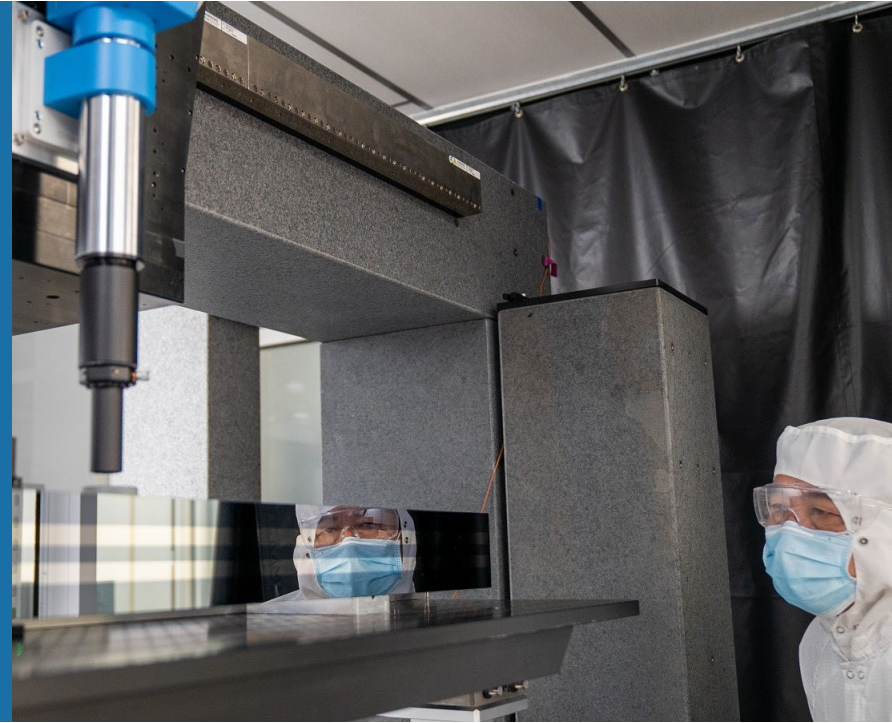


Shutdown Success Stories

Xianbo Shi
Physicist
X-Ray Science Division



U.S. DEPARTMENT OF
ENERGY

Argonne National Laboratory is a
U.S. Department of Energy laboratory
managed by UChicago Argonne, LLC.

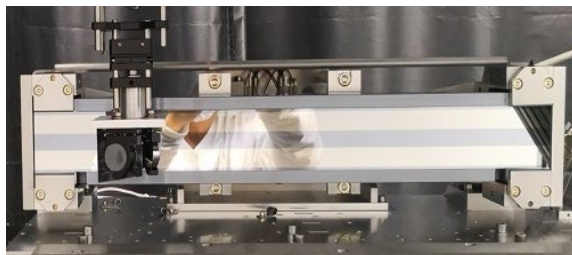
Argonne  | APS
NATIONAL LABORATORY

SCOPE AND CHALLENGES

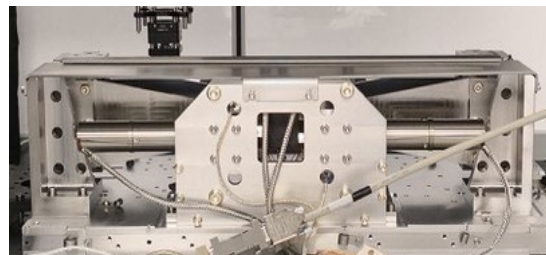
HIGH HEAT LOAD MIRROR 33ID-MR-1-OB (FMB OXFORD)

WHY DO WE NEED PRECISION OPTICS FOR THE UPGRADE?

- We need mirrors that can produce X-ray beams with very specific parameters and can adapt the beam properties when needed



(a) Front side



(b) Back side

MORE THAN 60 MIRRORS NEED TO BE TESTED BEFORE INSTALLATION

- Both vendor-delivered and in-house designed mirrors
- Super tight specifications
- Schedule tied to vendor visit and installation schedule, dynamically adjusted



(c) Prefigured elliptical cylinder mirror



(d) APS-design bender mirror

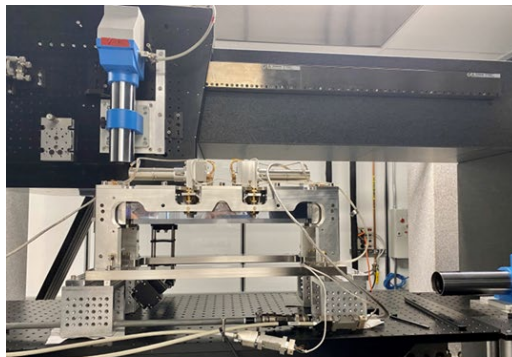
TEAM AND TOOLS

TEAM

- Optics group, APS-U mirror tech reps, support from beamline staff, BC group and optics group

TOOLS

- HVAC upgrade completed January 2023 with improved cleanliness, temperature stability, and reduced acoustic noise
- Upgraded instruments and data analysis software



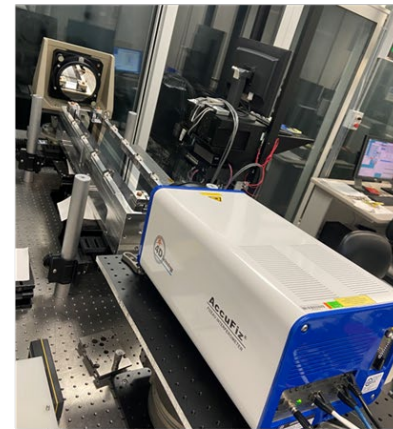
(a) APS Long Trace Profiler (LTP)



(b) Zygo NexView™ system



(c) Zygo Verifire™ HDX system



(d) 4D Technology AccuFiz system

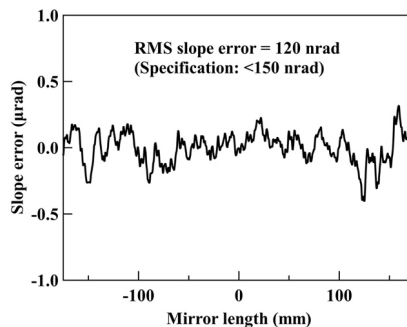
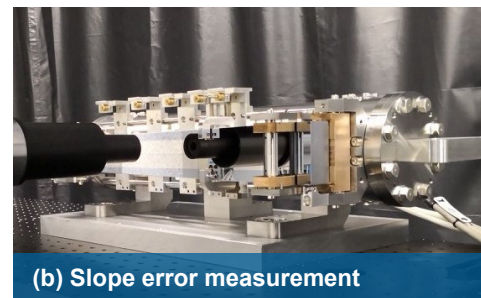
SUCCESS STORY

3ID KB MIRRORS

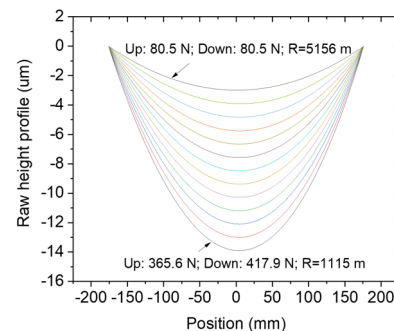
- Developed standards for mirror metrology procedures and documentations
- Mirror twist correction, slope/figure error, bending calibration, repeatability, stability

MORE THAN HALF OF THE TASKS COMPLETED

- On schedule with the rest of mirror systems
- Mirror beamline testing after installation



(c) Slope error profile



(d) Bender calibration