Lens Fabrication: How Lenses Are Made

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Duration: 1 hour

Course Description

Are you curious about the art and science of lens fabrication? This fun course explores surfacing and finishing in a modern lab. Topics include lens selection, layout, surfacing, edging, treatments, and quality assurance. Gain practical insights into both digital and traditional methods, all while ensuring adherence to industry standards.

Learning Objectives

Upon completion of this course, students should be able to:

- Describe the difference between a Surface vs. Finish lab
- List and explain the steps to generate (surfacing) and edge (finishing) lenses in an optical lab
- Calculate Minimum Blank Size (MBS) and Decentration (horizontal & vertical)

Timed Outline

I. Introduction to an Optical Lab (15 minutes)

1. Define the diMerent types of labs and purpose
    a. Surfacing lab
    b. Finishing lab
2. Optical lab terminology
    a. Lab order form
    b. Frame Boxing System Measurements (A, B, C, ED, DBL and Datum)
    c. Generator (CNC) – digital vs. traditional
    d. Tools and laps
    e. Finished vs. semi-finished lenses
    f. Sag measurements
    g. Cylinder machines
    h. Surface saver tape
    i. Blocking and deblocking (tool)
    j. Edger (wet vs. dry)
    k. Edger settings 36.5 (traditional pattern vs. pattern-less)
    l. Hand edger
    m. Leap Pads
    n. Swarf (wet vs. dry)
    o. Frame tracing
    p. Bevel placement (1/3 – 2/3, front, back, etc.…)
    q. Pin Bevel (aka. safety bevel)

r. Lens groove
s. MRP (Major Reference Point)
t. DRP (Distance Reference Point)
u. NRP (Near Reference Point)
v. Distance Between Centers (DBC)
w. Prism Reference Point (PRP)
x. Prism (degrees notation)
y. Lensometry
z. Hand tools: lens clock, thickness calipers, …

II. Process Journey (Workflow) to Generate Lenses in a Surfacing Lab (15 minutes)

1. Semi-finished Lens Selection
   a. Lens type (Blank)
   b. Refractive index
   c. Base vs. True curve
2. Lens layout
   a. Generator (traditional vs. digital)
3. Process Decision
   a. Traditional generator
      i. Cylinder machines: finning and polishing
   b. Digital generator
4. Lensometry - Power verification
5. Thin Films (Anti-reflective and mirror treatments)
   a. Master lens holder
   b. Crucible element selection
   c. Vacuum chamber

III. Process Journey to Generate Lenses in a Finishing Lab (15 minutes)

1. Finished Lens Selection
2. Lens layout
3. Edging
4. Lens Treatments
   a. UV
   b. Tints
   c. Edge treatments
5. Glazing (mounting)

IV. Quality Assurance Beyond ANSI Z80.1 **(10 minutes)**

1. ANSI Z80.1
2. Visual inspection

VII. Conclusion and Q&A (5 minutes)

1. Recap Summary Key Points
2. Q & A