

Guideline to daylight simulations with DIVA

This is a guideline to daylight simulations with MicroShade® in DIVA. DIVA is a daylighting analysis software that calculates the annual daylight availability in buildings based on the Radiance backwards raytracer and the DAYSIM daylighting analysis software. DIVA has been developed at the Graduate School of Design at Harvard University and is now distributed and developed by Solemma LLC.

Daylight metrics

DIVA calculates a series of climate-based daylight metrics including daylight autonomy (DA), useful daylight illuminance (UDI), spatial daylight autonomy (sDA) and annual sun exposure (ASE). Furthermore DIVA can calculate the daylight glare probability (DGP) for glare assessments. DIVA can also calculate the simpler daylight factor (DF). DIVA can be integrated with Grasshopper for parametric optimizations and includes an energy simulation component as well.

MicroShade® model

Together with Fraunhofer Institute for Solar Energy Systems Radiance models of MicroShade® type MS-A, MS-D, MS-RW and MS-RS has been developed. The models have been validated against angle dependent transmittance measurements.

Usage

The MicroShade® model is a description of only the MicroShade® layer. In order to model MicroShade® in a window two polygons are needed: the outer polygon is the MicroShade® layer and the inner polygon is the glazing. The two polygons together model the MicroShade® window. The surface normal of the polygon representing MicroShade® should face the exterior, see figure 1.

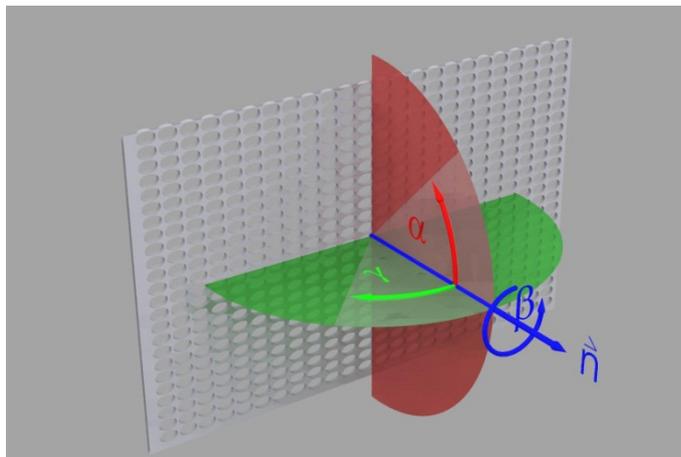


Figure 1. The surface normal should face the exterior.



The material description for MicroShade® is enclosed in the following files:

- [Microshade_a.cal](#), [Microshade_d.cal](#), [Microshade_rs.cal](#) and [Microshade_rw.cal](#) which should be stored in **C:\DIVA\Radiance\lib**
- [MicroShade_mat.rad](#), whose text has to be copied into the material.rad in **C:\DIVA\Daylight**

The letters following underscore e.g. "MicroShade_a" represent the different types of MicroShade® - in this case MS-A. For selection of the MicroShade type please see our selection guidelines on www.microshade.dk under downloads or contact MicroShade A/S at support@microshade.dk.

The [MicroShade_mat.rad](#) file contains the following:

```
void glass microshade_air
0
0
4 1 1 1 1

void plastic microshade_metal
0
0
5 0.1 0.1 0.1 0.017 0.005

void mixfunc microshade_a_mat
4 microshade_air microshade_metal trans microshade\_a.cal
0
1 0 → Edit for rotation angle , 0= no rotation, 90=90° rotation counterclockwise, 180 = 180°
      (upside down), 270= 270° rotation counterclockwise seen from the exterior.
```

If another type of MicroShade is used the green text should be exchanged with the relevant MicroShade® type.

A rotation of MicroShade® is normally done to optimize the g-value. For vertical facades MicroShade® are never rotated, while MicroShade® in roof windows can be rotated depending on the orientation and tilt of roof. Rotation should be considered for orientations between northeast (45°) and northwest (315°) for all roof windows. Please contact MicroShade A/S at support@microshade.dk in these cases to get the right rotation angle.

For a façade window with MicroShade® the structure is "open" downward and "closed" upward (z-direction), due to the tilt of the micro-lamellas in MicroShade®. In case of a horizontal window with MicroShade® it is important to notice that the structure is "open" towards west and "closed" towards east (x-direction) as default.

The material description for the glazing is the same as without MicroShade®.

Simulation parameters should minimum be set to "Scene Complexity 2", as MicroShade® can be compared to venetian blinds in complexity.

Simulations with DIVA

DIVA offers several kinds of daylight simulations; Useful Daylight Illuminance (UDI), Daylight Autonomy (DA), Continuous Daylight Autonomy (CDA), Spatial Daylight Autonomy (sDA), Annual Sun Exposure (ASE) and Daylight Factor (DF).

The UDI, DA, CDA, sDA and ASE are calculated with the chosen weather data file, while the daylight factor (DF) is calculated with a CIE standard overcast sky as default.

The daylight factor is a very simple daylight assessment method and it is therefore recommended also to use the daylight autonomy and/or useful daylight illuminance as a supplement to the daylight factor assessment.



If you have any questions regarding daylight simulation with MicroShade® you are welcome to contact MicroShade A/S. If you are a first time user of DIVA please see our tutorial on daylight simulations in DIVA, which can be found under download on our webpage www.microshade.dk.

All information is intended as guidance. MicroShade A/S reserves the right to make amendments and changes to product specifications. MicroShade A/S cannot be held responsible for the correctness of the information provided in this document.