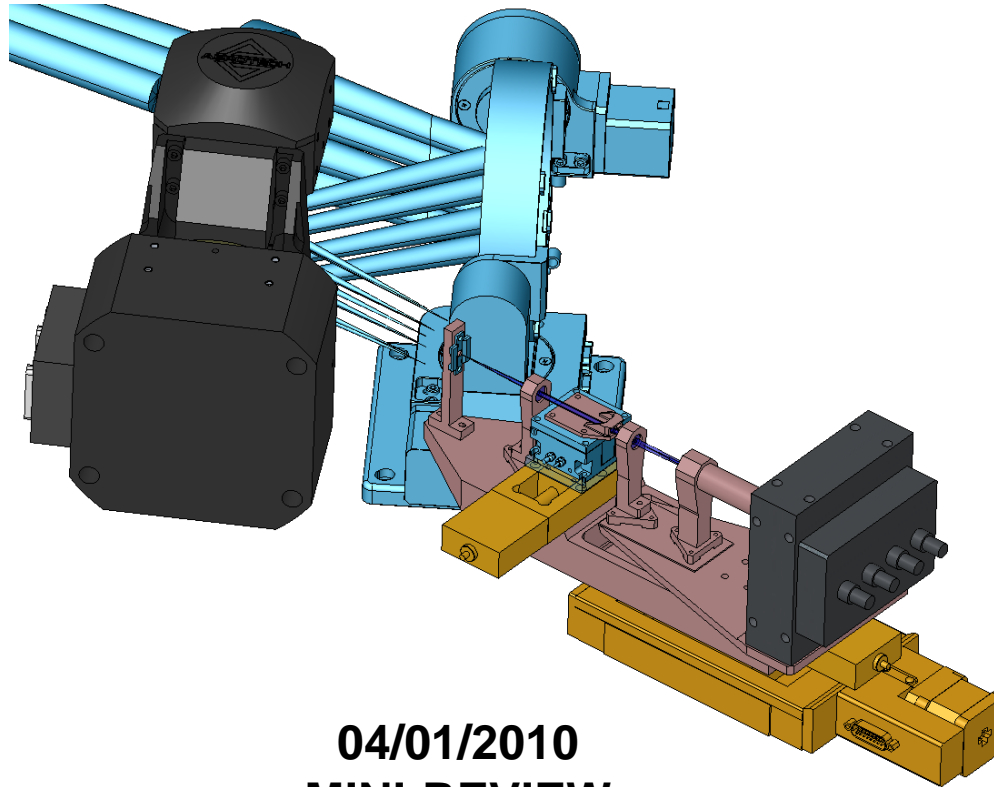


NGAO

Natural Guide Star Mechanical



**04/01/2010
MINI-REVIEW**

NGAO

Natural Guide Star Mechanical



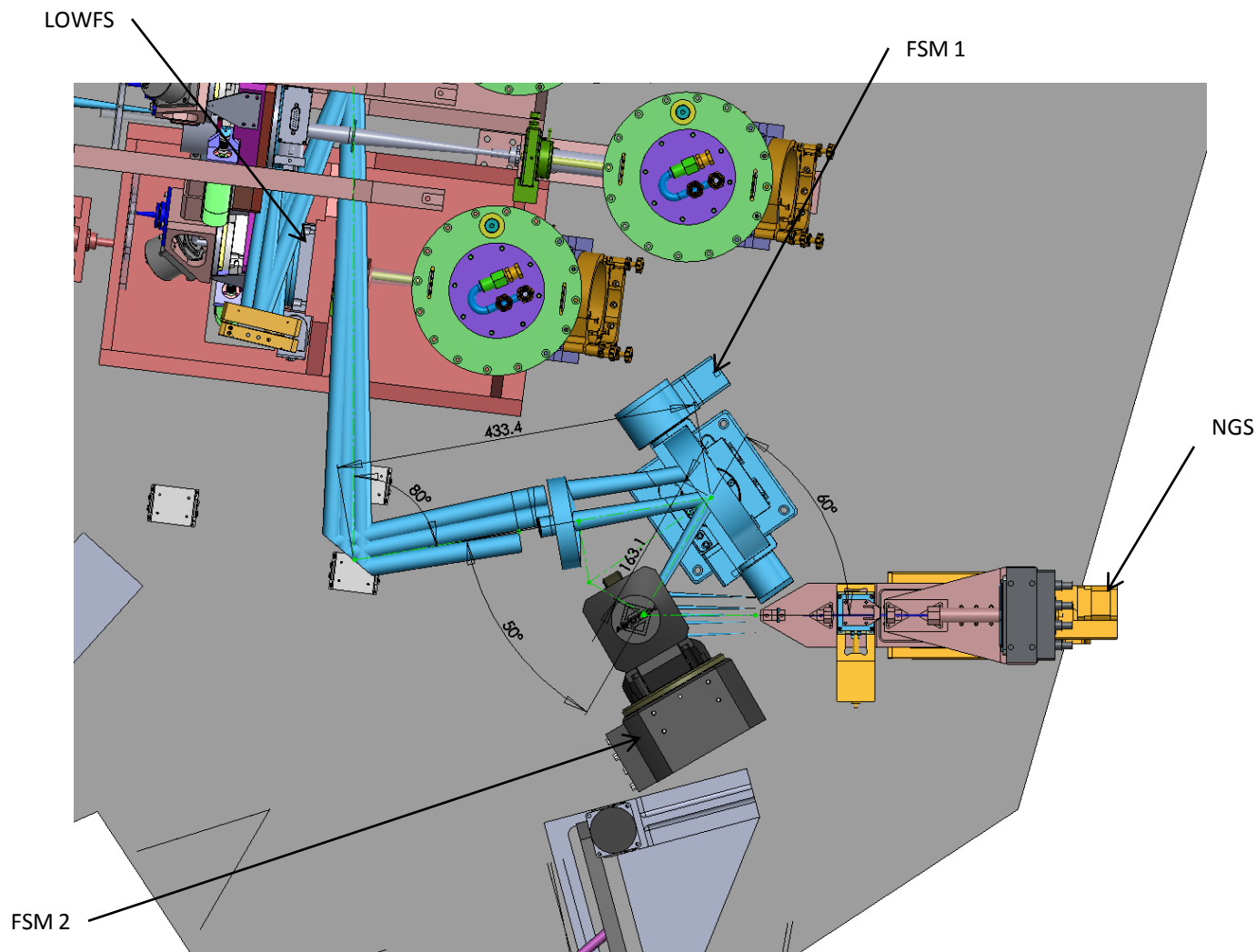
- 1) FSM accuracy determination
- 2) Stages accuracy requirements



1) FSM accuracy determination

The on sky accuracy is 5mas, so the accuracy at the NGS focal plane needs to be $1.063\text{mm} \times .005\text{mas} = 5.3 \text{ } \mu\text{m}$

FSM1 is 300mm away from the focal plane, its accuracy need to be better than $5\text{um} / 300\text{mm} = 16.3 \text{ E-6}$ or 3.43 arcsec



2) FSM 1



FSM 1 is a GMC-6 Newmark Gimbal with Mirror Cell for 6 inch optics

Repeatability: 5 arc seconds

Accuracy: 70 arc seconds

Resolution: 0.29 arc-sec

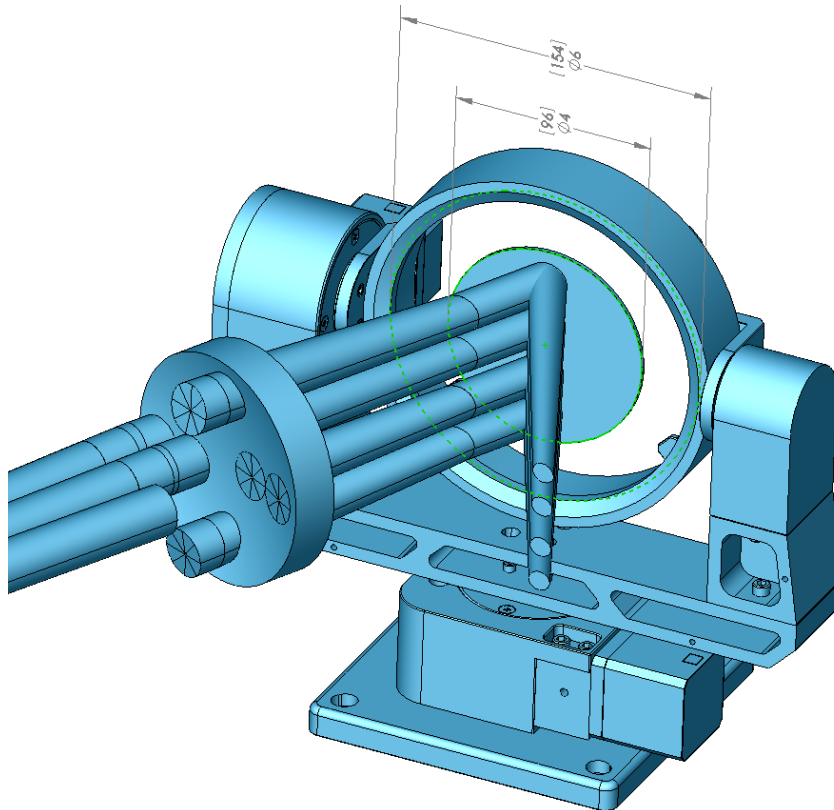
Elevation range: 360° continuous

Azimuth Range: $\pm 90^\circ$

Load capacity: 25 lbs.

Operating Temperature: -20 +50C

A motion controller is available with Ethernet port.



GM-6 Specifications

Resolution	0.29 arc-sec (MicroStepping) 3.6 arc-sec (servo motor)
Accuracy	70 arc-sec
Max. Speed	25°/sec (stepper motor) 60°/sec (servo motor)
Maximum Load	25 lbs.
Repeatability Uni-directional	5 arc-sec
Travel Range	Azimuth: $\pm 90^\circ$ Elevation: $\pm 90^\circ$, 360° continuous with limit switches disabled. Other travel ranges are available.
Limit Switches	Optical, located at $\pm 90^\circ$ on both axes
Origin	Optical home switch located in the middle of travel.
Gear Ratio	90:1
Stage Weight	15 lbs.
Material	Aluminum
Finish	Black Anodize

3) FSM 2



FSM 2 is a AMG 100LP Aerotech 100mm (4in) Gimbal looking for a 2 in gimbal

Repeatability: 4 arc seconds

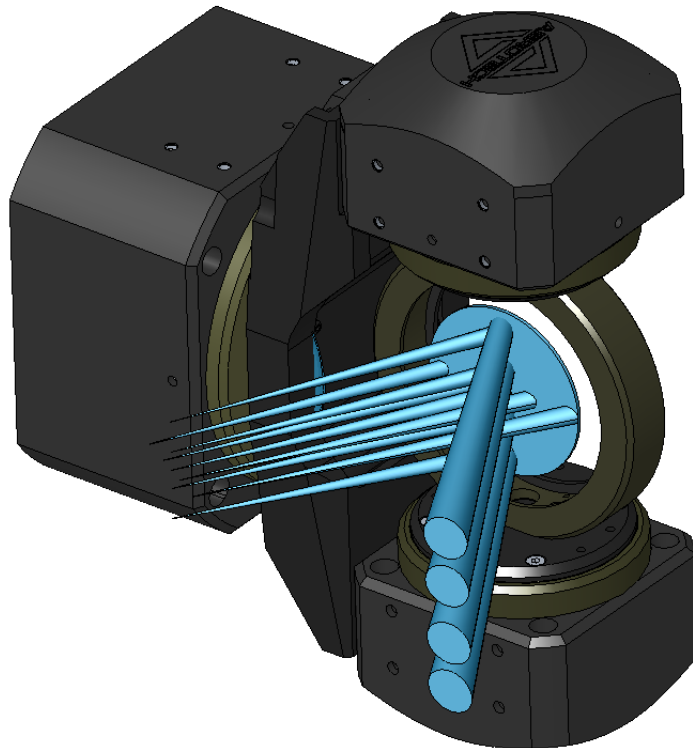
Accuracy: 80 arc seconds

Resolution: 0.18 arc-sec

Elevation range: 360° continuous

Azimuth Range: 360° continuous

Load capacity: 15 lbs.



Basic Model	AMG-100LP	AMG-150LP
Travel	360° Continuous, AZ/EL	
Clear Aperture Diameter	95 mm	144.3 mm
Mechanical Drive System	Direct-Drive Brushless Servomotor	
Accuracy ⁽¹⁾	±24 to ±192 μ rad (±5 to ±40 arc sec)	
AZ Repeatability	19.4 μ rad (4 arc sec)	
EL Repeatability	14.5 μ rad (3 arc sec)	
Maximum Rotary Speed ⁽²⁾	100 rpm	
AZ Resolution ⁽³⁾	0.32 μ rad (0.06 arc sec)	
EL Resolution ⁽³⁾	0.87 μ rad (0.18 arc sec)	
Maximum Load Capability	6.8 kg	
Axis Wobble	97 μ rad (20 arc sec)	
Orthogonality	72 μ rad (15 arc sec)	
Standard Finish	Black Anodize with Hard-Coated Cell	
Max Component Diameter	103 mm	154 mm
Nominal Component Thickness	19 mm	30 mm
Mass (Without Mirror)	9.5 kg	11 kg
Inertia AZ ⁽⁴⁾	0.038 kg·m ²	0.071 kg·m ²
Inertia EL ⁽⁴⁾	0.001 kg·m ²	0.0038 kg·m ²
AZ Motor Type	S-130-39-A	
EL Motor Type	S-76-35-A	
AZ Aperture When Slip Ring Is Removed (AZ Travel Must Be Limited)	15 mm	15 mm
Aperture With Slip Ring	No Aperture	
Height to Mirror Centerline	181 mm	220 mm
Height to Mirror Centerline Without Slip Ring (Limited Travel) ⁽⁵⁾	140.5 mm	179.5 mm

Notes:

1. ±24 μ rad calibrated (HALAR); ±192 μ rad uncalibrated.

2. Maximum speed based on stage capability; maximum application velocity may be limited by system data rate and system resolution.

3. With 500X multiplication. Higher resolutions available.

4. Unloaded inertia.

5. Bottom wiring cover is 40.5 mm tall. If customer is using a limited travel system without optical limits then this height can be removed from height

4) NGS Motion Control



All Stages Rated at -15C

Operating Closed loop

Currently investigating PI and MICOS (PI Vendor will come over this afternoon to discuss and a quote from MICOS is in progress)

