IEA SHC Task 50: Advanced lighting solutions for retrofitting buildings

Lighting retrofit in current practice
Evaluation of an international survey within the IEA Task 50
B. Paule / J. Kaempf

Focus on the Brazilian context
SubTask C: Method and Tools
C1 – Analysis of workflow and needs

- Answers per language
- Total answer: 1169
- Available answers: 1075

<table>
<thead>
<tr>
<th>Language</th>
<th>Nb of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>421</td>
</tr>
<tr>
<td>English</td>
<td>285</td>
</tr>
<tr>
<td>German</td>
<td>224</td>
</tr>
<tr>
<td>Dutch</td>
<td>82</td>
</tr>
<tr>
<td>Portuguese (Brazil)</td>
<td>72</td>
</tr>
<tr>
<td>Finish</td>
<td>30</td>
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<tr>
<td>Italian</td>
<td>24</td>
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<tr>
<td>Danish</td>
<td>19</td>
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<tr>
<td>Spanish</td>
<td>8</td>
</tr>
<tr>
<td>Japanese</td>
<td>4</td>
</tr>
</tbody>
</table>
Q4: Please select the main retrofit strategies you use in your current practice.

- Improvement in lamp technologies
- Improvement in luminaire technology
- Use of task and ambient lighting
- Improvement in application efficacy (delivering the light where it is needed in the most energy efficient manner)
- Use of switch-off occupancy sensors
- Increase of surface reflectances
- Improvement in ballast technologies
- Use of daylight dimming control (e.g. installation of a light sensor on the ceiling)
- Reduction of the total switch-on time (e.g. installation of an on/off timer)
- Improvement in spectral quality of the light source
- Use of manual dimming
- Improvement in maintenance factor (more frequent cleaning and lamp exchange)
- Reduction of maintained illuminances (e.g. from 500 to 400 lux)
- Other
- I do not apply retrofit strategies
Q5: Please indicate for each design phase, the type of tools or methods you use

**DAYLIGHTING**

Preliminary studies

- Experience
- Interactions with the owner
- Design guidelines
- Rule of thumb
- Computer simulation
- Interactions with future users
- Expert systems
- Collaboration with others
Q5: Please indicate for each design phase, the type of tools or methods you use

**DAYLIGHTING**

Detailed design

- **Computer simulation**
- Experience
- Interactions with the owner
- Rule of thumb
- Design guidelines
- Collaboration with others
- Expert systems
- Interactions with future users

IEA SHC Task 50 Advanced lighting solutions for retrofitting buildings
Q6: Please indicate for each design phase, the type of tools or methods you use

**ELECTRIC LIGHTING**

**Preliminary Studies**

- Experience
- Design guidelines
- Rules of thumb
- Interactions with the owner
- Computer simulations
- Expert systems
- Interactions with future users
- Collaboration with others

IEA SHC Task 50 Advanced lighting solutions for retrofitting buildings
Q6: Please indicate for each design phase, the type of tools or methods you use

**ELECTRIC LIGHTING**

Detailed design

- **Computer simulations**
- Experience
- Interactions with the owner
- Design guidelines
- Rules of thumb
- Expert systems
- Collaboration with others
- Interactions with future users

IEA SHC Task 50 *Advanced lighting solutions for retrofitting buildings*
Q7: How do you usually handle the design and decision process concerning the integration of lighting technologies in retrofit projects?

<table>
<thead>
<tr>
<th>Approach</th>
<th>Never</th>
<th>Very often</th>
</tr>
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<tbody>
<tr>
<td>Do it yourself</td>
<td>10</td>
<td>7</td>
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<tr>
<td>Involve an external consultant</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Organise a multi-disciplinary workshop (IDP)</td>
<td>9</td>
<td>5</td>
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<tr>
<td>Involve a lighting manufacturer</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Involve an electric contractor</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Consult a specialist in the company</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>3</td>
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</tbody>
</table>

Never, Very often
Q8: What kind of information about the BUILDING or INFRASTRUCTURE is usually available at the beginning of your lighting retrofit projects?

- 2D electronic documents
- Printed plans / sections
- No information
- Other
- 3D BIM
Q9: What information is usually available about the EXISTING LIGHTING SITUATION at the beginning of the lighting retrofit projects?
Q12: In your office, which type of tool(s) do you normally use for daylighting and electric lighting analysis?

- A combined lighting tool (electric lighting + daylighting)
- A combined energy tool (electric lighting + daylighting + thermal)
- A specific daylighting tool
- A specific electric lighting tool
- I don’t use any tools for this purpose
Q134a: Simulation tools (Global results)

<table>
<thead>
<tr>
<th>Simulation Tool</th>
<th>Satisfied Level</th>
</tr>
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<tbody>
<tr>
<td>DIALUX</td>
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</tr>
<tr>
<td>Relux</td>
<td>51%</td>
</tr>
<tr>
<td>Radiance</td>
<td>17%</td>
</tr>
<tr>
<td>DIAL+</td>
<td>17%</td>
</tr>
<tr>
<td>None</td>
<td>11%</td>
</tr>
<tr>
<td>Daysim</td>
<td>11%</td>
</tr>
<tr>
<td>Ecotect</td>
<td>7%</td>
</tr>
<tr>
<td>Sketchup</td>
<td>6%</td>
</tr>
<tr>
<td>Design Builder</td>
<td>6%</td>
</tr>
<tr>
<td>Lesosai</td>
<td>5%</td>
</tr>
<tr>
<td>Energyplus</td>
<td>5%</td>
</tr>
<tr>
<td>Velux</td>
<td>4%</td>
</tr>
<tr>
<td>Diva</td>
<td>4%</td>
</tr>
<tr>
<td>IDA Ice</td>
<td>3%</td>
</tr>
<tr>
<td>3DS max</td>
<td>2%</td>
</tr>
<tr>
<td>Trnsys</td>
<td>2%</td>
</tr>
<tr>
<td>Vasari</td>
<td>1%</td>
</tr>
<tr>
<td>Somfy disk</td>
<td>1%</td>
</tr>
</tbody>
</table>
Q14: Please list the up to 5 factors that most influence your choice of software

- Accuracy of results
- Quality of output (report, images)
- User-friendly design interface
- Time-efficiency (quickness)
- Cost
- Interactivity (feedback loop with user)
- 3D interface
- Possibility to use the results for certification...
- Availability of plug-in(s)
- Interoperability with other software used in...
- Availability of scripting feature
Q15: Among the following list, please select the up to 5 most important barriers you identified when applying lighting or daylighting design as part of the retrofit process?

- Tools are too complex
- Tools are not integrated in our CAAD software
- Tools are too time-consuming in their usage
- Tools are not integrated in our normal workflow
- Tools do not support integration of complex...
- Tools are not adequately supporting the...
- Tools are too expensive
- I find available tools quite satisfactory
- Tools are not compatible with other software used...
- Tools are too simplistic and do not provide useful...
- I do not use tools
- I don’t know
Q16: Do you see the need for improved tools to support the integration of electric lighting or daylighting considerations within the retrofit process?
Completion of the questionnaire

The ideal tool?

- Simple
- Fast
- Integrated with normal design flow
- Useful for preliminary design
- Combined (electric & daylighting + energy)
Completion of the questionnaire

Final result

Available on a website
Global result