DESIGN SUPPORT FOR PRACTITIONERS:
DESIGN WORKFLOWS AND DAYLIGHT SYSTEM CHARACTERIZATION

David Geisler-Moroder
Bartenbach

IEA SHC Task 61 / EBC Annex 77: Integrated Solutions for Daylighting and Electric Lighting
Solar Academy Webinar
September 24, 2020
Objective
Focus on the application of technical innovations in the field of integrated lighting solutions in practitioners’ workflows. Bring findings onto the desktops of designers by integration into widely used software tools, standards and codes, and design guidelines.

- Review of state-of-the-art design workflows
- Standardization of BSDF daylight system characterization
- Spectral sky models for advanced daylight simulations
- Hourly rating method for integrated solutions
Design Workflows

Example Design Projects

- Bartenbach R&D Office
- DIAL Headquarter
- CABR NZEB Office Building
Design Workflows

Evaluation of Design Workflows

- General System Design – Workflow at DIAL
- Design in day-by-day work – the DIAL Heavy User
- Lighting design workflow at Bartenbach
- ISO 16817: Design Process for the Visual Environment
- Design workflow as Inform Design
- Fener in the design workflow of façade systems
- Workflow for lighting design projects in Norconsult
- ESTIA Workflow
- LITG Scope of Services
Design Workflows

Analysis of Simulation Software Tools

- General Information
- Users
- Design Phase
- Algorithms / Engines
- Electric Lighting
- Daylighting
- Control System
- Extended Scope

<table>
<thead>
<tr>
<th>Applies to Software</th>
<th>AG132</th>
<th>ElemTools</th>
<th>DALEC</th>
<th>DIALux</th>
<th>DIVA+</th>
<th>DIALux+</th>
<th>DIVA for Rhino</th>
<th>FENER</th>
<th>GB SWARF</th>
<th>LADYBUG</th>
<th>Honeybee</th>
<th>PKFM</th>
<th>Radiance</th>
<th>RELUX</th>
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Remarks / explanations

- 11: some tools to create and collect geometry
- 12: with the add-on "ReluxCAD for Revit" in Revit for BIM projects
Design Workflows

Workflows and software for the design of integrated lighting solutions


IEA SHC Task 61 / EBC Annex 77
Integrated Solutions for Daylighting and Electric Lighting
From component to user centered system efficiency

Report available on https://task61.iea-shc.org/
Daylight System Characterization

BSDF?
BSDF Standardization
BSDF Standardization
BSDF Sensitivity Analysis

Blinds, 00deg tilt
CIE Sunny Sky
21 March, 10am
Innsbruck, Austria (47.3N / 11.4E)

Geometry
Ev 1490 lx
DGP 0.26

Klems aBSDF
Ev 3340 lx
DGP 0.59

Klems BSDF
Ev 2650 lx
DGP 0.35

tt46 aBSDF
Ev 1530 lx
DGP 0.26

tt46 BSDF
Ev 1530 lx
DGP 0.26
Characterization of daylighting systems

**Aim:** The „right“ system data for

- Transparent systems
- Fabrics
- Venetian blinds
- Specular blinds / grids
- Micro-/Nano-structured systems
- Prisms, LCPs
- ...


### Characterization of daylighting systems

#### Diffuse blinds or grids

<table>
<thead>
<tr>
<th>Task</th>
<th>Simulation method</th>
<th>System characterization / BSDF</th>
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<tbody>
<tr>
<td>Daylight Factor</td>
<td>Raytracing possibly mkillum continuous sky model</td>
<td>(a) Geometry (b) Low-res BSDF</td>
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<tr>
<td>Point-in-time illuminance for overcast / sunny sky</td>
<td>Raytracing continuous sky model</td>
<td>(a) Geometry (b) Low-res BSDF</td>
</tr>
<tr>
<td>Point-in-time glare metric for overcast / sunny sky</td>
<td>Raytracing peak extraction continuous sky model</td>
<td>(a) High-res BSDF (b) Low-res BSDF (with peak extraction)</td>
</tr>
<tr>
<td>Point-in-time rendering for overcast / sunny sky</td>
<td>Raytracing peak extraction continuous sky model</td>
<td>(a) High-res BSDF (b) Low-res BSDF if peak extraction</td>
</tr>
<tr>
<td>Annual illuminance metric</td>
<td>DC-method or 3-PM</td>
<td>Low-res BSDF</td>
</tr>
<tr>
<td>Annual glare metric</td>
<td>5-PM peak extraction</td>
<td>Low-res BSDF and (a) Geometry or (b) High-res BSDF or (c) Low-res BSDF (only if PE)</td>
</tr>
</tbody>
</table>
Characterization of daylighting systems

Whitepaper to be released soon.
Stay tuned!

A white paper on
BSDF generation procedures for daylighting systems
September 17, 2020

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