

## FEATURES

- High Optical Quality Continuous Surface
- Capable of Receiving Any High Reflectivity Coating
- >3 kHz First Resonance Typical
- Diameters: 1" – 9" (25mm-230mm)
- Compatible with AOS AO Controllers
- Custom Actuator Patterns
- Typically, 4 microns of throw

## APPLICATIONS

- **Defense Systems:** Used in high-powered directed energy systems. Commonly used at the laser input side of a beam control system for beam cleanup, and for atmospheric correction of the beam to the target.
- **Imaging Systems:** Enhance live or long-distance imaging, particularly through dynamic atmospheric and thermally induced distortions. Also employed to remove aberrations caused to the system by the imaging platform itself, such as in aerospace applications.
- **Space & Astronomy:** Compensate for atmospheric disturbances and errors in optical elements, improve resolution of telescopes
- **Laser communications:** Actively correct for distortions in the laser beam caused by atmospheric turbulence, continually improving signal quality.
- **Pulse shaping & Laser Machining:** Customize laser beam shapes and control beam size, as well as increasing overall accuracy.
- **Biomedical:** Utilized in medical scanning applications such as in ophthalmology for retinal imaging or phoropter technology.

## DESCRIPTION

The AOS deformable mirror (DM) is an integral part of an adaptive optics (AO) system used to compensate for dynamic atmospheric distortions, thermally induced distortions, and manufacturing errors in optics that can dramatically degrade system performance.

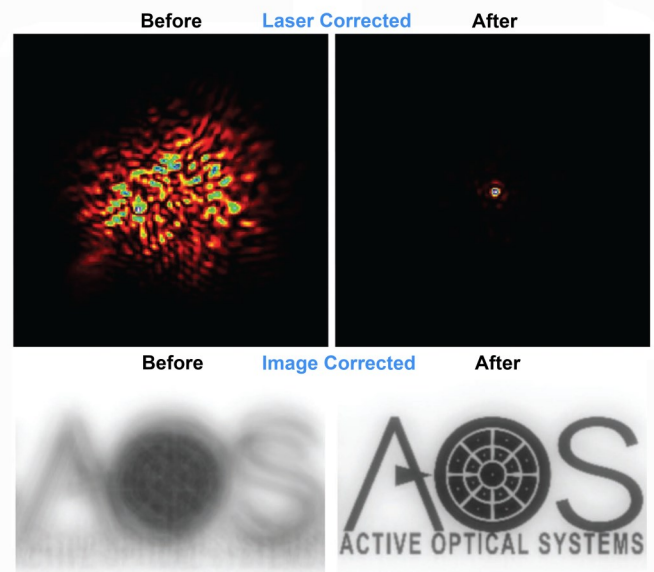
AOS has produced groundbreaking deformable mirrors since 2005 that revolutionized the industry with enhanced laser power handling and dramatically lowered cost. AOS has extensive experience in Directed Energy and HEL industry and maintains an established production process to meet industry demand.

AOS maintains two available DM lines: The Plate-Type DM (PDM) product line and the Membrane DM. The membrane line fulfills customer requirements for lower cost and laboratory environments and is available as a fully customized component. The piezoelectric actuated (PZT) PDM product line was uniquely designed for applications inherent in current defense and aerospace applications and is a full AOS product offering. PDMs are available with or without exterior packaging, and in either anodized or uncoated finishes, to accommodate physical space or vacuum requirements. Designs can also be ruggedized for harsh environments and EMI protection.

### Plate-Type DM (PDM)

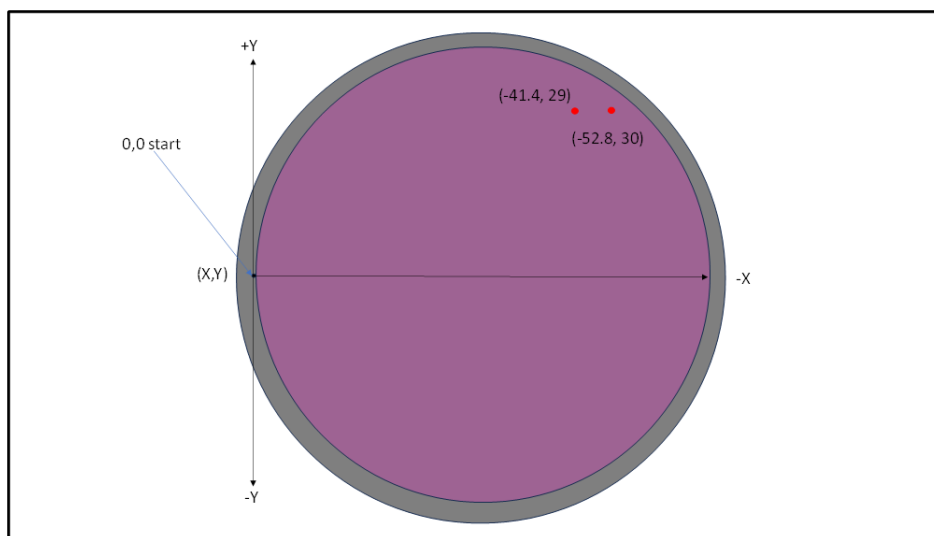


### Laser and Image Correction Using AOS Adaptive Optics



### PDM SPECIFICATIONS

Parameter	Value	Units	Notes
Clear Aperture / Diameter	1" - 9"	in	25 - 230 mm
Actuator Count / Array	6 - 1004+		
Actuator Stroke (Max)	2 - 36	μm	Physical Stroke
Actuator Pattern	Any	-	Hexagonal, Rectangular, Annular, etc.
Actuator Pitch	3 - 20	mm	
Coating Type	Any	-	Coated with the same coatings as the rest of the optics in the system
Mirror Coating Absorption	0.44	ppm	
Angle of Incidence	0 - 45	degrees	Typically 10-degrees for High Power Coatings
Laser Power Handling	Tested up to 240kW and 1MW/cm2	-	120kW (20kW/cm2) for 5s resulted in <10C heating
Actively Flattened Surface Figure	< 20	nm (RMS)	Actively Flat
Bandwidth (-3dB)	1 - 20	kHz	
DM Switching Time	10 - 1000	μs	Electronics Dependent
Closed Loop AO System Speed	> 1	kHz	Electronics & Camera Dependent
Actuator Lifetime	10 <sup>10</sup> cycles	-	10 years (8 hours per day every day at 100Hz operation )
Thermal Stress Test	-50 - 90	° Celsius	No performance loss
Vacuum Bake	10	μtorr	Low Outgassing Materials



*Laser damage testing directly on a completed AOS DM. 100% raster scanned over the full aperture at 100kW/cm2. The DM successfully passed and demonstrated only two edge hot spots that reduced in temperature over the dwell time. Zero damage occurred to the DM under test.*