Optical Handling and Positioning

Module 1-2
of
Course 1, Fundamentals of Light and Lasers
Figure 2-1  Refractive index of several optical materials as a function of wavelength
Figure 2-2 Absorption of light passing through a transparent medium of thickness $x$
Figure 2-3  Transmission characteristics of several optical materials: (a) fused silica, (b) fused quartz, (c) Pyrex, and (d) Zerodur  
(Source: www.escoproducts.com)
Reflection and transmission of light incident perpendicular to an air-glass interface.

Figure 2-4  Reflection and transmission of light incident perpendicular to an air-glass interface
Figure 2-5  Reflection and refraction of initially unpolarized light containing equal amounts of $E_{TE}$ and $E_{TM}$
Figure 2-6  Absence of reflected light at a Brewster angle of incidence when incident light is totally polarized as $E_{TM}$
Figure 2-7  *Schematic diagram of a typical vacuum deposition chamber*
Figure 2-8  Reflection at multiple interfaces with different refractive indices
Figure 2-9  Reflection at top and bottom interfaces of coating material. Reflected rays 1 and 2 are 180° out of phase, leading to destructive interference and little or no reflected light.
Figure 2-10 *Increase of reflectivity at a specific wavelength \( \lambda \) after reflection at multiple layers of coating*
Figure 2-11  Reflectance of some metals as a function of wavelength
Figure 2-12  Properties of a band pass filter
Figure 2-13  Properties of a high pass cut-off filter
Figure 2-14  Optical densities of some neutral-density filters
Figure 2-15  Percentage of transmission of a specific narrow-band filter
Figure 2-16  Transmission characteristics of a radiometric filter showing a nearly uniform transmission between 400 nm and 1000 nm (Image as revised in Fundamentals of Light and Lasers, 3rd Edition)
Figure 2-17 Transmission characteristics of a photometric filter
Figure 2-18  Transmission characteristics of a safety goggle suitable for protection from CO₂ laser beams
Figure 2-19  *Cross-sectional view of a triangular optical rail with carriage, adjustable rod, lens support and lens*
Figure 2-20  *Double rectangular optical rail*  
*(Courtesy: Newport Corporation)*
Figure 2-21  Flat-bed bench for optical mounting
Figure 2-22  *Isolation table with pneumatic legs*
Figure 2-23  *Different types of lens/mirror mounts*
Figure 2-24  Other types of holders for optical elements
Figure 2-25  *Schematic diagram of a scissors jack and a “sine table”*
Figure 2-26 Schematic diagrams of one-dimensional and two-dimensional translators
Figure 2-27  Picture of a simple rotational stage and a rotational stage of designed to hold Polaroid sheets
Figure 2-28  *Combined rotational and translational stage*
Figure 2-29  *One and two-dimensional tilting stages*
Figure 2-30  A commercial goniometer  
(Courtesy: Newport Corporation)
Figure 2-31  *Schematic diagram for observing surface imperfections on an optical element*
Figure 2-32  Schematic diagram of an optical setup used to observe internal defects in an optical element
**Figure 2-33** Experimental setup designed to observe interference fringes on a flat optical element
Figure 2-34  Typical interference patterns observed on flat optical test plates of different flatness