GCA 8500 Stepper
Training Overview
Prerequisites

• Brewer Sciences Cee coater
• FT40 Film thickness measurement
Main Subsections of Stepper training

• Reticles and layout
• Tool specifications
• Stepper subsystems
• Illumination intensity/uniformity check
• Baseline calibration check
  • Global alignment
  • Local alignment
• Focus/exposure verification
• Job entry/editing
GCA Stepper Reticles

• 5” x 5” x 0.09” quartz/Cr reticles
• 75 mm x 75 mm usable pattern field (5 x 15mm)
• Standard GCA RMS keys for reticle alignment
• Barcode for stepper ID of reticles in RMS
• Reticles require GCA RMS reticle box for RMS system management
  • $170 from 3c Technical
Reticle Layout

RMS Alignment Window (offset)  RMS Alignment Window (standard)

Barcode

75mm x 75mm printable pattern area

RMS Alignment Window

Front Right Chrome Side Down

Negative Phase Reticle
Alignment Window

Positive Phase Reticle
Alignment Window

Dark is chrome

Reticle Window Phases

Typical Alignment Window Location
GCA 8500 5X Stepper specifications

- **Resolution:** 0.83um equal line/space
- **Depth of Focus:** 1.49um
- **Stage Precision:** 0.15um TIR
- **Reduction:** ± 0.15um from zero error
- **Global Registration:** ± 0.25um from zero, normalized over three wafers
- **Local Registration:** ± 0.15um from zero, normalized over three wafers
- **Orthogonality:** ± 1.0ppm from zero
- **Wafer Leveling Repeatibility:** ± 20ppm
- **Illumination Uniformity:** <3.0%
- **Open Frame:** No repeating defects
- **Reticle Aligner Accuracy:** ± 0.10um
- **RMS Reliability:** 100 reticle and aperture cycles – no errors
- **Aperture Blade Repeatibility:** ± 0.25mm
- **Aperture Blade Skew:** ± 0.25mm
- **Maximum die size:** 15mm x 15mm (Die must fit within the 22mm diameter lens limit)(75mm x 75mm on reticle)
Stepper Subsystems

- The environmental chamber
  - Illumination system
  - Reticle and wafers stages
  - Several other electronic and optical systems
- Control console containing the keyboard and computer display.
- The Dark Field Alignment System (DFAS) which is located in the control console rack above the control console computer
- The Air Handler Unit (AHU) located behind the control console rack
- Power supply for the laser interferometer system
- The interchangeable wafer chucks which handle pieces up to 4” wafers and associated pedestal chucks
  - Stage is 6” wafer capable
- The Atmospheric Compensation System (ACS) which controls the environmental chamber ambient conditions
- The Reticle Management Systems (RMS) that houses and manipulates the 10 mask holder magazine
- The Automatic Wafer Handler (AWH) which is designed to automatically load and unload wafers to the stage but is inactive on this system
Illumination

- 1000W Hg arc bulb
  - Typically running at 600-700W
- 9000 hr. operation before change
- Typical intensity: 180-200 mW/cm²
- Typical uniformity: 1.8%
- SOP in place for uniformity check