physibel

Tutorial

Calculating the linear thermal transmittance of a glazing spacer according to EN ISO 10077-2

BSC Tutorial b

BISCO

1. Introduction

This tutorial explains how to determine the linear thermal transmittance of a glazing spacer (for the window profile of tutorial a) according to the European standard EN ISO 10077-2 with BISCO.

Key elements:

- Adjusting a BISCO file by importing a BMP
- Application of BiscoBmp
- Derived thermal properties: linear thermal transmittance of a junction of a frame profile with a glazing (ψ_g)

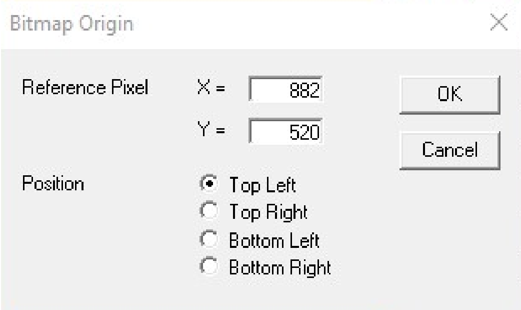
2. Case study data

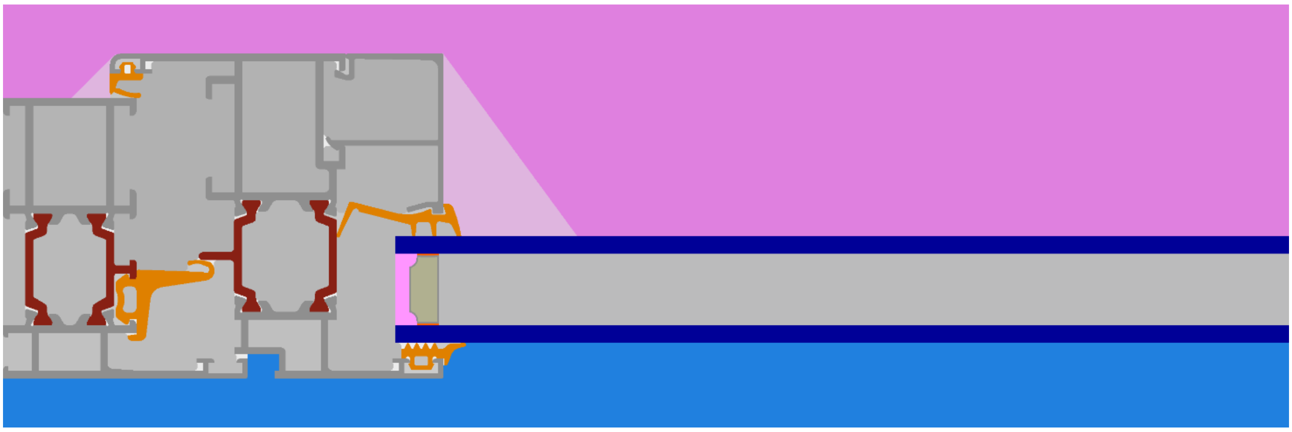
alu_1_frame_panel.bsc
glazing_spacer_4_16_4_aluminium.bmp
alu_1_frame_glazed.bsc

The case study data considers the frame of tutorial a and a double glazing with an aluminium spacer.
We want to replace the insulation panel by a double glazing, in order to calculate the linear thermal transmittance of the spacer at the glazing edge.

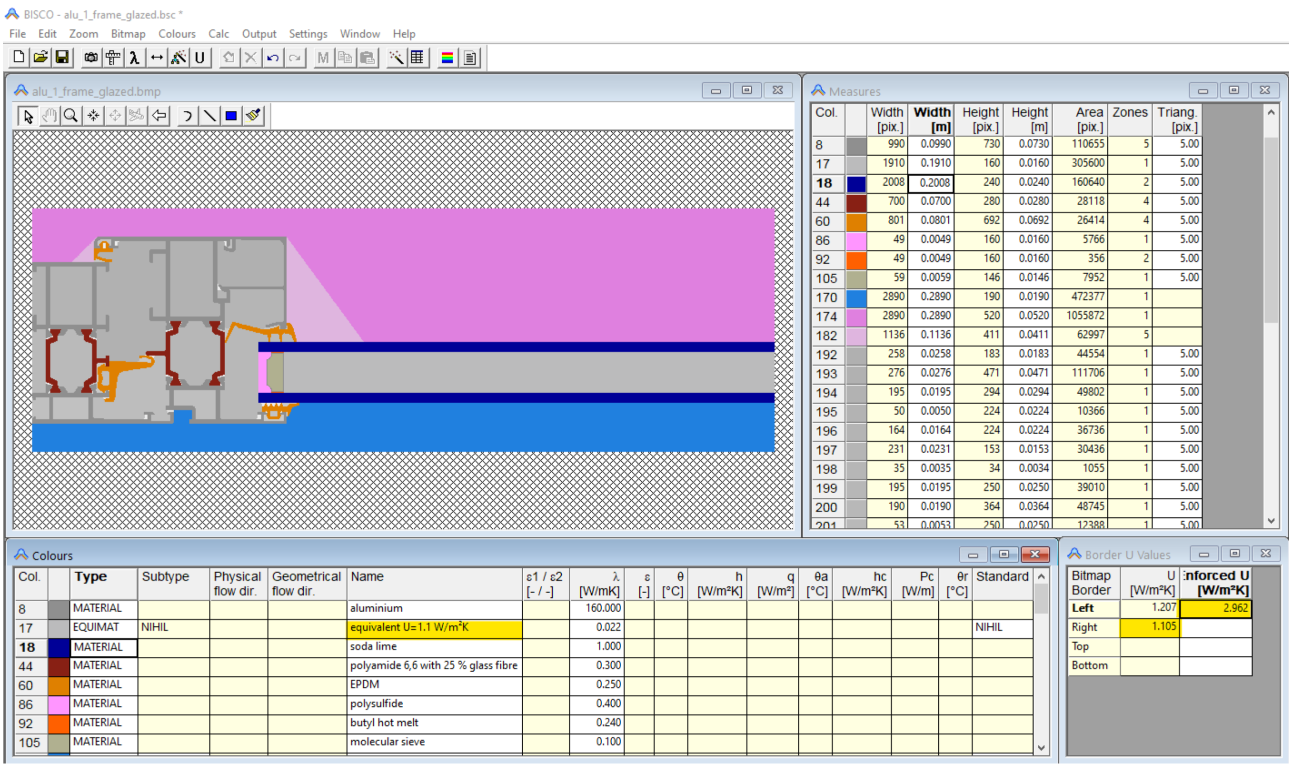
3. Method a: import glazing within BISCO

- A bitmap of the glazing with spacer is available in the file glazing_spacer_4_16_4_aluminium.bmp with the same thickness (24 mm) and pixel resolution (0.1 mm) as the insulation panel.
- Open the BISCO file alu_1_frame_panel.bsc (*File → Open...*).
- Choose *Zoom → Select*, zoom in on the top left corner of the insulation panel and click with the left mouse button on this corner pixel. This is to initialise the reference pixel for the bitmap to import.
- Choose the function *Bitmap → Import Bitmap...* and choose the file glazing_spacer_4_16_4_aluminium.bmp.
- Then the Bitmap Origin dialog box appears. The reference pixel coordinates are initialised using the last clicked pixel in "select mode". Press OK.

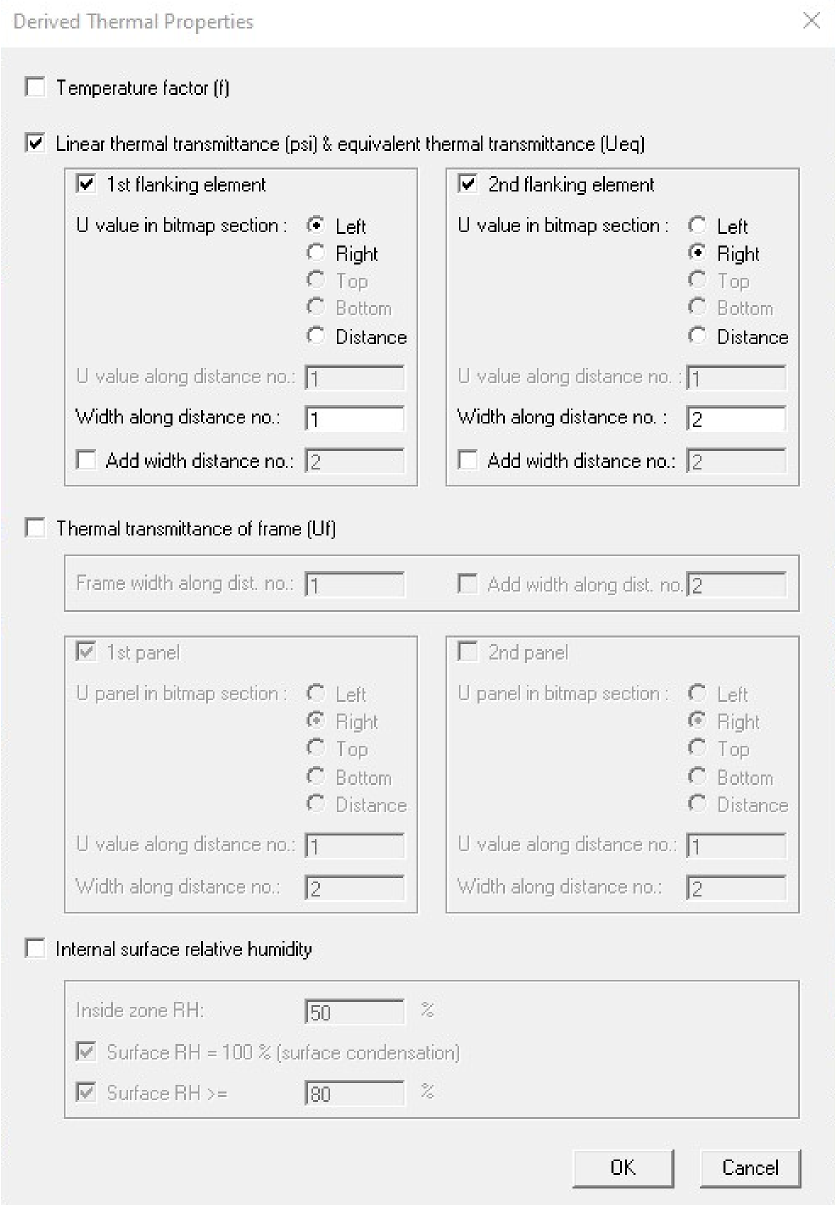




- The colours in the imported bitmap have been chosen in accordance to the used template Colour database. Only the cavity (colour 17) must be defined as EQUIMAT with a user defined thermal conductivity, e.g. λ_{eq} = 0.022 W/(m.K), to obtain the thermal transmittance of the glazing as indicated in the **Border U Values window** (here Ug = 1.105 W/(m2.K) at the right bitmap border).



- Enter as enforced U value (in the **Border U Values window**) the thermal transmittance of the frame (U_f = 2.962 W/(m2.K), as calculated in tutorial a for the left bitmap border.
  In the calculation of the linear thermal transmittance (see below), this enforced U value will be used over the projected width of the frame section, while the U value of the glazing will be used over the visible width of the glazing.
- The flanking elements are defined in the Derived Thermal Properties dialog box (*Edit → Derived Thermal Properties...*) as in the figure below.

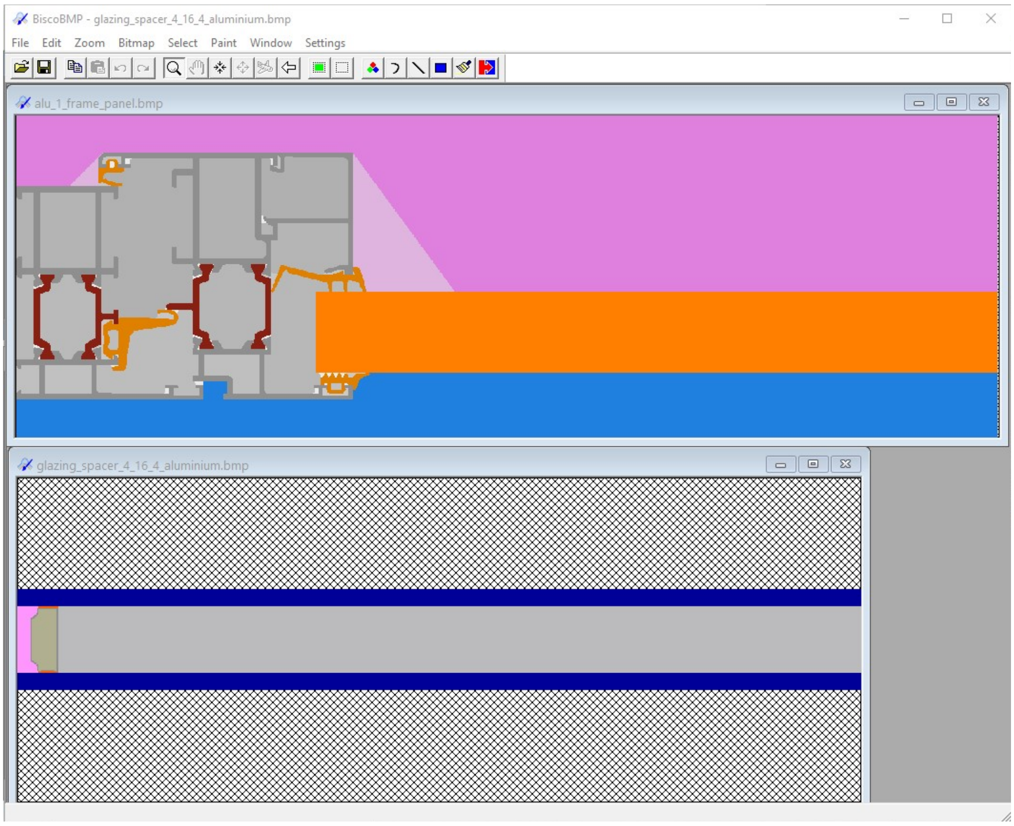


- Save the current data (*File → Save As...*) as Frame_glazed.bmp and Frame_glazed.bsc.
- Calculate the system (*Calc → Calc System*).
- Go to the **Text Output window** (*Output → Text Output*) to see the linear thermal transmittance (Ψ = 0.080 W/(m.K)).

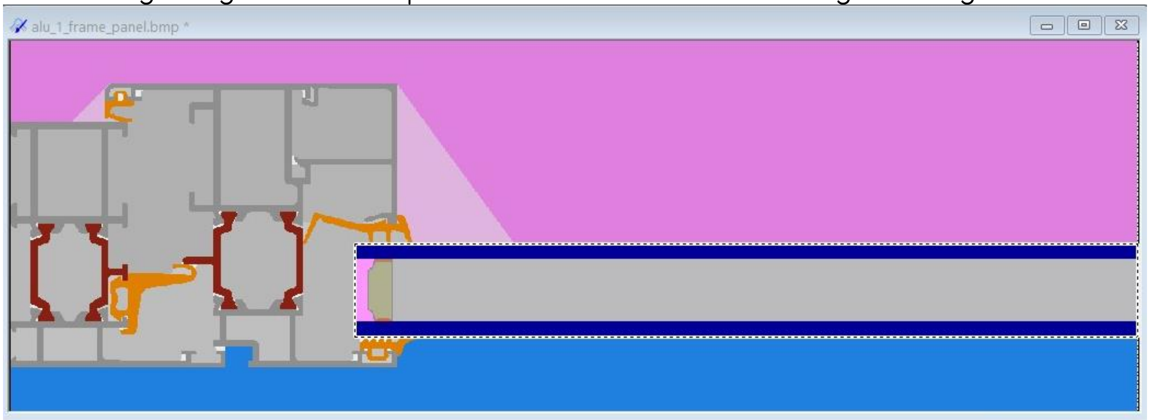
4. Method b: import glazing within BiscoBmp

An alternative method is to import the glazing within the subprogram BiscoBmp:

- Open the BISCO file alu_1_frame_panel.bsc (*File → Open...*).
- Save the BISCO file under a different name (*File → Save as...*).
- Open the corresponding BMP in BiscoBmp from within BISCO via *Bitmap → Edit using BiscoBmp.*
- Within BiscoBmp open a second bitmap with the glazing *File → Open...* and select glazing_spacer_4_16_4_aluminium.bmp.



- Select and copy the double glazing and spacer by activating the corresponding window (left mouse click in window) and press <Ctrl+A> and then press <Ctrl+C>.
- Activate thereafter the bitmap window with the frame and press <Ctrl+V>.
- The double glazing can now be positioned in the frame according to the figure below.



- By saving and closing BiscoBmp the modified BMP becomes directly available in BISCO.