

Applications of MRF

Case Study – High Precision Sphere Correction

Presented By:

QED Technologies Applications and Engineering

High Precision Sphere Correction

Large Convex

◆ The Optic

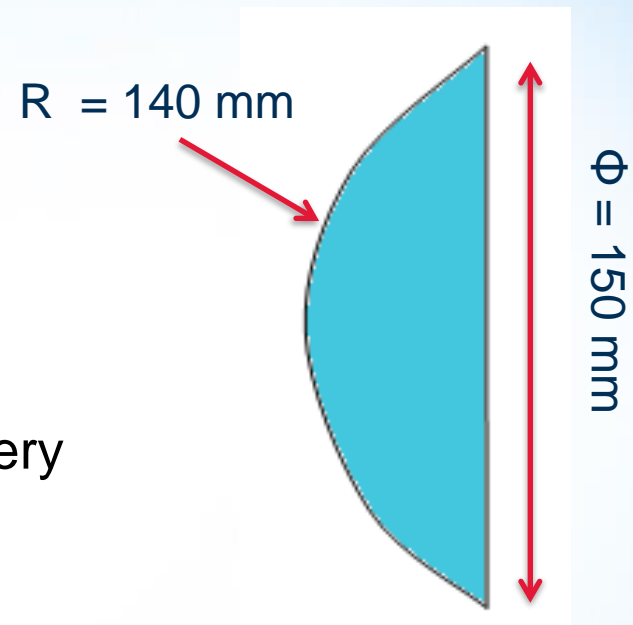
- Size: 150 mm Φ
- Shape: 140mm CVX
- Material : N-LAF2 (soft)

◆ The Goal

- Correct high precision ($\lambda/8$) lens to very high precision ($< \lambda/20$)

◆ The Configuration

- Q22-X
 - ◆ Rotational mode
- 150 mm wheel
 - ◆ Large spot
- C10+ fluid
 - ◆ soft glass, small removal amount



- ◆ Q22-X
 - Rotational Mode
- ◆ 150 mm Wheel
- ◆ C10+ Fluid

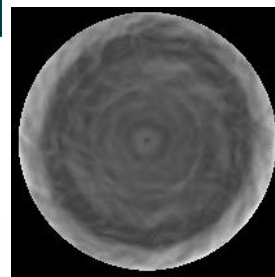
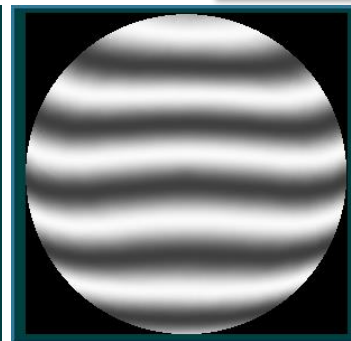
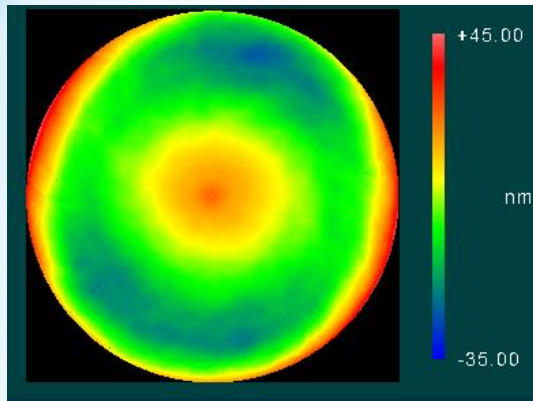
High Precision Sphere Correction

Large Convex

- ◆ *C10+ provides fast correction of high precision large optics*

- ◆ Q22-X
- Rotational Mode
- ◆ 150 mm Wheel
- ◆ C10+ Fluid

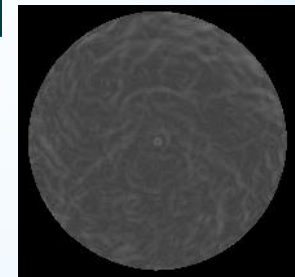
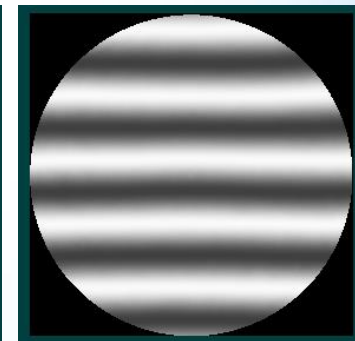
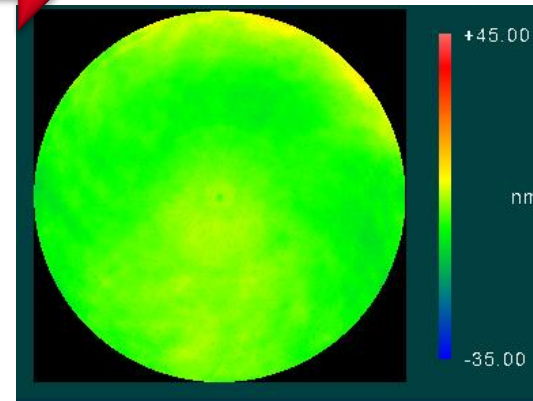
Before



Diameter: 143 mm
PV: 80nm ($\sim\lambda/8$)
RMS: 12 nm ($\sim\lambda/50$)
Slope: 6 μ rad

~10 min!

After



PV: 23nm ($\sim\lambda/27$)
RMS: 3 nm ($\sim\lambda/200$)
Slope: 1.5 μ rad

High Precision Sphere Correction

Large Concave

◆ The Optic

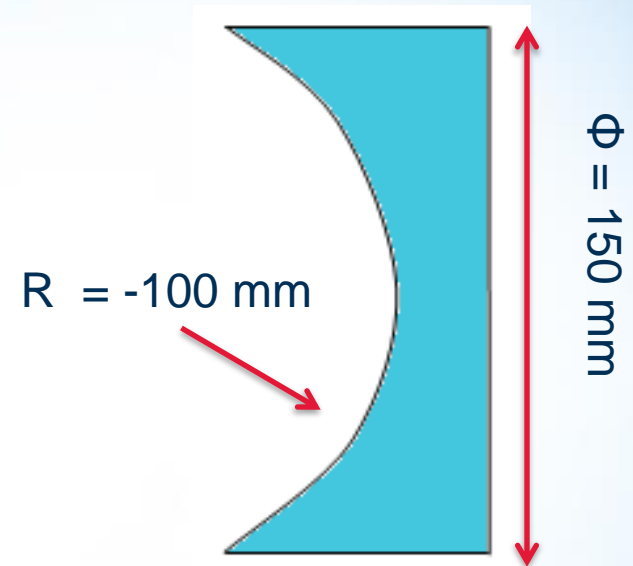
- Size: 150 mm Φ
- Shape: -100 mm CCV
- Material : S-FSL5Y (soft)

◆ The Goal

- Correct high precision ($\lambda/10$) lens to very high precision ($< \lambda/20$)

◆ The Configuration

- Q22-X
 - ◆ Rotational mode
- 20 mm wheel
 - ◆ Need smallest wheel for clearance inside deep concave
- D11 fluid
 - ◆ Maximize removal rate because of small spot



- ◆ Q22-X
 - Rotational Mode
- ◆ 20 mm Wheel
- ◆ D11 Fluid

High Precision Sphere Correction

Large Concave

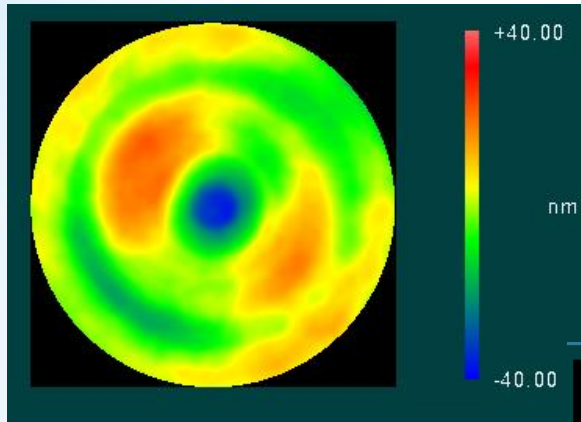
- ◆ *D11 & Small wheel provides ability to correct large, deep concave*

- ◆ Q22-X
 - Rotational Mode
- ◆ 20 mm Wheel
- ◆ D11 Fluid

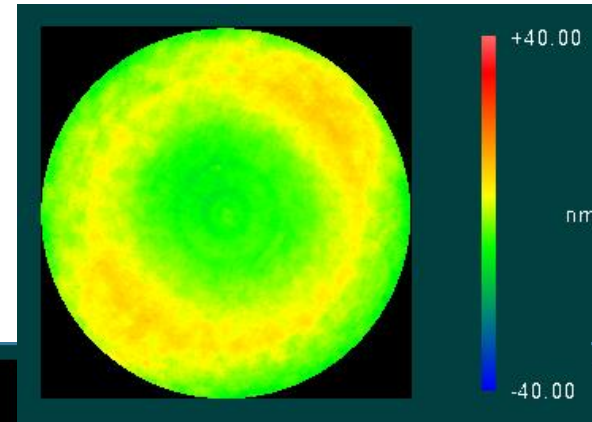
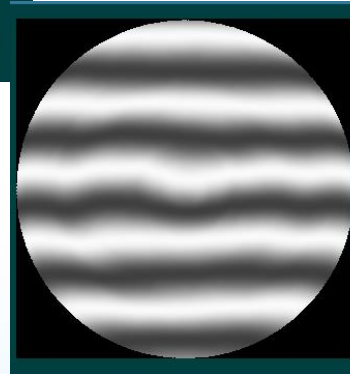
Before

~110 min

After



Diameter: 143 mm
PV: 60nm ($\sim\lambda/10$)
RMS: 10 nm ($\sim\lambda/63$)



PV: 27 nm ($\sim\lambda/23$)
RMS: 5 nm ($\sim\lambda/125$)

