

The case study further demonstrates that the new ESP-r interface can be used to better evaluate the impact of different technologies (different shading devices, different complex façades) on the thermal comfort of an enclosure and on the energy demands.

### FURTHER DEVELOPMENT

Some limitations are still not solved and further analysis and studies must be done by the authors:

- Only UP or DOWN positions for the blinds are considered (e.g. the blinds cannot be positioned to cover only half of the window)
- Predetermined slat angles (no glare analysis is done to determine appropriate slat angles)
- Pre-calculation of the façade properties is needed; at the moment there are no user friendly tools for this pre-calculation.
- Further model development must be done to take into account more accurately the diffuse irradiation. A new model for daylighting calculation is available for the software Daysim. This new Dynamic Daylight Simulation (DDS) was developed as a mechanism for sharing daylight coefficient data between lighting and energy simulation programs (Laouadi et al. 2007, Bourgeois et al. 2007).
- Additional control options should be added to allow combinations of sensed conditions (e.g. temperature and irradiation) to determine the appropriate slat state.

### APPENDIX

An example of the input file is shown in this section. The file is used as input for the new optics menu that was introduced in ESP-r.

The *Datatype* flag describes which input data are provided.

The complex façade (double glazing with external venetian blinds) is modelled as *three layers* (glass pane, air, glass pane). Six configurations (e.g. different slats angles) are possible for inclusion in this file.

```

*BIDIRECTIONAL
*types,1
*item, silver_raffstore_ISE-building in combination with
WSV_ISE_building
*datatype,Te_g_rho
*layers,3
*sets,6
## Next nine lines are not used (only for documentation)
## Properties of glazing:
## GZG-Name: WSV_ISE_building
## g0 = 0.58
## tauvis0 = 0.75
## udgu = 1.2

```

```

## Properties of blind:
## BLD-Name: silver_raffstore_ISE-building
## rhodiff[closed] = 0.452548
## tauidiff[0] = 0.431566

*start_set
*set_type 1,#slat angle = n.a. (glazing only)
*Uvalue 1.2
*Rexternal 0.0434783
*Rinternal 0.125
## Next two lines are only used for data type 1
*diffuse_abs,##,##
*diffuse_trn,#
*direct_angs,37,37
*data
#Azimuth,Height,Te,g,rho
-90,-90,0.,0.,0.68
-90,-85,0.,0.,0.68
...
0,-15,0.50821,0.57797,0.17179
0,-10,0.50921,0.5791,0.17079
0,-5,0.5098,0.57978,0.1702
0,0,0.51,0.58,0.17
0,5,0.5098,0.57978,0.1702
0,10,0.50921,0.5791,0.17079
0,15,0.50821,0.57797,0.17179
...
90,85,0.,0.,0.68
90,90,0.,0.,0.68
*end_set
*start_set

*set_type 2,#slat angle = 0.deg
*Uvalue 1.2
*Rexternal 0.0434783
*Rinternal 0.125
## Next two lines are only used for data type
1
*diffuse_abs,##,##
*diffuse_trn,#
*direct_angs,37,37
*data
#Azimuth,Height,Te,g,rho
-90,-90,0.,0.,1.
-90,-85,0.,0.,1.
...
0,-10,0.39747,0.49138,0.12755
0,-5,0.42246,0.51938,0.12546
0,0,0.4461,0.54592,0.12375
0,5,0.42161,0.51804,0.13274
0,10,0.39124,0.48359,0.14285
...
90,90,0.,0.,1.
*end_set
*end_file

```