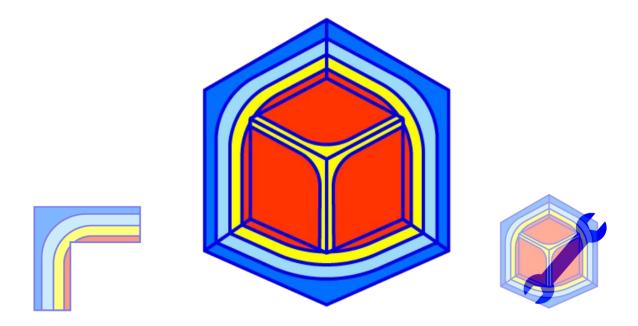


TRISCO v15 New program performances



www.physibel.be/en/products/trisco

TRISCO v15 - Overview

A Includes new tool Trisco2D

- A.1 Using a DXF as underlayer
- A.2 Automatic grid recognition
- A.3 Intuitive drawing and material selection functions
- A.4 Fast reporting of ψ -values and U_{2D}-values
- A.5 Trisco2D files can be imported in TRISCO

B Graphic output and Image views

- B.1 New thermal Palette allows comparison with IR-images
- B.2 Legend
- B.3 Orthogonal views in Image window
- B.4 Miscellaneous
- C Revision of Colour Window
 - C.1 Allows conformity with different EN standards
 - C.2 Customisable Colour Database
- D EN ISO standards

physibe

- D.1 Cavities and layers according to EN ISO 6946
- D.2 Cavities according to EN ISO 10077-2
- D.3 Interaction between BISCO and TRISCO

E Graphic visualisation performance

- E.1 Improved GPU selection and bug fixes
- F <u>Text output</u>
 - F.1 Automated 'Make report' function
 - F.2 Save text output in .csv format

G <u>TriscoDxf</u>

- G.1 Accessible from TRISCO
- G.2 Improved algorithms (extrusion direction detection)
- G.3 Error warning: open line ends and duplicates
- G.4 Layer selection when loading DXF

H Online Physibel Portal

- H.1 User management
- H.2 Support
- H.3 Physibel Knowledge Base
 - Documentation
 - Tutorials and examples
 - Videos

Licencing

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

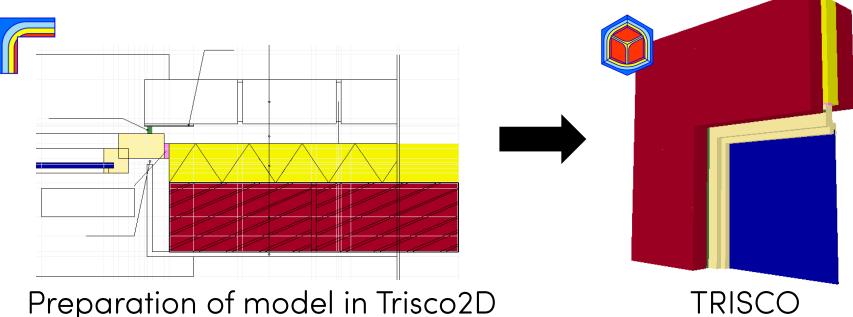




A. New tool Trisco2D

Allows to model fast 2D thermal problems based on rectangular blocks:

- Using DXF-underlayer
- Automatic grid recognition from random DXF files
- Intuitive drawing and material selection functions
- Fast reporting of ψ -values and U_{2D}-values
- Trisco2D model can be imported in TRISCO

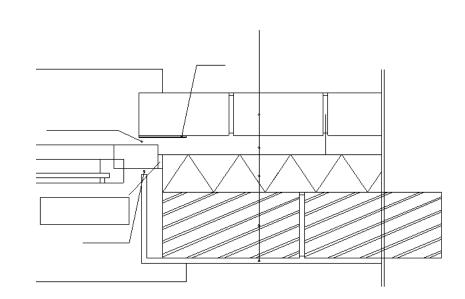


overview

A.1 Trisco2D – Using a DXF as underlayer

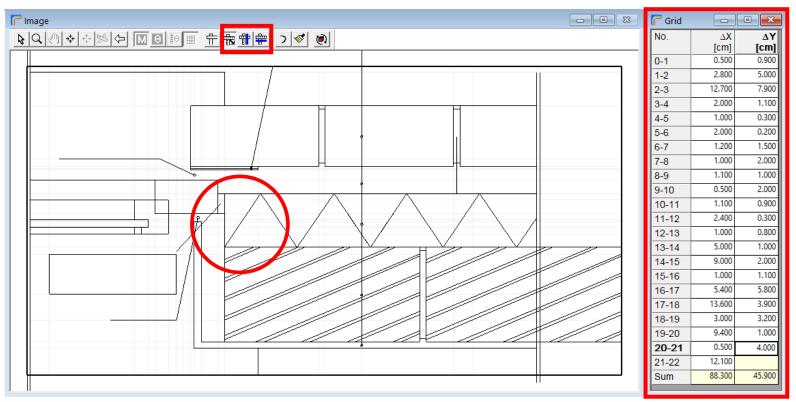
- Import 2D DXF as underlayer in Trisco2D
- DXF file has no format requirements (e.g. can contain open polylines)
- Option to skip unwanted DXF layers

Create DXF underlayer	×
DXF unit = 0.01 m	ОК
Total object size	Cancel
Total X size = 122 [cm]	
Total Y size = 174.5 [cm]	
Create horizontal and vertical object grid Select DXF layers that should be skipped A0_GENERAL-A01_FRONT-008 A0_GENERAL-A01_FRONT-025 A2_UPPER-02_MASONRY_INNER A0_GENERAL-A01_FRONT-018 A0_GENERAL-A01_FRONT-035 GEEN	I lines based on DXF



A.2 Trisco2D – Automatic grid recognition

- Horizontal and vertical object grid lines detected
- <u>Snap</u> functions to <u>add</u> grid lines with mouse cursor
- Drag function to move or delete grid line with mouse cursor



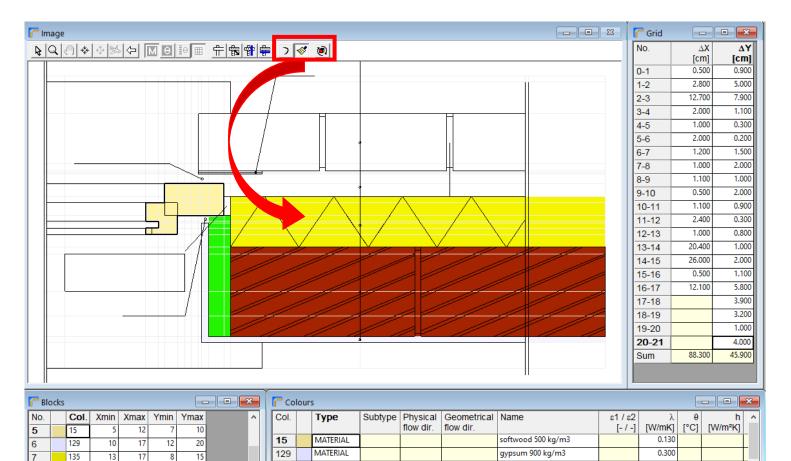


Automatic grid detection



A.3 Trisco2D – Intuitive drawing and material selection

- <u>Draw</u> and <u>fill</u> functions to link colours to grid with mouse cursor
- Fast key to optimize number of blocks



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insulation 0.025 W/mK

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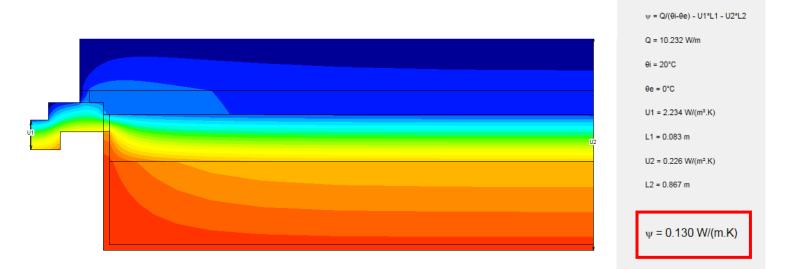




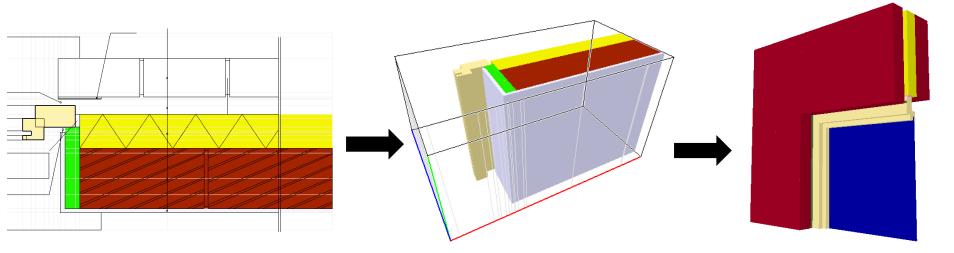
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A.4 Fast reporting of ψ/U_{2D} -values and input for TRISCO

- Direct output for 2D thermal problems: ψ -values and U_{2D}-values in Graphic Output



- Trisco2D files can be imported in TRISCO to create 3D geometries

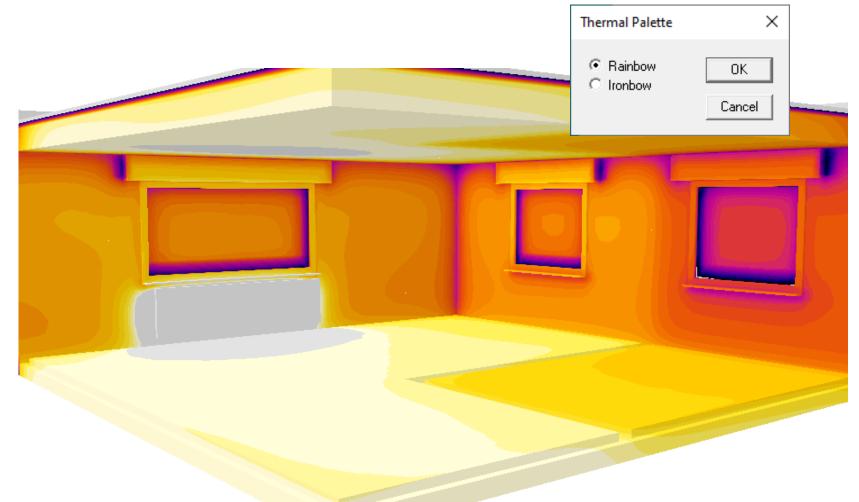


B.1 New thermal Palette – comparison with IR-images

<u>overview</u>

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New thermal palette allows to compare simulation with IR-image



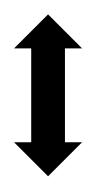


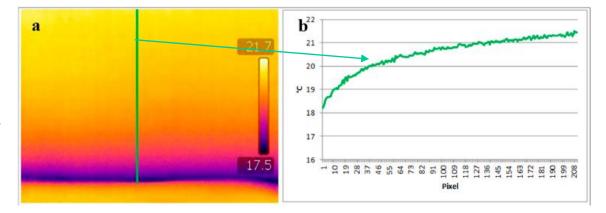


B.1 New thermal Palette – comparison with IR-images

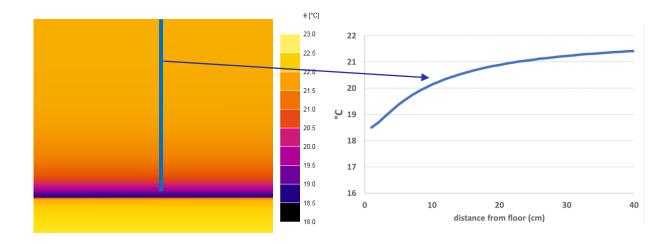
overview

IR-study measurement





SOURCE: F. Bianchi & A-L. Pisello & G. Baldinelli & F. Asdrubali, 2014. "Infrared Thermography Assessment of Thermal Bridges in Building Envelope: Experimental Validation in a Test Room Setup," Sustainability, MDPI,vol. 6(10)

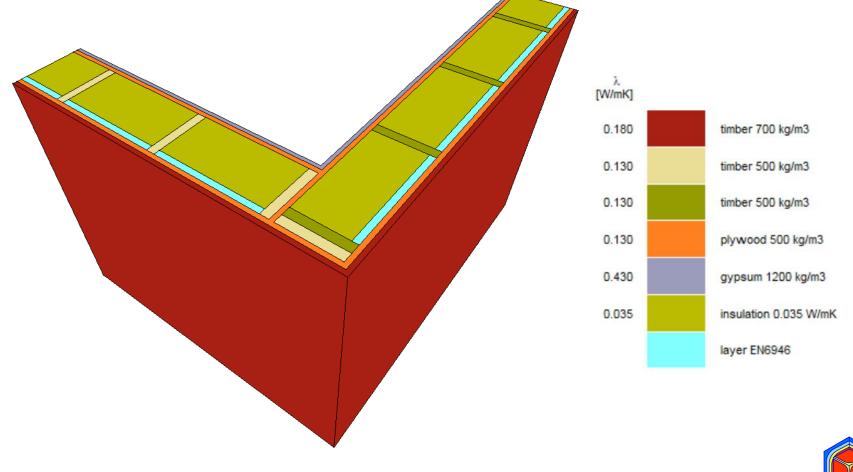


TRISCO simulation

Thermal bridge at floor-to-wall junction

Fill materials

 \rightarrow revised legend: <u>material name + clustered cavities</u> (with relevant standard)







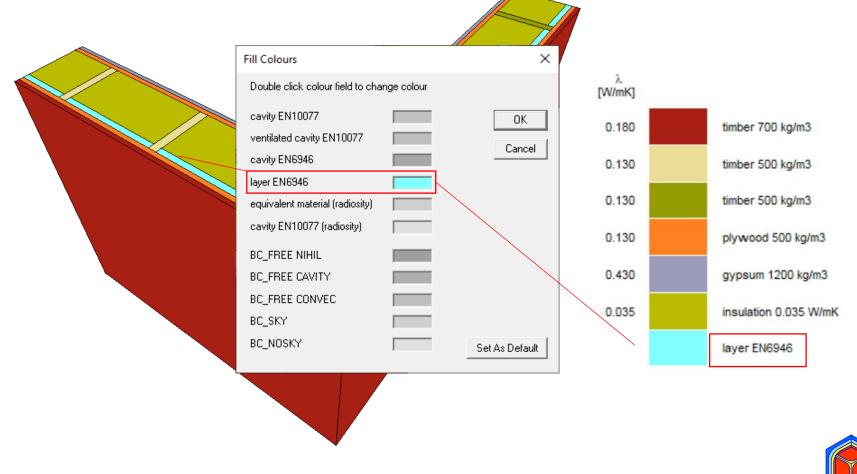
B.2 Graphic output - Legend

TRISCO v15

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Fill materials

→ revised legend: <u>material name</u> + <u>clustered cavities</u> (with relevant standard)

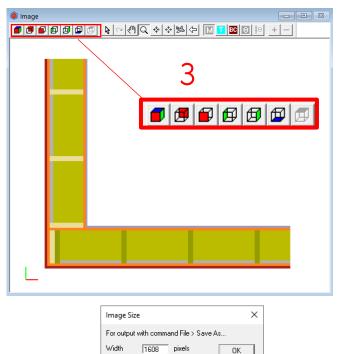




B.3 Graphic output – Miscellaneous

- 1. Automatic selection of temperature range
- 2. Coordinate system in left corner of Image window
- 3. Orthogonal views in Image window
- 4. Image Size: possible to use Screen Settings for image output

	Temperature Range		×
	Use boundary condition	temperatures	ОК
1	Minimum temperature	<u>0</u> ℃	Cancel
	Maximum temperature	20 °C	Set As Default
	First increment	1 °C	
	Second increment (multiple of first increment)	5 °C	
	Single value	0 °C	
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k			



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Font size 8

Use Screen Settings

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point

Cancel

Set As Default

Heiah

On screen : Width

Height

Font size 8



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

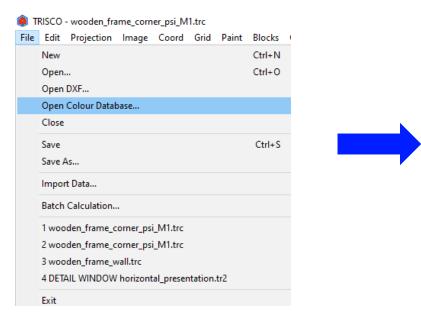
- Rule \rightarrow Subtype
- Physical flow direction (horizontal, up, down): defined by the user (and standard)
- Geometrical flow direction (X, Y, Z)
- Standard (EN10077, EN6946)
- $\epsilon 1/\epsilon 2$: emissivities linked to a cavity ("single equivalent thermal conductivity method")
- ε emissivity linked to a material ("radiosity method")

A Colo	urs														x
Col.	Туре	Subtype	Physical flow dir.	Geometrical flow dir.	Name	s1 / s2 [- / -]	λ [W/mK]	г [-]	θ [°C]		q [W/m²]	hc [W/m²K]	Pc [W/m]	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	х	cavity (CEN)	0.90 / 0.90	0.037							EN10077	
214	EQUIMAT	CAVITY	HOR	γ	cavity (CEN)	0.90 / 0.90	0.065							EN10077	
215	EQUIMAT	CAVITY	HOR	Y	cavity (CEN)	0.90 / 0.90	0.102							EN10077	

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Customisable Colour Database with predefined colours

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



	티 잡기	+ 🖉 λ	VV				1		
Col.	Туре	Subtype	Physical flow dir.	Geometrical flow dir.	Name	s1/s2	λ	8	0°] 10°]
0	MATERIAL		now uir.	now un.		[-/-]	[W/mK] 1.000	[-] 0.90	10
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	
B	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	

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

Implementation of air layers according to EN ISO 6946 Example: wall junction with non-ventilated air layers in wall

	5.000 5.000 1000.000 5.000 5.000	Î
Blocks Colours	1 1485.000 1270.000 1000.000 5.000 5.000 1000.000 5.000 5.000 1000.000	
Image: Delta state	5.000 5.000 1000.000 5.000 5.000	
Image: Second	5.000 5.000	
Blocks Colours		
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E Block Colours	5.000 5.000	
Blocks	5.000 5.000	
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17-11 18-11 19-21 20-2 21-27 20-2 21-27 20-2 21-27 20-2 21-27 20-2 21-27 20-2 21-27 20-2 20-2 20-2 20-2 20-2 20-2 20-2 2		
Blocks Colours		
19-21 20-2 21-22 21-22 20-2 21-22 20-2 20-		
20-2 91-2 00-2 00-2 00-2 00-2 00-2 00-2 00-2 0		
Blocks Colours		
Blocks Colours		
	5.000 5.000	
		- • ×
No. Col. Xmin Xmax Ymin Ymax Zmax Λ Col. Type Subtype Physical Geometrical Name ε1/ε2 λ ε θ Physical Geometrical Name ε1/ε2 λ ε θ Physical Geometrical Name ε1/ε2 λ ε θ Physical	h q θа hc Pc θ m²K] [W/m²] [°C] [W/m²k1 [W] [°C	er Standard
	<u>n-kj [vv/m²j [°Cj [vv/m²k] [W] [°C</u>	C] EN6946
	7.70 0	EN6946
		EN6946
12 43 175 181 8 48 0 1 13 43 255 261 8 48 0 1 v		
		>





<u>overview</u>

D.1 EN ISO 6946 – cavities and layers

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

TRISCO - EN1745_case2.trc * File Edit Desiration January Color Color			– 0 ×
File Edit Projection Image Coord Grid Paint Blocks Colours Calc Output Settings Window Help			
$\square \blacksquare \blacksquare \blacksquare \blacksquare \land $	Y		~
lmage	🏮 Grid		
	No.	X Y Z	^
	Sum	[mm] [mm] [mm] 132.500 365.200 250.000	
	0-1	2.000 2.000 26.327	
	1-2	2.000 2.000 21.062	
	2-3	2.000 2.000 16.849	
	3-4	1.500 2.000 13.479	
	4-5	2.000 2.000 10.783	
	5-6	2.000 2.000 8.627	
	6-7	2.000 2.000 6.901	
	7-8	2.000 2.000 5.521 2.000 2.000 4.417	
	8-9 9-10	2.000 2.000 4.417 2.000 2.000 3.534	
	10-11	2.000 2.000 3.000	
	11-12	2.000 2.000 3.000	
	12-13	0.300 2.000 3.000	
	13-14	2.000 2.000 3.000	
	14-15	2.000 2.000 3.000	
	15-16	2.000 2.000 3.534	
	16-17	2.000 2.000 4.417	
	17-18	2.000 2.000 5.521	
	18-19	2.000 2.000 6.901	
	19-20	1.400 2.000 8.627	
	20-21	2.000 2.000 10.783	
	21-22	2.000 2.000 13.479	✓
Blocks Colour			
No. Col. Xmin Xmax Ymin Ymax Zmin Zmax \wedge Col. Type Subtype Physical flow dir. Geometrical Name ϵ_1 / ϵ_2 λ No. Col. Type Subtype Physical flow dir. Geometrical Name ϵ_1 / ϵ_2 λ Image: Col. Type Subtype Physical flow dir. Image: Col. [-/-] [W/mK]	е ө [-] [°C]	h q θa [W/m²K] [₩/m²] [°C] [W/m	hc Pc θr Standar ^
132 MATERIAL fired clay 0.350			
9 170 0 71 188 193 0 25 10 194 0 13 21 29 15 25	0.0	25.00 0	EN6946
11 195 0 13 49 57 15 25 174 BC_SIMPL HI HOR interior (normal)	20.0	7.70 0	EN6946
12 195 0 13 77 85 15 25 193 EQUIMAT CAVITY HOR Yx non-ventilated cavity 0.90/0.90 0.071			EN6946
13 197 0 13 105 113 15 25 194 EQUIMAT CAVITY HOR Yx non-ventilated cavity 0.90/0.90 0.078			EN6946
	1 1		

D.2 Cavities according to EN ISO 10077-2

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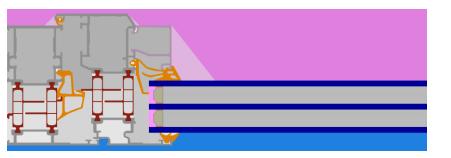
Implementation of cavities according to EN ISO 10077-2 Example: window frame in 3D

TRISCO - alu_3_frame_glazed_CLUSTER.trc * File Edit Projection Image Coord Grid Paint Blocks Colours Calc	Output Settings Window Help						- 0	×					
D GR <u>A</u> + T A X <u>X</u> <u>X</u> <u>A</u> X E A			~										
Image		-	🔲 🔀 🌘 Grie	d				×					
			No. Sum 0-1 1-2 2-3 3-4 4-5 6-6 6-7 7-8 8-9 9-10 10-11 11-12 12-13 13-14 14-15 15-16 16-17 16-16 16-16 16-16 16-16 16-27 16-2	0.200 3 0.200 0. 0.200 0. 0.200 0. 0.200 0. 0.200 0. 0.200 0. 0.200 0. 0.200 0. 0.200 0. 0.200 0. 0.200 0. 0.200 0. 0.200 0. 2 0.400 3 0.200 3 0.200 3 0.200 3 0.200 0. 0. 3 0.200 0. 0. 0.0200 0. 0. 0.200	Y Z (mm) (mm) 00 400.000 800 40.000 200 200	5							
Blocks Col. Xmin Xmax Ymin Ymax Zmax 197(1 192 112 164 252 1 1 1971 192 182 87 112 297 355 0 1 1972 192 87 112 297 355 0 1 1973 192 164 186 365 0 1 1974 192 117 455 393 410 0 1 1974 192 143 198 171 180 0 1	Col. Type Subtype Phy	interior (reduced)	0.100 0.1 20,1 20,1	9 h (W/m²K) 0 25.00 (0 0 7.70 (0	200	hc Pc n²K] [W] 	Ør Standar [°C] EN6946 EN10077 EN10077 EN10077 EN10077						
Colours													
Col. Type Subtype	Physical Geometri flow dir. flow dir.	cal Name	ε1 / ε2 [- / -]	λ [W/mK]	е [-]	θ [°C]	h [W/m²K]	q [W/m²]	θa [°C]	hc [W/m²K]	Pc [W]	θr [°C]	Standar
105 MATERIAL		molecular sieve		0.100									
170 BC_SIMPL HE		exterior				0.0	25.00	0					EN6946
	HOR	interior (normal)				20.0	7.70	0					EN10077
174 BC_SIMPL HI_NORML						20.0	5.00	0					EN10077
174 BC_SIMPL HI_NORML 182 BC_SIMPL HI_REDUC	HOR	interior (reduced)				20.0	5.00	· ·					ENTOUTT
	HOR HOR Xy	interior (reduced)	0.90 / 0.90	0.101		20.0	5.00						EN10077

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Fast 3D extrusion of BISCO files in TRISCO:

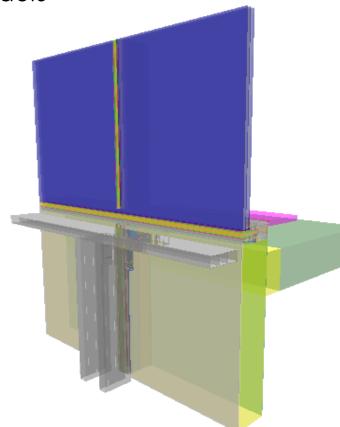
- Implementation of air cavities according to EN ISO 10077-2 in TRISCO
- fixed equivalent thermal conductivities (clustered cavities)



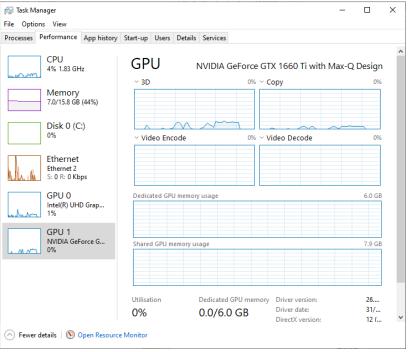


E. Graphic visualisation performance

- 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



physibe





F. Text output

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F1: feature to save text output in .csv format (e.g. process data in MS Excel)

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$\rightarrow \checkmark \uparrow \square \rightarrow$ This PC \rightarrow Deskt	op > CSV	マ ひ Search CSV		٩	Worl	book Views		llines 🗹 Hea		Freeze Panes ~		ີນ Win	witch Ma dows ~ Ma	
me	Date modified	Туре	Size		F27		D Phys. flow	E Geom. flow	F	G lambda [W/mK]			J) V/m²K] q [W	
alu_1_frame_panel.bmp	19/06/2020 10:49	BMP File	40 KB		2 8 MAT 3 28 MAT 4 44 MAT	RIAL			aluminium insulation panel polyamide 6.6	160 0.035 0.3	0.9 0.9 0.9			
alu_1_frame_panel.bsc	19/06/2020 10:49	BSC File	4 KB		5 60 MAT	RIAL	HOR		EPDM	0.25	0.9	0	25 0	EN1007
alu_1_frame_panel.flw	19/06/2020 10:49	FLW File	2,120 KB		7 174 BC_S	IMPL HI_NORM	L HOR		interior (normal) horizontal heat flow indoors (reduced)				7.7 (EN1007
alu_1_frame_panel.flx	19/06/2020 10:49	FLX File	677 KB		9 192 TRAN	SMAT CAVITY	HOR	DIR	indoors (reduced)	0.025		20	5 (EN1007
alu_1_frame_panel.sol	19/06/2020 10:49	SOL File	919 KB		10 193 TRAN 11 194 TRAN	SMAT CAVITY	HOR	DIR		0.057				EN1007
ilu_1_frame_panel.tri	19/06/2020 10:49	TRI File	3,690 KB		12 195 TRAN 13 196 TRAN	SMAT CAVITY	HOR	DIR		0.025				EN1007
ilu_1_frame_panel_1.csv	19/06/2020 10:49	Microsoft Excel C	2 KB		14 197 TRAN 15 198 TRAN 16 199 TRAN	SMAT CAVITY	HOR	DIR		0.025				EN1007 EN1007
Ilu_1_frame_panel_2.csv	19/06/2020 10:49	Microsoft Excel C	3 KB		16 199 TRAN 17 200 TRAN 18 201 TRAN	SMAT CAVITY	HOR HOR HOR	DIR DIR DIR		0.038 0.047 0.037				EN1007 EN1007
lu_1_frame_panel_3.csv	19/06/2020 10:49	Microsoft Excel C	2 KB		19 202 TRAN 20 203 TRAN	SMAT CAVITY	HOR	DIR		0.035				EN1007 EN1007
					21 204 TRAN 22 205 TRAN 23 206 TRAN	SMAT CAVITY	HOR HOR HOR	DIR DIR DIR		0.025 0.027 0.025				EN1007 EN1007 EN1007
						SMAT CAVITY	HOR	DIR		0.025				EN1007

F2: Automated 'Make report' function:

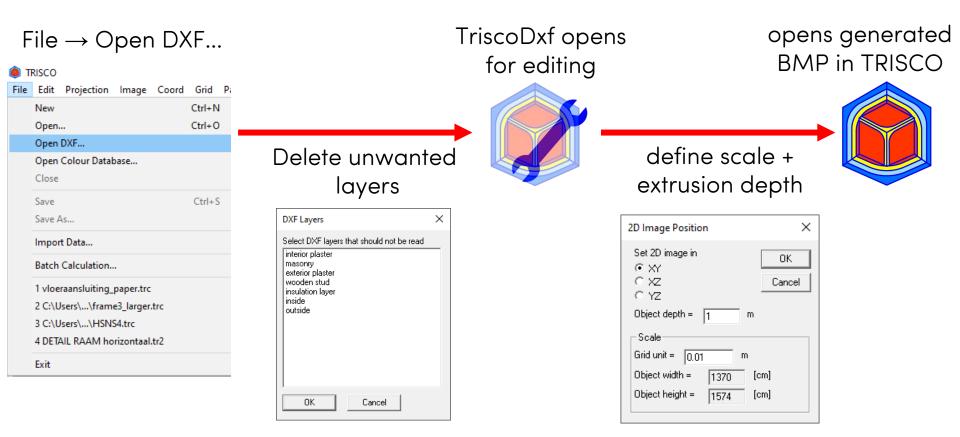
This function now copies and opens the report template in current folder





G.1 TriscoDxf - accessible from TRISCO

overview



Optimized to import efficiently 'prepared DXF-files':

- Closed polylines
- Every material in different layer

For 'non-prepared DXF-files' \rightarrow DXF as underlayer in <u>Trisco2D</u>

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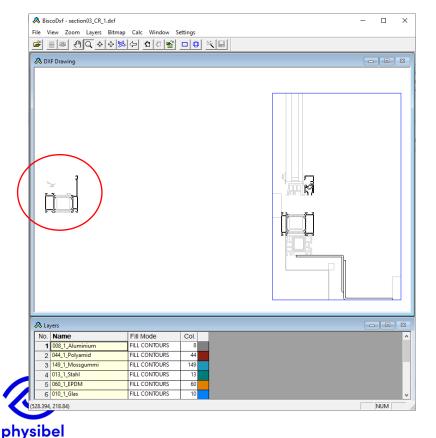
G.2 TriscoDxf – Improved algorithm

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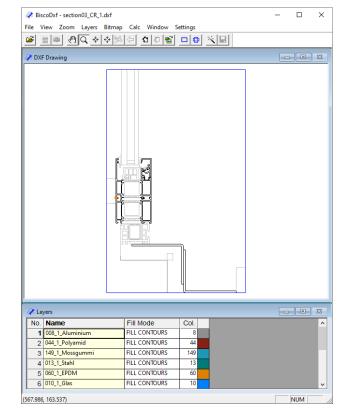
In TRISCO v14 problems may occur when the 2D DXF files are extracted from 3D DXF files because of differences in extrusion direction

 \rightarrow TriscoDxf in TRISCO v15 anticipates for mirrored extrusion directions

TRISCO v14

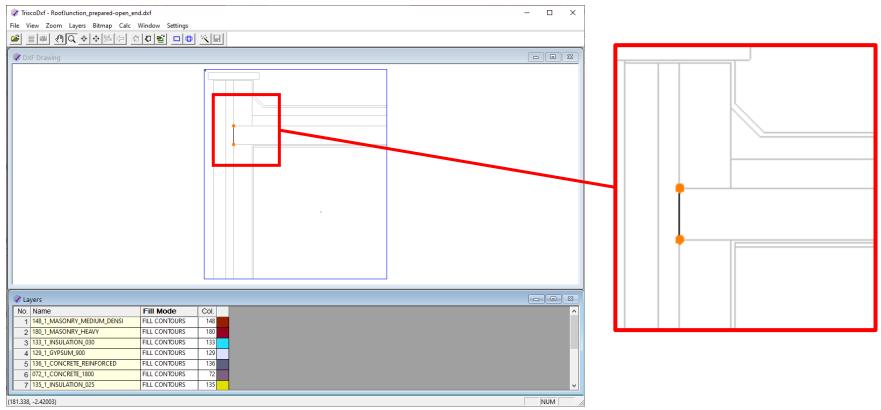


TRISCO v15





Warning (orange dots) when a polyline is <u>not closed</u> or contains <u>duplicates</u>



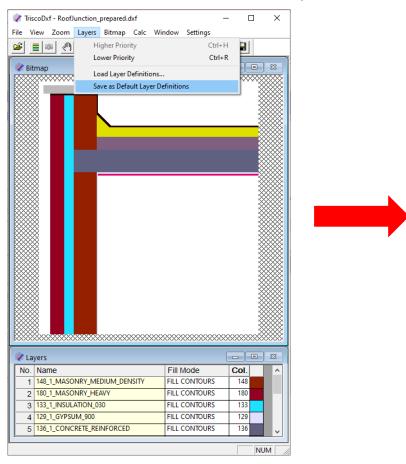




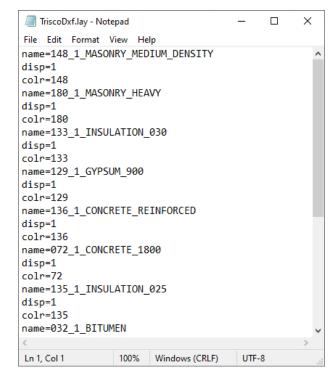
G.4 TriscoDxf – layer info

New feature to store layer information as default

Layers \rightarrow Save as Default Layer Definitions



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



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

H.1 Online Physibel Portal

+

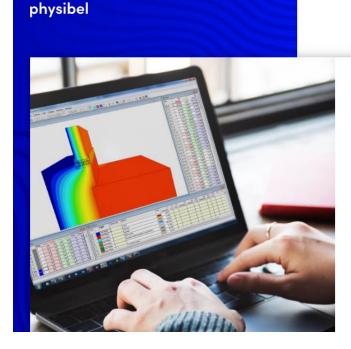
ew.be/physibel/en

Physibel: building physics software

← → C ①

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log in to portal via www.physibel.be



Building physics software for modelling, analyzing and optimizing façade elements

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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.

Physibel software is a cutting-edge building physics analysis and design software for modelling, analyzing and optimizing building envelope systems.

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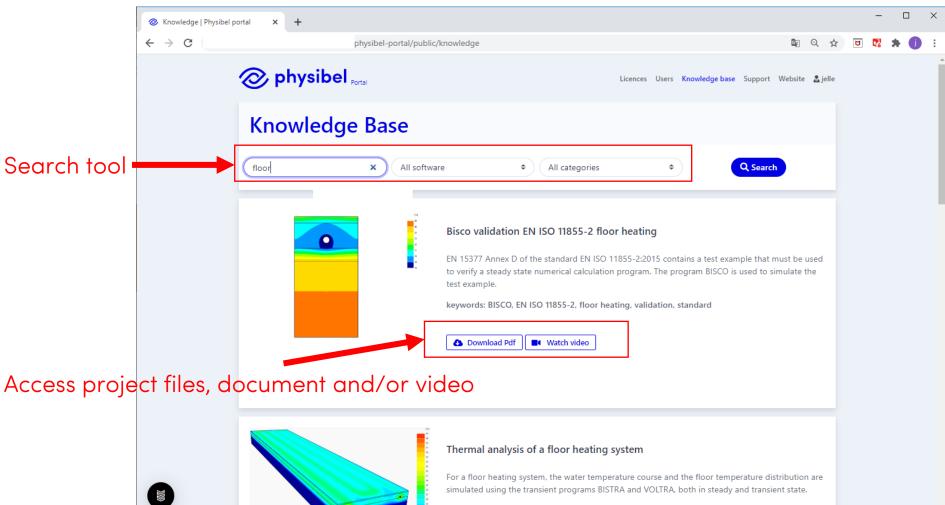
industries

SCHEDULE TRAINING

H.1 Online Physibel Portal

Access to

• Knowledge Base with example projects, tutorials and videos

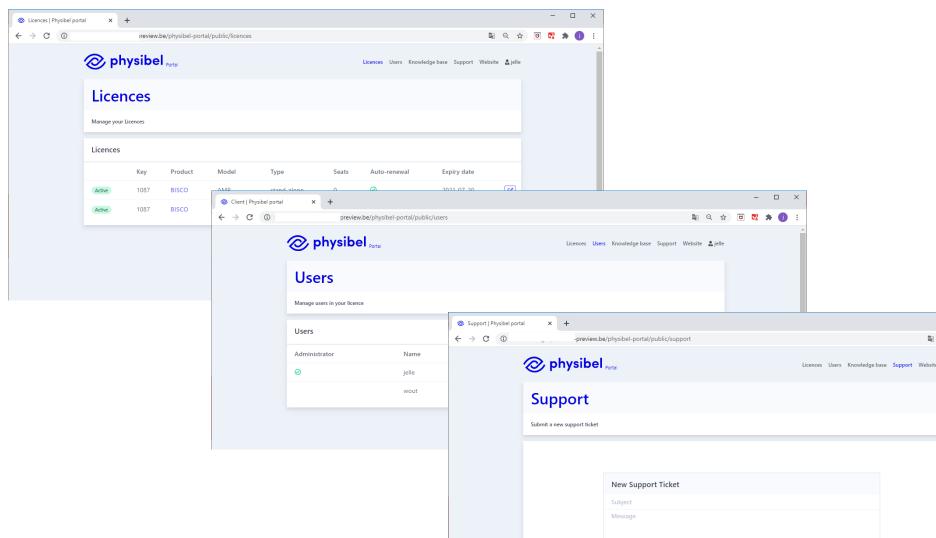


Keywords: BISTRA, VOLTRA, floor heating, cooling, inertia

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Access to

- Licence and user management
- Support



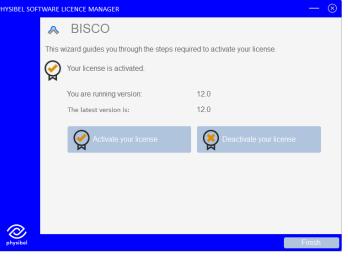
Option 1: hardware key

- 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



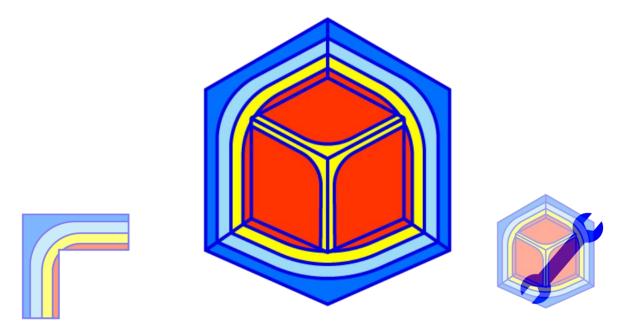








TRISCO v15 New program performances



www.physibel.be/en/products/trisco

downloadable program demo version