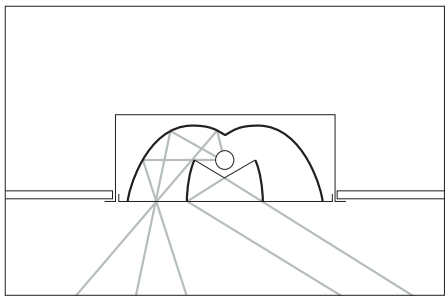
2.7.4 Secondary reflector luminaires

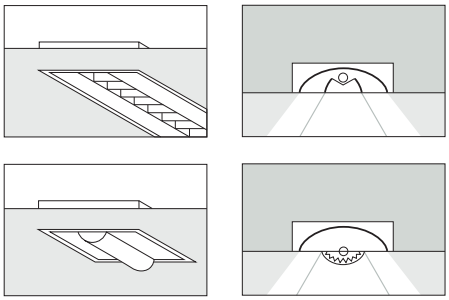
The widespread use of personal computer workstations in modern-day office spaces has led to a greater demand for improved visual comfort, above all with regard to limiting direct glare and discomfort glare. Glare limitation can be provided through the use of VDT-approved luminaires, or through the application of indirect lighting installations.

Exclusively indirect lighting that provides illumination of the ceiling will avoid creating glare, but is otherwise ineffective and difficult to control; it can produce completely uniform, diffuse lighting throughout the space. To create differentiated lighting and provide a component of directed light, it is possible to combine direct and indirect lighting components in a two-component lighting system. This may consist of combining task lighting with ceiling washlighting, or the use of direct-indirect trunking systems.

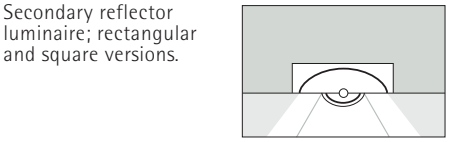
The use of secondary reflectors, which is a relatively new development, makes for more comprehensive optical control. This means that the ceiling, which represents an area of uncontrolled reflectance, is replaced by a secondary reflector which is integrated into the luminaire and whose reflection properties and luminance can be predetermined. The combination of a primary and a secondary reflector system produces a particularly versatile luminaire, which is able to emit exclusively indirect light as well as direct and indirect light in a variety of ratios. This guarantees a high degree of visual comfort, even when extremely bright light sources such as halogen lamps or metal halide lamps are used, and while still being possible to produce differentiated lighting.



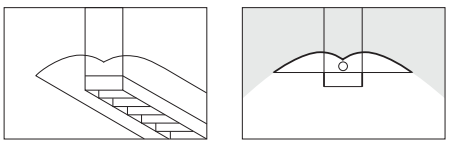
Secondary reflector luminaire with a parabolic reflector for the direct component and involute secondary reflector for the control of the indirect component.



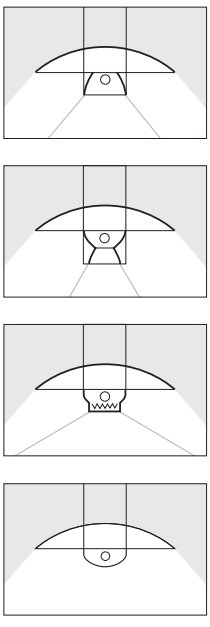
Secondary reflector luminaire; rectangular and square versions.



Direct-indirect and indirect secondary reflector luminaire.



Pendant direct-indirect secondary reflector luminaire.



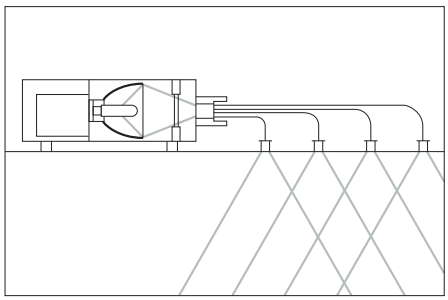
Rotationally symmetrical secondary reflector luminaire for point sources (e.g. high-pressure discharge lamps). Illustrated versions with parabolic reflector or lens system for the direct component, and a luminaire with a secondary reflector only.

2.7.5 Fibre optic systems

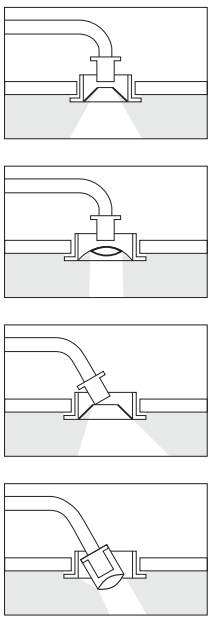
Light guides, or optical fibres, allow light to be transported at various lengths and around bends and curves. The actual light source may be located at a considerable distance from the light head. Optical fibres made of glass are now so well developed that adequate amounts of luminous flux can now be transmitted along the fibres for lighting applications.

Fibre optics are used above all in locations where conventional lamps cannot be installed due to size, for safety reasons or because maintenance costs would be exorbitant. The especially small-dimensioned fibre ends lend themselves perfectly to the application of miniaturised downlights or for decorative starry sky effects. In the case of showcase lighting, glass display cases can be illuminated from the plinth. Thermal load and the danger of damaging the exhibits are also considerably reduced due to the fact that the light source is installed outside the showcase.

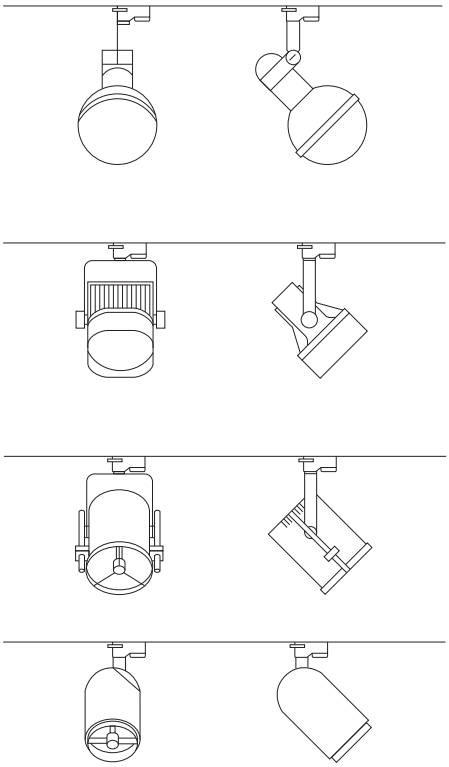
In the case of architectural models several light heads can be taken from one strong central light source, allowing luminaires to be applied to scale.



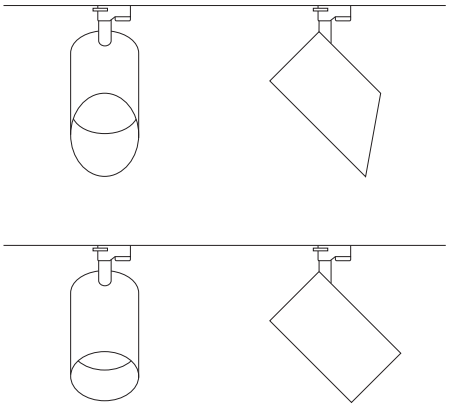
Fibre optic system comprising projector, flexible light guides and individual light heads for the ends of the fibres. Inside the projector the light emitted by a low-voltage halogen lamp is focussed onto the Common End of the bundle of fibres by means of an elliptical reflector. The light is then conveyed along the individual light guides, and emitted at the ends of the fibres through the attached light heads.



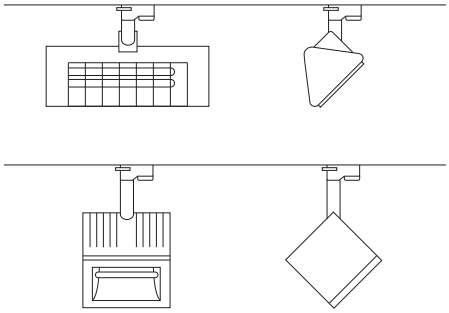
Typical light guide fixtures (from the top downwards): downlight with reflector, downlight with lens optics, directional spotlight with reflector, directional spotlight with lens optics.

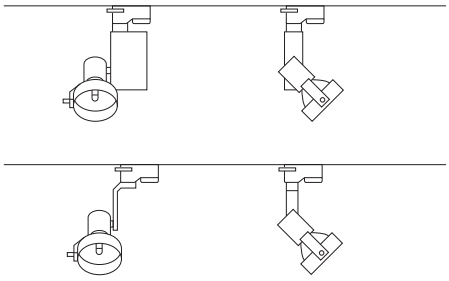


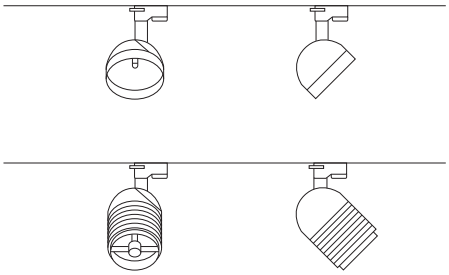
Spotlights of different designs and technical performance.

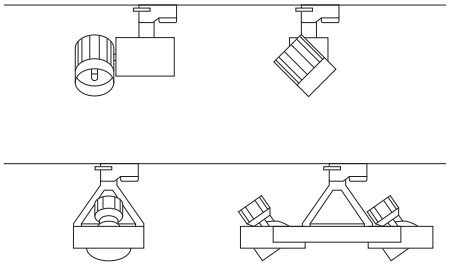


Spotlights and washlights whose design is based on fundamental geometrical forms.









The development of low-voltage halogen lamps allows the design of luminaires of especially compact dimensions, in particular for spotlights for low-voltage track.