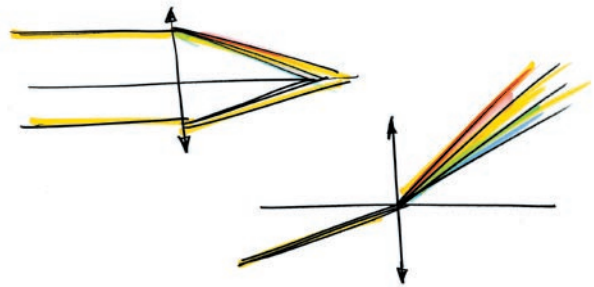


Optical materials & surfaces

The choice of the optical material normally depends on the optical, mechanical and environmental requirements set to the end-product, total costs and manufacturing possibilities. We use thermoplastics, coated or uncoated, in most of our products.

Optical materials

The quality of a lens material is characterized by transmission and dispersion factor (so called Abbe factor). Glass is the best of lens materials, when it only comes to these figures. Plastic materials can be used, when developing a system with less requirements for optical precision, and when there is a need for good integration of the optical system to the rest of the mechanical structure.



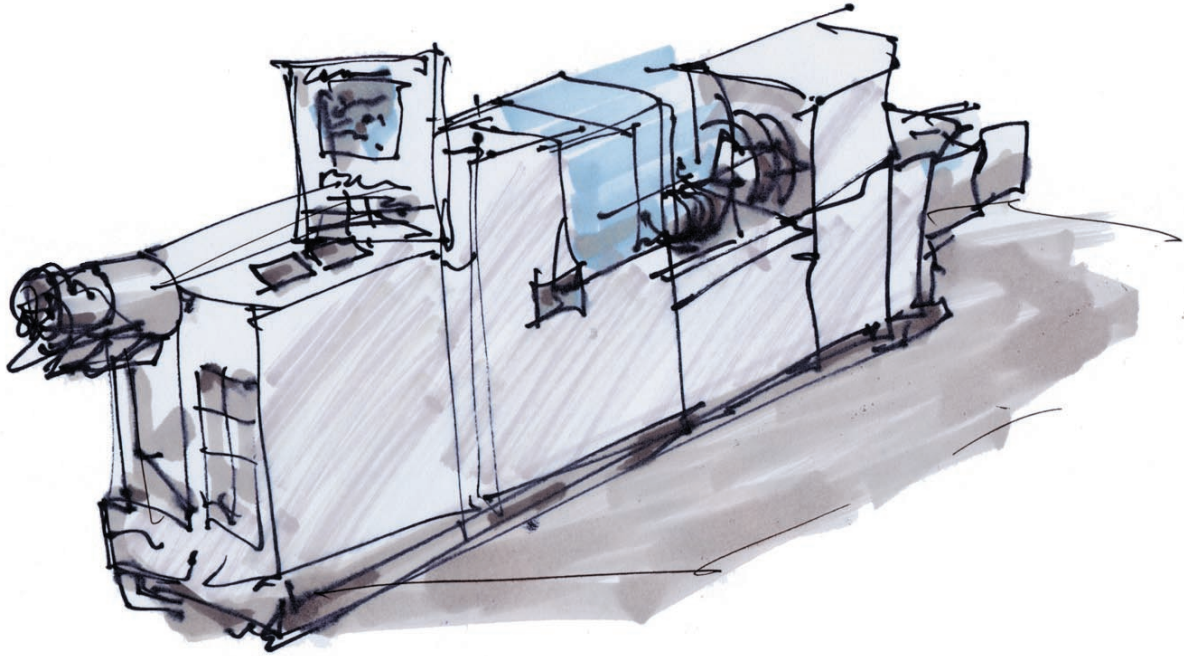
Optical Thermoplastics

Suitable standard thermoplastics materials for lenses are, e.g., PMMA, PC, PS, SAN and PA12. When using thermoplastics, special attention must be paid to material specific properties, to material behavior in the molding process and to manufacturing & design of molds.

Advantages of thermoplastics as optical material are

- Mass production and low cost per piece
- Geometrical degree of freedom
- Light weight
- Unbreakable
- Easy integration
- Quality in series





Disadvantages in turn are

- Sensitivity to heat
- Shrinkage
- Chemical resistance
- Color unevenness
- Flow lines

Coatings

Coatings establish reflective surfaces on thermoplastics. Paints in different forms make a diffusive optical surface. The percentage of light reflected is proportional to the color of the paint used and to the size and the geometry of the diffusing particles in it compared to the wavelength of the light. A mirror surface can be established on a diamond polished thermoplastics surface using different metallization techniques. The degree of reflection is based on material properties of the thermoplastics, mold surface quality and material flowing conditions inside the mold and coating material properties. The purer the material and the more homogeneous the flowing conditions inside the mold are the better is the mirror surface.

