

# Quality Assurance of Precision Optics

## Figures and Images for Instructors

### Module 1 Fabrication of Precision Optics

Precision Optics Series



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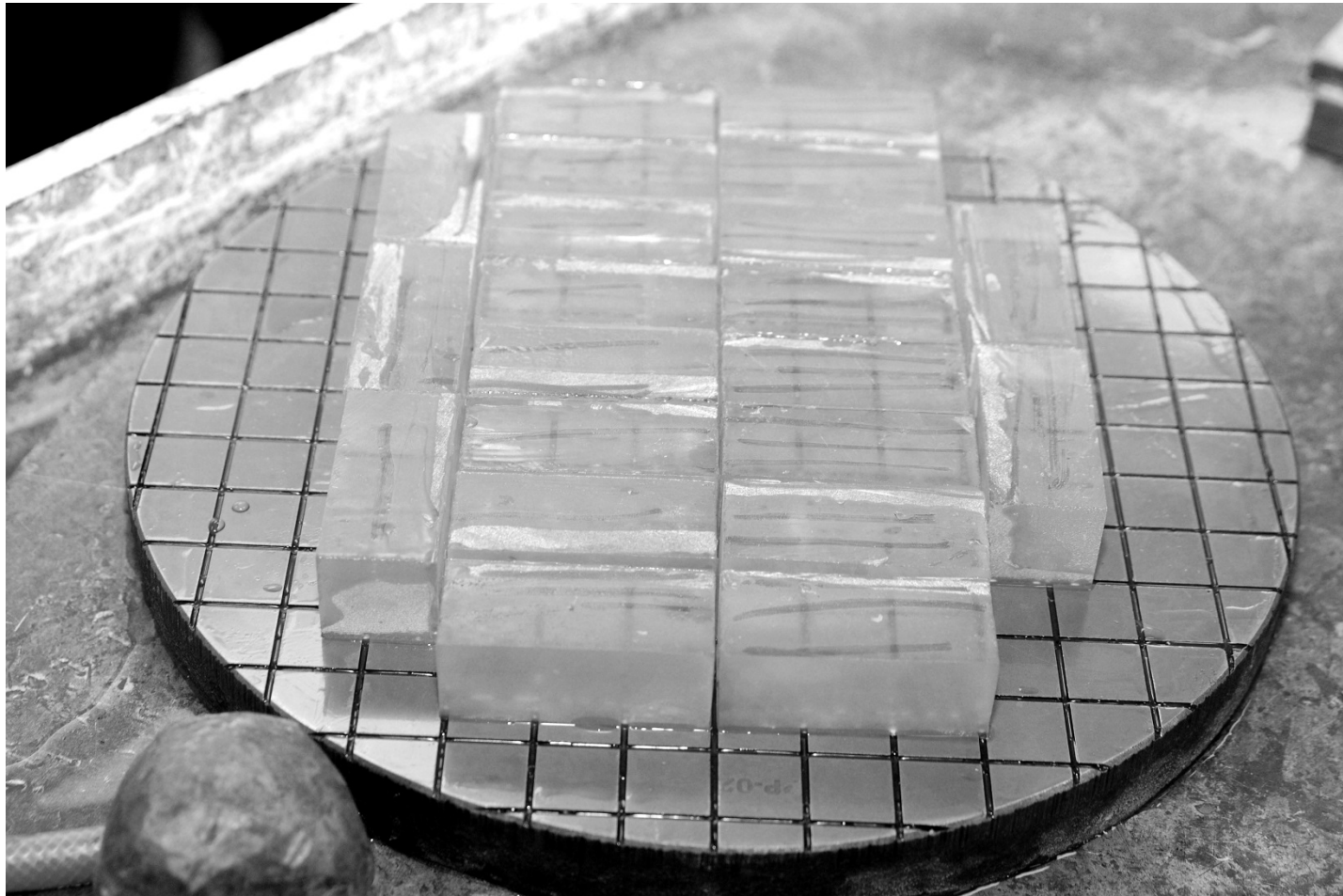


**Figure 1-1** *Large band saw for initial cutting of raw material*



**Figure 1-2** *Circular saw for intermediate precision cutting*

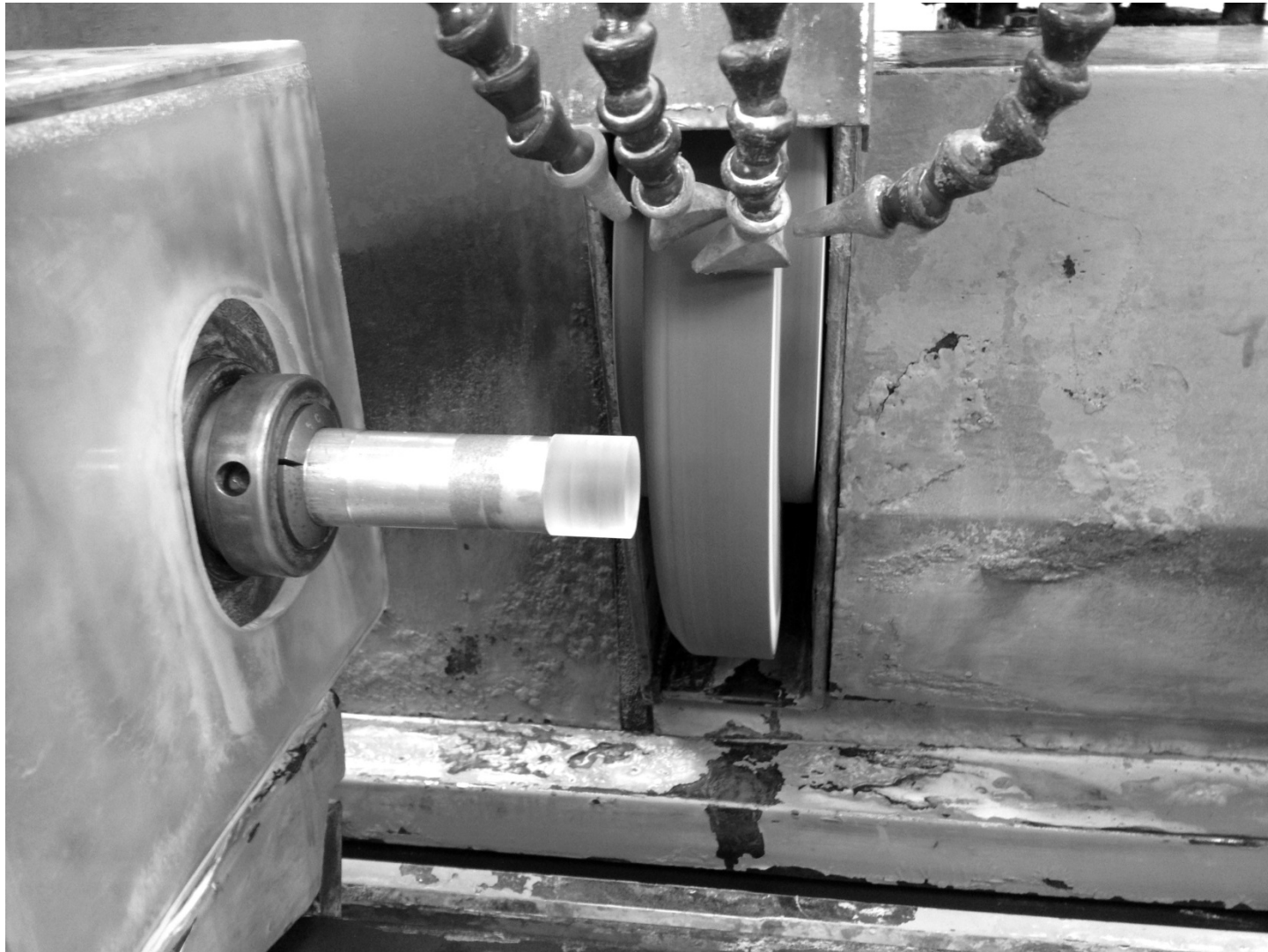




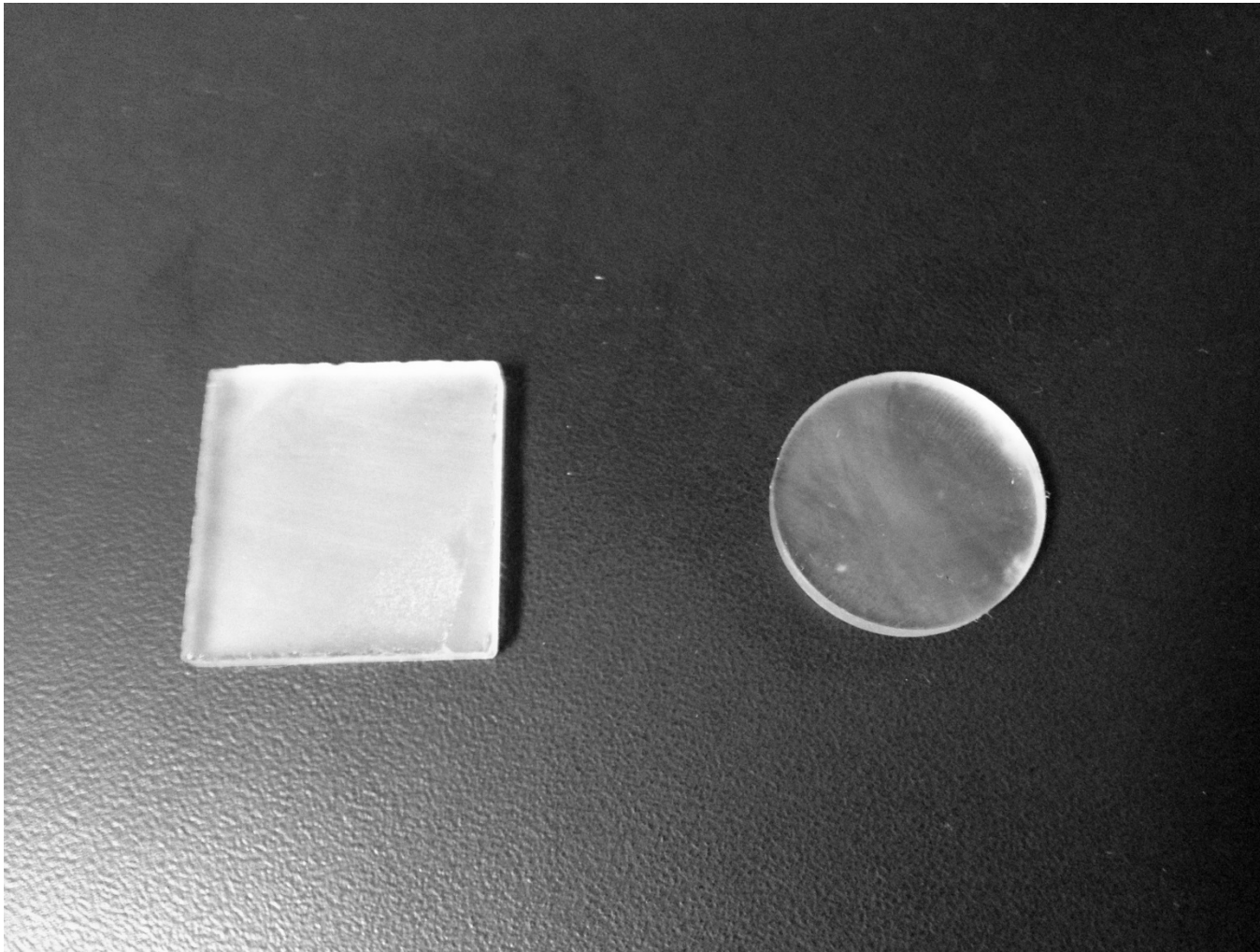
**Figure 1-3** *Wax block on parallel metal plate*



**Figure 1-4** *Setup of a parallel machining operation*



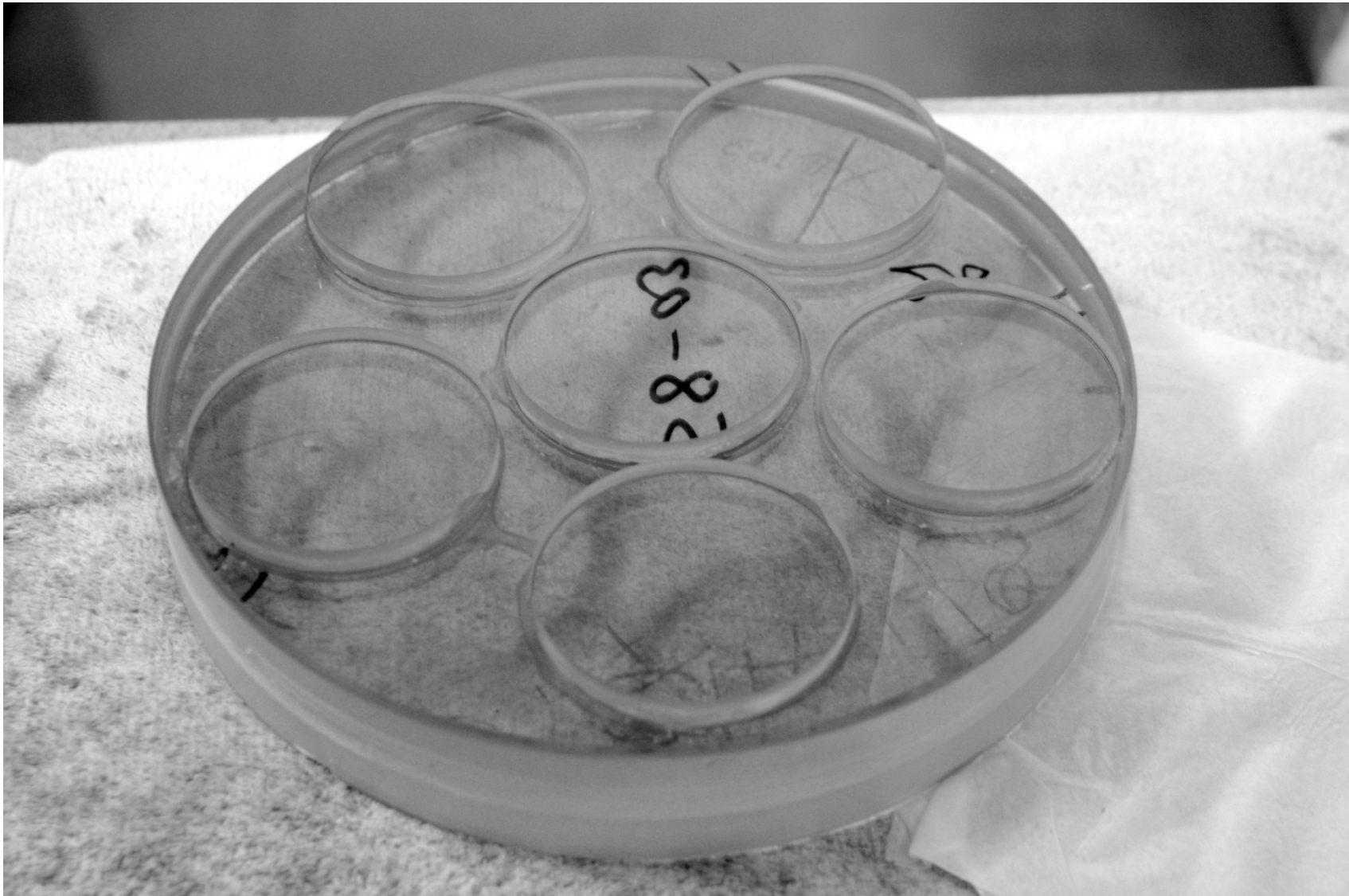
**Figure 1-5** *Mirror substrate being edged to diameter using diamond wheel and edging machine*



**Figure 1-6** *Mirror substrate before and after edging*

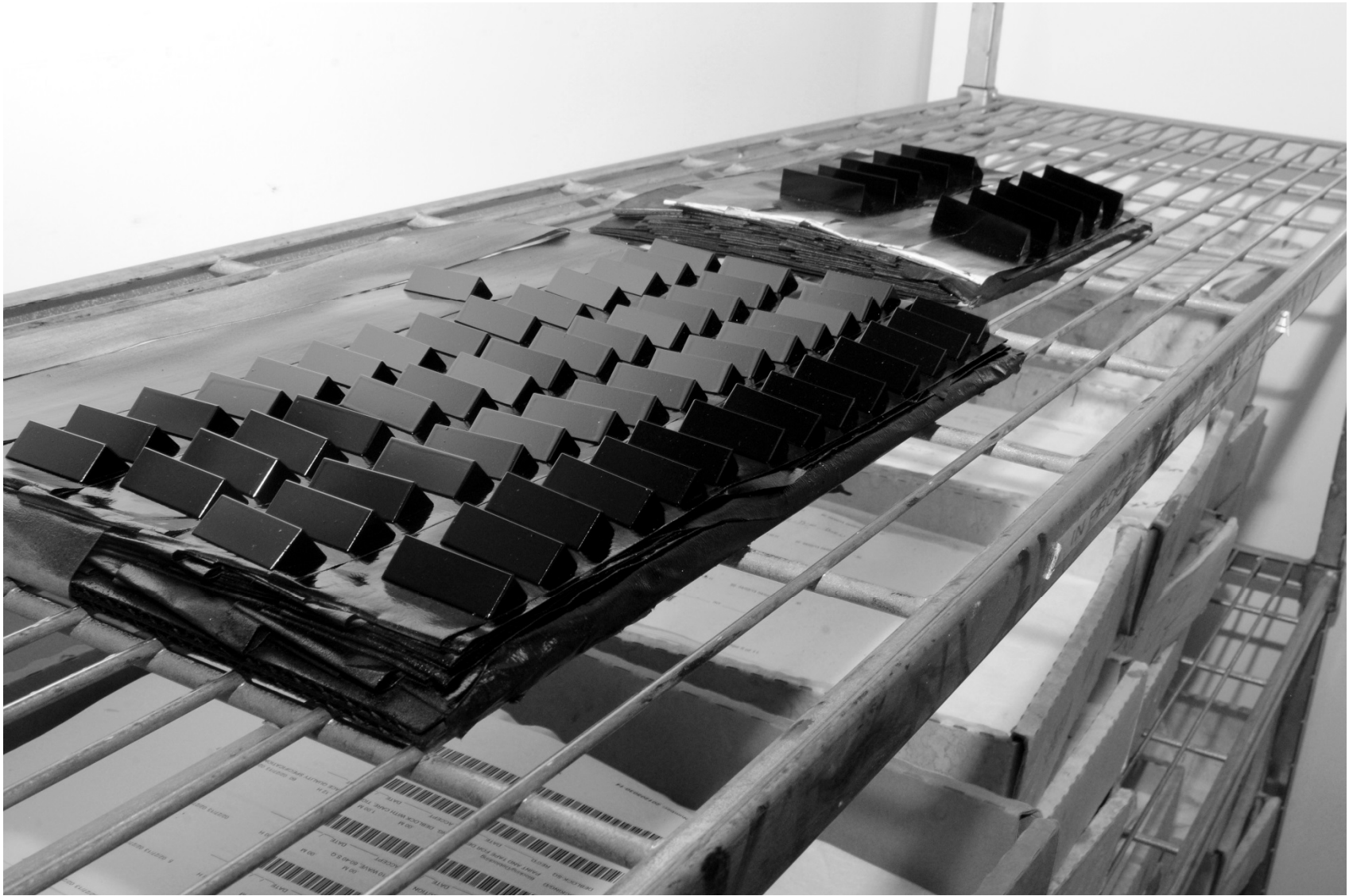


**Figure 1-7** *Upper left: Hand grinding a block of prisms  
Upper right: Precision hand grinding an individual prism  
Bottom: Continuous polishing machine that is pitch-polishing various  
substrates*



**Figure 1-8** *Precision polished optical surfaces*





**Figure 1-9** *Prisms painted to protect finished optical surfaces*



**Figure 1-10** *Optics blocked in pitch*





**Figure 1-11** *Optics blocked in plaster*



**Figure 1-12** *Deblocking a plaster block*



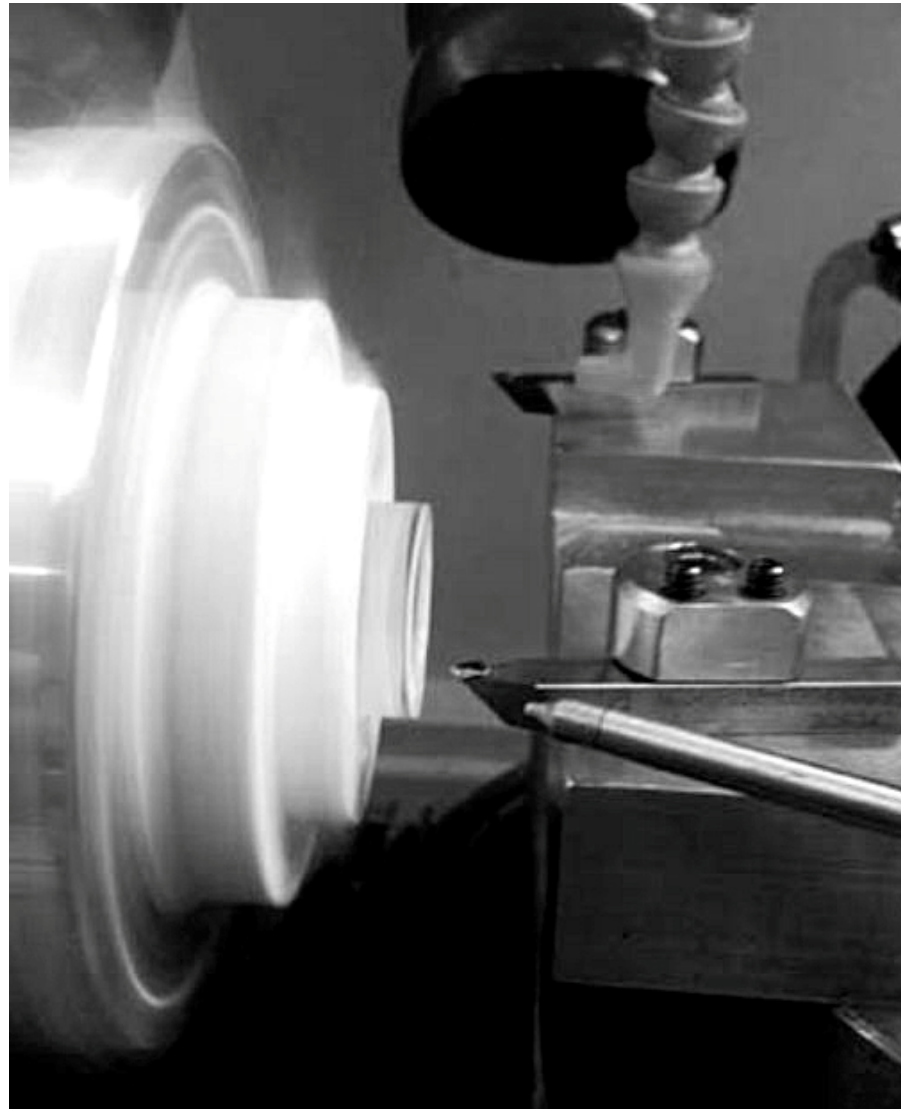
**Figure 1-13** *Basket of paint-protected optics being loaded into a degreasing machine to remove pitch and plaster*



**Figure 1-14** *Tooling optics in degreasing basket*



**Figure 1-15** *Optical plastic injection mold*

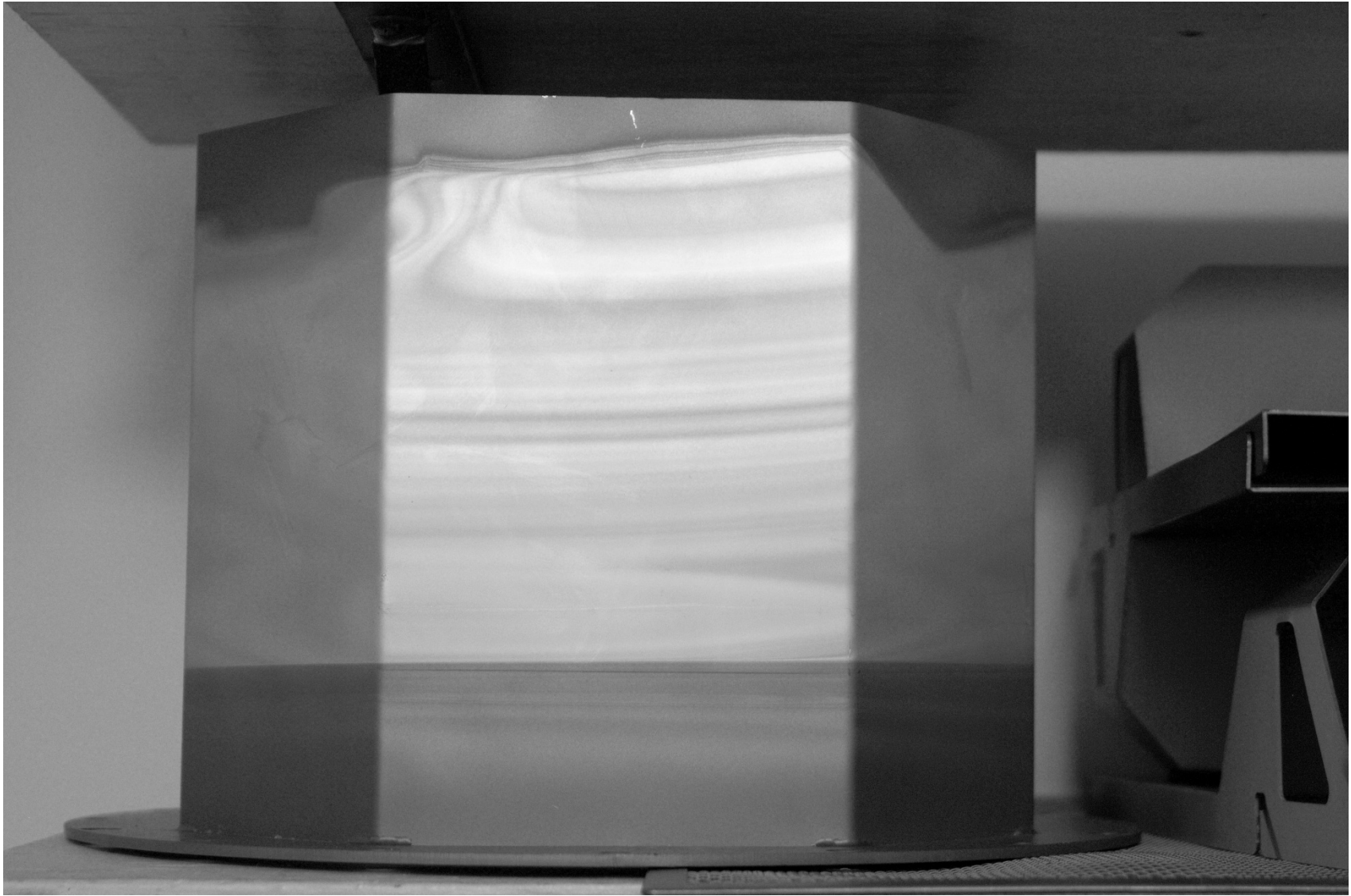


**Figure 1-16** *Single-point diamond turning (SPDT) system cutting a plastic lens*



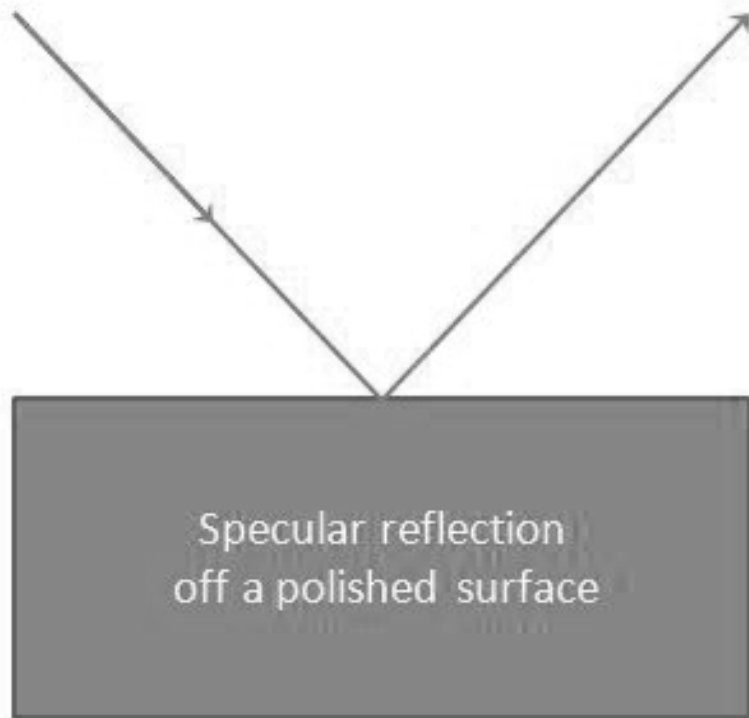


**Figure 1-17** *A precision assembly technician applying optical adhesive to the hypotenuse surface of a right-angle prism before bonding it to another right-angle prism to create a beamsplitter cube*

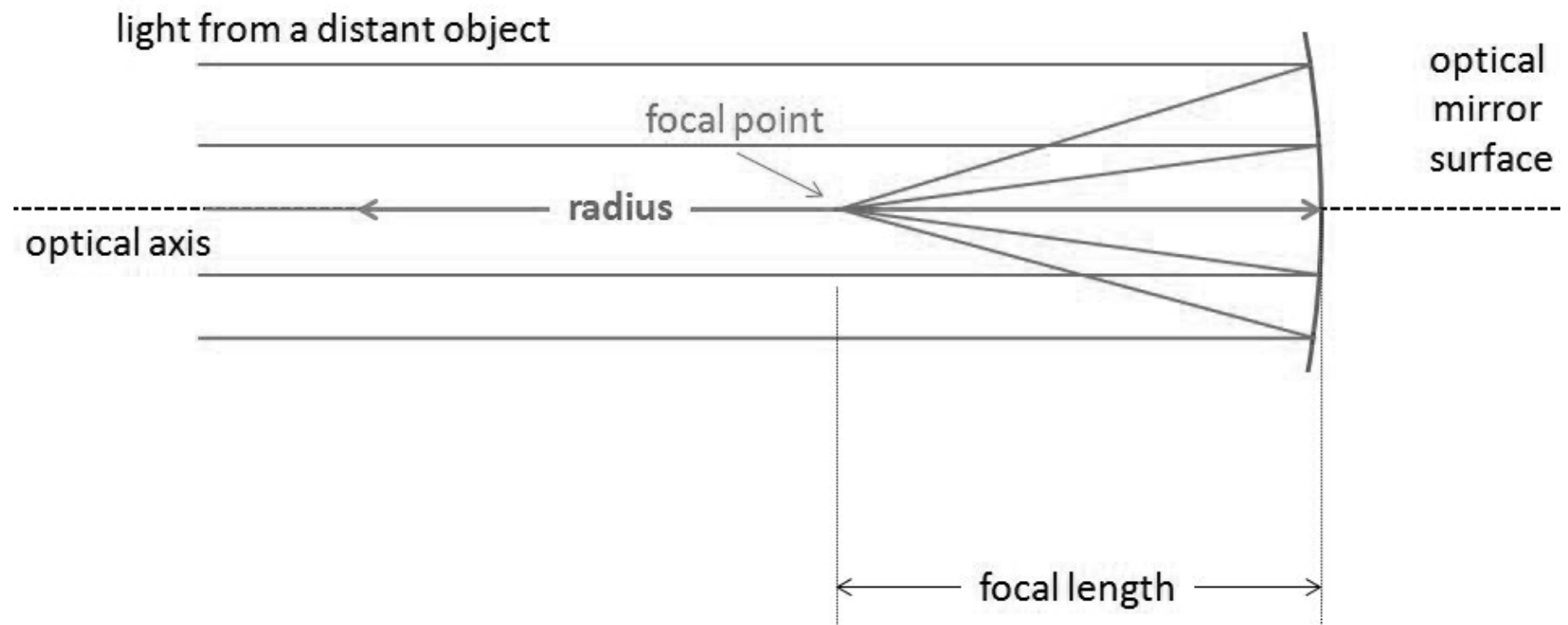


**Figure 1-18** *Shielding for a coating chamber, contaminated after multiple coating runs*

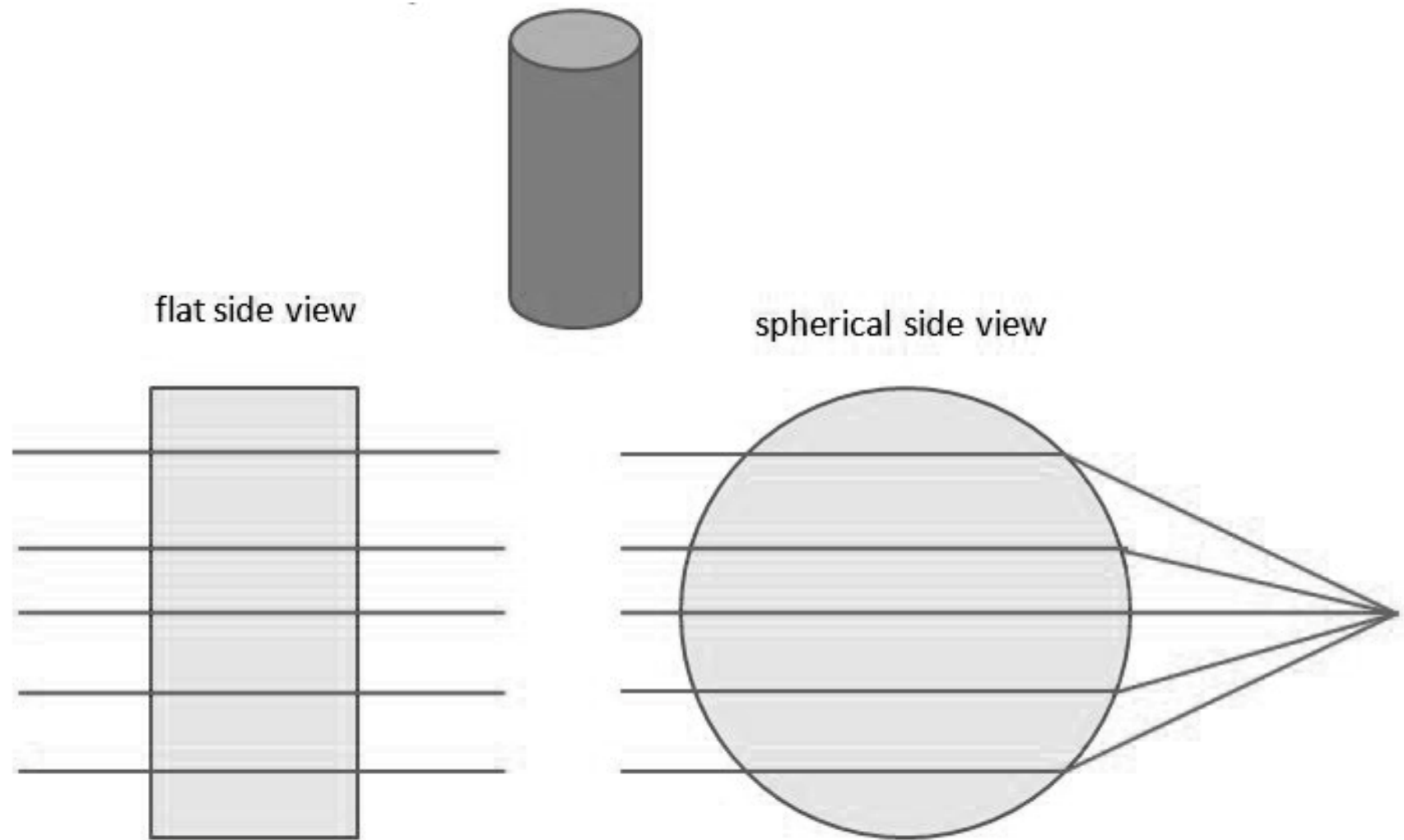




**Figure 1-19** *Specular versus diffuse reflection*



**Figure 1-20** *Graphical definition of focal length and radius*



**Figure 1-21** *Light propagating through cylindrical lenses*



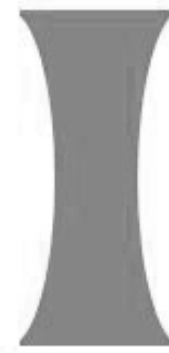
planoconvex



planoconcave



biconvex



biconcave

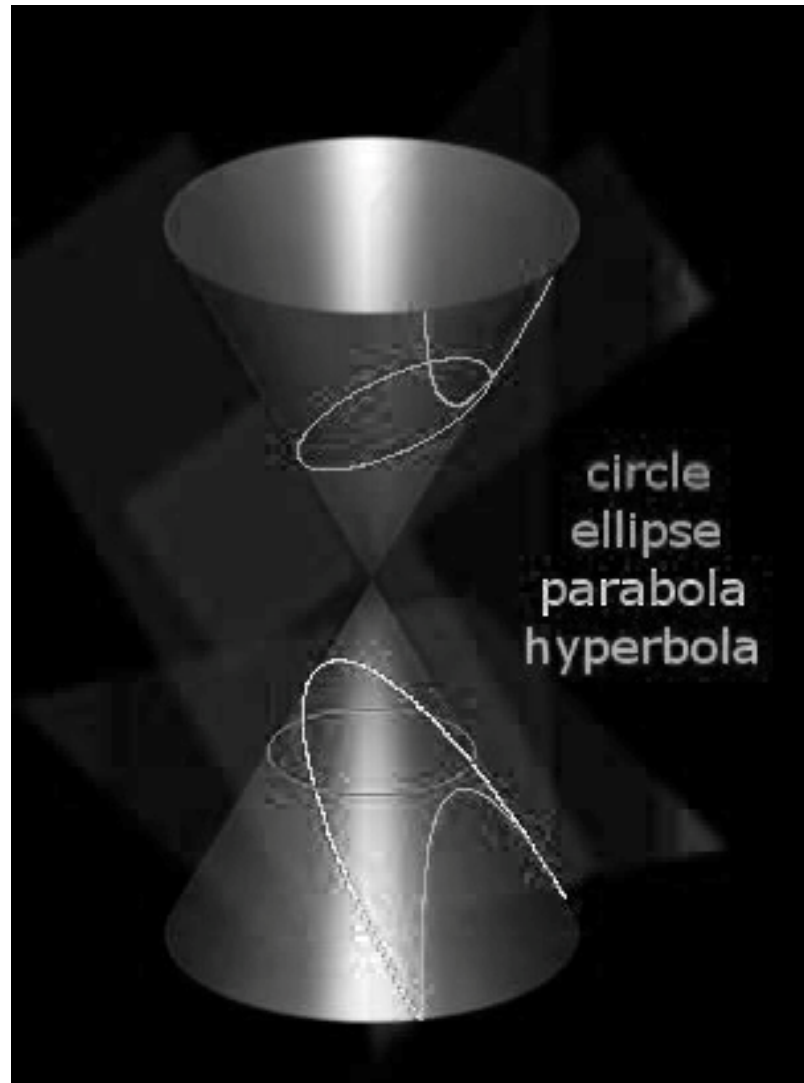


positive meniscus

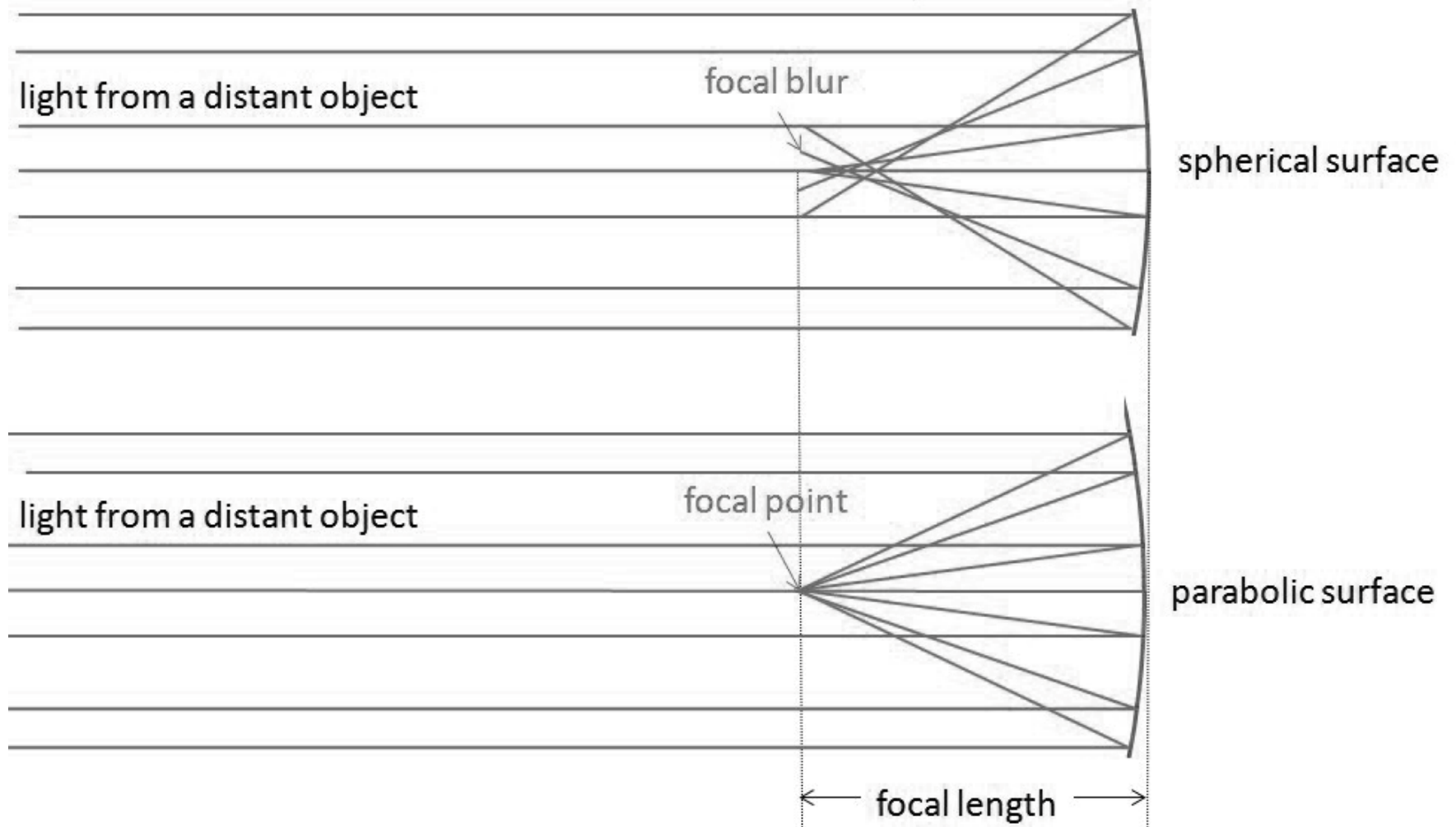


negative meniscus

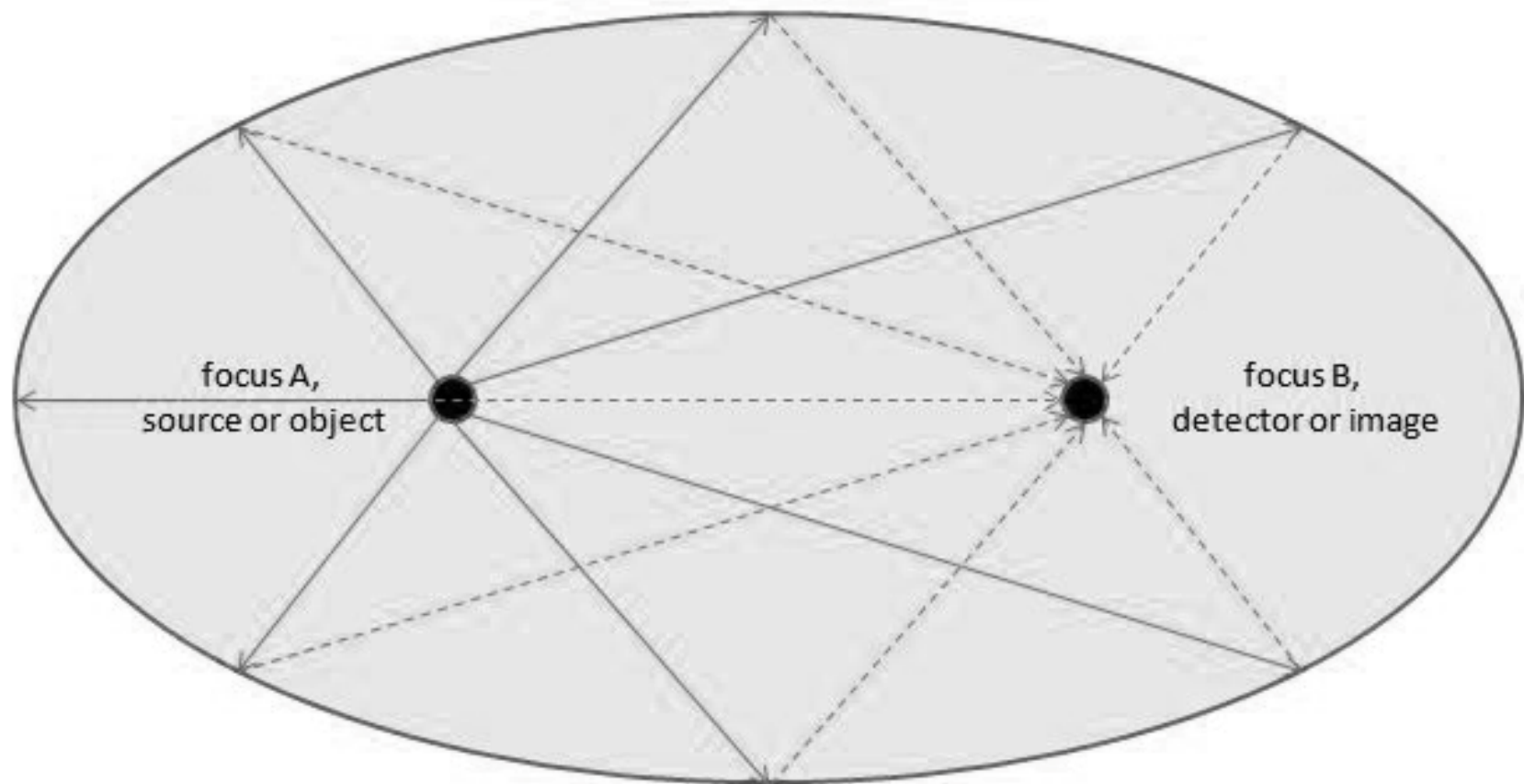
**Figure 1-22** *Lens types*



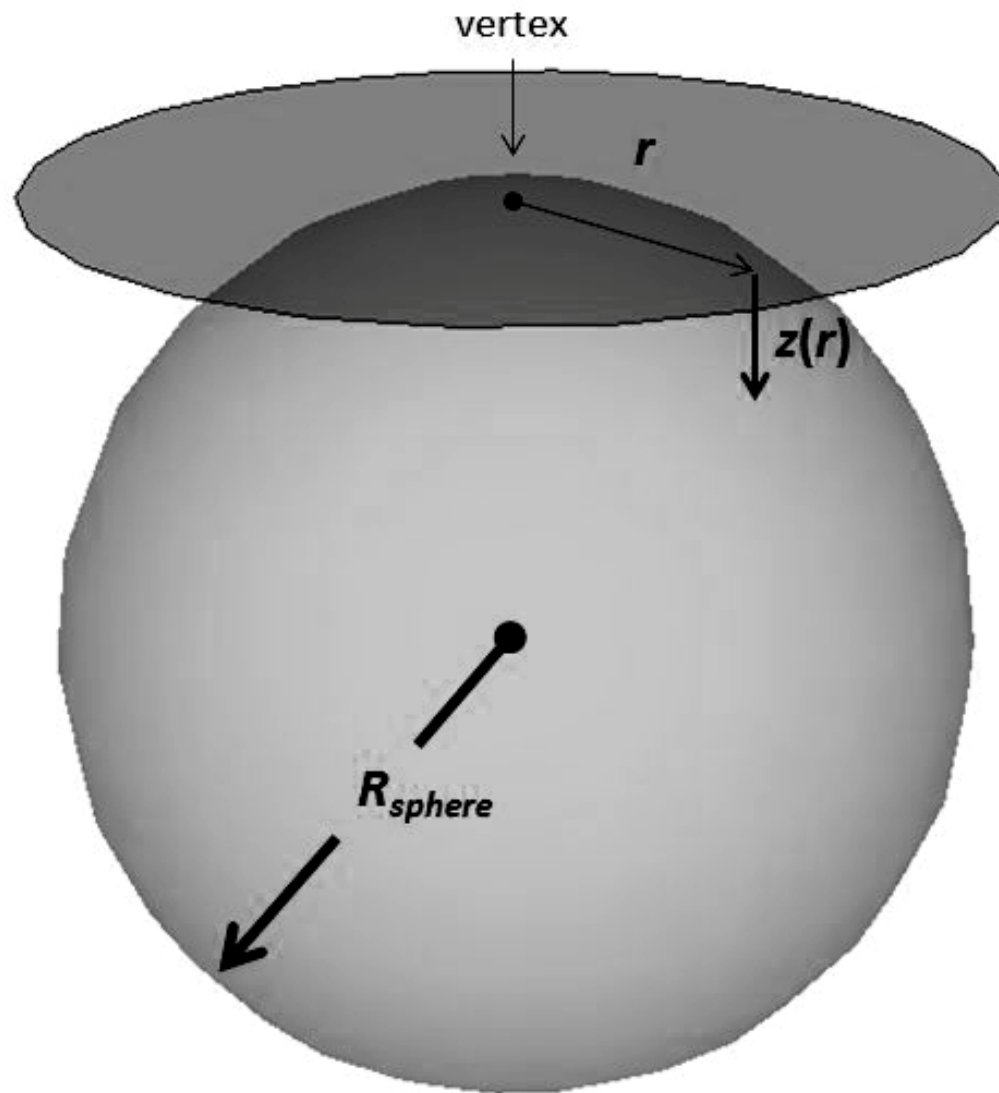
**Figure 1-23** *Four different slices through a cone pair create the four types of conic sections that are used to make aspheric optical surfaces*



**Figure 1-24** *Comparison of the images formed of a distant object by a spherical and paraboloidal mirror*

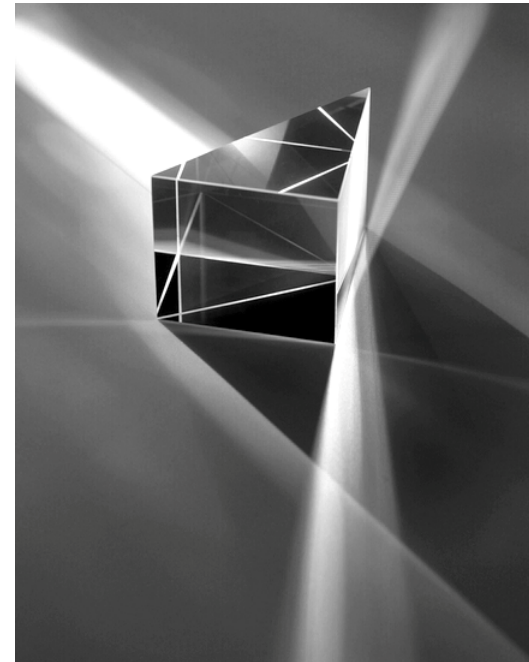
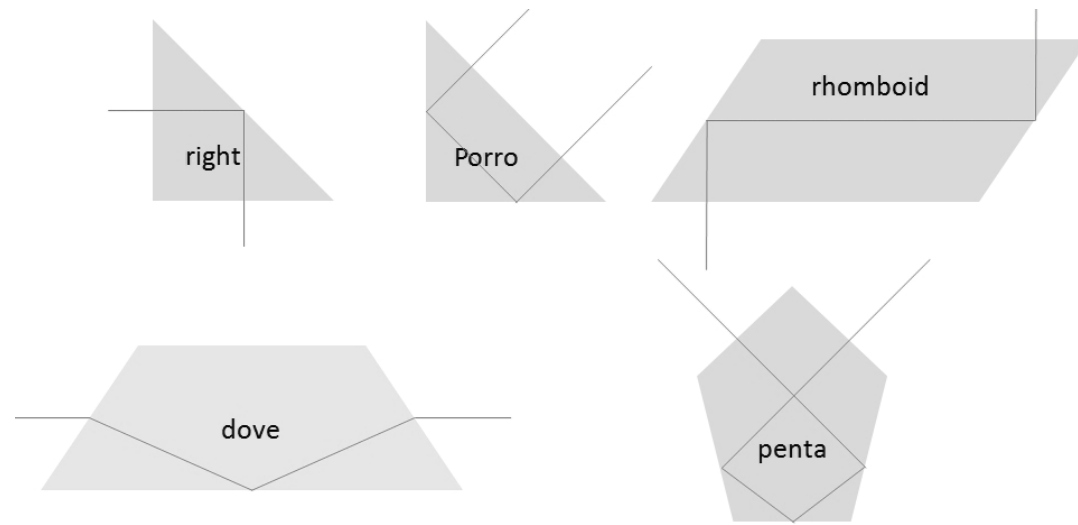


**Figure 1-25** *Elliptical whispering gallery*

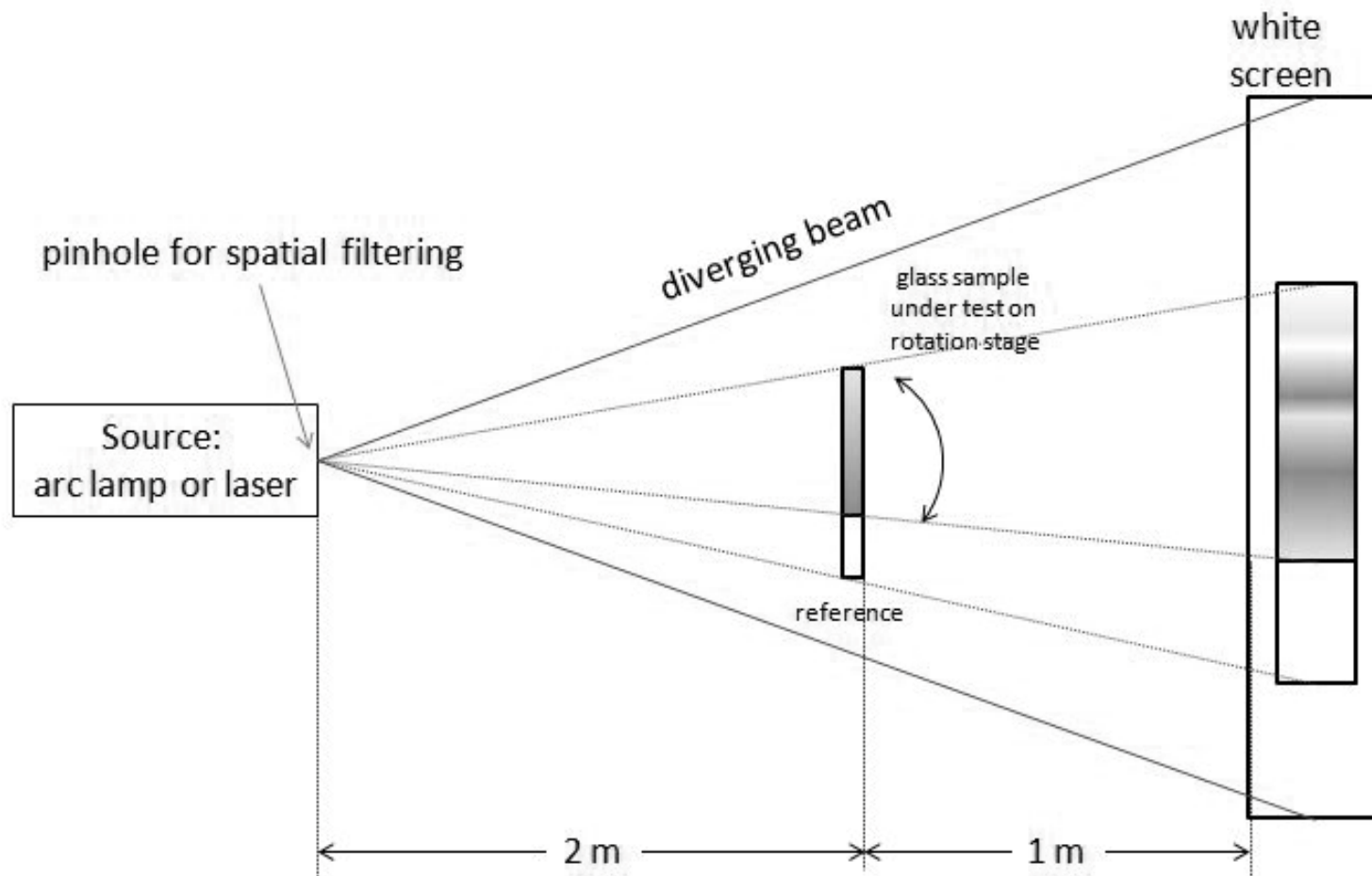


**Figure 1-26** *Graphical definition of surface sag*

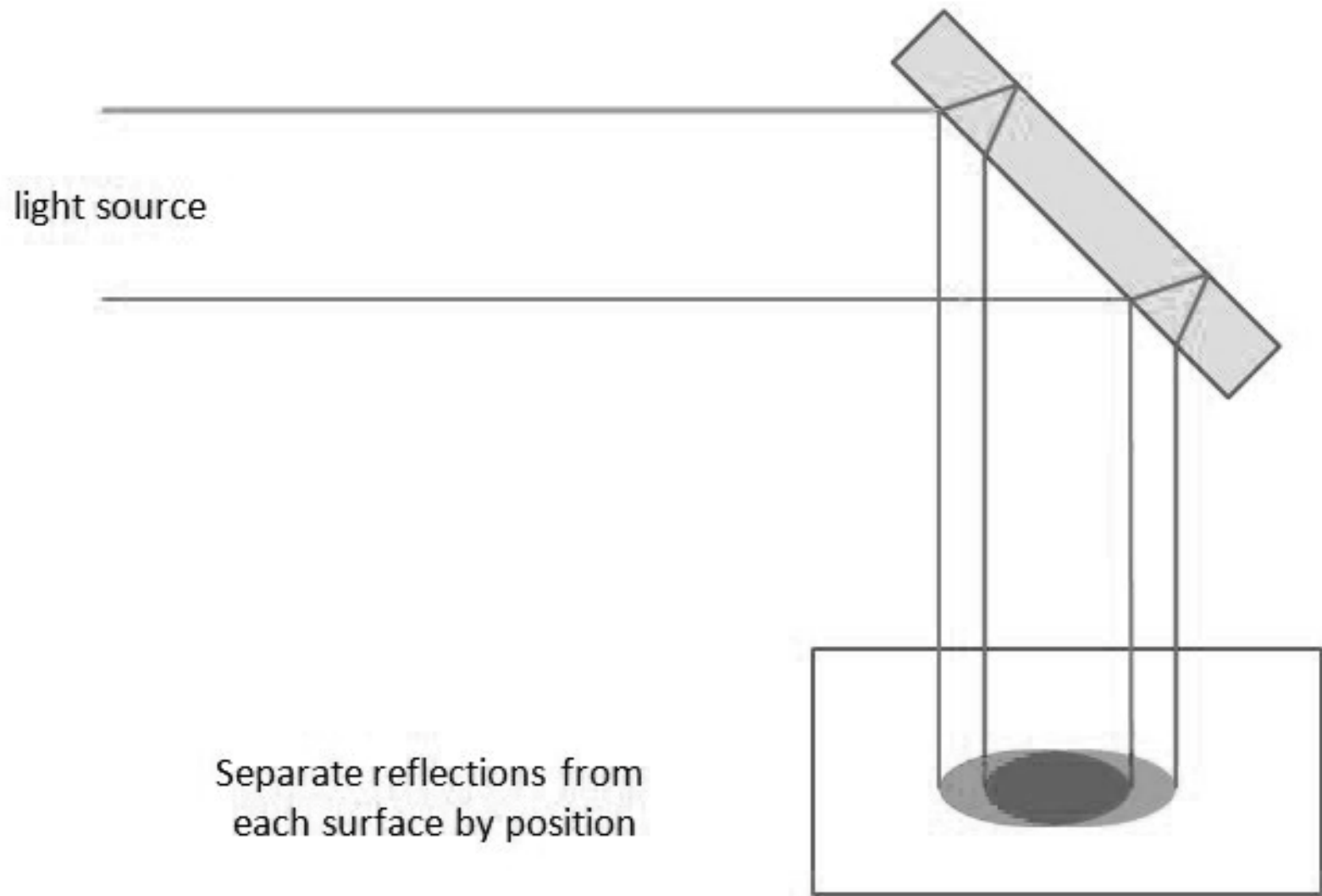




**Figure 1-27** *Common types of prisms*



**Figure 1-28** *Shadowgraph*



**Figure 1-29** *Experiment coatings*