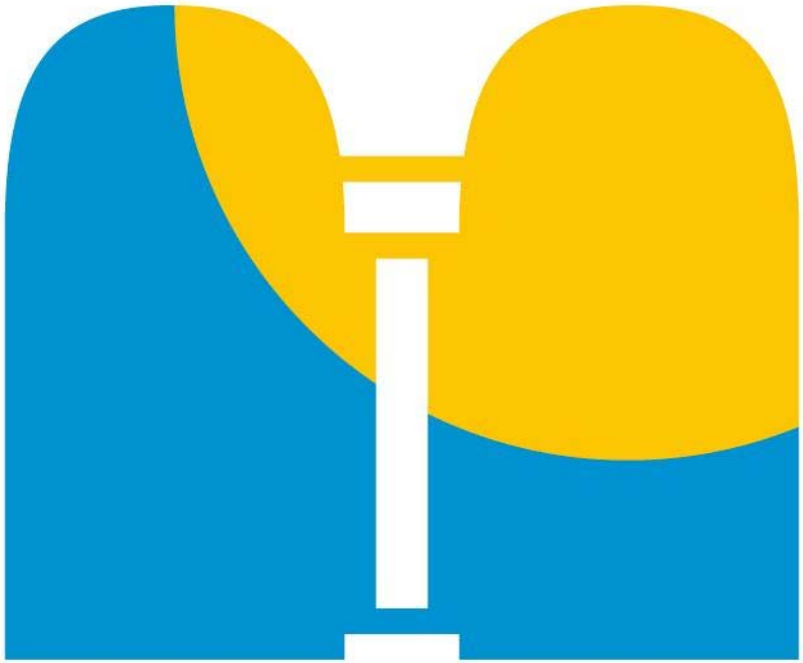


D8.9 Educational Material for University Studies

Daylighting in Historic Buildings

Weitlaner Robert - Aldrans, Austria

The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 260162

Guiding principle

Presentation 1

Author: Robert Weitlaner

Partner: Bartenbach Lichtlabor

University course: The lesson could be realized on University Courses on light (i.e. Faculty of Architecture) and also on Bartenbach Lighting Academy

Date: 24.01.2013, University Innsbruck, course: ‚Projektmanagement und interdisziplinäres Planen 2‘, Fakultät für Architektur, Fakultät für Bauingenieurwesen, lecturer: Robert Weitlaner, audience: students of architecture and civil engineering.

Future integration in Bartenbach Lighting Academy.

Place: Aldrans

Title of the lesson: Grundlagen der Tagesbelichtung in historischen Gebäuden – Lösungsansätze: Daylighting in historic buildings: approach and solution

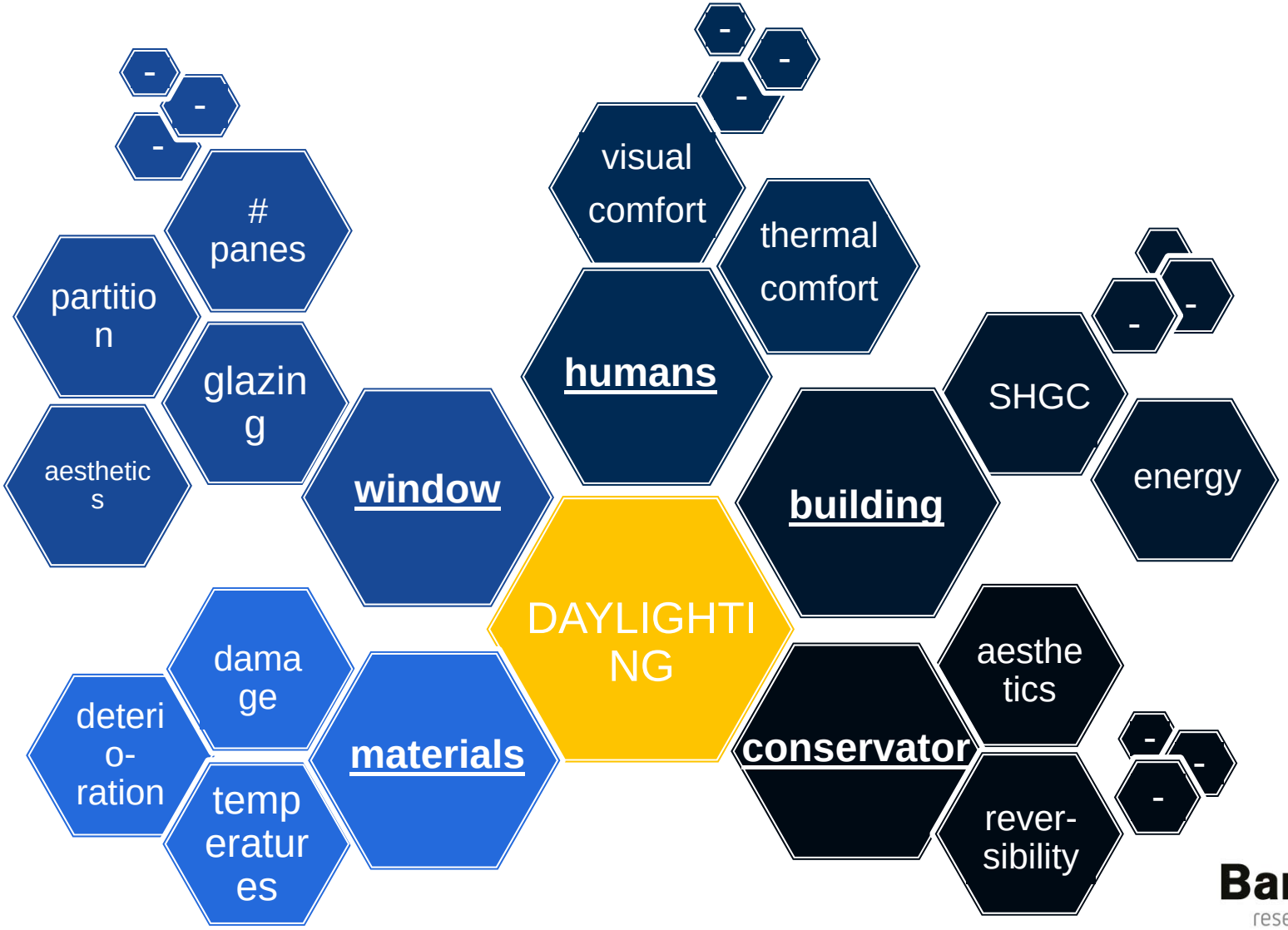
Description of the contents: Principle question to be considered when the task of ‘Daylighting in historic building’ is commissioned. Showing an assessment approach, key questions and key answers. Case study examples show specific solutions.

Name of the file: WP8_D8.9_20131007_BLL-Lesson 1

content

- Defintion of players in daylighting

Daylighting



Regulation

Zweiter Internationaler Kongress der Architekten und Denkmalpfleger

Charta von Venedig

Internationale Charta über die Konservierung und Restaurierung von Denkmälern und Ensembles (Denkmalbereiche)

Have a look!

Venedig, 25. bis 31. Mai 1964 (in der Fassung von 1989)

1965 von ICOMOS beschlossen

Als lebendige Zeugnisse jahrhundertealter Traditionen der Völker vermitteln die Denkmäler in der Gegenwart eine geistige Botschaft der Vergangenheit. Die Menschheit, die sich der universellen Geltung menschlicher Werte mehr und mehr bewußt wird, sieht in den Denkmälern ein gemeinsames Erbe und fühlt sich kommenden Generationen gegenüber für die Bewahrung gemeinsam verantwortlich. Sie hat die Verpflichtung, ihnen die Denkmäler im ganzen Reichtum ihrer Authentizität weiterzugeben.

SHUTTER

HISTORIC USE (WINDOW WINTER - SUMMER)

GNU licenced

FARM HOUSE

GEOMETRY; ENERGETIC BEHAVIOUR OF BUILDING

GNU licenced

Daylighting design

- In-situ measurement
- Definition of use
- Multidisciplinary requirements
- Calculation/Simulation
- Assessing/evaluating
- Developing
- Recommendation

Building / Materials / Use

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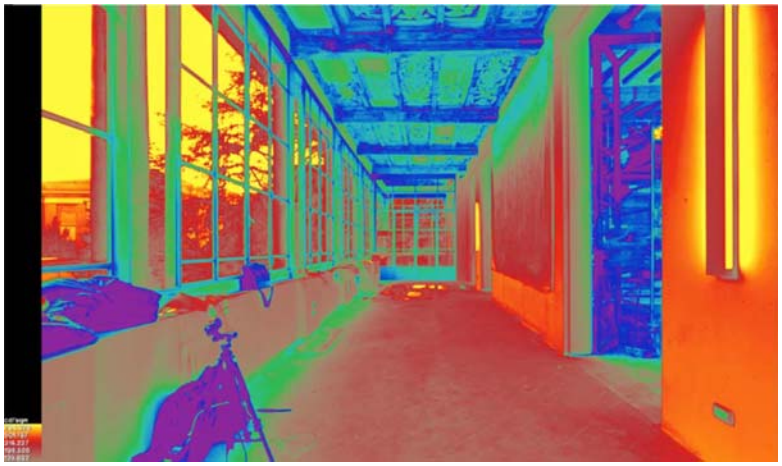
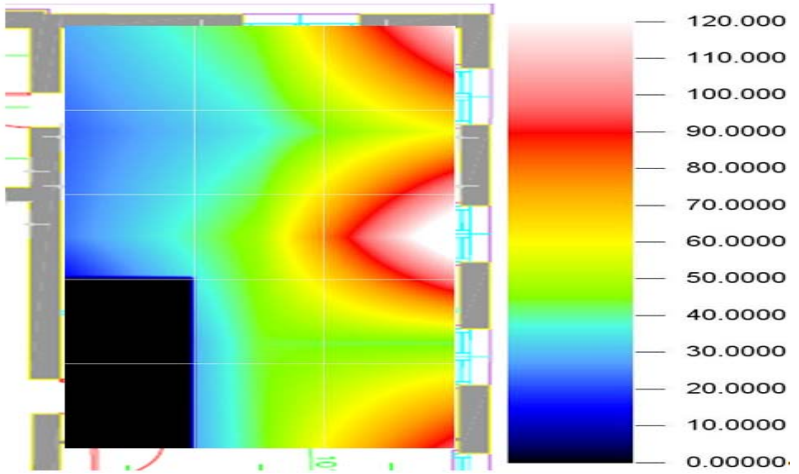
View to the top



Luminance distribution



Daylight factors

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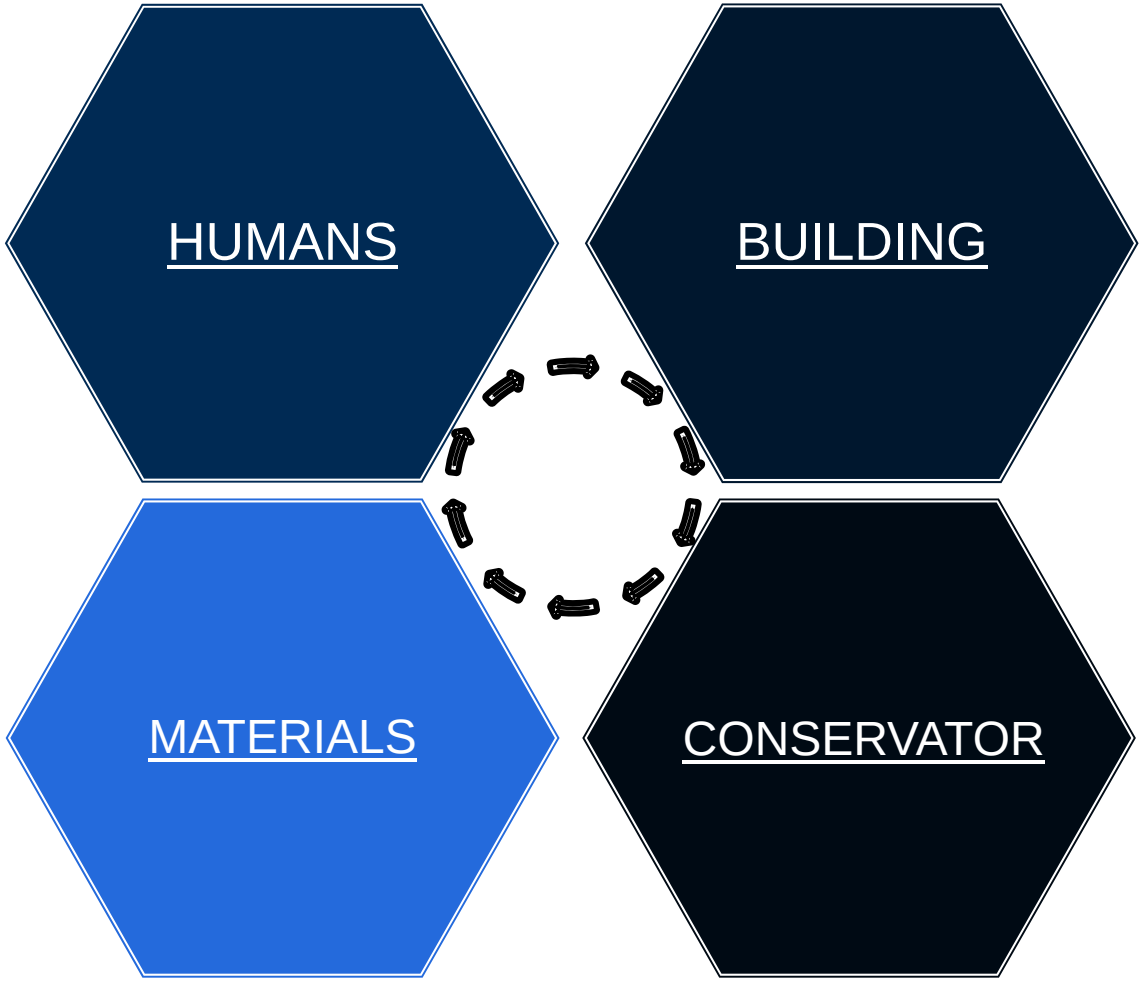
Requirements



Requirements (cont.)

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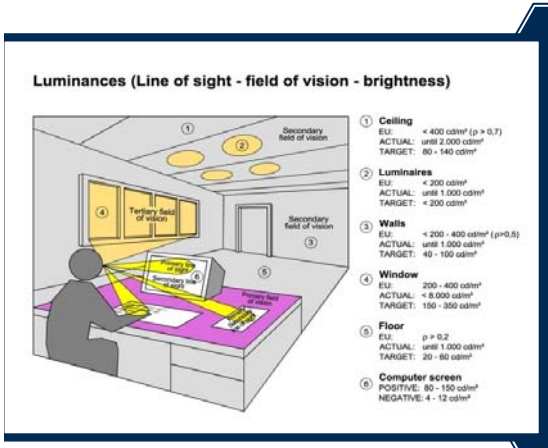
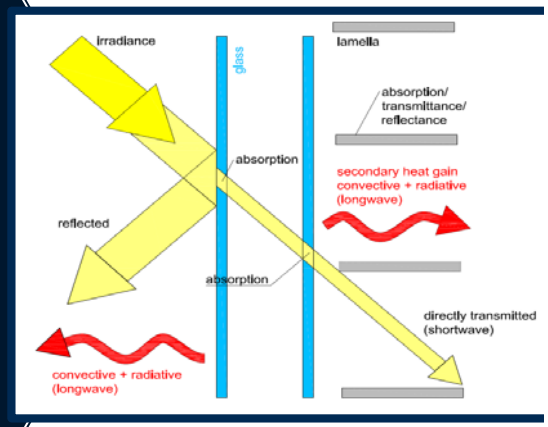
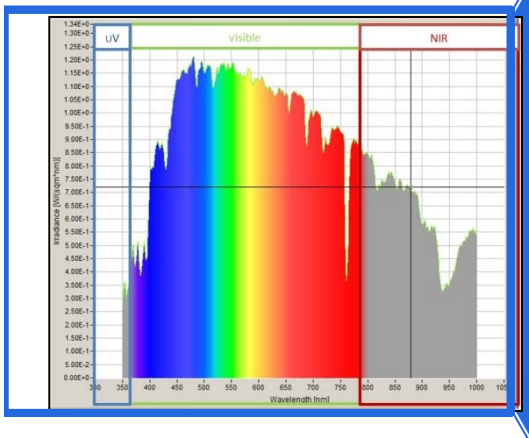


HUMANS

BUILDING





MATERIALS

CONSERVATOR

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Design / Simulation

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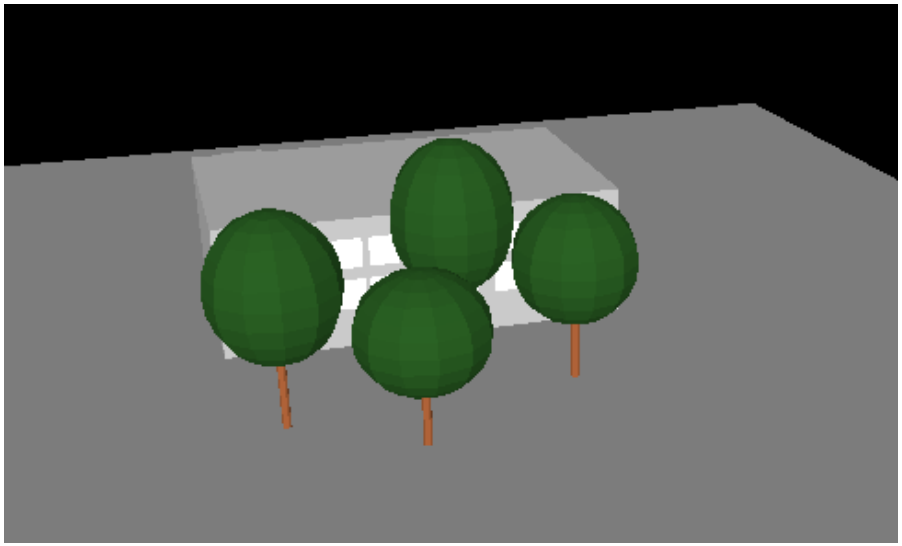

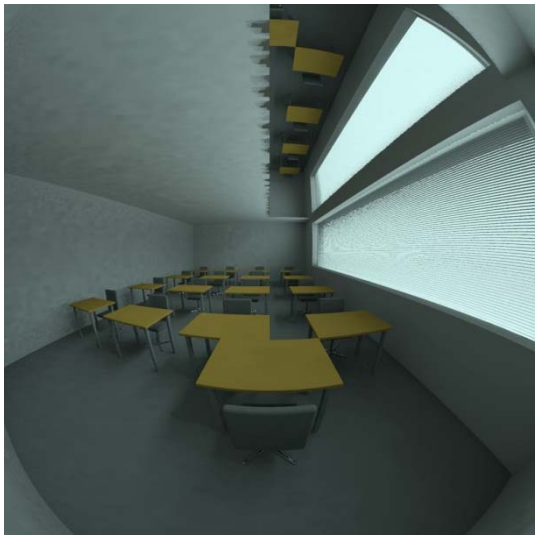

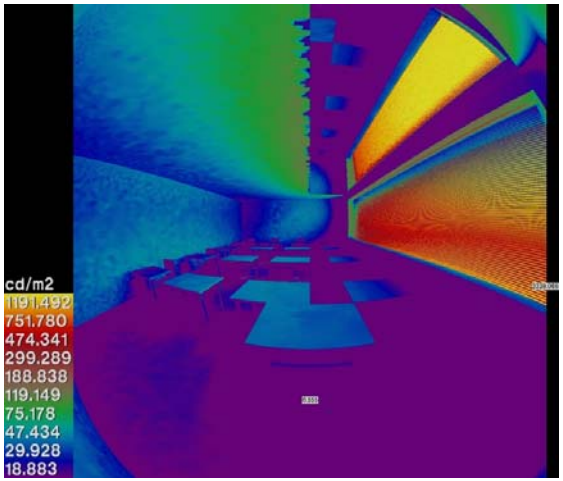

Dialux

Radiance

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Design / Simulation (cont.)

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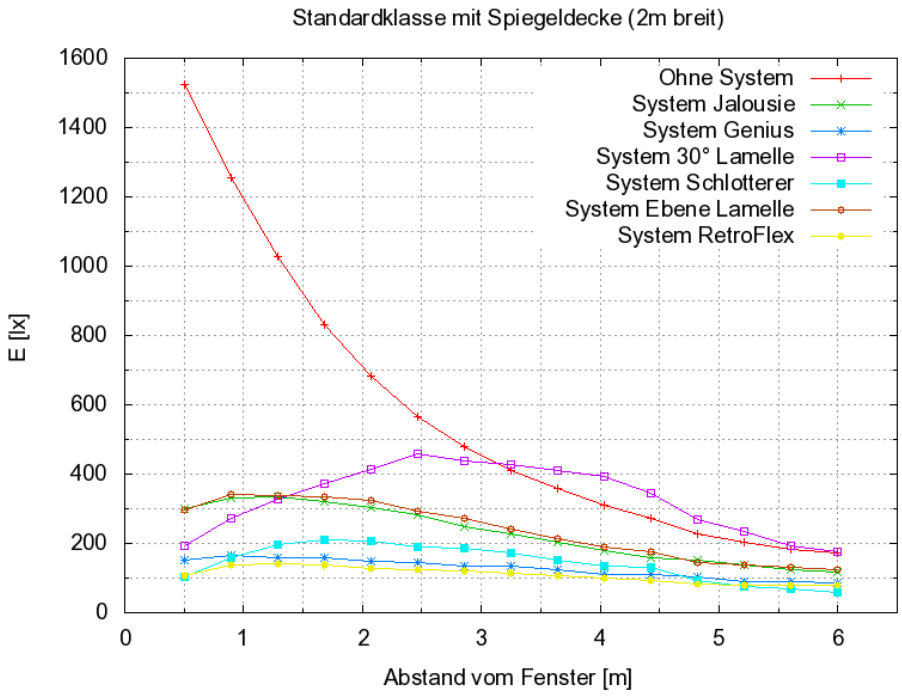
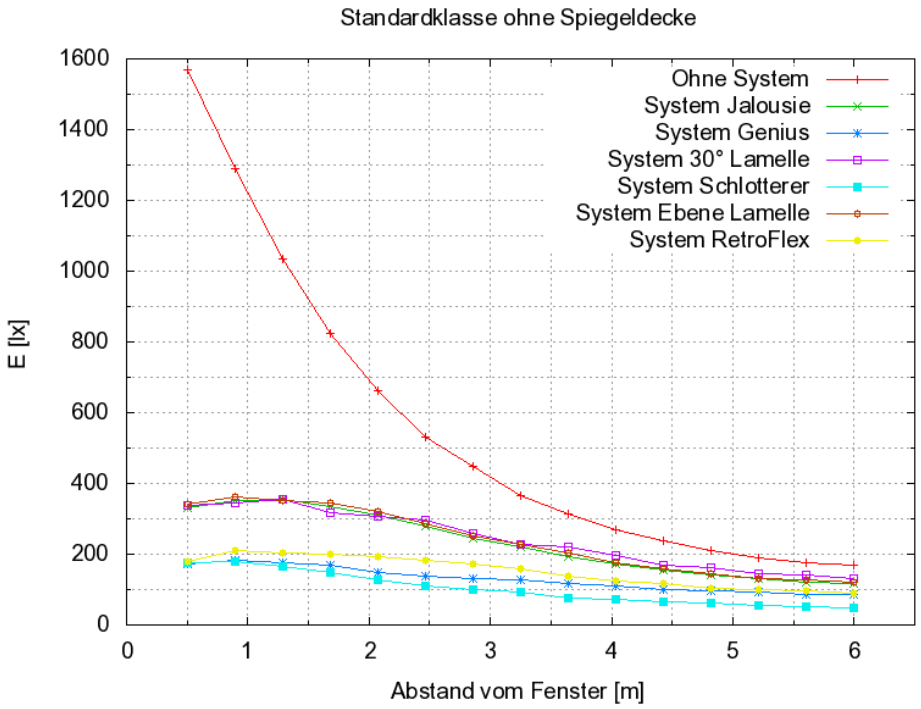
INCL. MIRROR CEILING



NO MIRROR CEILING



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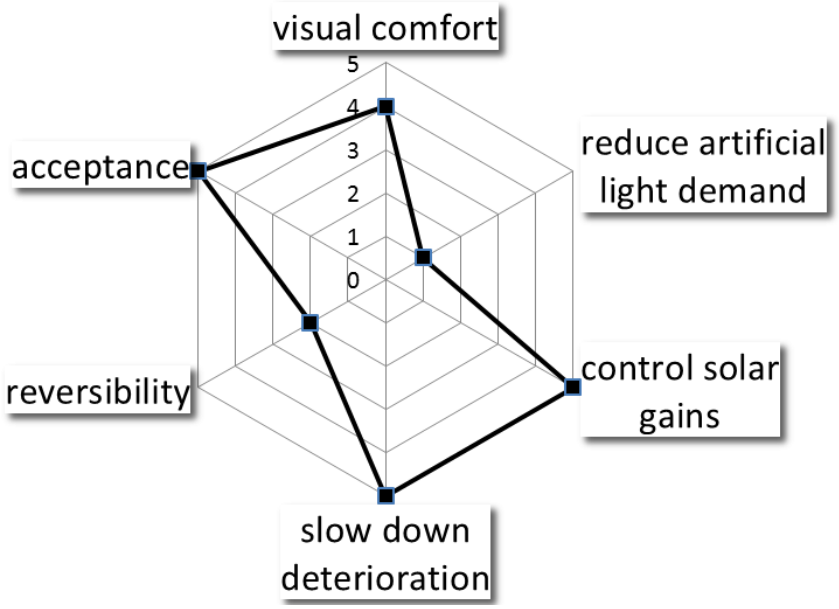
Assessment of Concepts



importance		rate
3	visual comfort	4
2	reduce demand art. Light	1
1	control solar gains	5
5	slow down deterioration	5
5	reversibility	2
5	acceptance is in doubt	5
Total	$\sum_{k=1}^{6} \text{importance}_i \cdot \text{rate}_i$	79

Assessment of Concepts: Example

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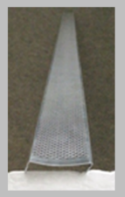
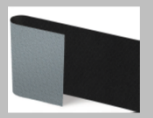
Double Blind E 80LD	Daytec	SNM3%	si/gr 2R
WAREMA	DURLUM	Hexcelscreen = mermet	Haverkamp / Opalfilm
			OPALFILM
5	5	1	1
5	4	1	1
1,2	4,0	1	5
4	4	4	4
3	3	4	2
2	2	2	2
117,95	125,7	77	94

Improvement possible?

>> **Product development**

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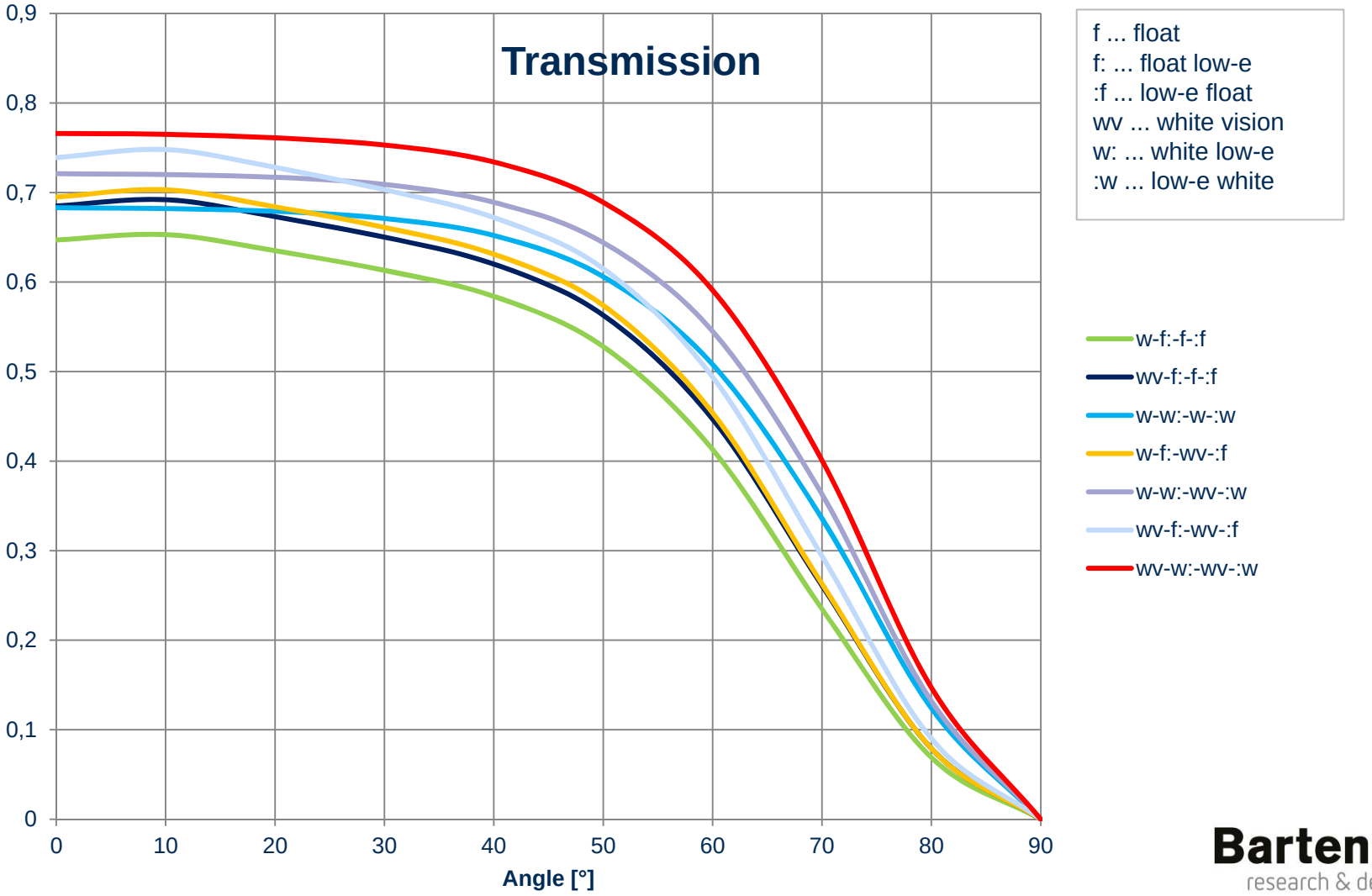
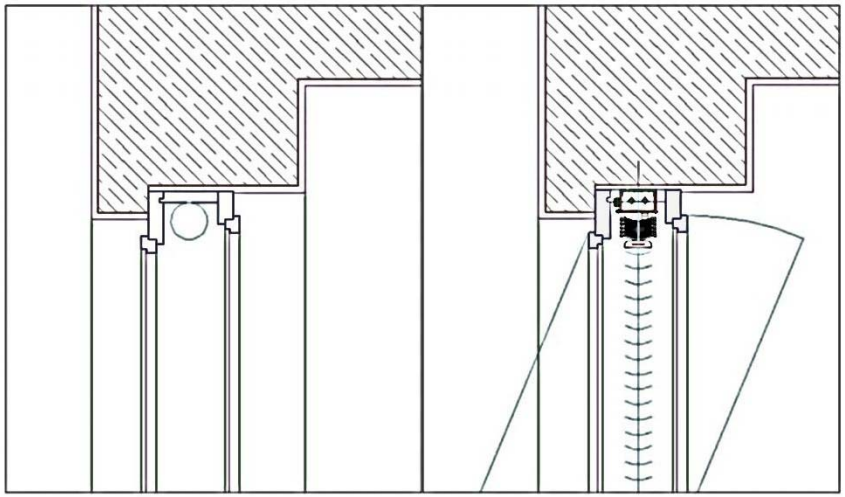
Case Example: Number of panes (4)



Case Example: School in Innsbruck

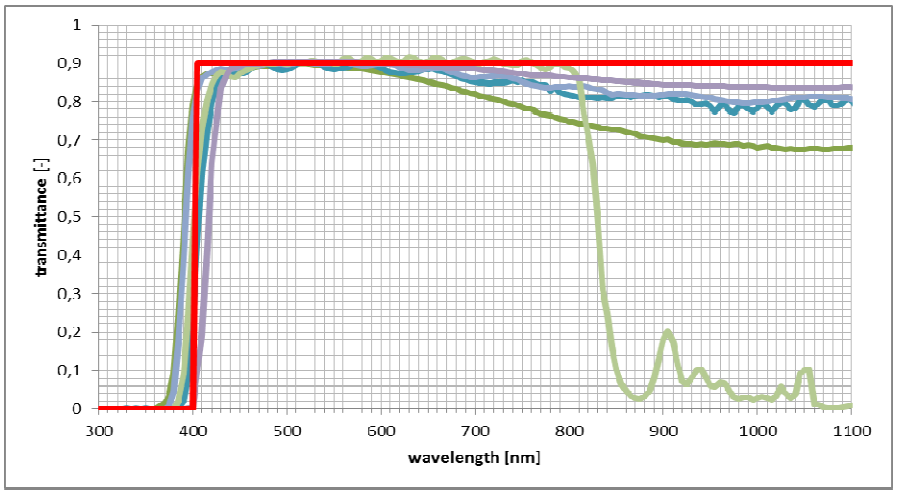


boxtype window

E80LD

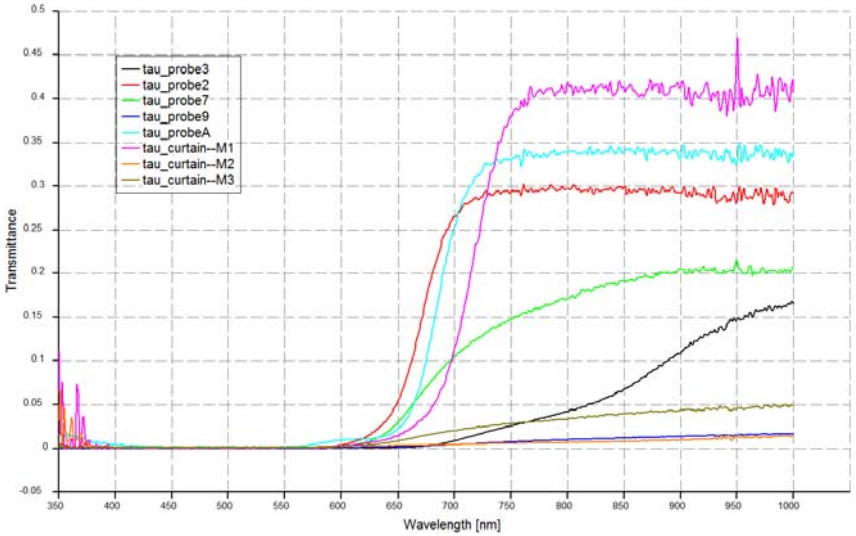
mirror ceiling

Case Example: UV Filter Foils / textile curtains



filter characteristic of glazing or foils

textile curtain in Bologna



filter characteristics of red curtains in Bologna

Case Example: Weighhouse Bolzano

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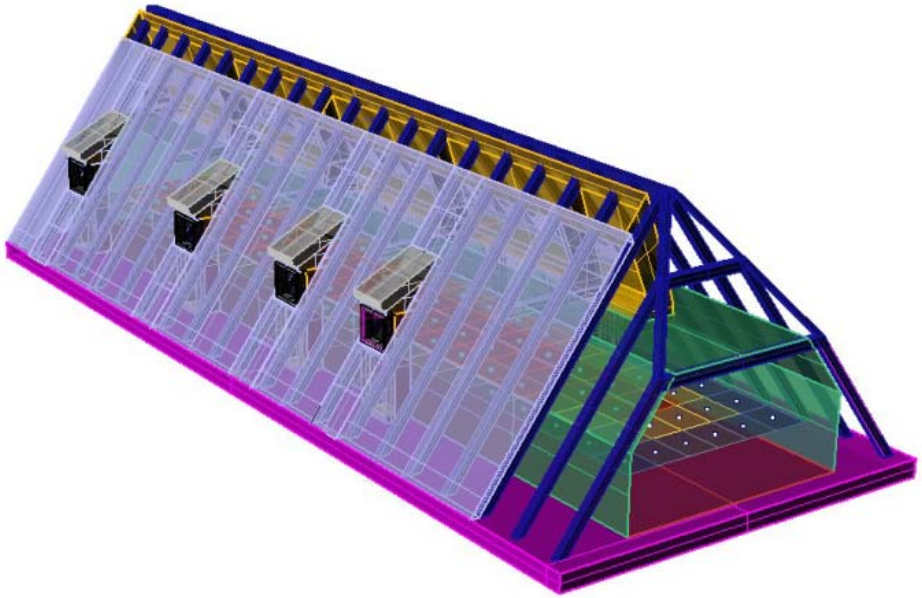

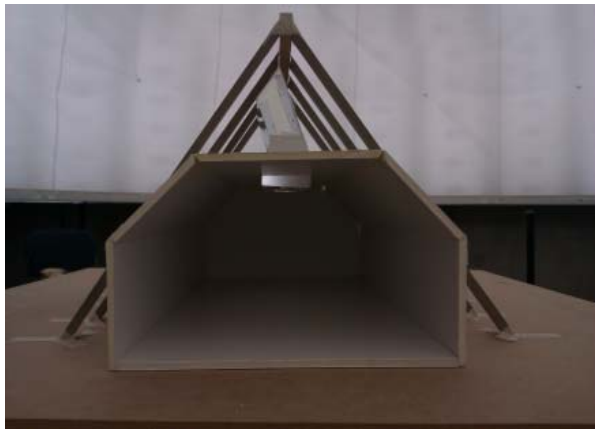

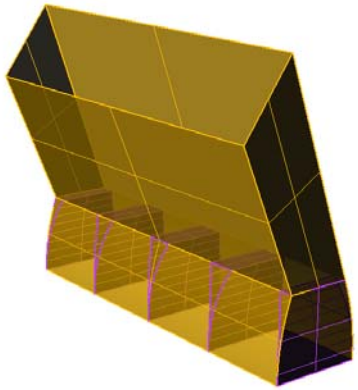

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Case Example
Weighhouse Bolzano (cont.)

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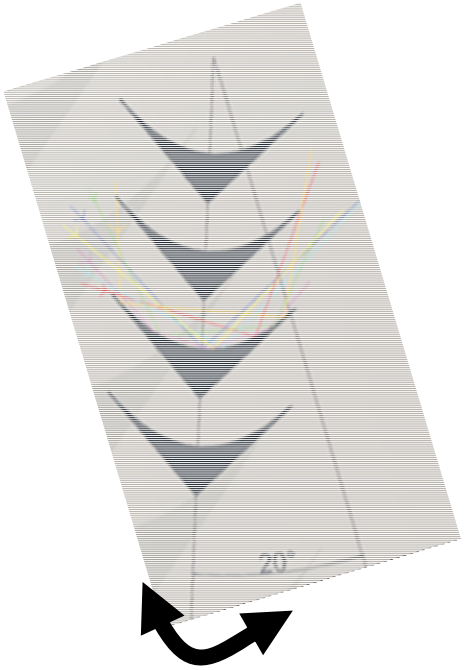
shutter



tiltable

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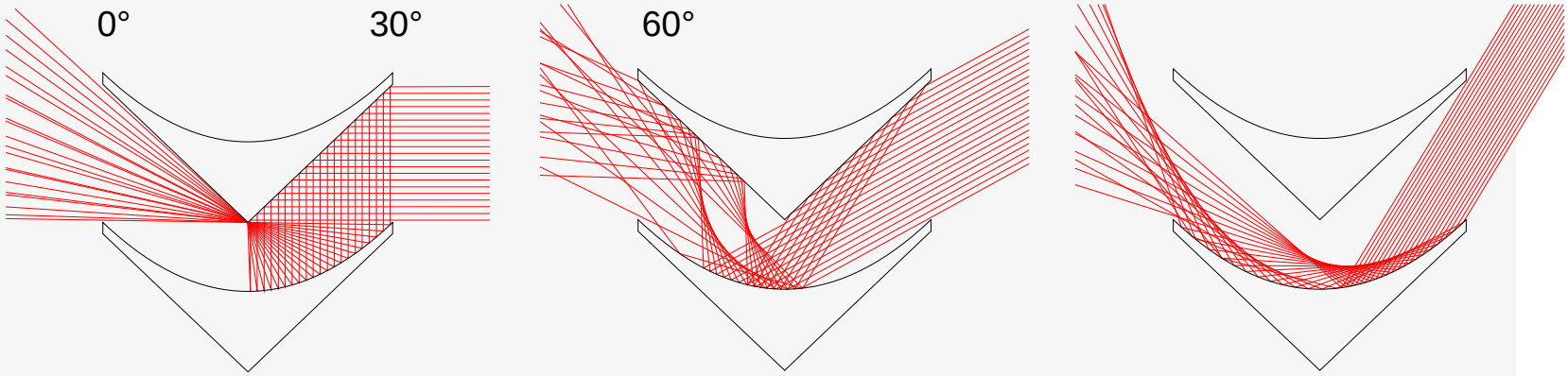
Case Example: Weighhouse Bolzano (cont.)

Fish in shutters

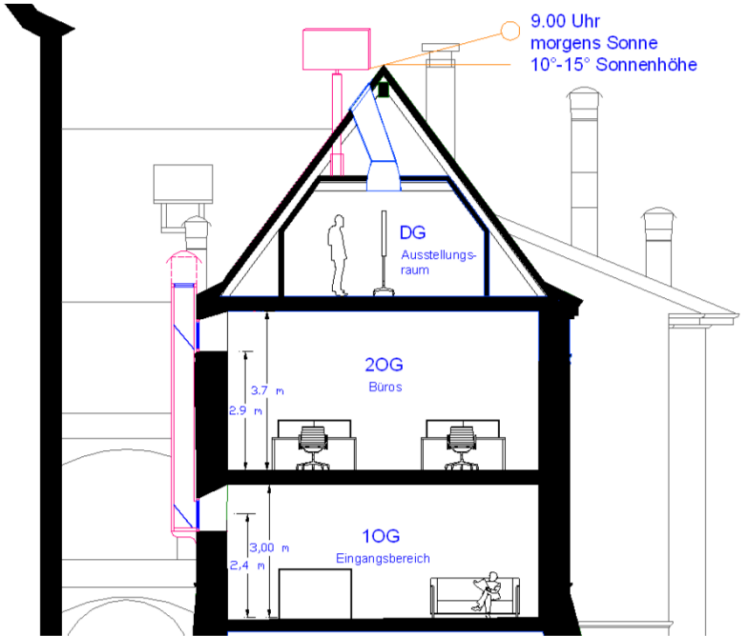
Reflects the skylight to the ceiling from where it is diffusely or – if a mirrored ceiling is mounted – even specularly scattered onto the workplane (light entry on the right).

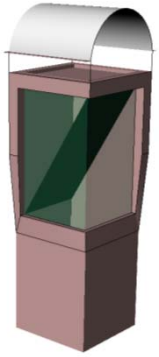


Embedded into insulating glass it builds an opaque wall (view from below), whereas the light is allowed to pass the wall onto the ceiling..

Case Example: Weighhouse Bolzano (cont.)

Weighhouse Bozen





heliostat

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Case Example: Foil System for Boxtype Windows

- three (arbitrary) transmittance within one foil system
- boxtype window

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Case Example: Internal Courtyards

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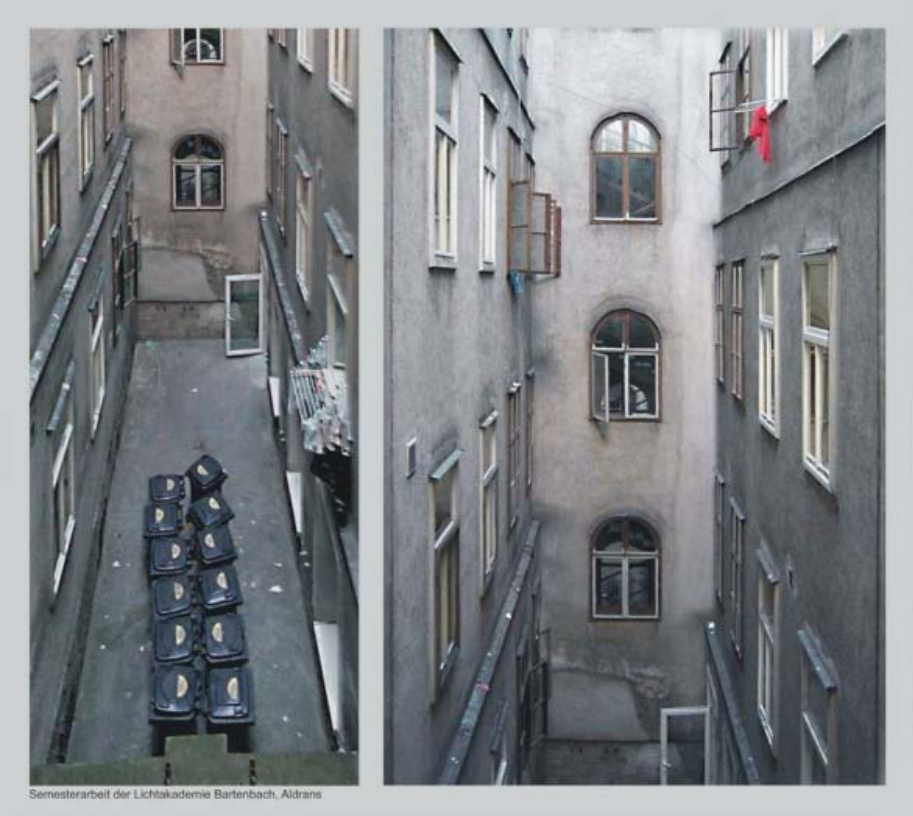

internal courtyard

aluminium cladding: view to the top

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Case Example: Internal Courtyards (cont.)

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Case Example: Boxtype Window

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Case Example: Boxtype Window (cont.)

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Daylighting in Historic Buildings

Weitlaner Robert

Bartenbach

Aldrans, Austria

Most of this work is a result of FP7 project ‘3encult’, which was funded by the European Commission under the Seventh Framework Programme - GRANT AGREEMENT No. 260162 (www.3encult.eu).