

# Quality Assurance of Precision Optics

## Figures and Images for Instructors

### Module 1 Fabrication of Precision Optics

Precision Optics Series



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This text was developed by the National Center for Optics and Photonics Education (OP-TEC), University of Central Florida, under NSF ATE grant 1303732. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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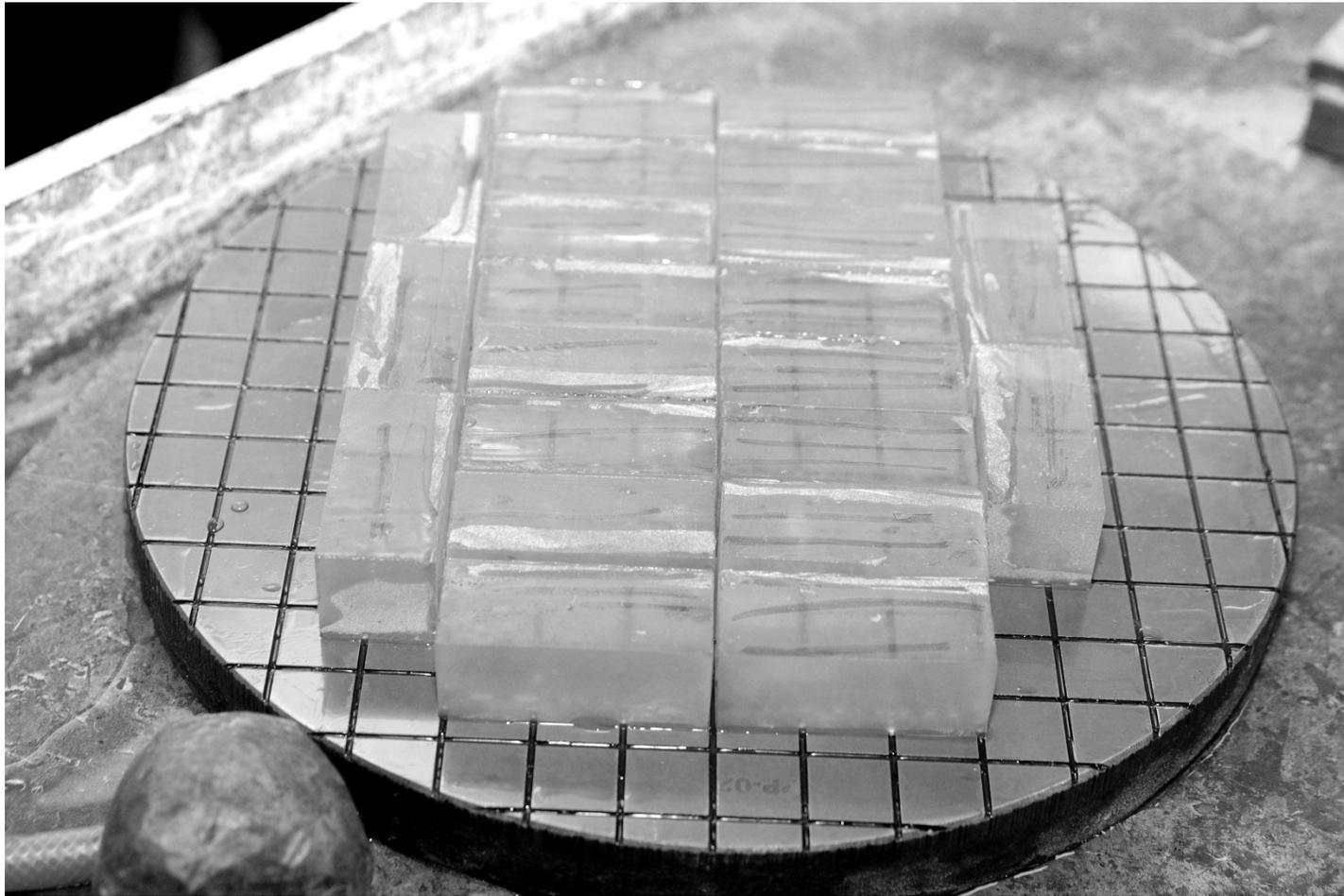
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**Figure 1-1** *Large band saw for initial cutting of raw material*



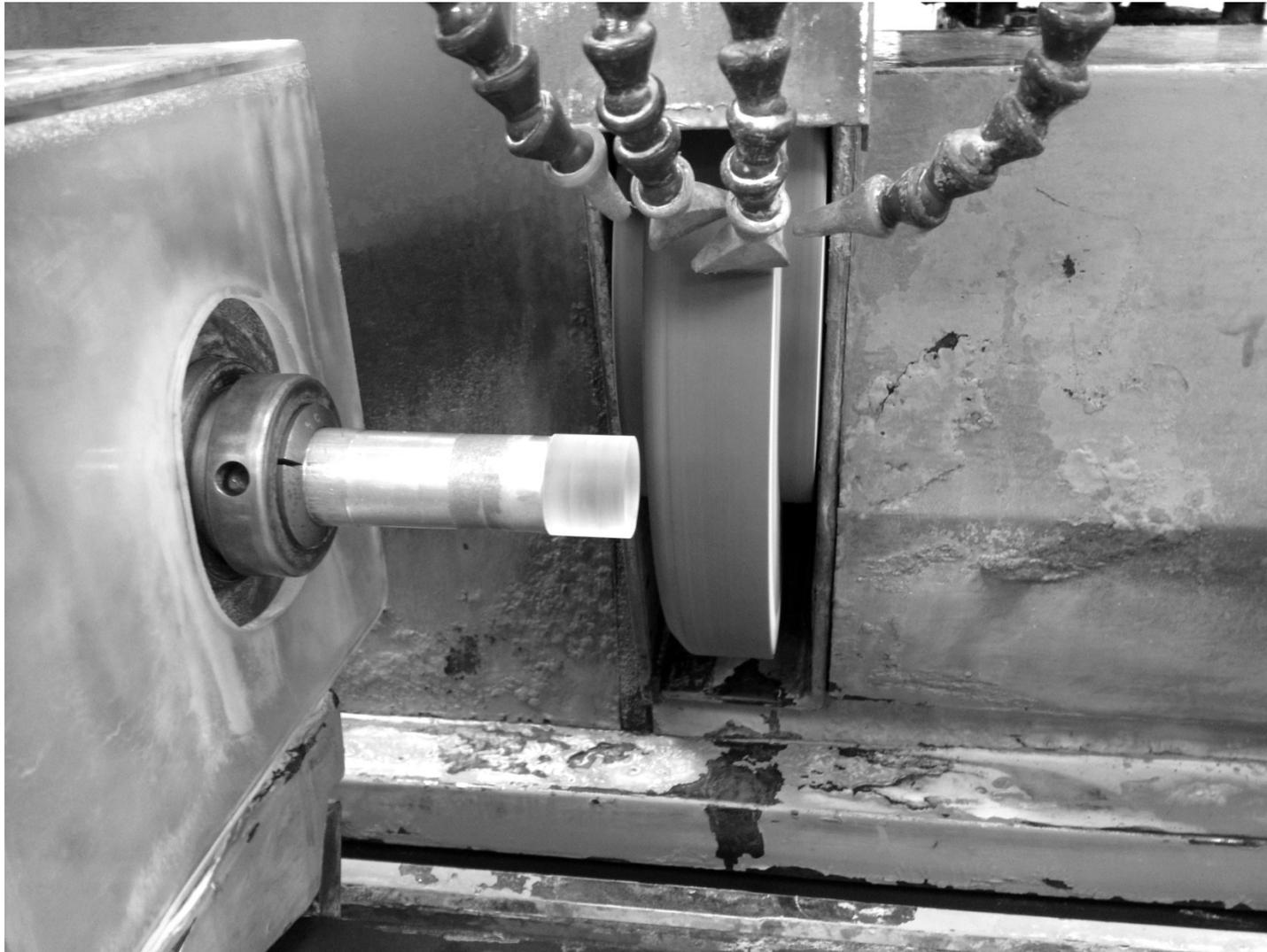
**Figure 1-2** *Circular saw for intermediate precision cutting*



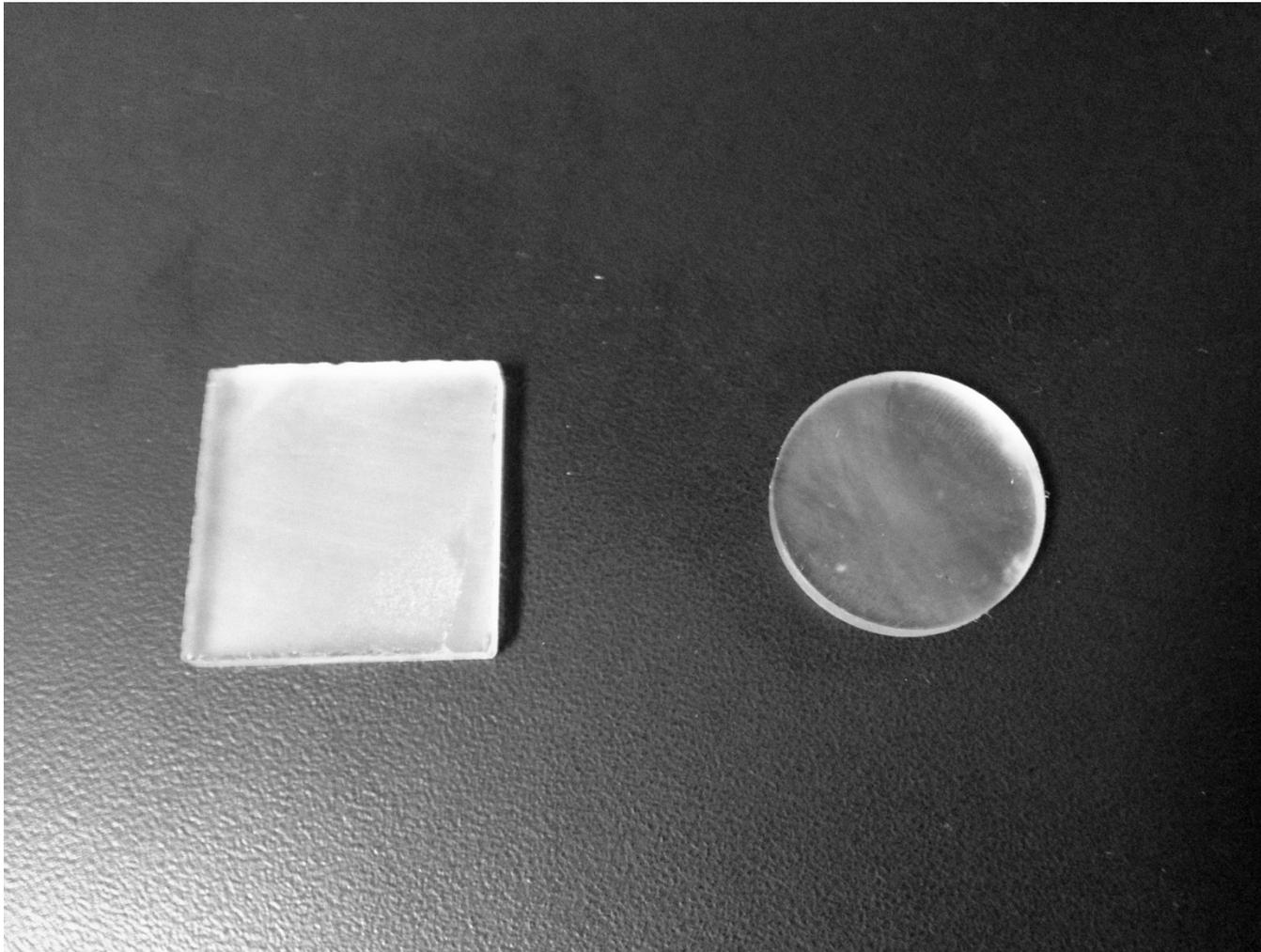
**Figure 1-3** *Wax block on parallel metal plate*



**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*



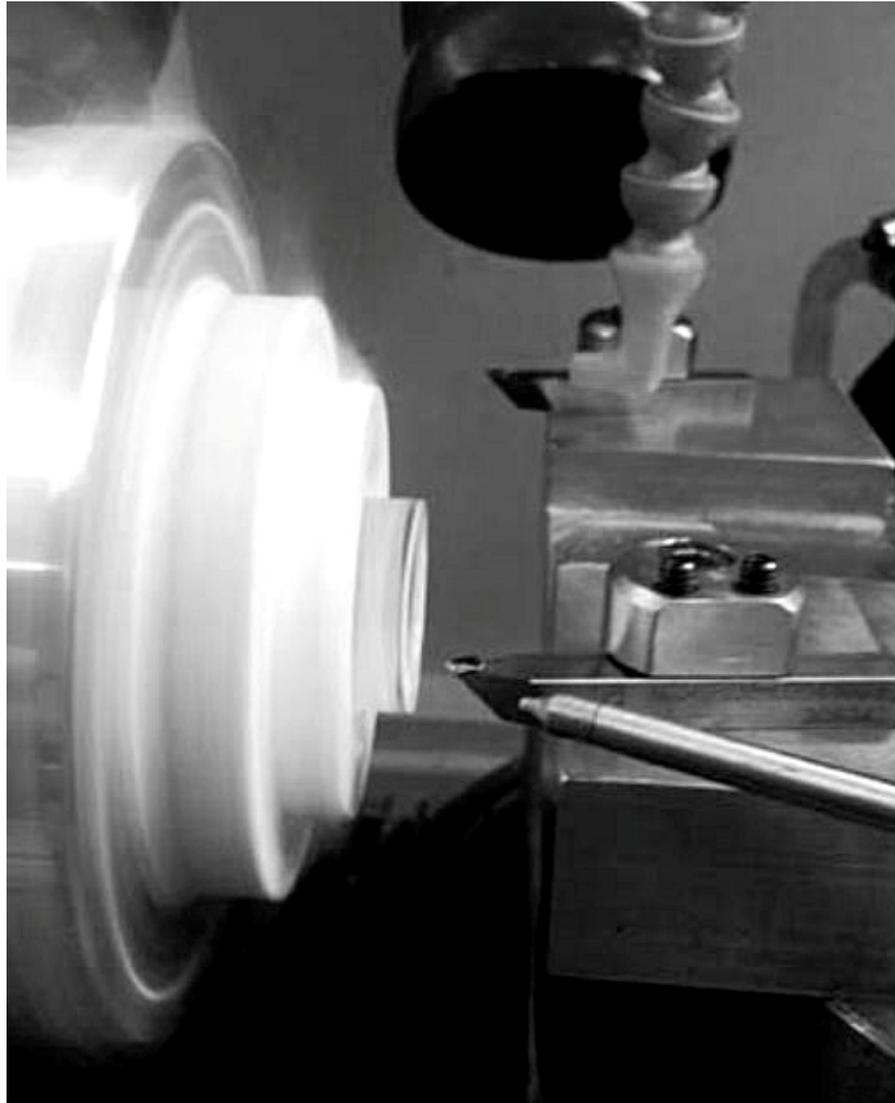
**Figure 1-13** *Basket of paint-protected optics being loaded into a degreasing machine to remove pitch and plaster*



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



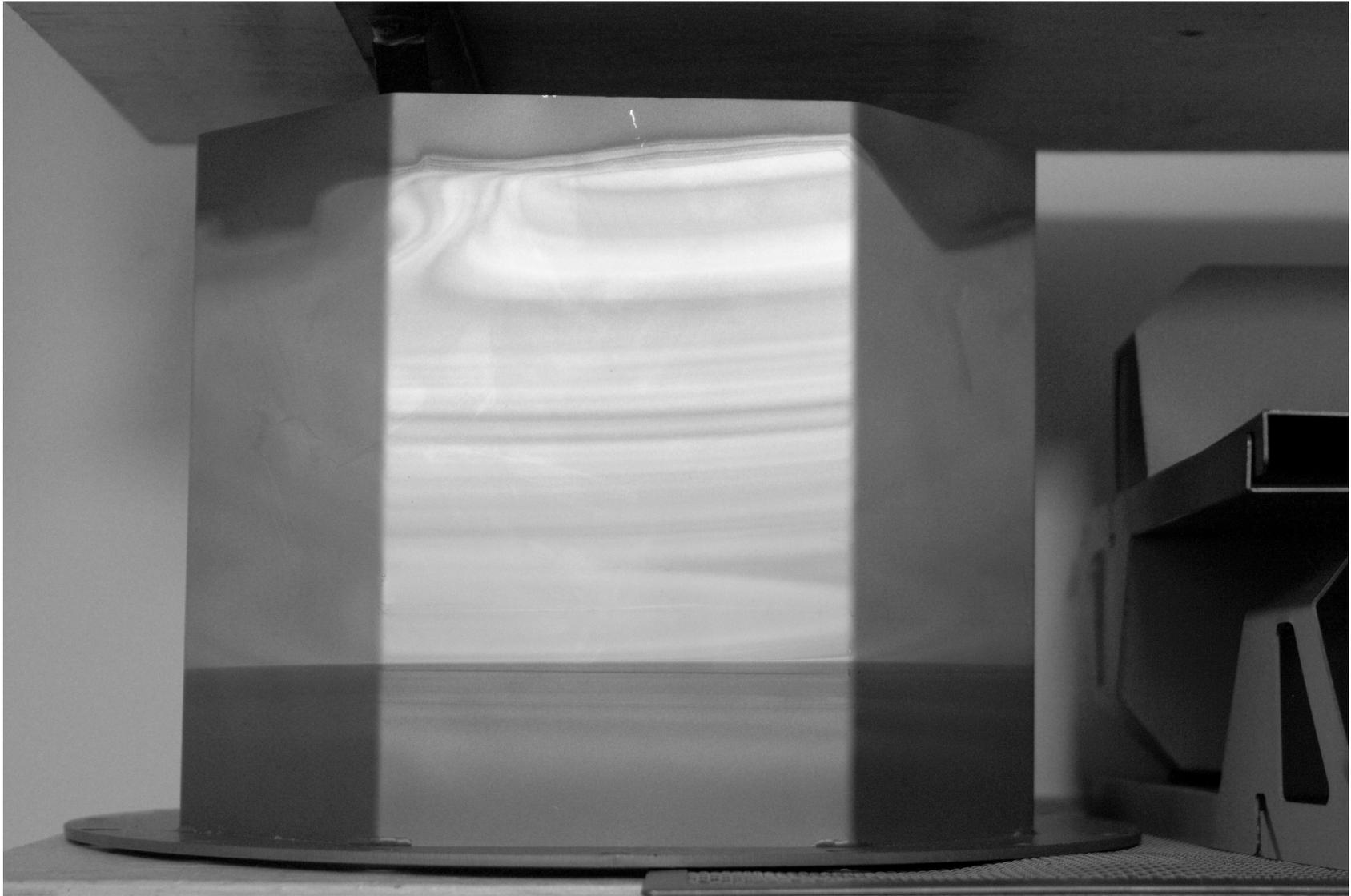
**Figure 1-15** *Optical plastic injection mold*



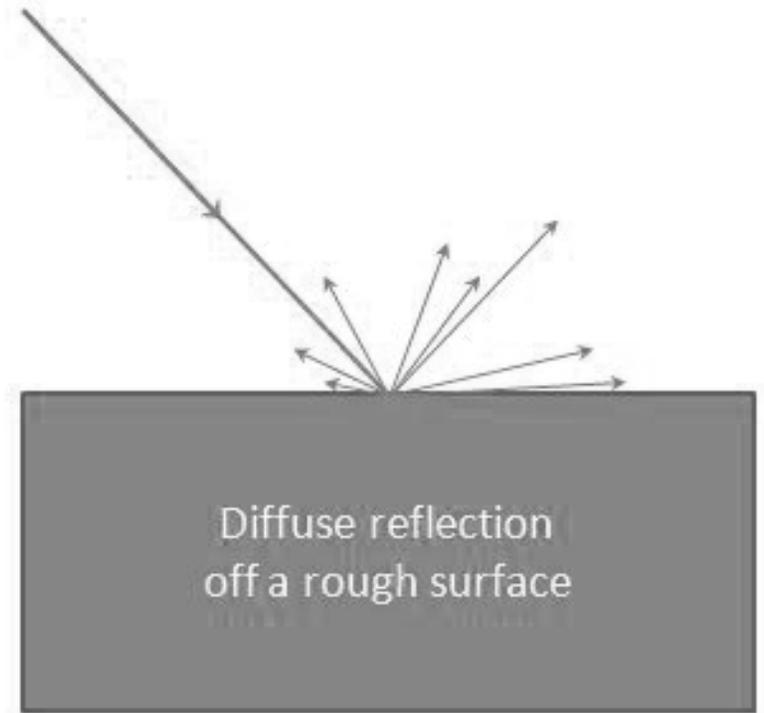
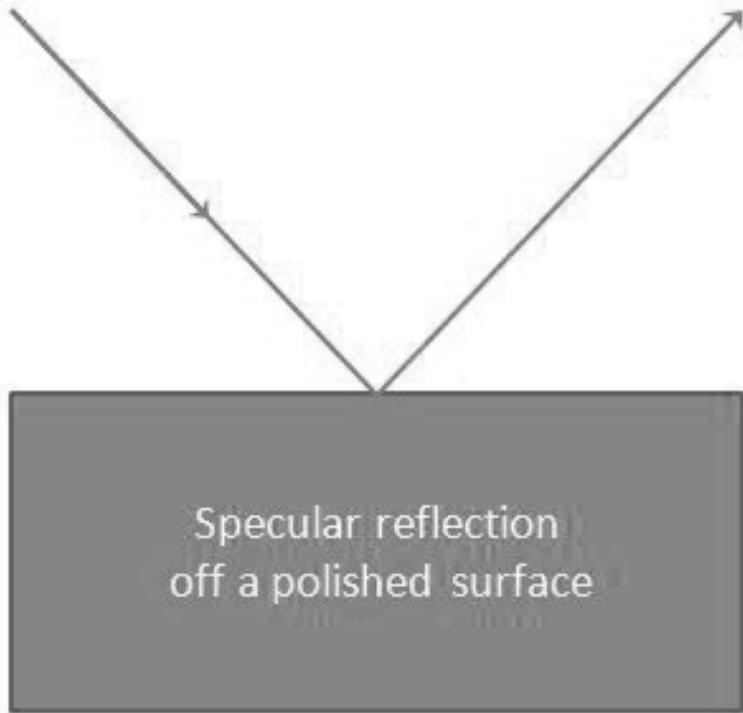
**Figure 1-16** *Single-point diamond turning (SPDT) system cutting a plastic lens*



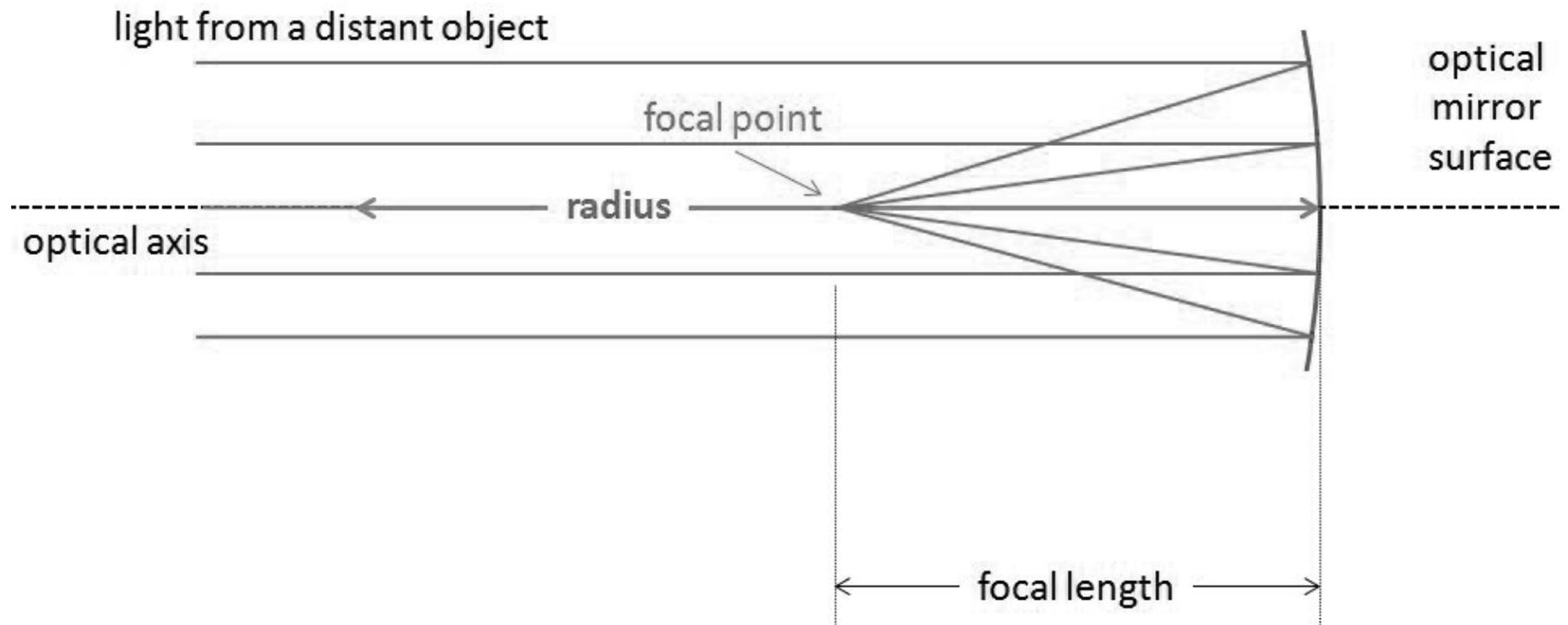
**Figure 1-17** *A precision assembly technician applying optical adhesive to the hypotenuse surface of a right-angle prism before bonding it to another right-angle prism to create a beamsplitter cube*



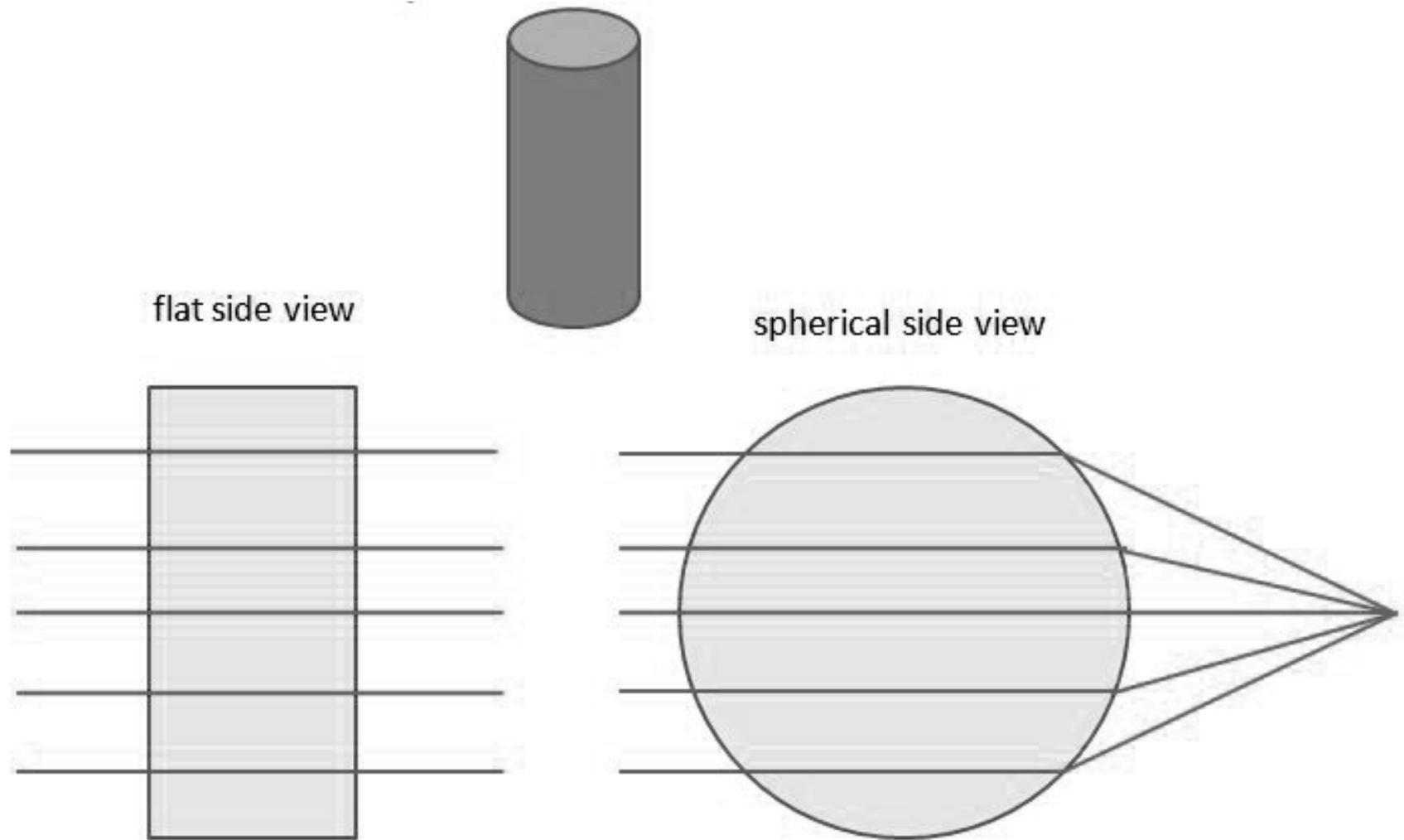
**Figure 1-18** *Shielding for a coating chamber, contaminated after multiple coating runs*



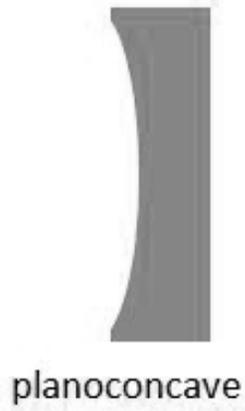
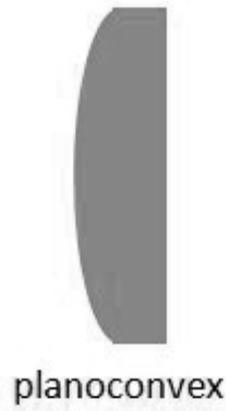
**Figure 1-19** *Specular versus diffuse reflection*



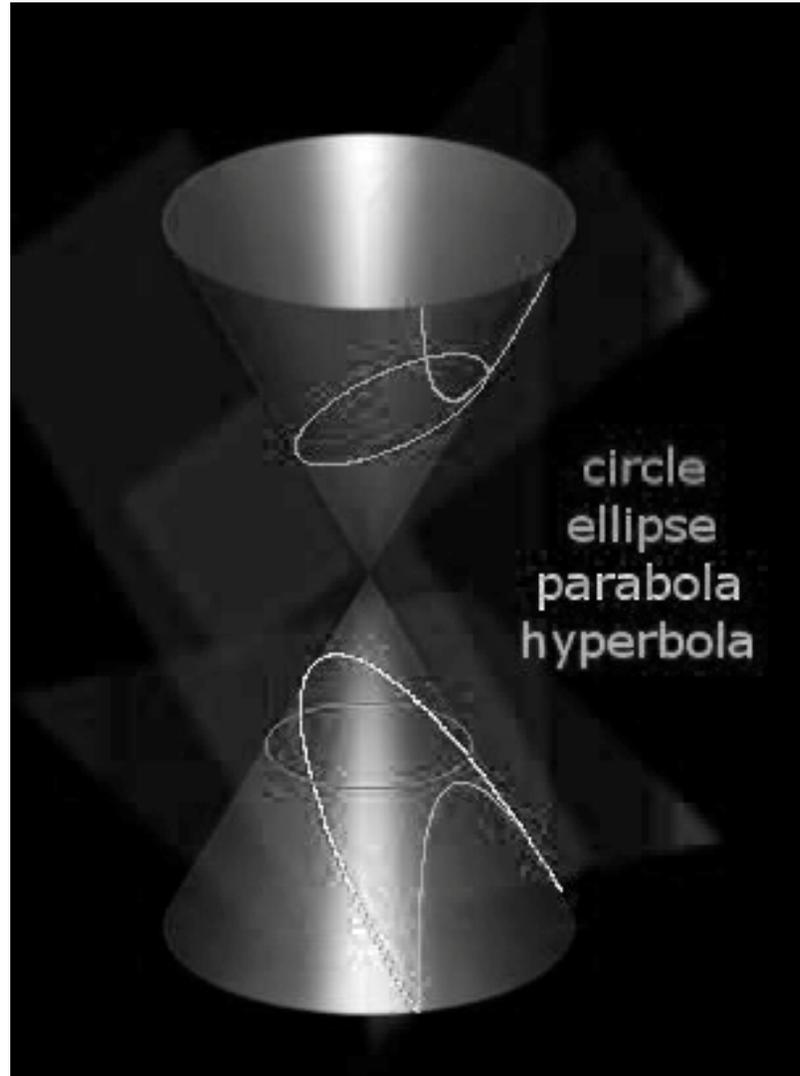
**Figure 1-20** *Graphical definition of focal length and radius*



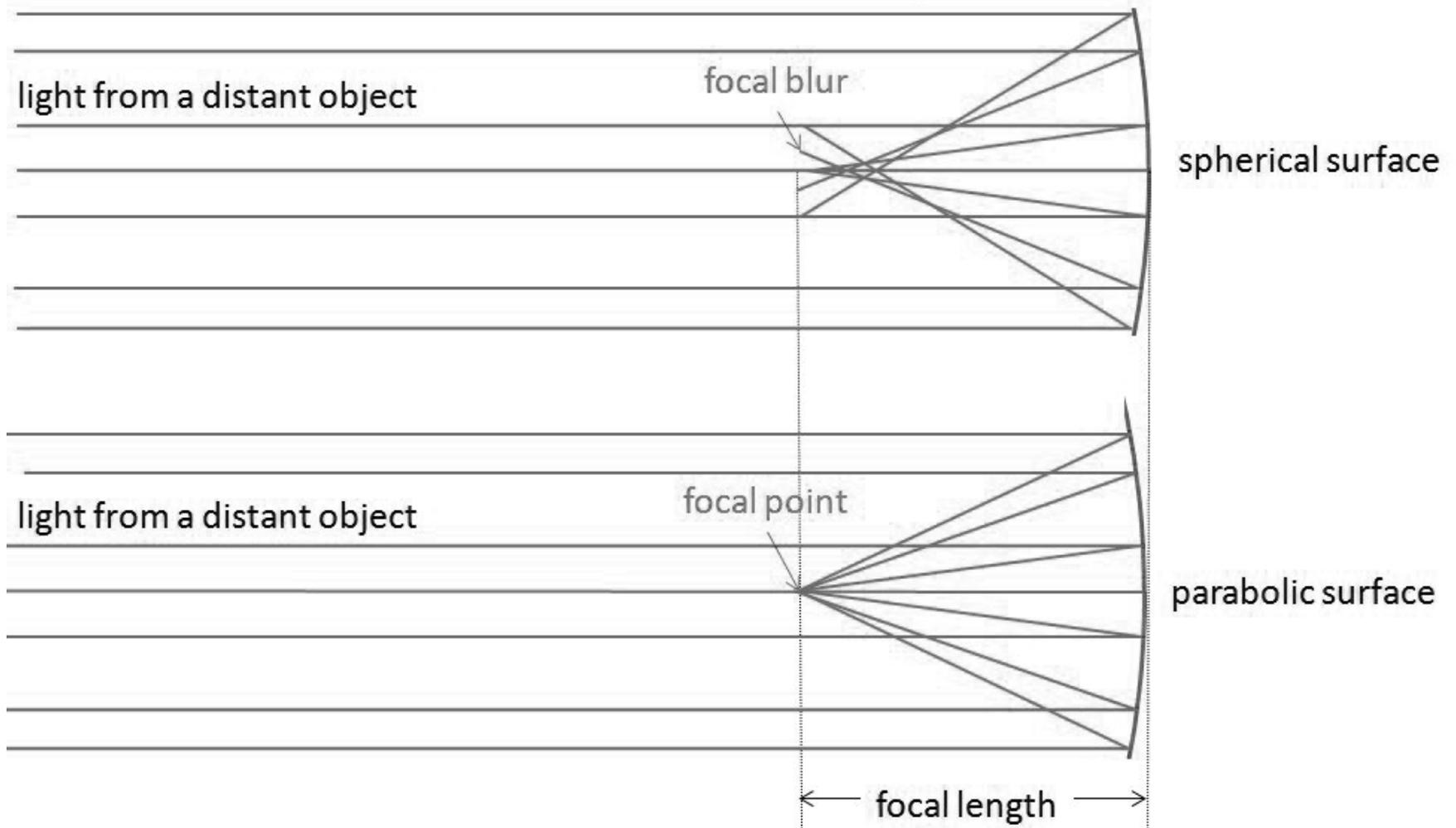
**Figure 1-21** *Light propagating through cylindrical lenses*



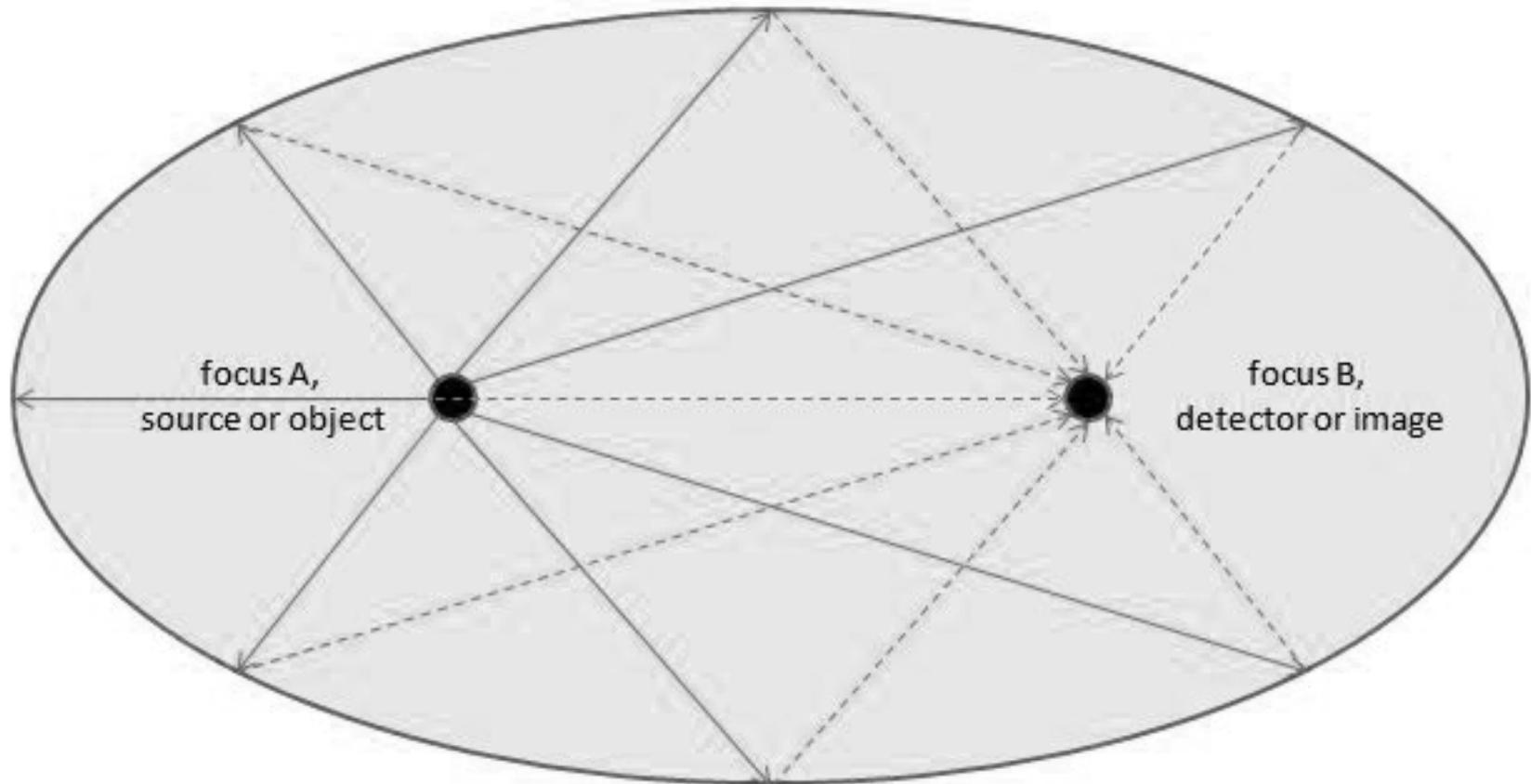
**Figure 1-22** *Lens types*



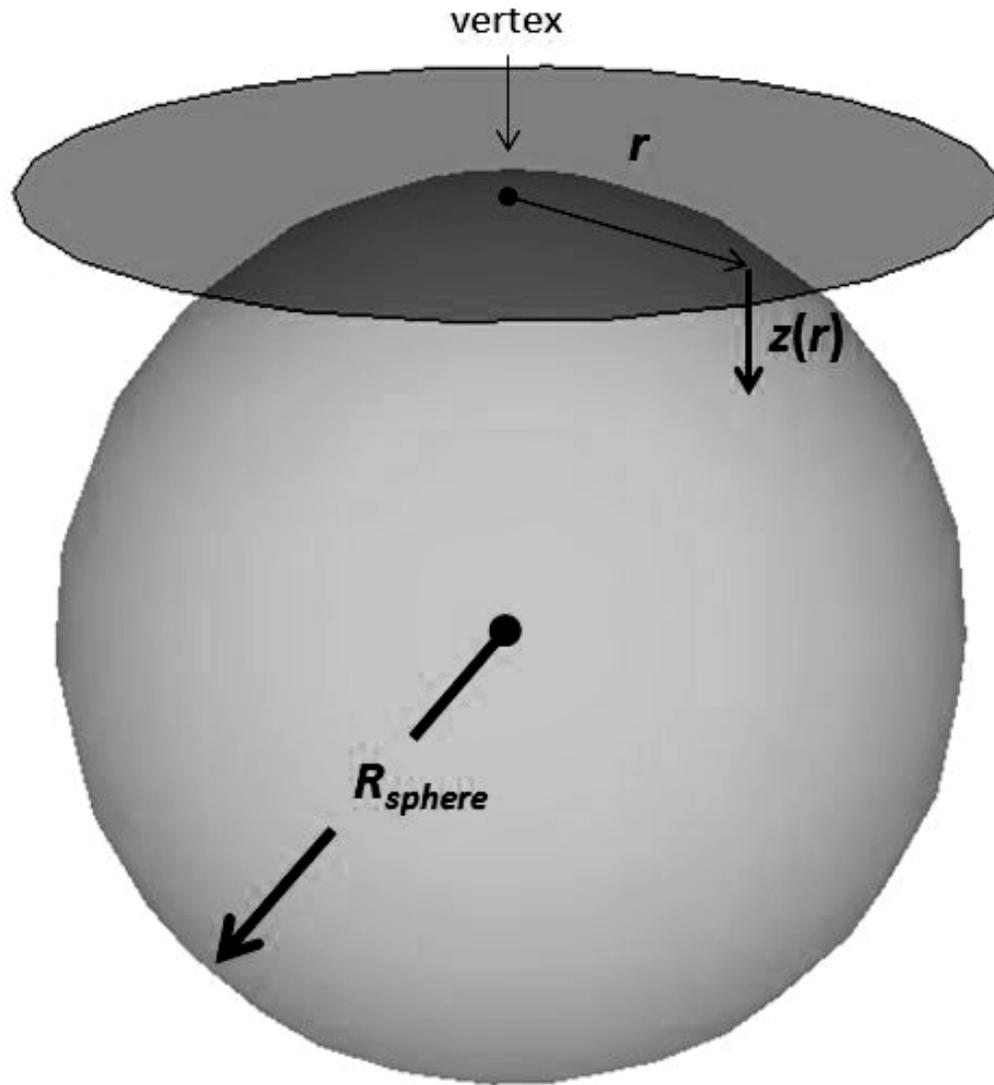
**Figure 1-23** *Four different slices through a cone pair create the four types of conic sections that are used to make aspheric optical surfaces*



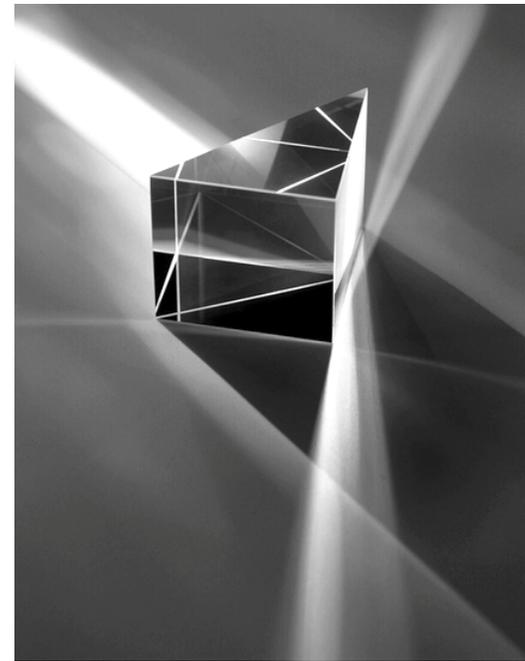
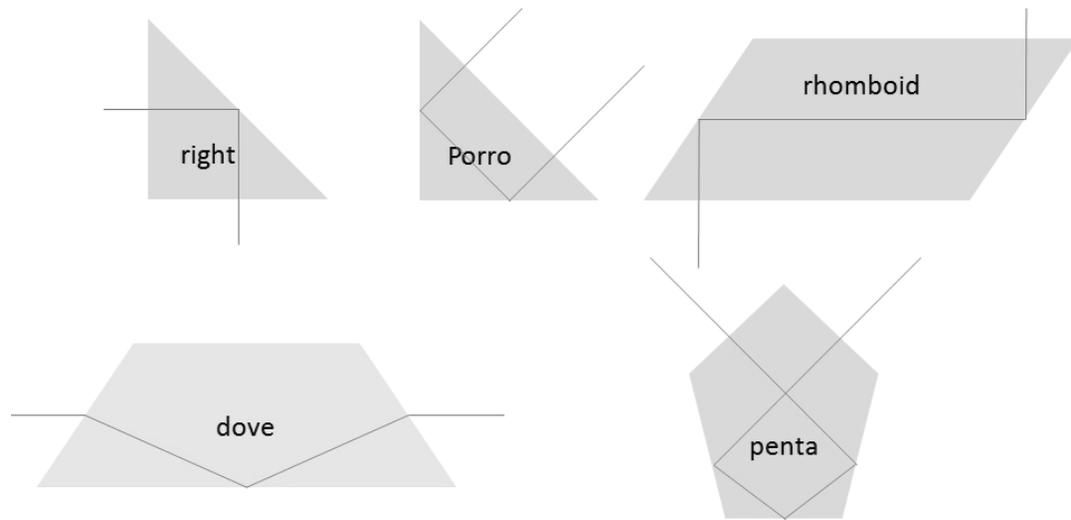
**Figure 1-24** *Comparison of the images formed of a distant object by a spherical and paraboloidal mirror*



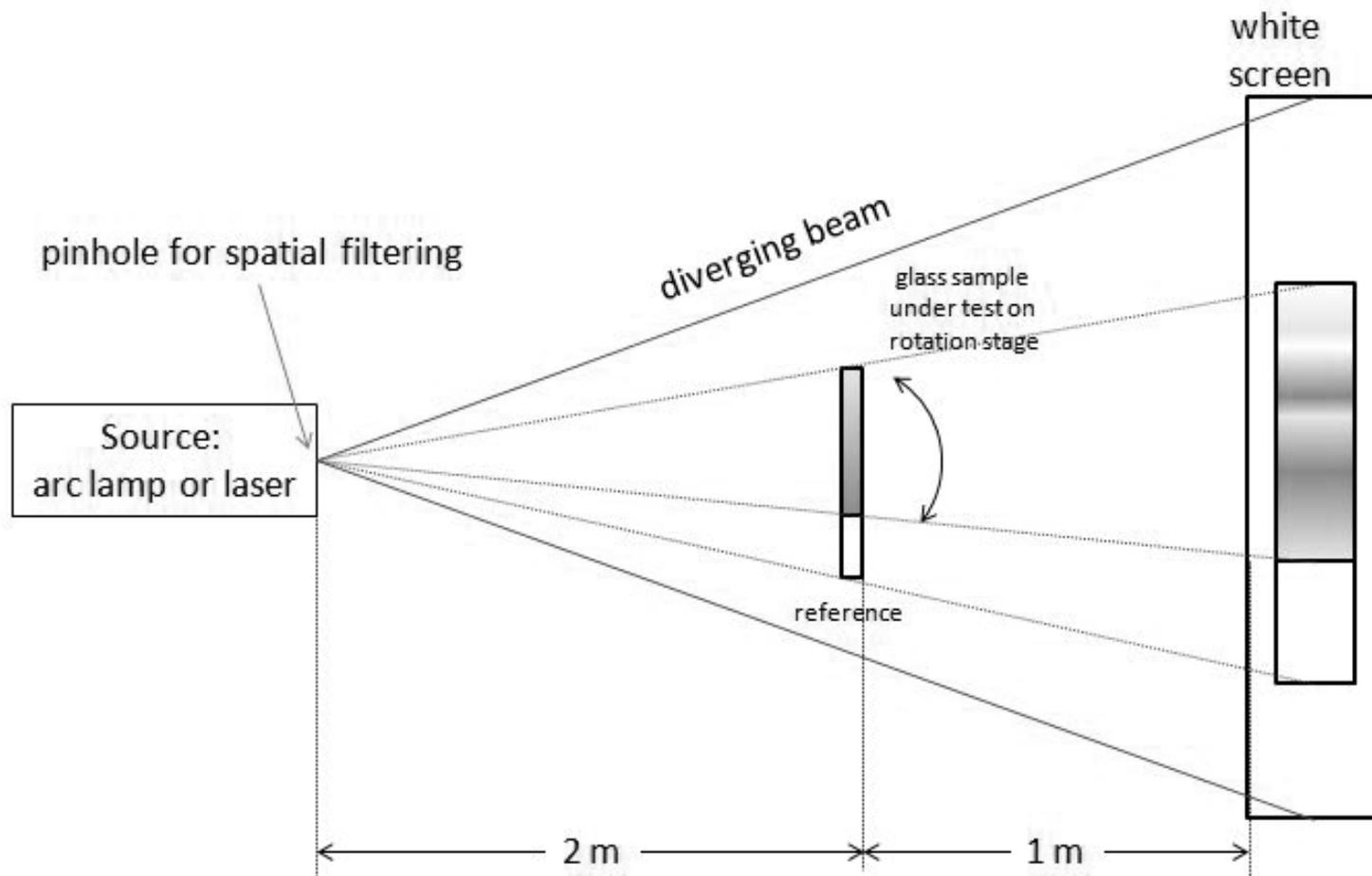
**Figure 1-25** *Elliptical whispering gallery*



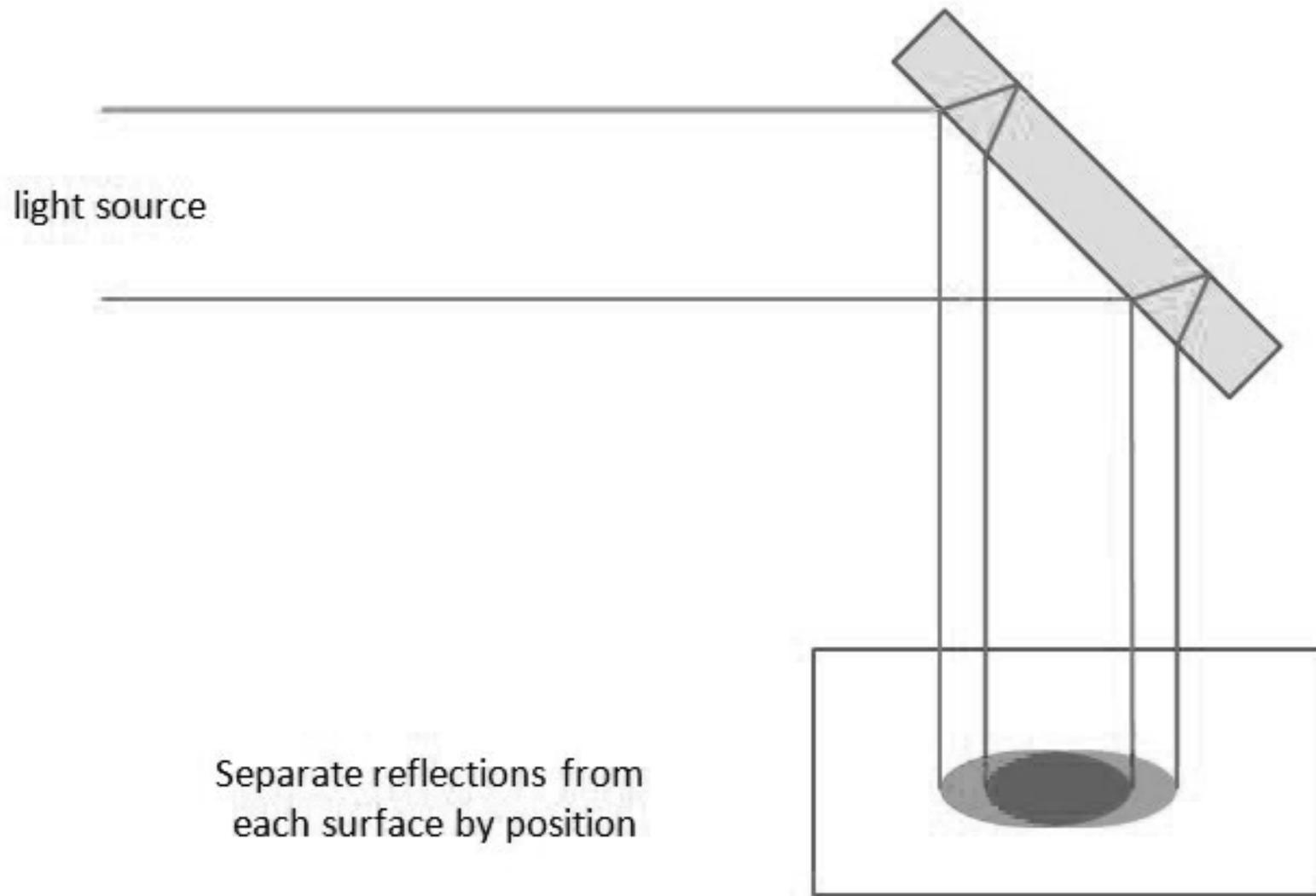
**Figure 1-26** *Graphical definition of surface sag*



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



**Figure 1-28** *Shadowgraph*



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