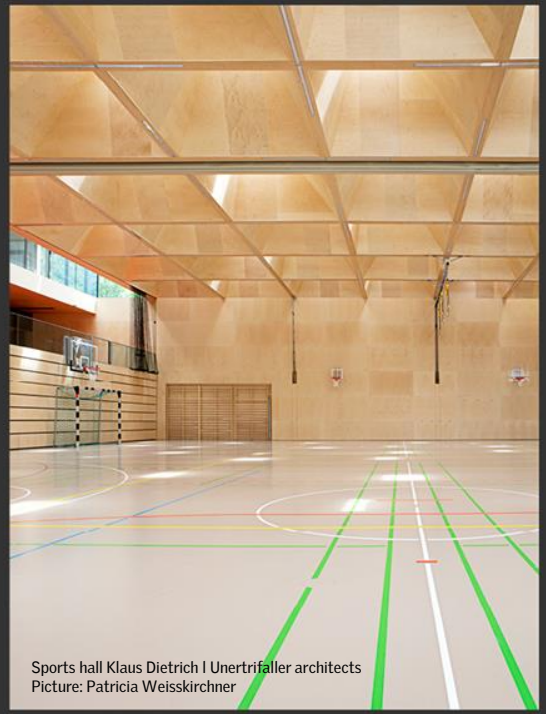
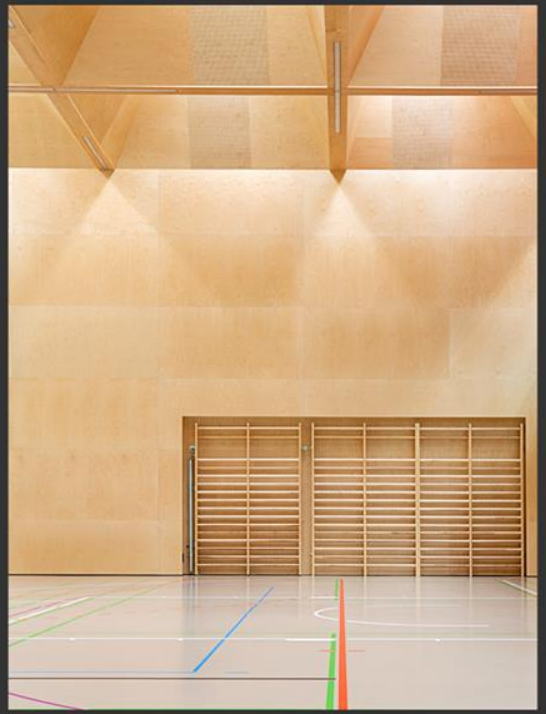
Window size and position

Back then

For centuries, daylight was the only efficient source of light available. Architecture was dominated by the goal of spanning wide spaces and creating openings large enough to distribute daylight to building interiors.



Sports hall Klaus Dietrich I Unertrifaller architects
Picture: Patricia Weisskirchner



Design goals

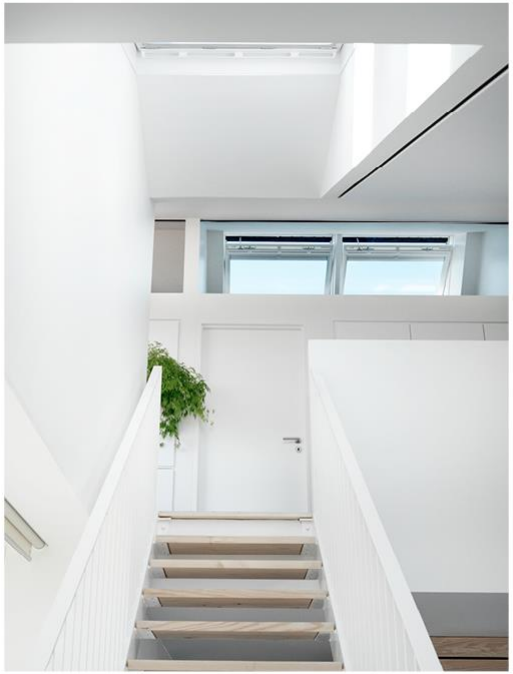
Attention should be placed on creating lighting conditions that are suitable for the visual tasks performed in a room and that simultaneously meet individual needs.

Attention need to be given to both our central vision (illumination of an object) and our peripheral vision (illumination of the surroundings). Peripheral vision contributes to an impression of the surroundings in which we find ourselves – space dimensions and shape, ambience, materials and light distribution.

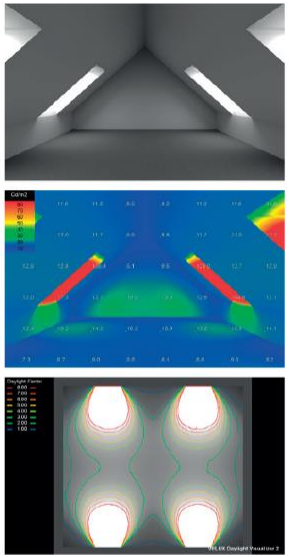
In the design phases this is supported by appropriate placement and sizing of windows to achieve an intelligent balance between the intensity of light, its distribution and directionality.

Orientation

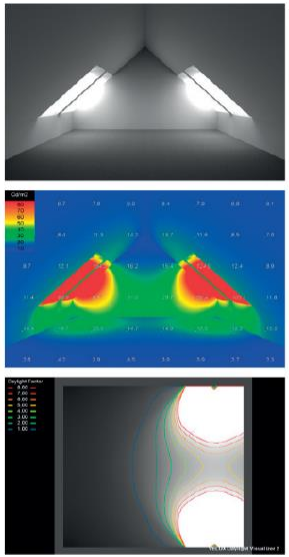
In the northern hemisphere, light coming from the north is mainly composed of diffuse skylight and provides the interior with a functional and comfortable light that is pretty stable throughout the day. Light coming from the south, east and west orientations will, in many cases, provide the interior with direct sunlight and light levels that vary significantly throughout the day. The quality and distribution of daylight in a room increases when it is delivered from multiple directions.



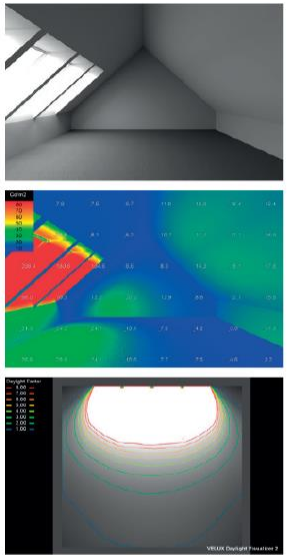
Window size and position



DF	5,63%
Median DF	3,88%
Uniformity Dmin/Dav	0,22



Average DF	4,45%
Median DF	1,60%
Uniformity Dmin/Dav	0,06



Average DF	5,88%
Median DF	2,94%
Uniformity Dmin/Dav	0,14

Position

The positioning of windows will influence the distribution od daylight in the room and determine the amount of `useful´ daylight. Good daylighting design will provide large amounts of glare-free light; poor daylighting design, on the other hand, will provide either inadequate amounts of light – so that electric lighting has to be used frequently – or large amounts of light, which could cause glare.

The figure to the right shows the effect of different window position in an attic with four roof windows. The results show that the average DF values vary in the room, but not as much as median DF values, which are a better representation of the useful amount of daylight in the room. It is also worth noting the effect of window placement on the uniformity of daylight in the room and taking it into consideration in the building design and window layout.

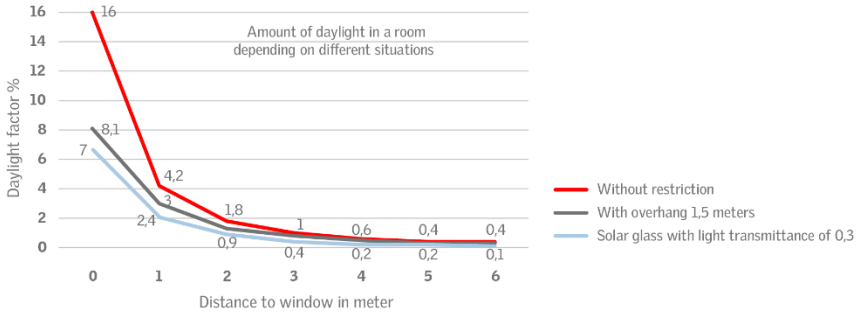
Top lighting

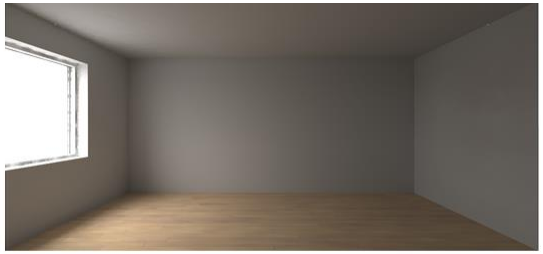
Daylight coming from the top brings three times the amount than coming from facade windows. A combination of both would on the one hand optimize the daylight conditions and additionally provide view to the outside.

Daylight penetration

The amount of daylight decreases with the distance to the window. Further reducing factors could be natural or artificial disturbances like:

- environmental (trees, neighbour buildings,...)
- architectural (lintel, fixed lamellas, overhangs...)
- materials (sun-protection glasses)





without restriction

with overhang 1,5 meters

solar glass with light transmittance of 0,3

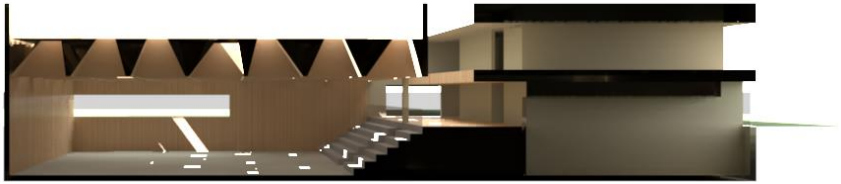
Window size and position

ReThink Daylight

Architecture: A_TSCHAPELLER M_STEINLECHNER
Picture: Wolfgang Leeb

Linings

The geometry and depth of window linings influences the amount of daylight entering the room and can be used to soften the luminance transition between the high luminance values of the window and the surfaces of the room.



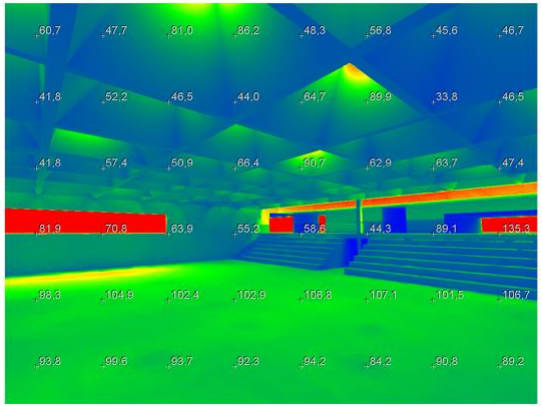


Illustration: VELUX Daylight Visualizer

Linings

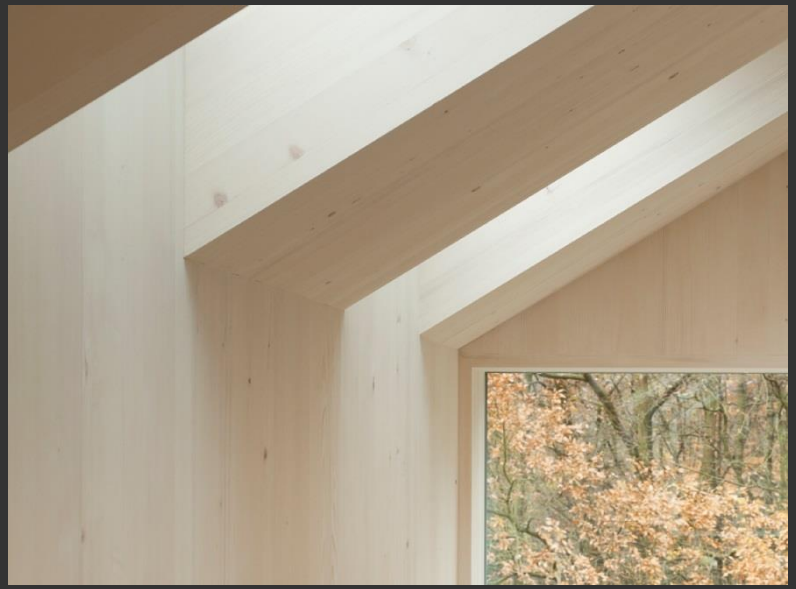
Sportshall KlausDietrich | Unertrifaller architects.

Above the hall, a cross-laminated timber girder grid supports the roof and admits daylight at the same time. Between the roof beams, the architects inserted 56 'daylight pyramids' made of birch plywood, each of which has a flat roof window at the top.

Window size and position

Sports hall Klaus Dietrich I Unertrifaller architects
Picture: Patricia Weisskirchner

ReThink Daylight



VELUX Sunlighthouse, HEIN-TROY architects
Picture: Adam Mørk

Sports hall Klaus Dietrich I Unertrifaller architects
Picture: Adam Mørk

Window size and position

Initiated by the VELUX Group

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