMAT	NIHIL			equivalent U = 0.7 W/m2K		0.026									NIHIL
242		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.127									EN10077
243		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.029									EN10077
244		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.029									EN10077
245		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.066									EN10077
246		EQUIMAT	LAYER	HOR	Y	cavity (CEN)	0.90 / 0.90	0.148									EN6946

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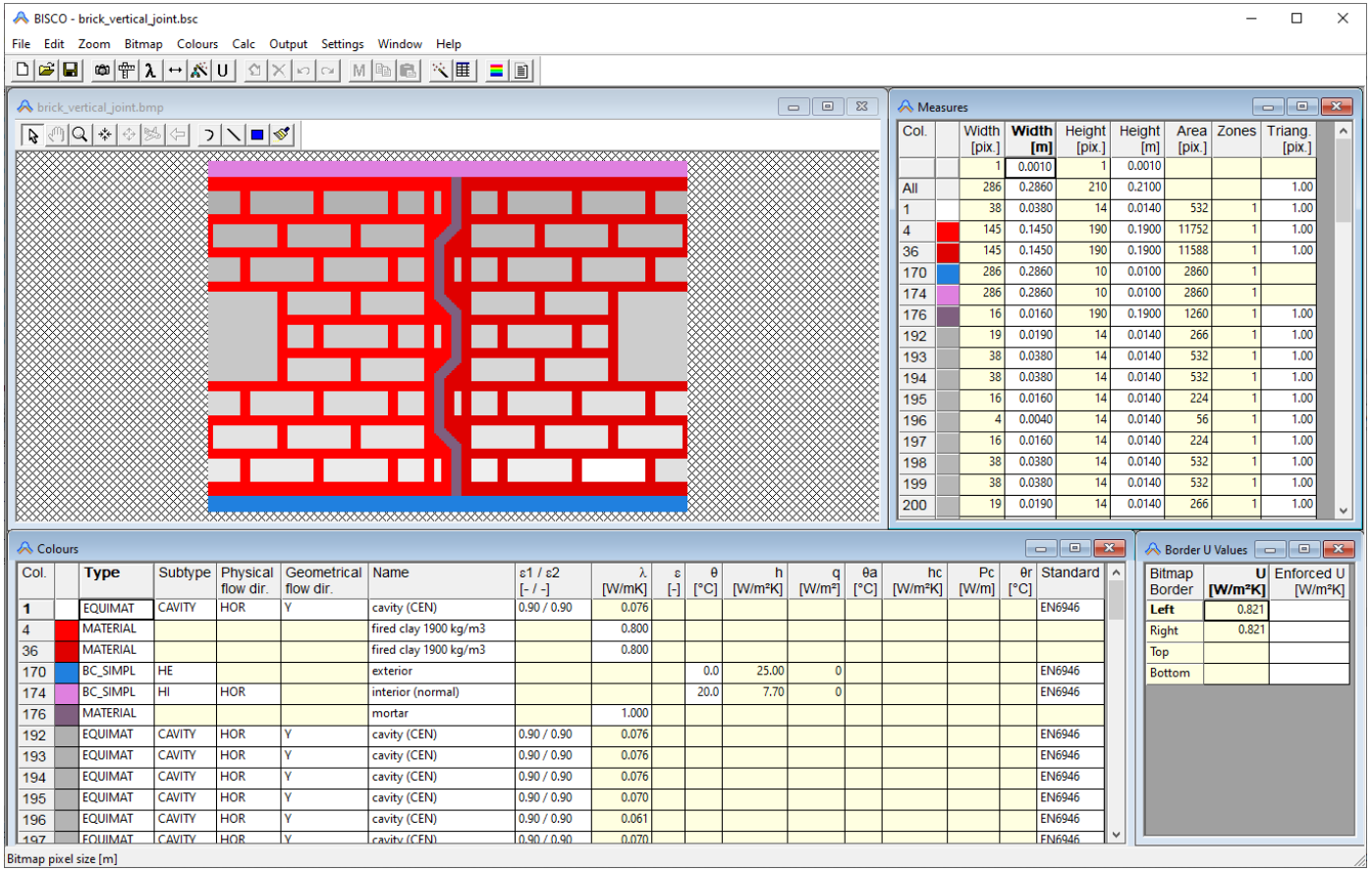
C.2 EN ISO 6946 – cavities and layers

overview

Example 2: air cavities in masonry (EN ISO 1745)



Col.		Width [pix.]	Width [m]	Height [pix.]	Height [m]	Area [pix.]	Zones	Triang. [pix.]
		1	0.0010	1	0.0010			
All		286	0.2860	210	0.2100			1.00
1		38	0.0380	14	0.0140	532	1	1.00
4		145	0.1450	190	0.1900	11752	1	1.00
36		145	0.1450	190	0.1900	11588	1	1.00
170		286	0.2860	10	0.0100	2860	1	
174		286	0.2860	10	0.0100	2860	1	
176		16	0.0160	190	0.1900	1260	1	1.00
192		19	0.0190	14	0.0140	266	1	1.00
193		38	0.0380	14	0.0140	532	1	1.00
194		38	0.0380	14	0.0140	532	1	1.00
195		16	0.0160	14	0.0140	224	1	1.00
196		4	0.0040	14	0.0140	56	1	1.00
197		16	0.0160	14	0.0140	224	1	1.00
198		38	0.0380	14	0.0140	532	1	1.00
199		38	0.0380	14	0.0140	532	1	1.00
200		19	0.0190	14	0.0140	266	1	1.00

Col.		Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	ε1 / ε2 [- / -]	λ [W/mK]	ε [-]	θ [°C]	h [W/m²K]	q [W/m²]	θa [°C]	hc [W/m²K]	Pc [W/m]	θr [°C]	Standard
1		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.076									EN6946
4		MATERIAL				fired clay 1900 kg/m3		0.800									
36		MATERIAL				fired clay 1900 kg/m3		0.800									
170		BC_SIMPL	HE			exterior				0.0	25.00	0					EN6946
174		BC_SIMPL	HI	HOR		interior (normal)				20.0	7.70	0					EN6946
176		MATERIAL				mortar		1.000									
192		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.076									EN6946
193		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.076									EN6946
194		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.076									EN6946
195		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.070									EN6946
196		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.061									EN6946
197		EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.070									EN6946

Bitmap Border	U [W/m²K]	Enforced U [W/m²K]
Left	0.821	
Right	0.821	
Top		
Bottom		

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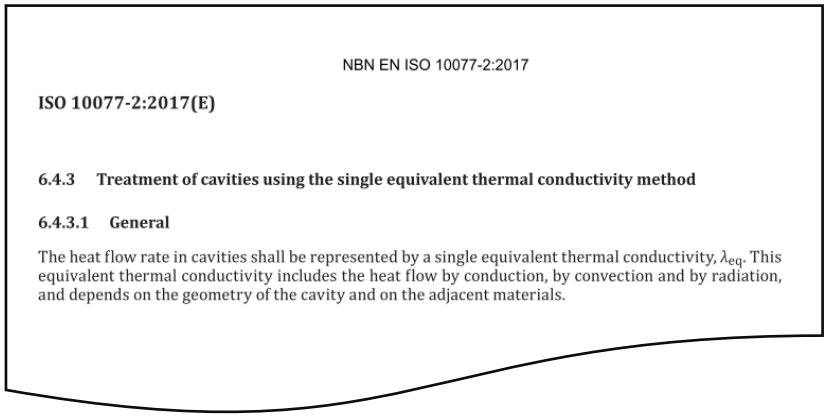
C.3 EN ISO 10077-2 – Conversion method for air cavity

overview

Air cavities in EN ISO 10077-2 (2017):

- Method 1: 'Single equivalent thermal conductivity' method (EQUIMAT)
- Method 2: 'Radiosity' method (TRANSMAT) (requires feature RADCON)



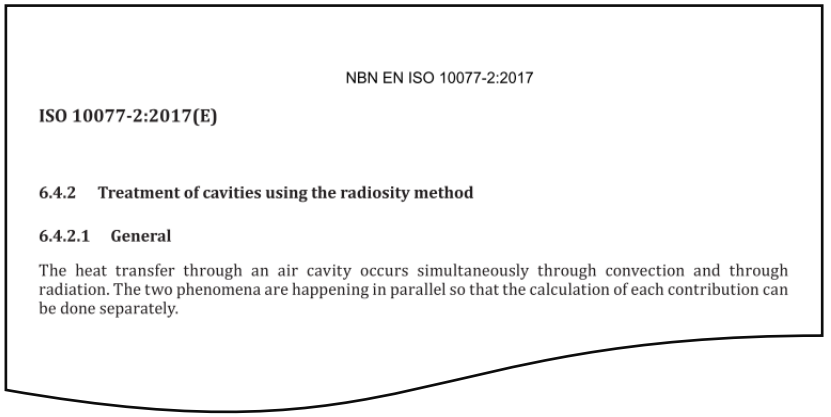
NBN EN ISO 10077-2:2017

ISO 10077-2:2017(E)

6.4.3 Treatment of cavities using the single equivalent thermal conductivity method

6.4.3.1 General

The heat flow rate in cavities shall be represented by a single equivalent thermal conductivity, λ_{eq}. This equivalent thermal conductivity includes the heat flow by conduction, by convection and by radiation, and depends on the geometry of the cavity and on the adjacent materials.



NBN EN ISO 10077-2:2017

ISO 10077-2:2017(E)

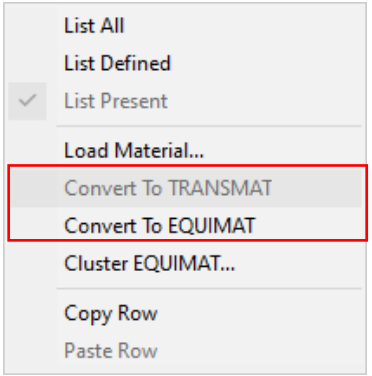
6.4.2 Treatment of cavities using the radiosity method

6.4.2.1 General

The heat transfer through an air cavity occurs simultaneously through convection and through radiation. The two phenomena are happening in parallel so that the calculation of each contribution can be done separately.

Easily switch between both methods:

- Colours → Convert to EQUIMAT
- Colours → Convert to TRANSMAT

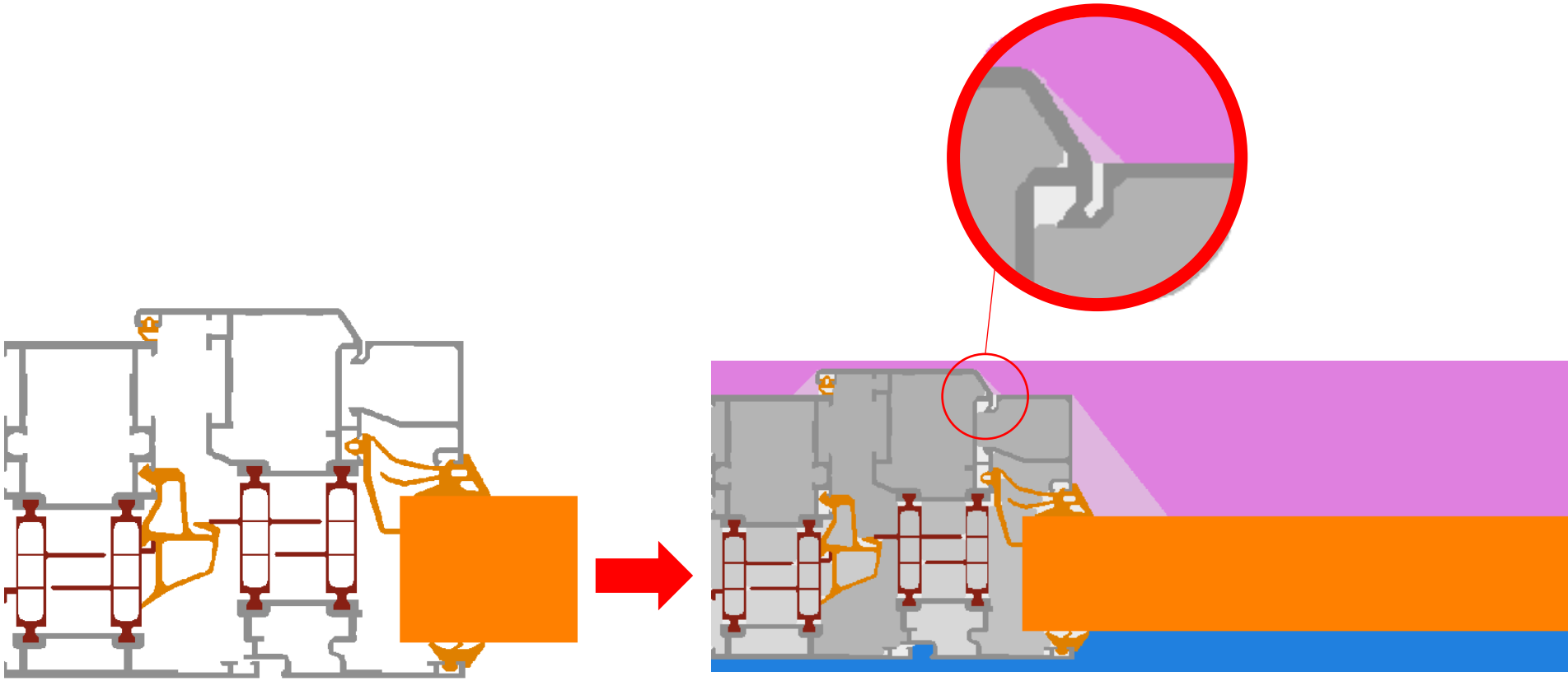


+ visualization feature of 'radiosity' method (Graphic output → A.2)

C.3 EN ISO 10077-2 – Surface grooves

overview

Detection of non-ventilated cavities (<2mm) at surfaces

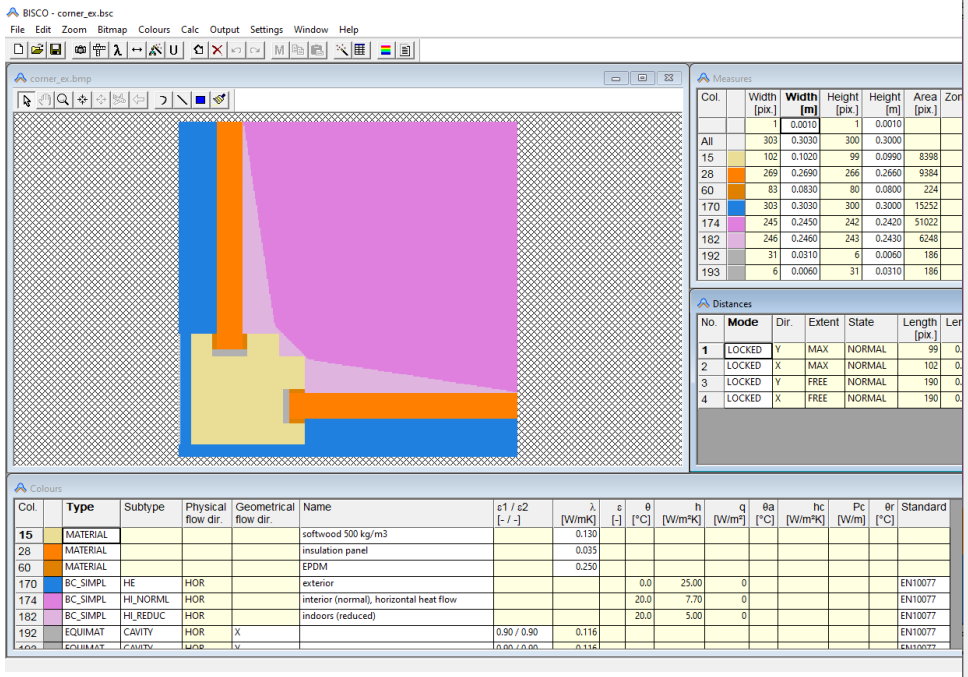


BITMAP → EN 10077 Preparation

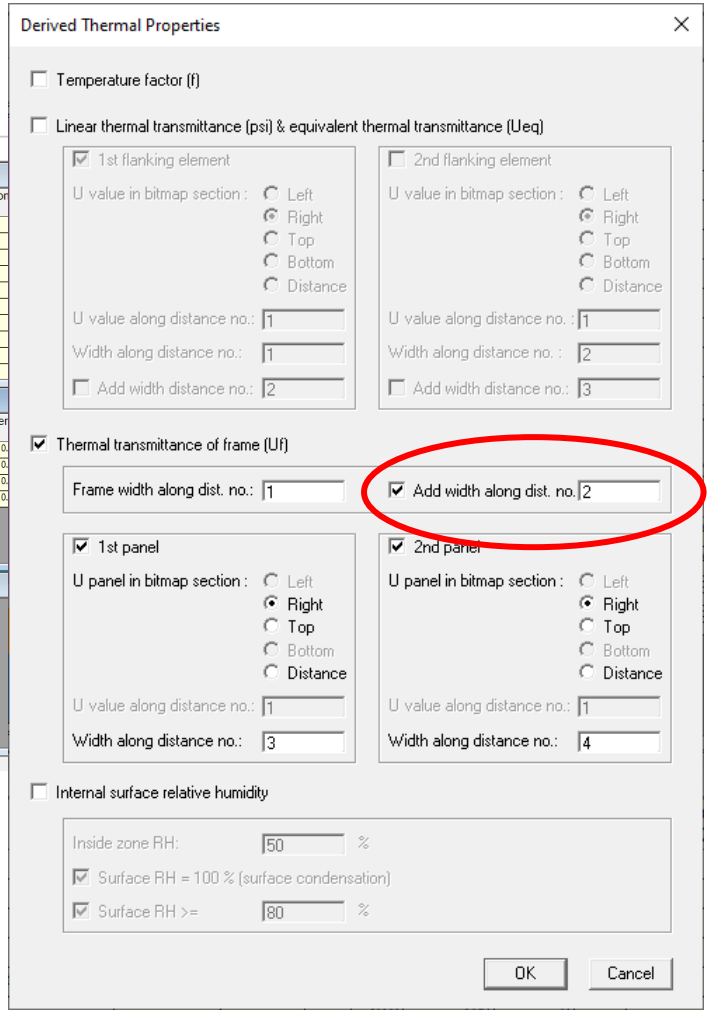
C.3 EN ISO 10077-2 – Uf corner profiles

overview

Uf corner profiles: add 2 distances



Col.	Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	ε1 / ε2 [- / -]	λ [W/mK]	ε [-]	θ [°C]	h [W/m²K]	q [W/m²]	θa [°C]	hc [W/m²K]	Pc [W/m]	θr [°C]	Standard
15	MATERIAL				softwood 500 kg/m3		0.130									
28	MATERIAL				insulation panel		0.035									
60	MATERIAL				EPDM		0.250									
170	BC_SIMPL	HE	HOR		exterior				0.0	25.00	0					EN10077
174	BC_SIMPL	HI_NORML	HOR		interior (normal), horizontal heat flow				20.0	7.70	0					EN10077
182	BC_SIMPL	HI_REDUC	HOR		indoors (reduced)				20.0	5.00	0					EN10077
192	EQUIMAT	CAVITY	HOR	X		0.90 / 0.90	0.116									EN10077



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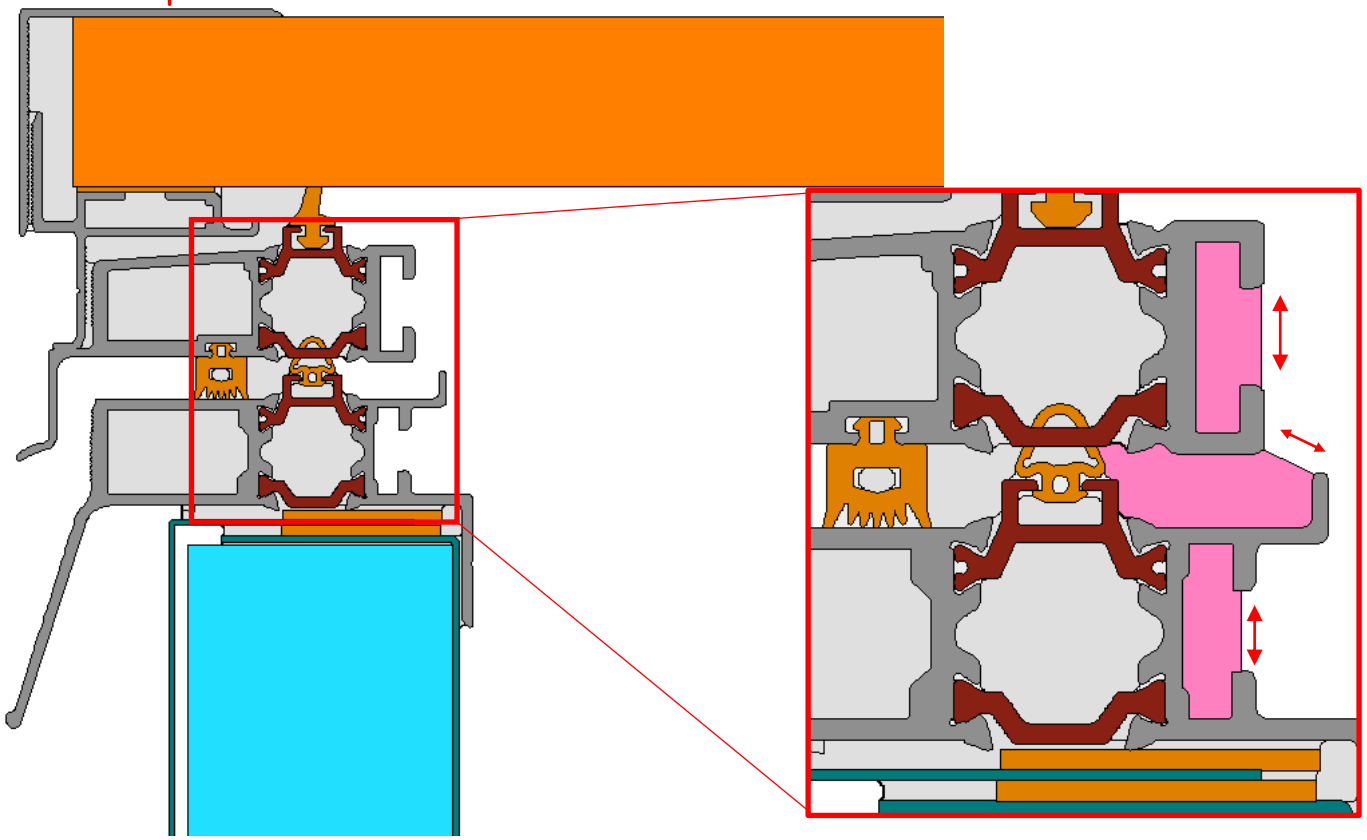
BISCO v12

C.4 EN ISO 13788 – Temperature factor

overview

Slightly ventilated cavities (2-10mm) are considered in the temperature factor

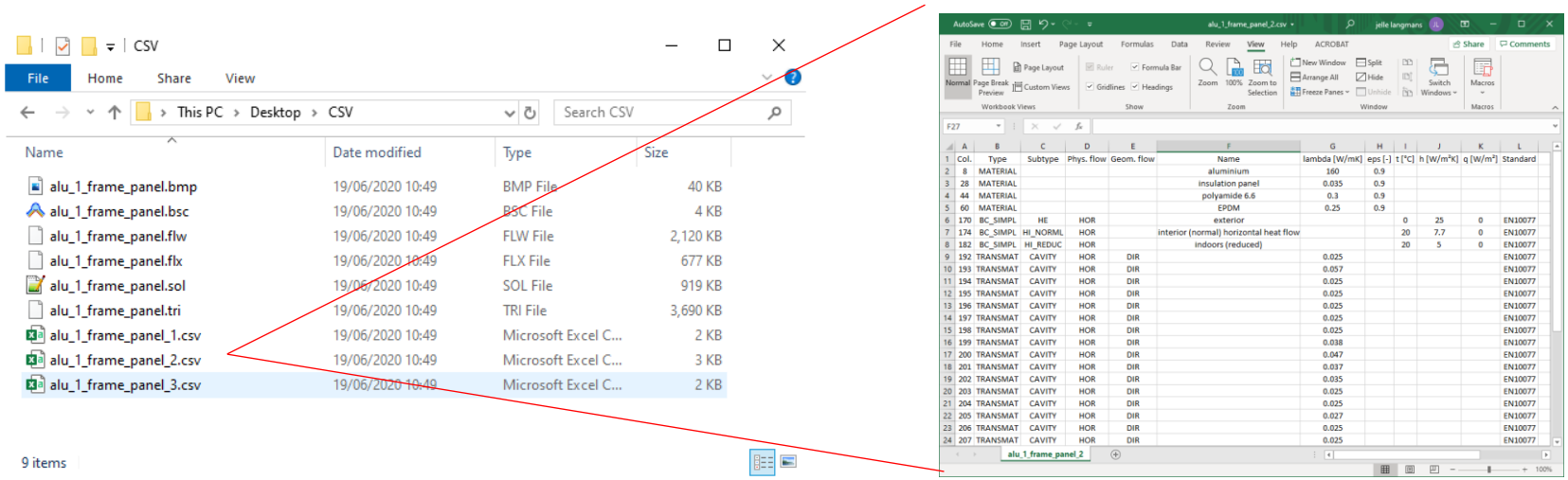
example



D. Text output

overview

D1: feature to save text output in .csv format (e.g. process data in MS Excel)



D2: Automated 'Make report' function:

This function now copies and opens the report template in current folder

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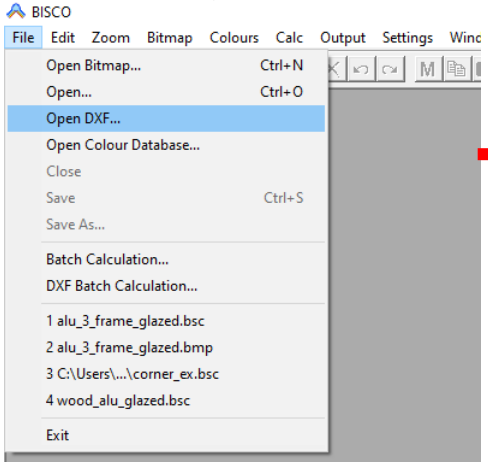
BISCO v12

E.1 BiscoDxf – accesible from BISCO

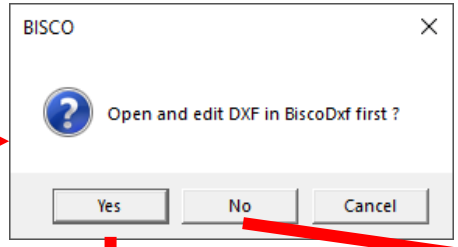
overview

BiscoDxf is accessible from BISCO

File → Open DXF...

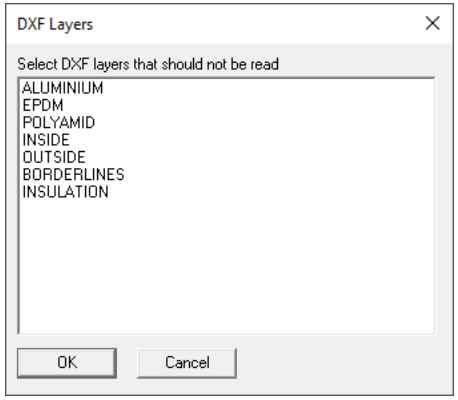


Selection of DXF file



Automatic conversion of DXF to BMP in BISCO

Delete unwanted layers



opens generated BMP in BISCO

BiscoDxf opens for editing

physibel

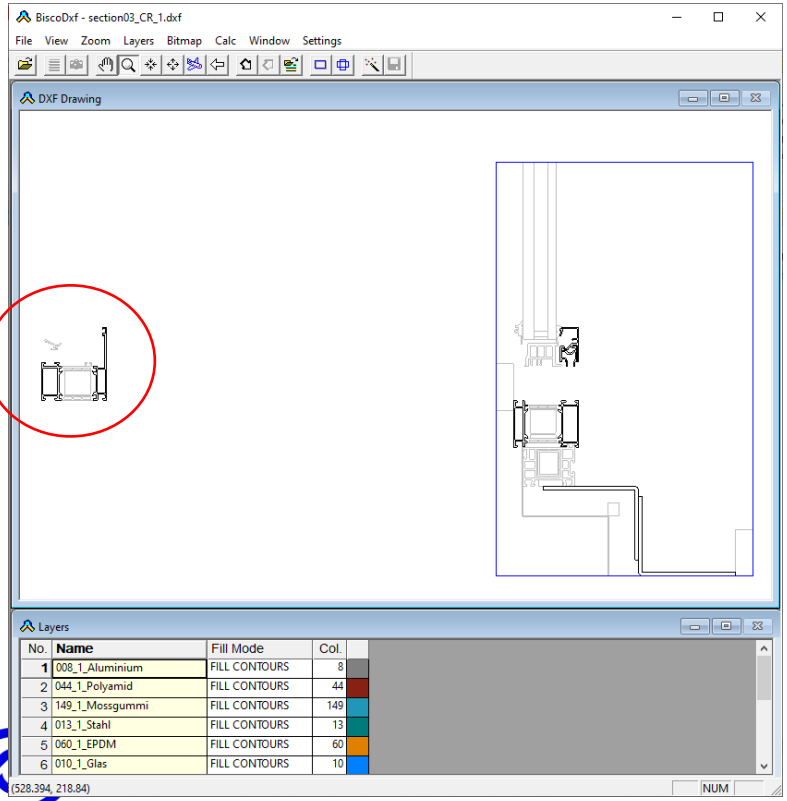
E.2 BiscoDxf – Improved algorithm

overview

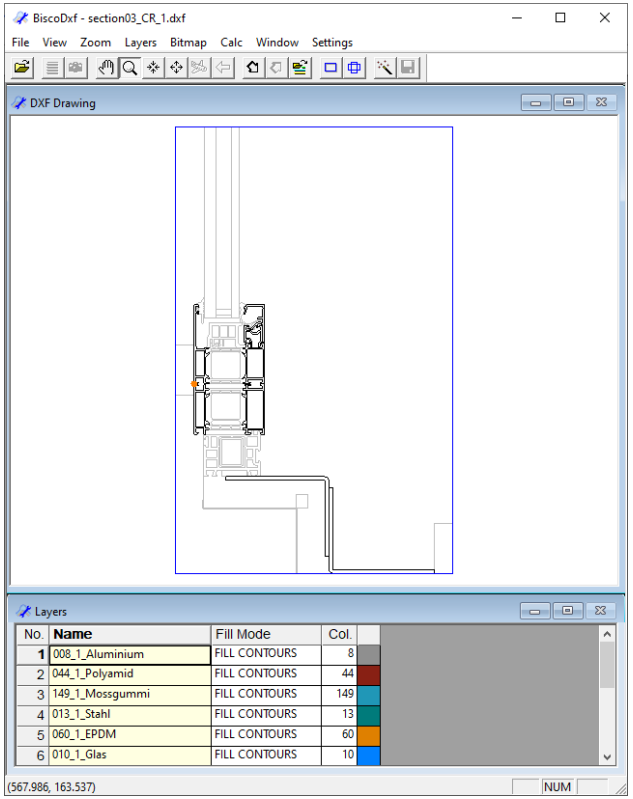
In BISCO v11 problems may occur when the 2D DXF files are extracted from 3D DXF files because of differences in extrusion direction

→ BiscoDxf in BISCO v12 anticipates for mirrored extrusion directions

BISCO v11



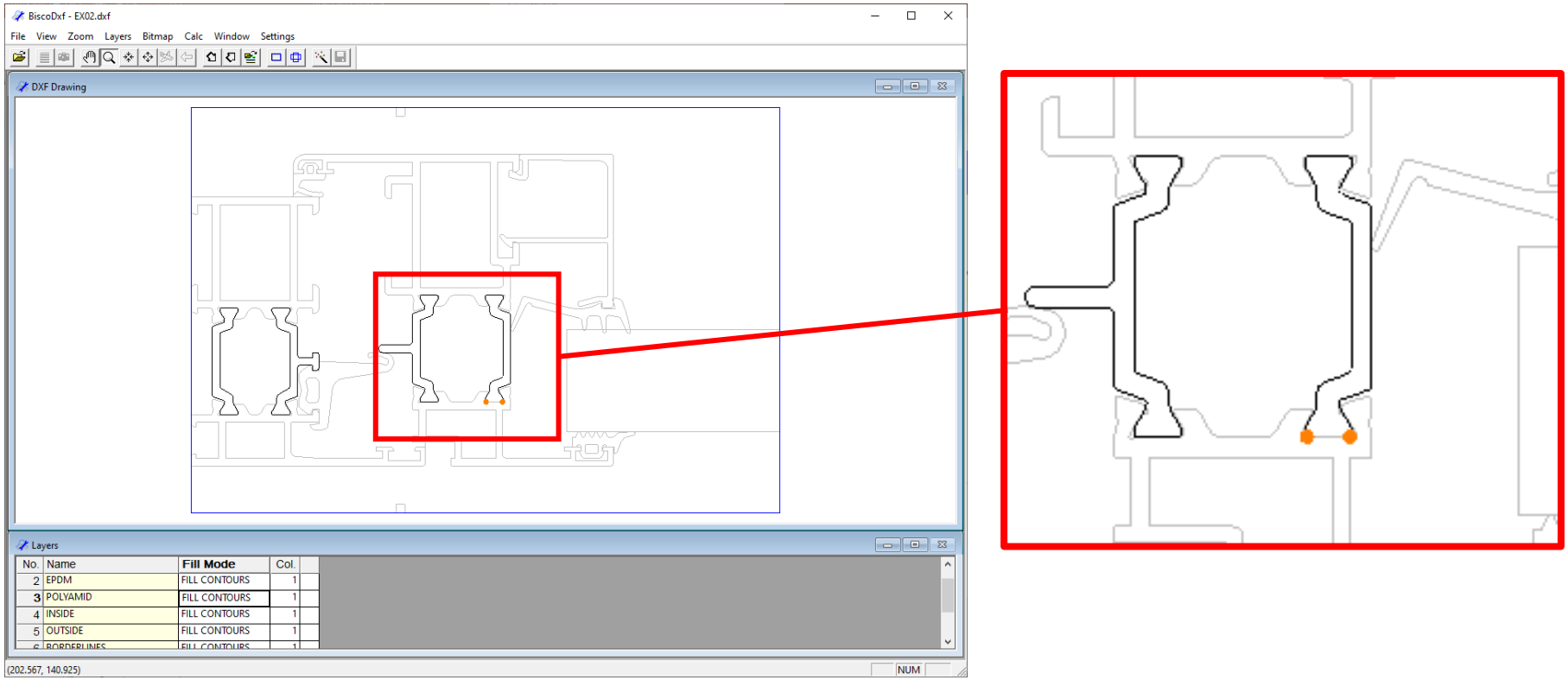
BISCO v12



E.3 BiscoDxf – Warnings

overview

Warning (orange dots) when a polyline is not closed or contains duplicates

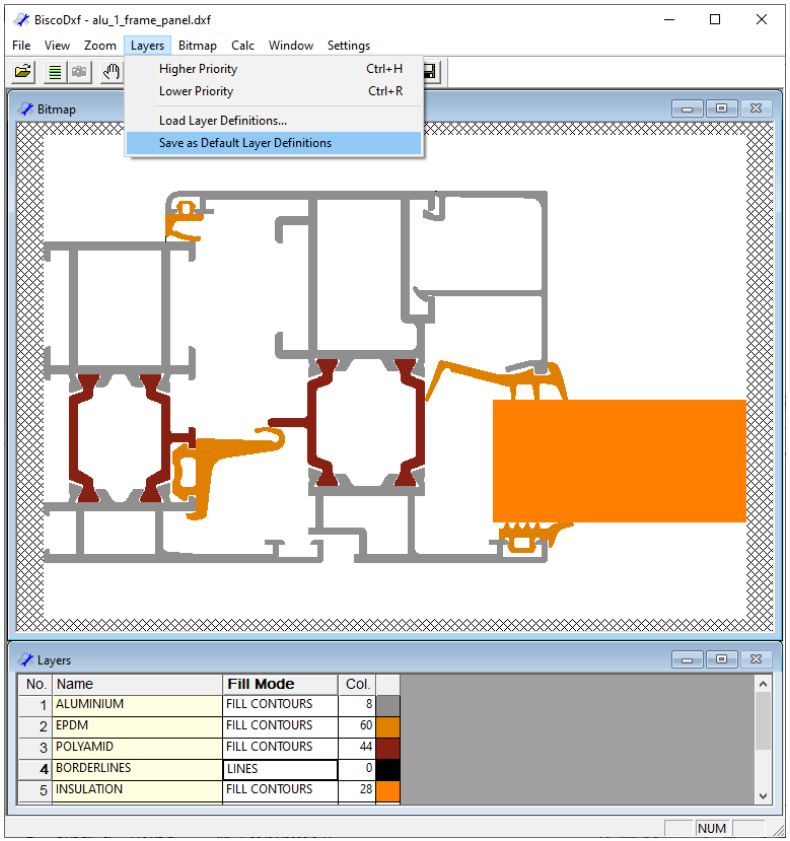


E.4 BiscoDxf – layer info

overview

New feature to store layer information as default

Layers → Save as Default Layer Definitions



C:\Users\...\AppData\Roaming\Physibel\Bisco\

BiscoDxf.lay - Notepad

File Edit Format View Help

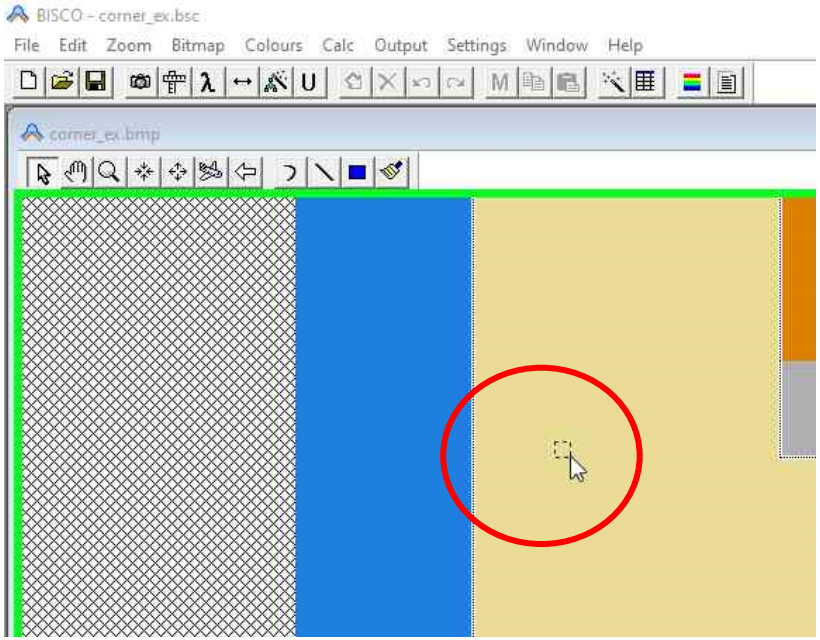
```
name=ALUMINIUM
disp=1
colr=8
name=EPDM
disp=1
colr=60
name=POLYAMID
disp=1
colr=44
name=BORDERLINES
disp=0
colr=0
name=INSULATION
disp=1
colr=28
name=OUTSIDE
disp=1
colr=1
name=INSIDE
disp=1
colr=1
```

Next project file: stored layer names get the correct ‘fill mode’, ‘colour’ and sequence

F.1 Bitmap editing – snap to pixel

overview

Pixel is highlighted when in 'selection' mode or in 'drawing' mode



Snap to pixel simplifies:

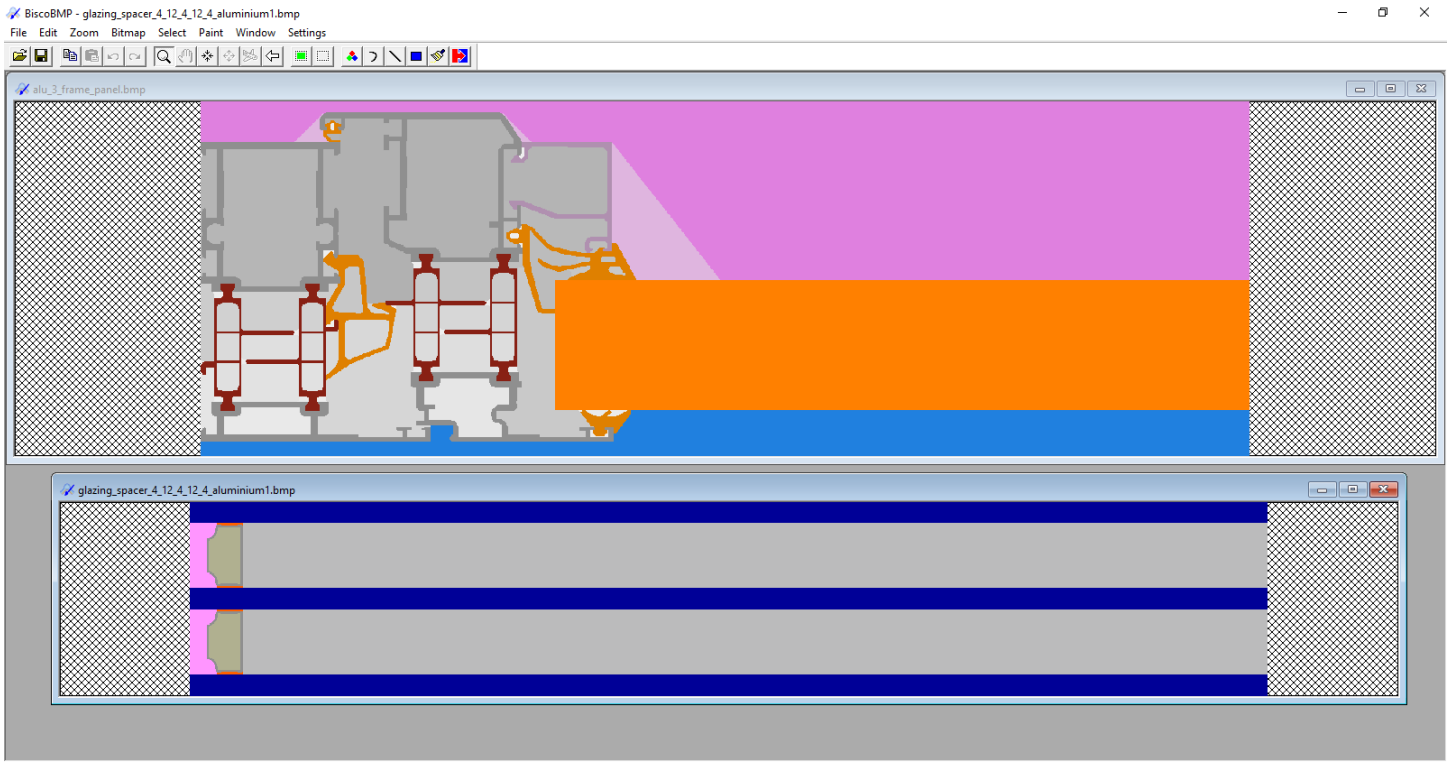
- drawing
- importing bitmaps (e.g. glazing)
- defining distances

F.2 Bitmap editing – Drawing tool BiscoBmp

overview

BiscoBmp accessible from BISCO

Bitmap → Edit using BiscoBmp



F.2 Bitmap editing – Drawing tool BiscoBmp

overview

BiscoBmp functionalities:

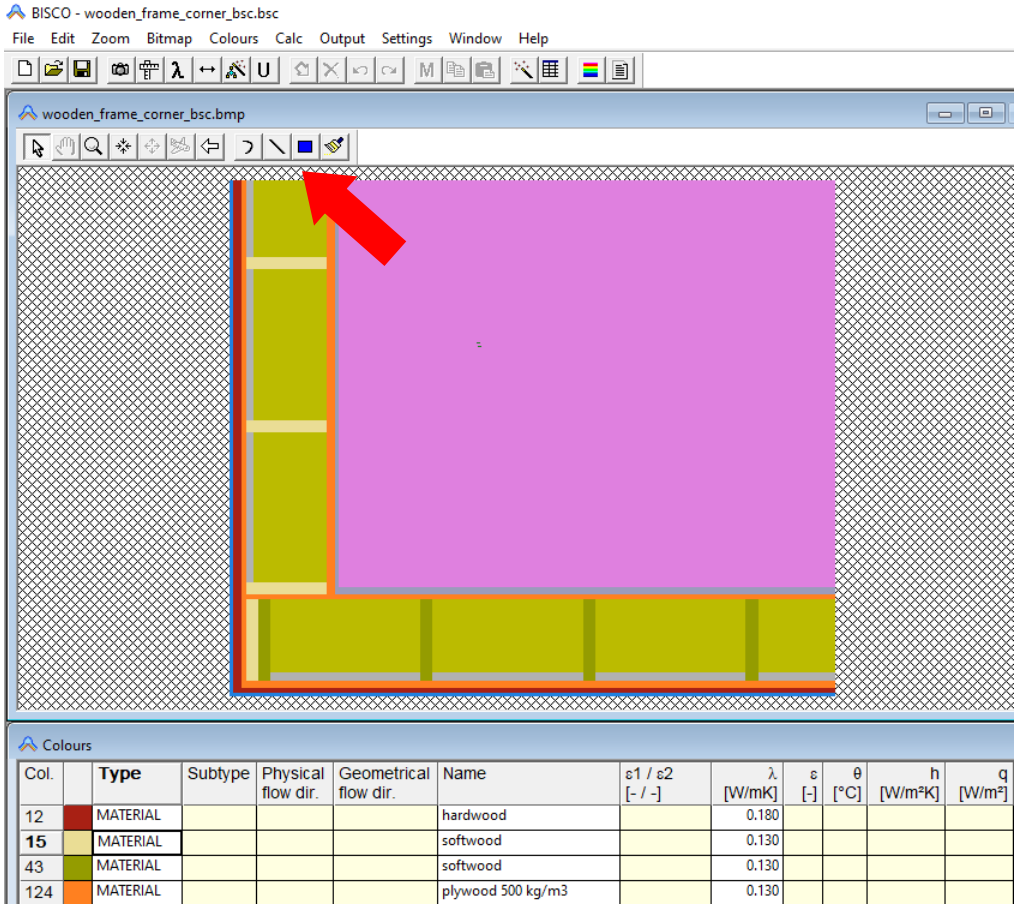
- Open multiple bitmaps
- Modify the size of the bitmap
- Verify dimension of a zone
- Crop the bitmap borders
- Modify the bitmap resolution
- Rotate the bitmap over 90°
- Flip and mirror the bitmap
- Add bitmap borders
- Several select options: all / none / window / colour / add to and subtract from selection.
- Several select operations: copy & paste / move / crop to selection.
- Draw pixels, lines, rectangles and fixed angle lines (increment 45°)
- Fill zones
- Replace colours

When closing BiscoBmp the adjustments are automatically loaded into current BISCO file

F.3 Bitmap editing – Rectangles & lines

overview

Drawing functions: rectangles & lines



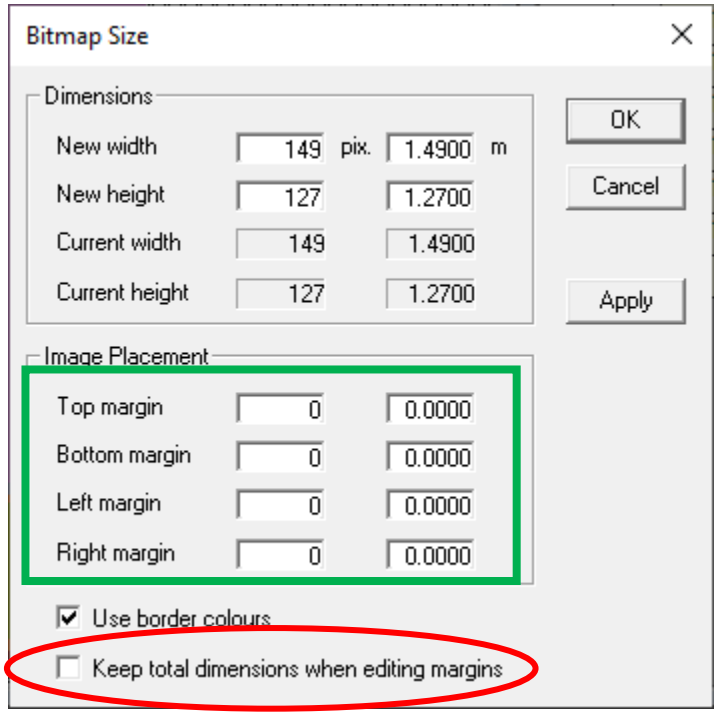
Col.		Type	Subtype	Physical flow dir.	Geometrical flow dir.	Name	ε1 / ε2 [- / -]	λ [W/mK]	ε [-]	θ [°C]	h [W/m²K]	q [W/m²]
12		MATERIAL				hardwood		0.180				
15		MATERIAL				softwood		0.130				
43		MATERIAL				softwood		0.130				
124		MATERIAL				plywood 500 kg/m3		0.130				

F.4 Bitmap editing – Miscellaneous

overview

Bitmap size: option to keep dimension when editing margins

Allows to easily extend the bitmap borders with desired extension length



F.5 Bitmap editing – Miscellaneous

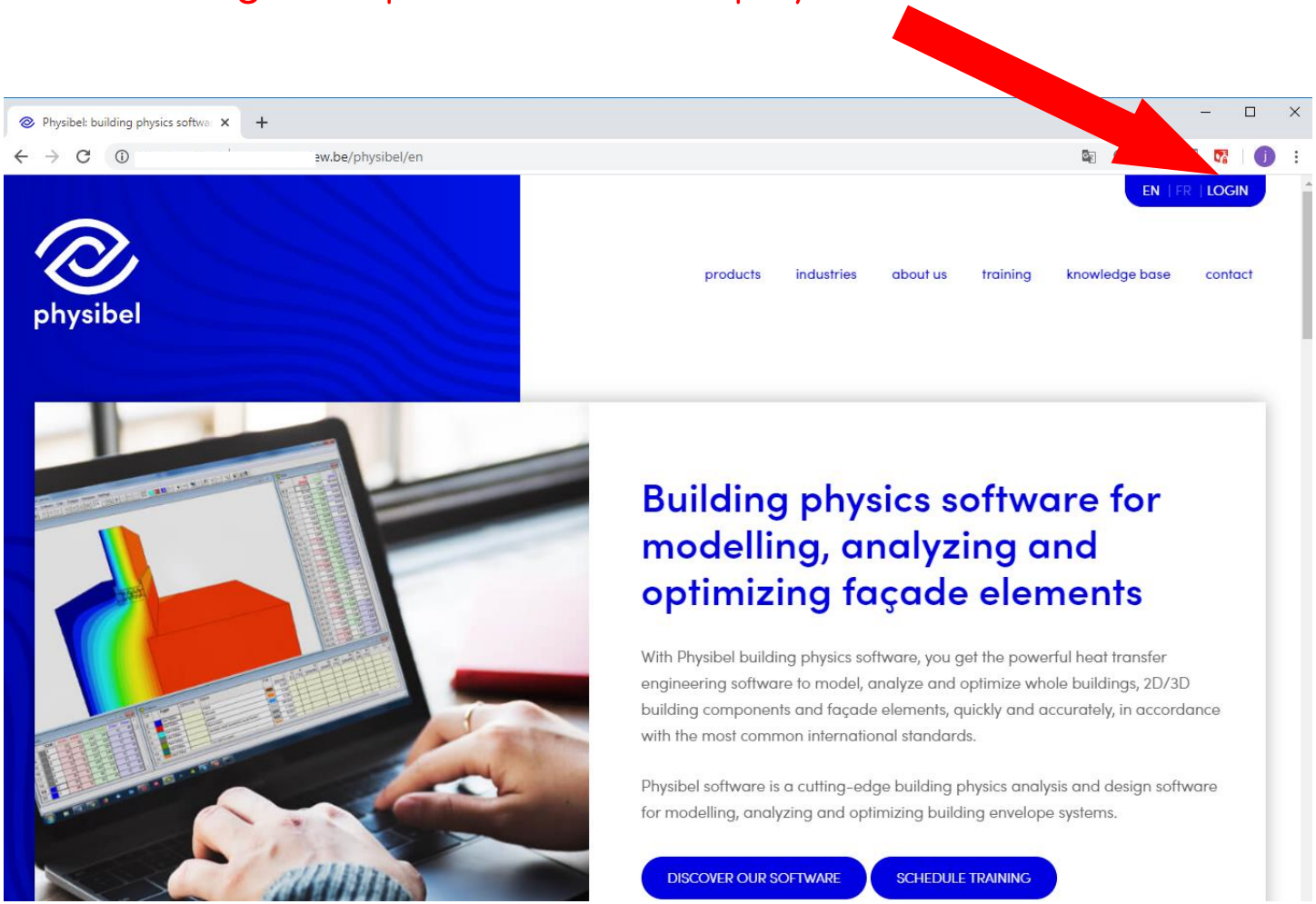
overview

- Cursor colour adjusted for background colour
- Zoom and draw function buttons moved to Bitmap window
- Pan: drag mode changed to ‘drag object’
- Function ‘Clean Colour…’ to delete pixel noise

G.1 Online Physibel Portal

overview

log in to portal via www.physibel.be



G.1 Online Physibel Portal

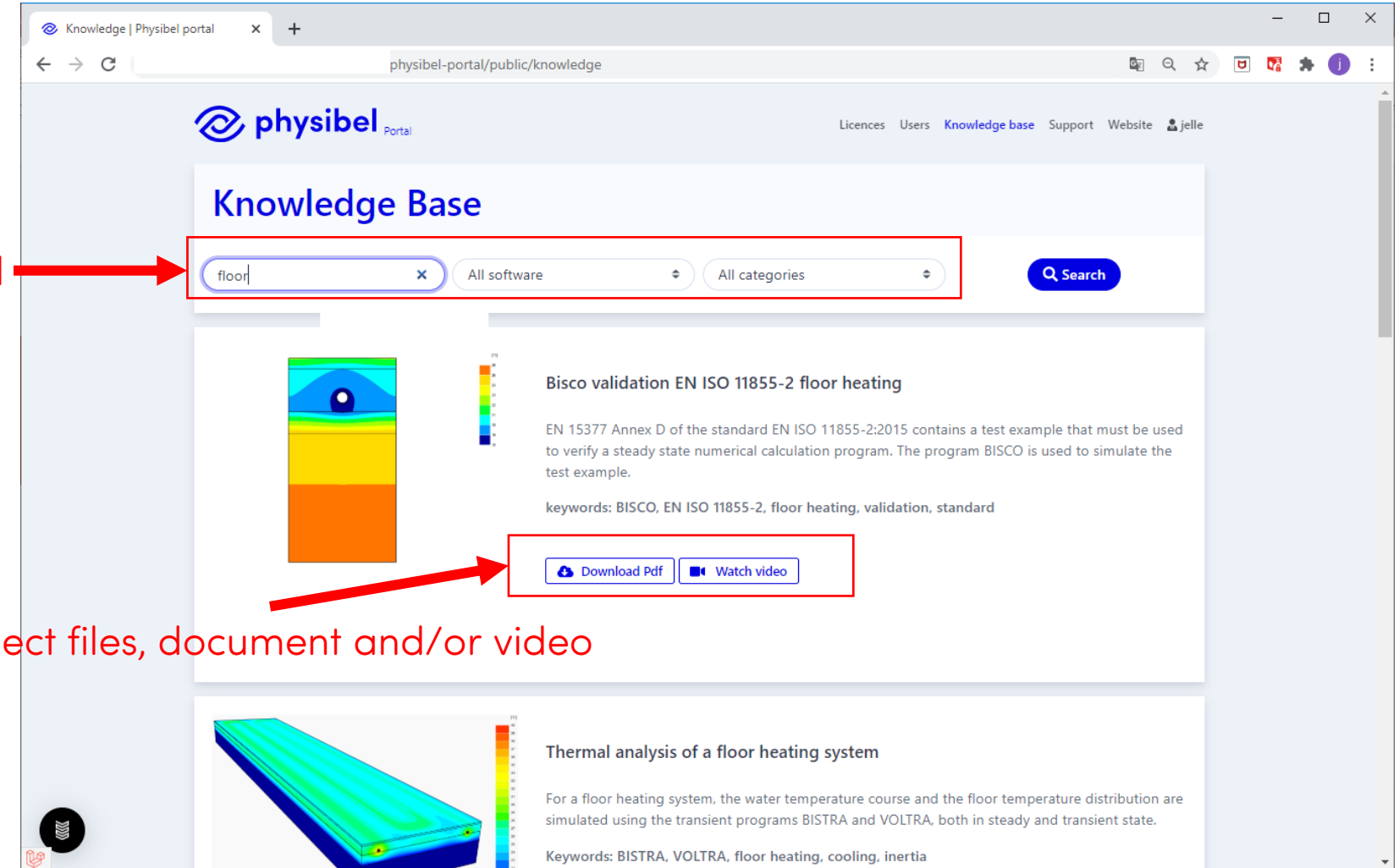
overview

Access to

- Knowledge Base with example projects, tutorials and videos

Search tool

Access project files, document and/or video

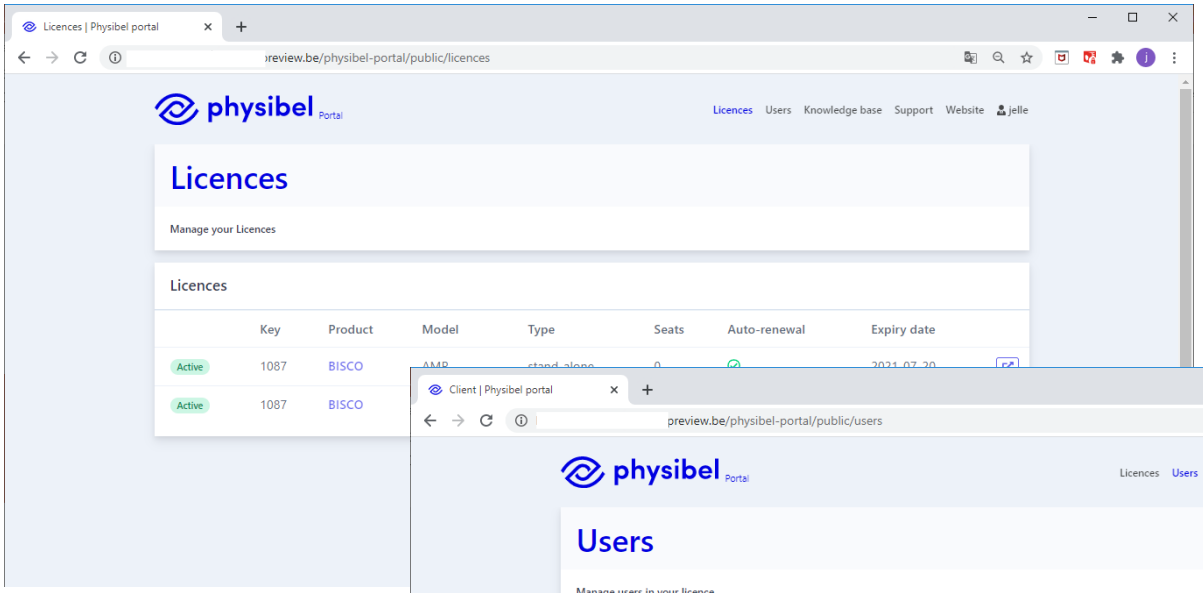


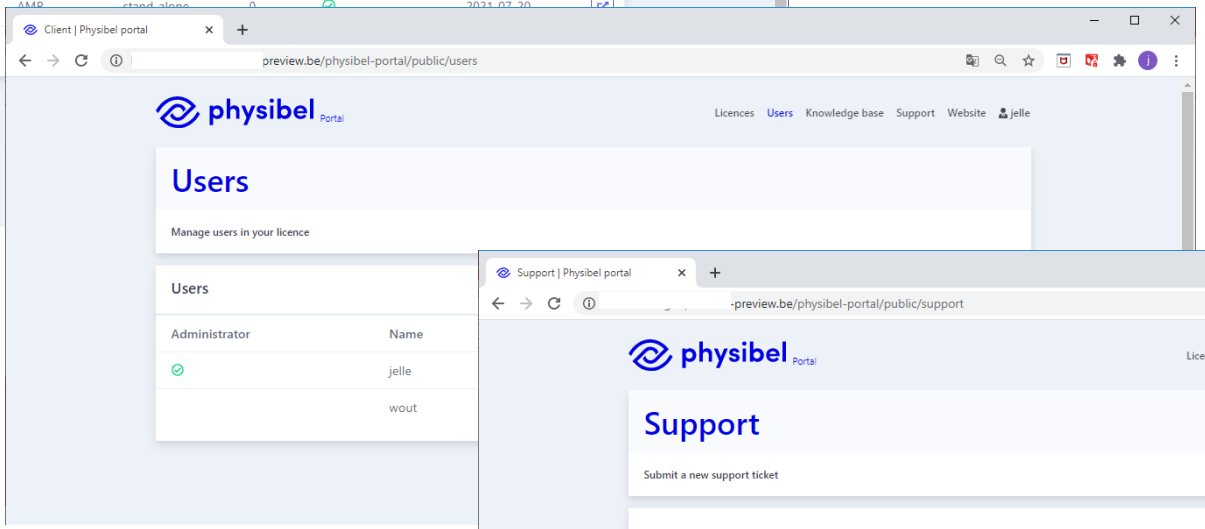
G.1 Online Physibel Portal

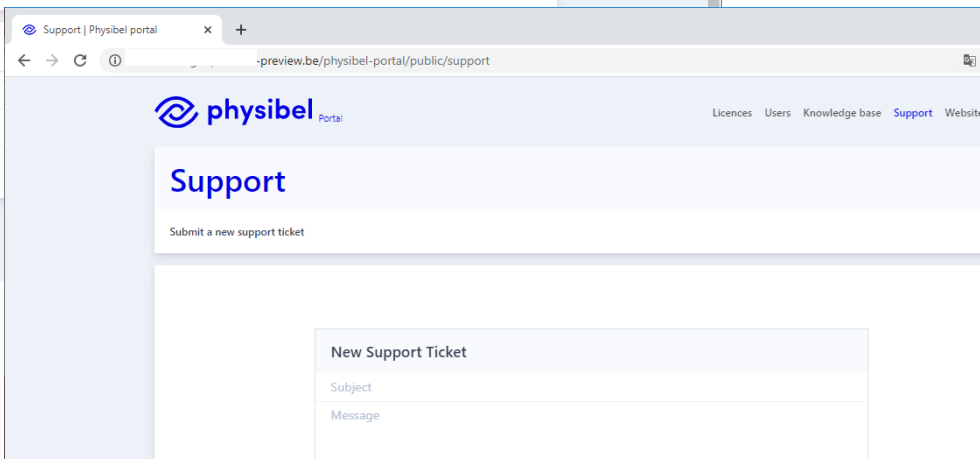
overview

Access to

- Licence and user management
- Support







H Licencing options

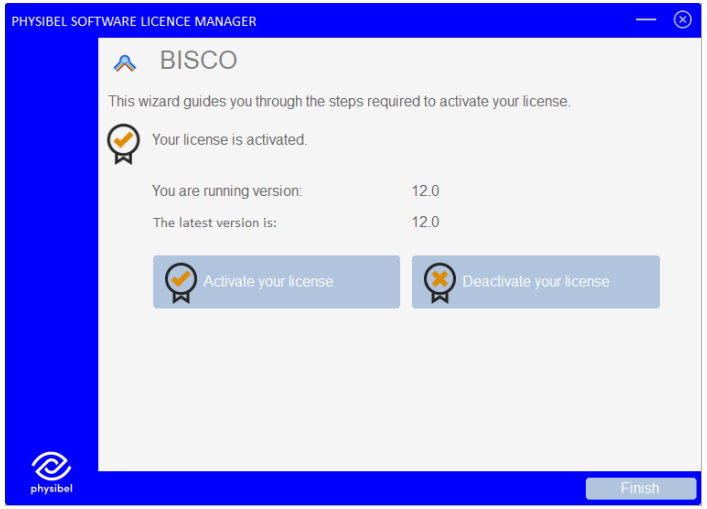
overview

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



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BISCO v12 New program performances

www.physibel.be/bisco

downloadable program demo version