Freeform glass grinding with Levicron® spindle

Goal:
Demonstrate the surface finish and form accuracy achievable when grinding glass with a Levicron® ultra precision spindle

Process:
Freeform XZC spiral glass grinding on a Nanoform® 250 ultragrin specifically designed for flood coolant applications. Starting with a flat blank removed 183 µm at the clear aperture.

Part Details:
- Material: BK7 glass
- Diameter: 40.0 mm
- Clear aperture: 26.3 mm x 22.29 mm
  (oversized blank used for convenience)
- Freeform surface: defined by Zernike polynomials

Process Details:
- Grinding wheel:
  Roughing: 12.05 mm diameter/metal bond wheel
  Semi-finish & finish – 15.84 mm diameter/
  #1800 Resin bond wheel
- Grinding spindle speed (finish pass):
  30000 rpm (24.9 m/min wheel OD speed)
- Grinding surface speed (constant surface speed grinding): 1400 mm/min
  (11 rpm @ edge to 125 rpm @ center)
- Depth of cut: Roughing – 2 passes at 5 µm
  Semi finish – 10 passes at 2 µm
  Finishing – 1 pass at 0.5 µm
- Total time: 267 min

Results:
- Surface finish: 25.0 nm rms
- Subsurface damage: 4 µm
- Form accuracy: 6.34 µm PV (spec < 8 µm)