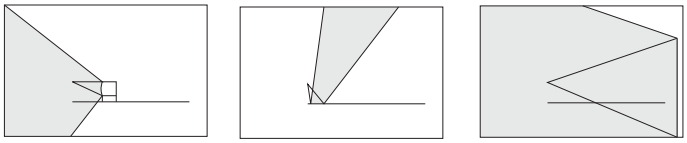
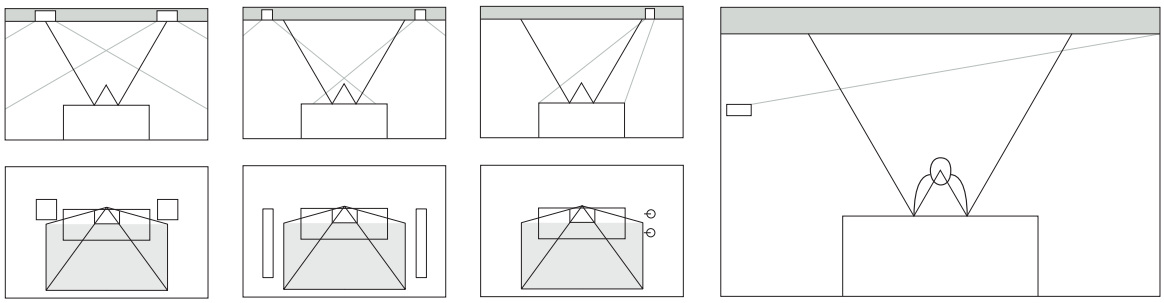
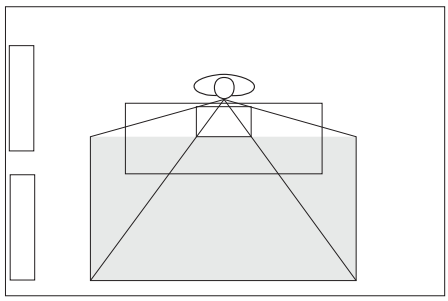
Critical areas (excluded zones) for VDT workstations (left), horizontal visual tasks (centre) and vertical visual tasks (right). Luminances falling on the visual tasks from the zones indicated result in reflected glare.

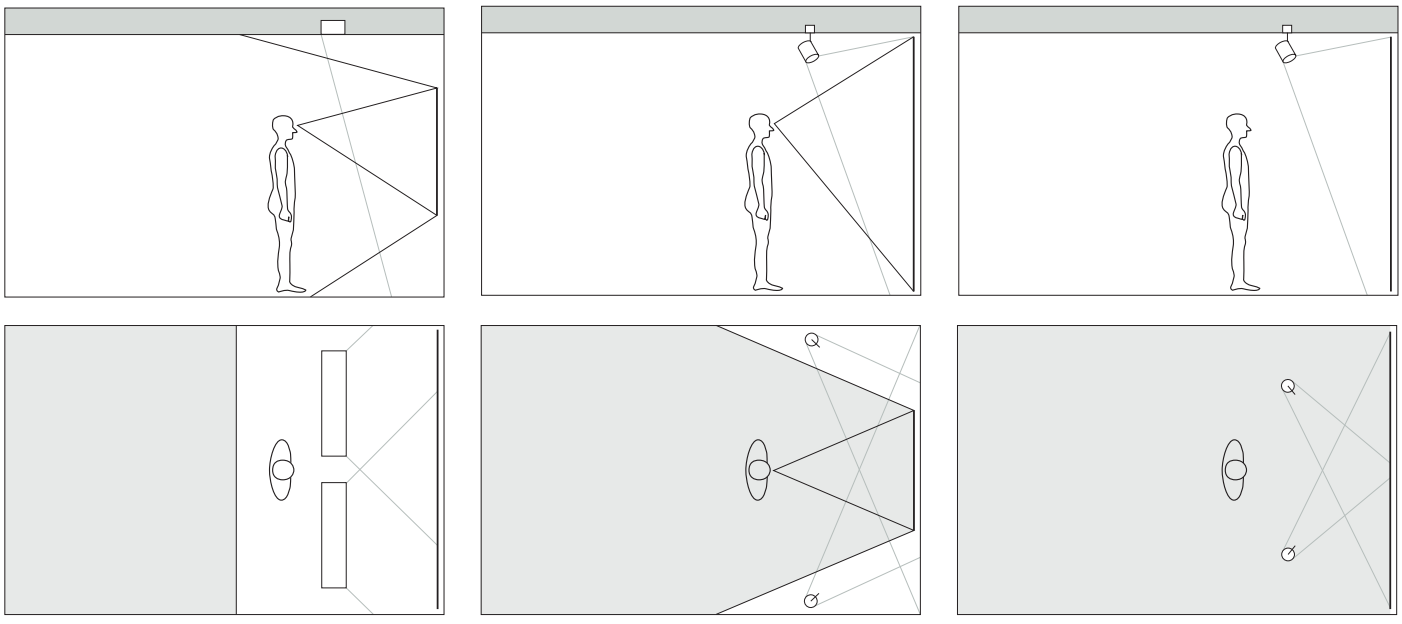


Lighting solutions for horizontal visual tasks free of reflected glare: direct lighting using luminaires positioned outside the excluded zone, indirect lighting.





Lighting solutions for vertical visual tasks free of reflected glare: (from left to right): if the reflective surface is arranged transversely, the luminaires can be mounted in front of the excluded ceiling zone. If the reflective surface is arranged vertically, then next to the excluded ceiling zone (centre). If the entire wall surface is reflective, the luminaires must be mounted within the excluded zone; the cut-off angles must be planned such that the observer is not disturbed by reflected light.



3.3.4 Switching and lighting control

In the simplest case a lighting installation may consist of a single circuit. An installation of this kind can only be switched on and off and therefore only produces one lighting arrangement. Lighting frequently has to meet changing requirements, however, which means that additional control options must be provided.

Even if the space is always used in the same way, daylight conditions change radically during the course of the day. In the daytime artificial lighting must compete with sunlight, and our perception is adapted to high levels of brightness on the room surfaces. In the evening and at night lower illuminances and pools of light are accepted. This fact presents a significant planning criterion for a wide range of lighting tasks. In some cases, e.g. the lighting of exclusive restaurants, it is likely to be a prime consideration and require a lighting installation to meet both environmental situations.

As the use of the space changes, so the demand for variability and flexibility will increase. For example, the lighting provided in lecture rooms should consist of accent lighting for podium discussions with comparatively high levels of lighting in the auditorium; the lighting installation should also be suitable for slide presentations, where the speaker is seen in accent lighting and the ambient light is just sufficient for the people in the audience to take notes. If films or videos are to be shown, lighting control requirements will be extended accordingly.

In many cases, the creation of a differentiated lighting installation cannot be restricted to the development of a concept that meets a clearly defined set of requirements with an equally fixed, exclusively spatially differentiated lighting layout. Changing environmental conditions and different uses may demand the creation of temporal differentiation – that is to say, the transitions from a fixed lighting situation to a series of optional light scenes that are dependent on the time of day or given situations.

The first way of creating a light scene is to arrange individual luminaires in an installation to form groups that can be switched separately. These groups may consist of lighting arrangements that are completely independent of one another and designed to fulfil different lighting tasks, and individual components of an overall installation, which may be operated separately or together.

As a rule, the definition of a light scene does not simply cover the simple switching of groups of luminaires, but also involves varying the levels of brightness. Besides the switching of separate circuits, dimming equipment is required for the separate groups of luminaires.

Once the required level of brightness has been identified, it is then possible to plan differentiated lighting to meet specific requirements. The potential range of light scenes increases considerably even if the number of luminaires and the switching remains the same. The distribution and level of brightness of the lighting can be accurately controlled in individual areas within the space and the overall level of a light scene adjusted to the changing requirements – e.g. to the time of day or the daylight available.

The switching and dimming of individual groups of luminaires can be controlled manually, either using conventional switches and controllers or by infrared remote control, which allows groups of luminaires to be controlled even if there are only a minimal number of circuits.

This method still makes it difficult to reproduce defined light scenes or to adjust them at a fixed rate. If the requirements the lighting control has to meet are complex, or if a larger number of groups of luminaires are to be controlled, it is advisable to use an electronic control system. This allows precisely defined light scenes to be recalled at the touch of a button, or a change of light scene to be programmed to take place over a given period of time. It is also possible to control the light in accordance with daylight or the use of the spaces using sensors; other functions apart from lighting can also be operated by coupling the lighting control system with the building management system.

Further developments in lighting control can also be used to create theatrical effects in architectural lighting. Besides controlling brightness, this may include changing luminous colour, beam spread or even the direction of the luminaires.