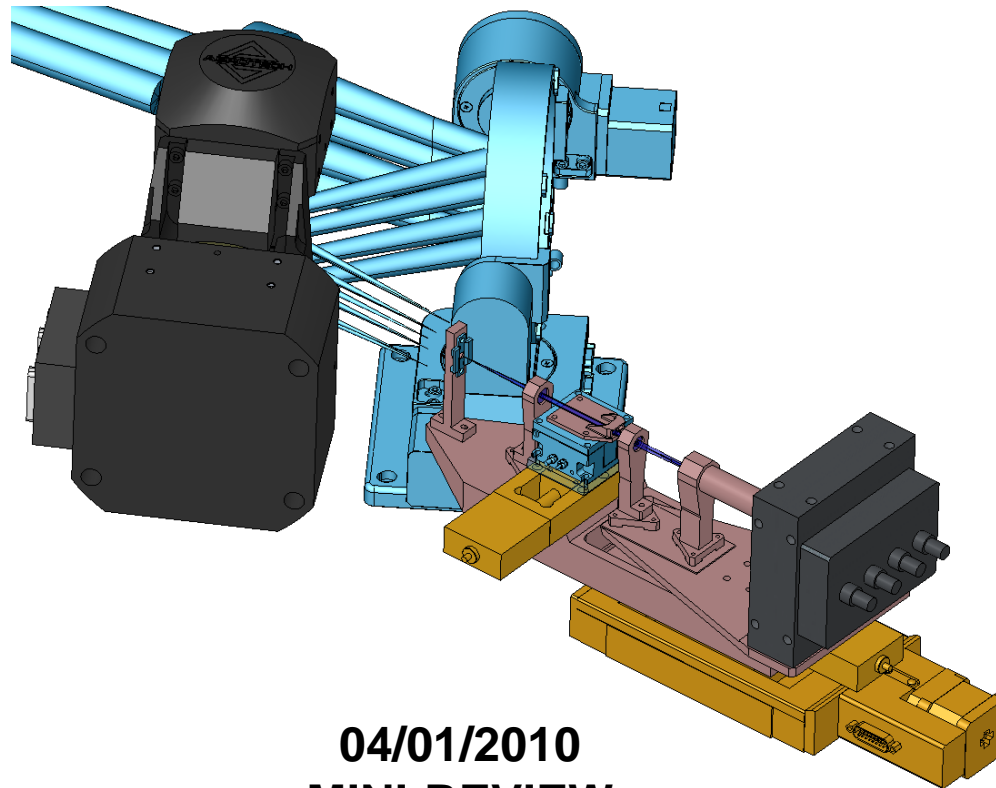


# NGAO

## Natural Guide Star Mechanical



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

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## Natural Guide Star Mechanical



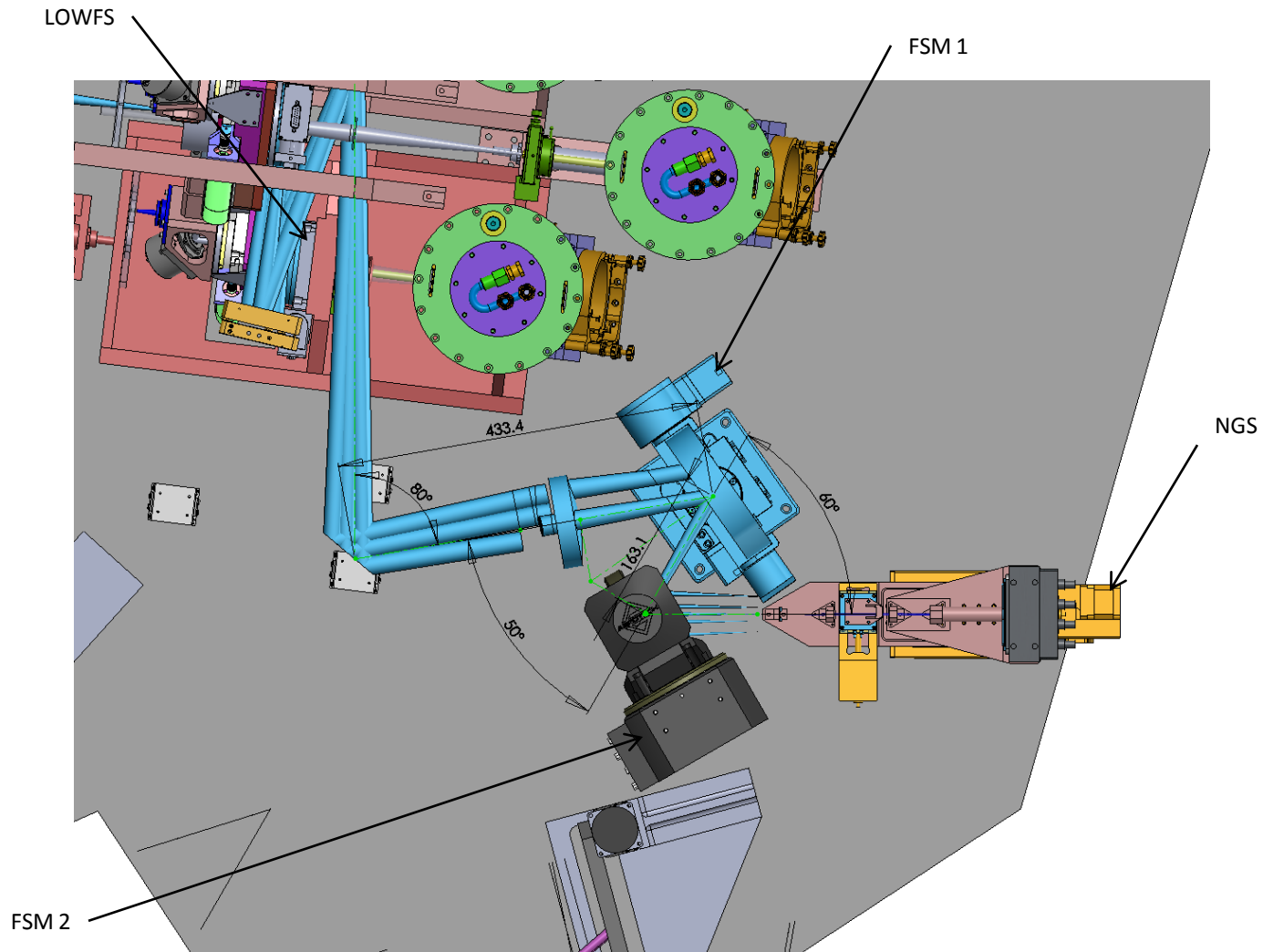
- 1) Integration
- 2) FSM 1
- 3) FSM 2
- 4) NGS Overview
- 5) Adaptor plate preliminary analysis

# 1) Integration



The NGS fits on the Bench, below the LOWFS, after the two gimbaled FSM.

Some more clearance between the FSM and the NGS may still be obtained depending on surrounding instruments proximity.



## 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

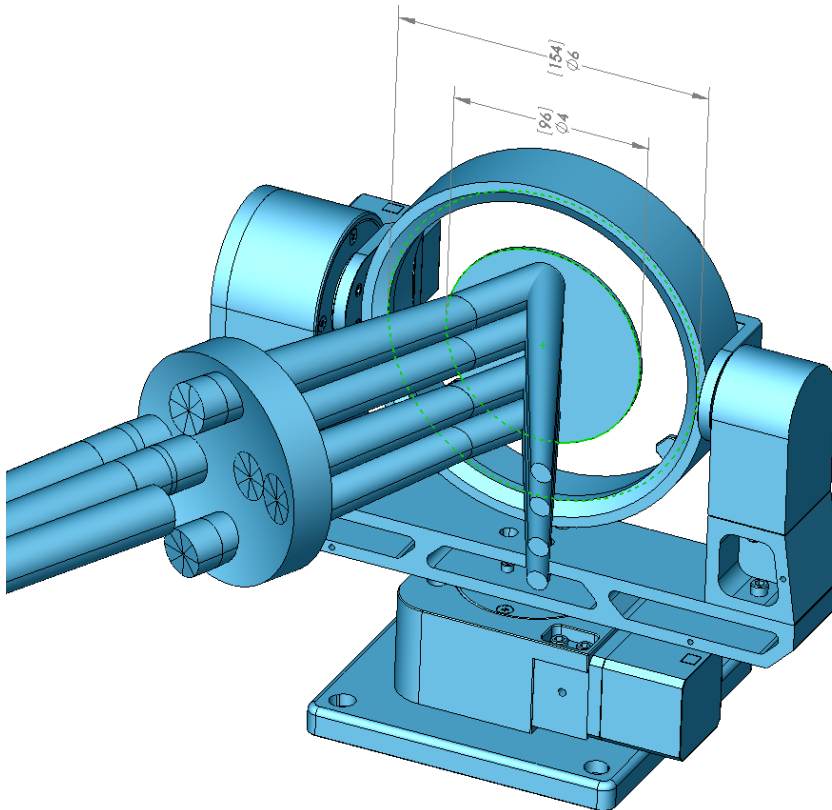
Resolution: 0.29 arc-sec

Elevation range: 360° continuous

Azimuth Range:  $\pm 90^\circ$

Load capacity: 25 lbs.

A motion controller is available with Ethernet port.



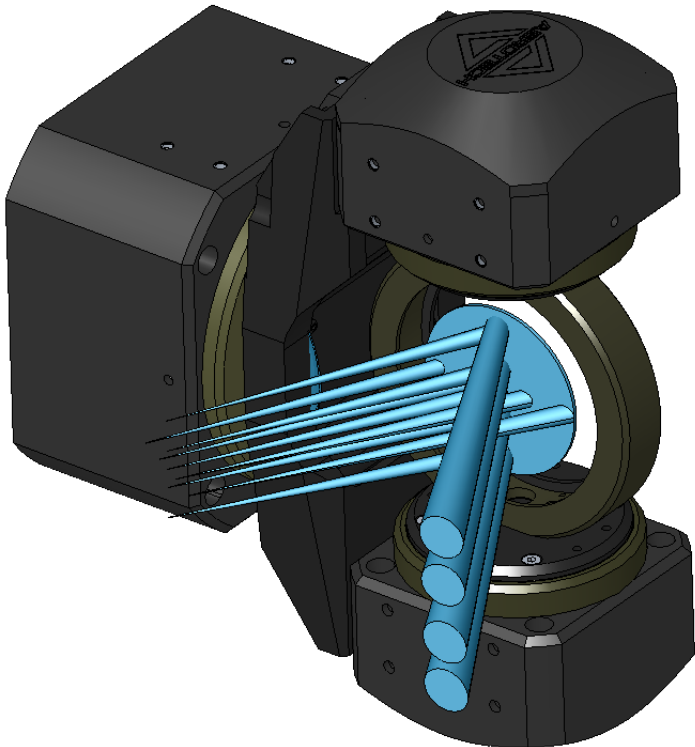
### GM-6 Specifications

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 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 <sup>(1)</sup>	±24 to ±192 μrad (±5 to ±40 arc sec)	
AZ Repeatability	19.4 μrad (4 arc sec)	
EL Repeatability	14.5 μrad (3 arc sec)	
Maximum Rotary Speed <sup>(2)</sup>	100 rpm	
AZ Resolution <sup>(3)</sup>	0.32 μrad (0.06 arc sec)	
EL Resolution <sup>(3)</sup>	0.87 μrad (0.18 arc sec)	
Maximum Load Capability	6.8 kg	
Axis Wobble	97 μrad (20 arc sec)	
Orthogonality	72 μrad (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 <sup>(4)</sup>	0.038 kg·m <sup>2</sup>	0.071 kg·m <sup>2</sup>
Inertia EL <sup>(4)</sup>	0.001 kg·m <sup>2</sup>	0.0038 kg·m <sup>2</sup>
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) <sup>(5)</sup>	140.5 mm	179.5 mm

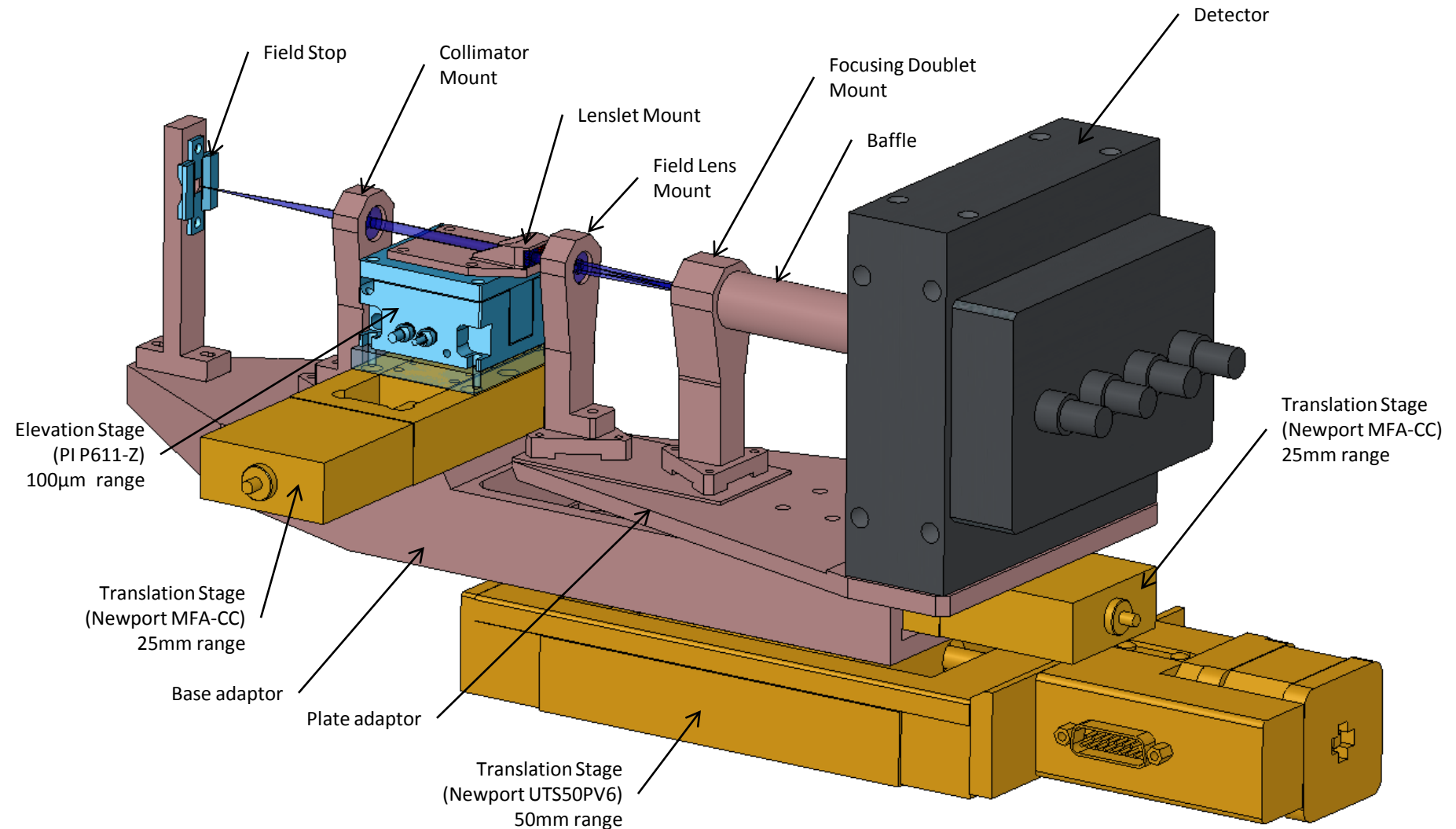
Notes:  
 1. ±24 μrad calibrated (HALAR); ±192 μrad uncalibrated.  
 2. Maximum speed based on stage capability; maximum application velocity may be limited by system data rate and system resolution.  
 3. With 500X multiplication. Higher resolutions available.  
 4. Unloaded inertia.  
 5. Bottom wiring 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 Overview



The NGS components are installed on Aluminum machined parts.

The Lens holders and pedestals have to be custom made to accommodate with the extremely close proximity of mobile lenses.



## 5) NGS Plate Adaptor Preliminary analysis



The NGS Plate adaptor is held cantilevered by the miniature Translation stage but a preliminary Deflection analysis reveals that a ¼ inch plate might be satisfactory:

