



Mechanical system upgrade of the 62-cm telescope at the Severo Díaz Observatory for its automation.

Gerardo Sierra^(a), J. Manuel Núñez^(a), Salvador Zazueta^(a), Benjamín Martínez^(a), Benjamín García^(a), Francisco Lazo^(a), José Luis Ochoa^(a), Gerardo Guisa^(a), Jorge Valdez^(a), Eduardo de la Fuente^(b), Jaime Almaguer^(b), Salomón Eduardo Ibarra^(b).

^(a) Observatorio Astronómico Nacional, Instituto de Astronomía, UNAM, Km. 103 Carretera Ensenada Tijuana, Ensenada, B.C., México;

^(b) Centro Universitario de Ciencias Exactas e Ingenierías, Universidad de Guadalajara, Av. Revolución 1500, Guadalajara, Jalisco, México



We present a description of the mechanical modification made to the 62 cm telescope of the observatory "Severo Diaz Galindo" owned by the University of Guadalajara (U. de G.). These modifications consist of four mechanical systems that were designed, manufactured and successfully installed on the telescope. This work was carried out by the academic staff of the Instrumentation Department of National Astronomical Observatory, of the Institute of Astronomy in UNAM, Campus Ensenada, and in the high precision machine shops of the same institution.

We designed and implemented the 2 mechanisms for the movement of the telescope, one for right ascension (RA) and the other for declination (DEC). Also a mechanical system that acts as a counterweight to balance the telescope was designed and constructed, this system was located in the north pier of the telescope, and finally the focus mechanism for the secondary mirror was implemented, this mechanism is adjustable for collimation of the telescope's optic. The mechanical system design and modifications were made in the framework of a collaboration project between the University of Guadalajara (CUCEI and the General Directorate of Cooperation and Internationalization or DGCI) and UNAM (Institute of Astronomy and Technical Council of Scientific Research and CTIC). The collaboration project also included the computer control system of the 62 cm telescope.



This is how I met the telescope



The RA and DEC motion mechanisms specifications and requirements list.

Must be self-adjustable, to absorb small machining and assembly errors, and to compensate variations in dimension by temperature.

Must be easy to engage and disengage to the telescope, in order to facilitate the procedure of balancing of the telescope.

Must be damped, in order to reduce unwanted oscillations and vibrations to facilitate control of the telescope.

The resolution of the motion mechanisms must be lower than 10 pulses / sec. of arc.

The component of the mechanisms must be standard among them.

To achieve the specifications and requirements

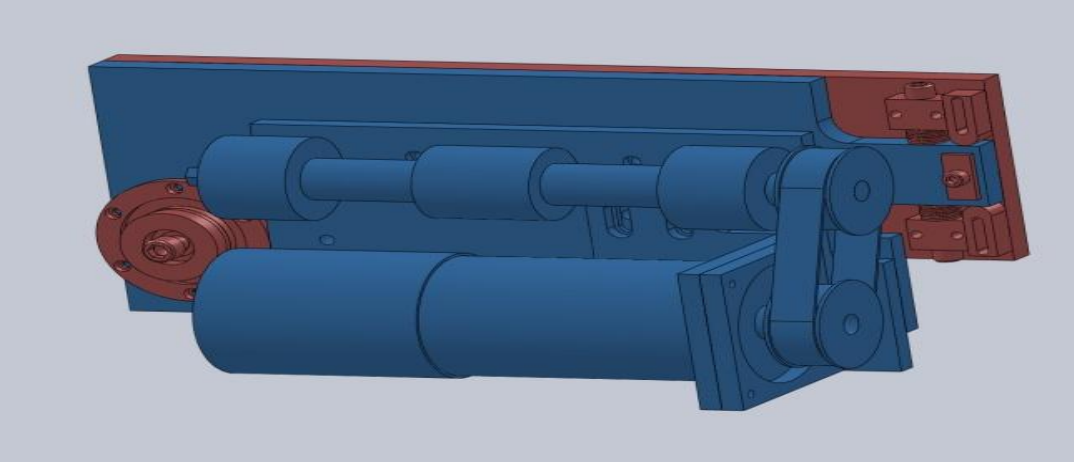
Auto-adjustable, we designed an innovative lever that maintains contact between the worm and the gear steady and stable. Also the south pier of the telescope was structurally reinforced to stiffen the structure where the RA mechanism is located.

Easy to engage; For DEC motion mechanism system we designed a "C" type clamp around the axis of the telescope that loose frees the telescope with a single screw For RA mechanism system we designed clutch friction disc

Damped motions system, we designed a regulated rotational friction damper that is vibration isolated and the motor vibration were insulated by a polyurethane band.

The resolution was achieved using a worm-gear traction mechanism with a ratio of 360:1 and an 36,000 pulse encoders achieving a resolution of 40 pulses / sec. Arc.

To achieves standardization. We use standard commercial mechanical components and we achieve that both motion mechanisms were equal in the Power Transmission. They differ in the coupling to telescope.



DEC auto-adjustable system



RA auto-adjustable system

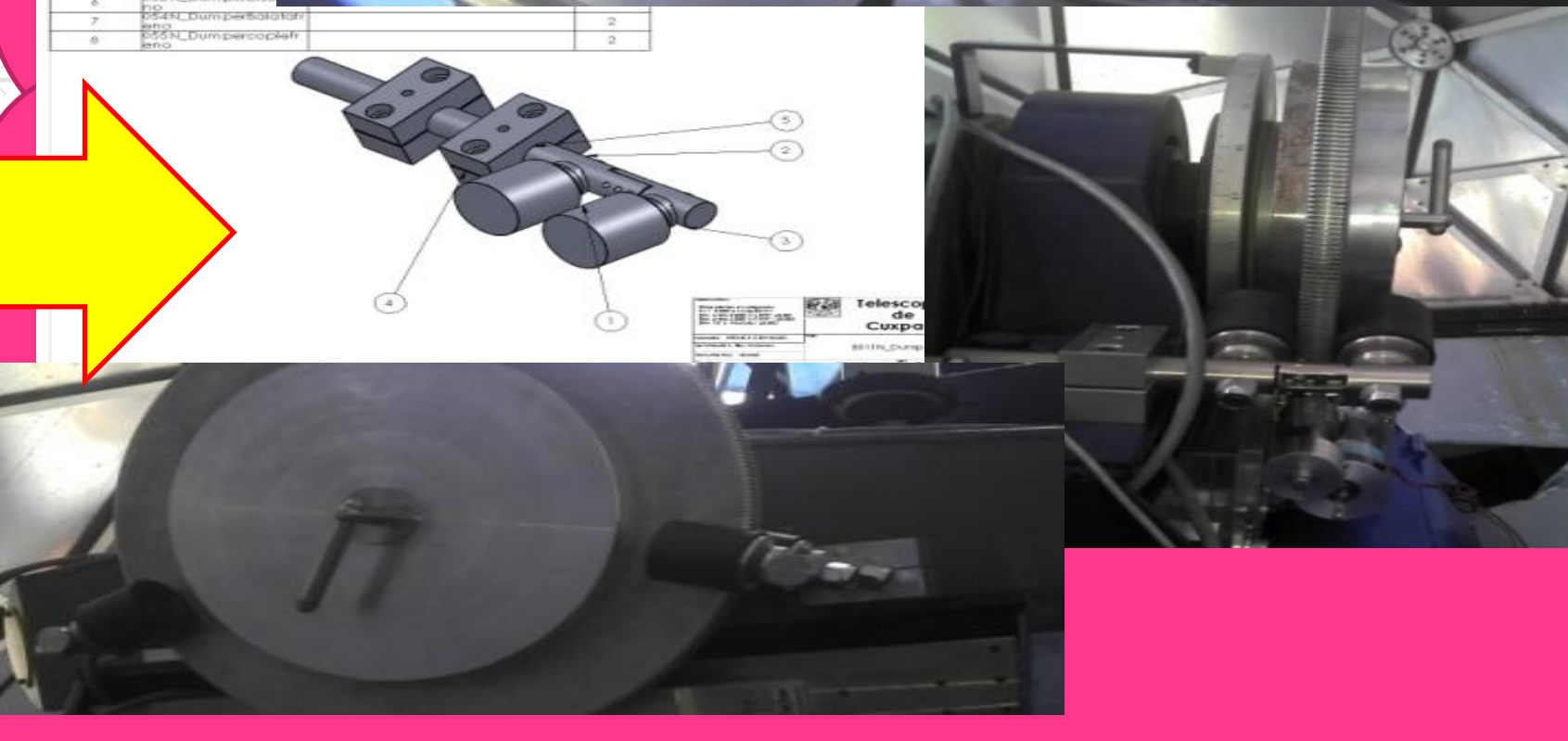


DEC Easy to engage system



RA Easy to engage system

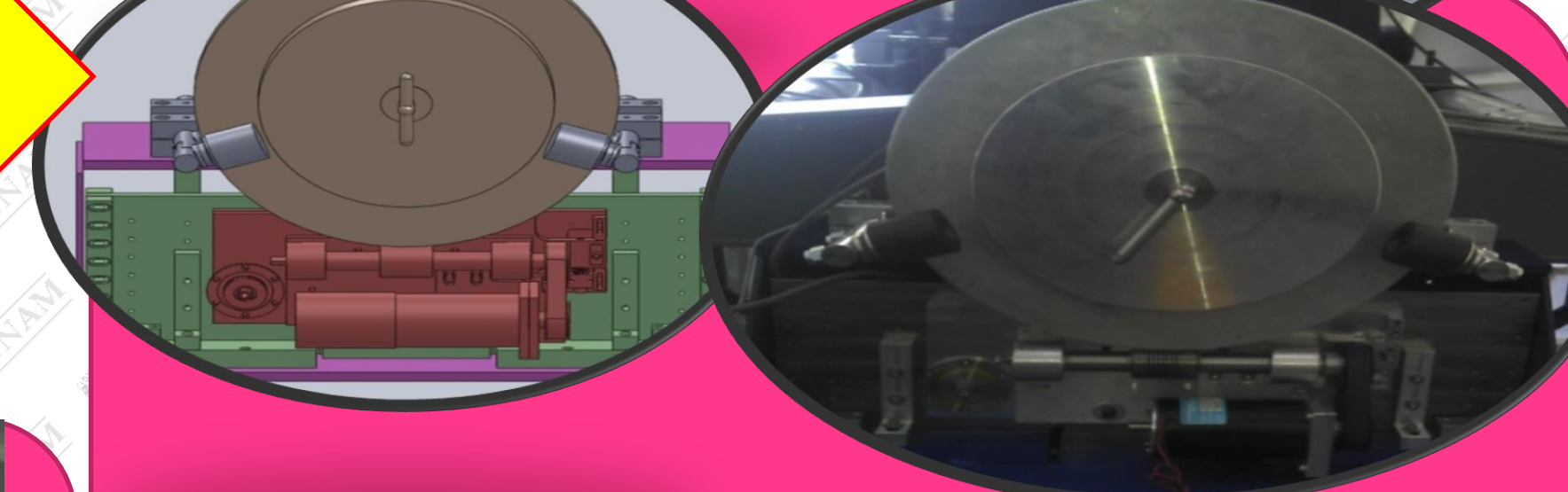
DEC rotational friction damper



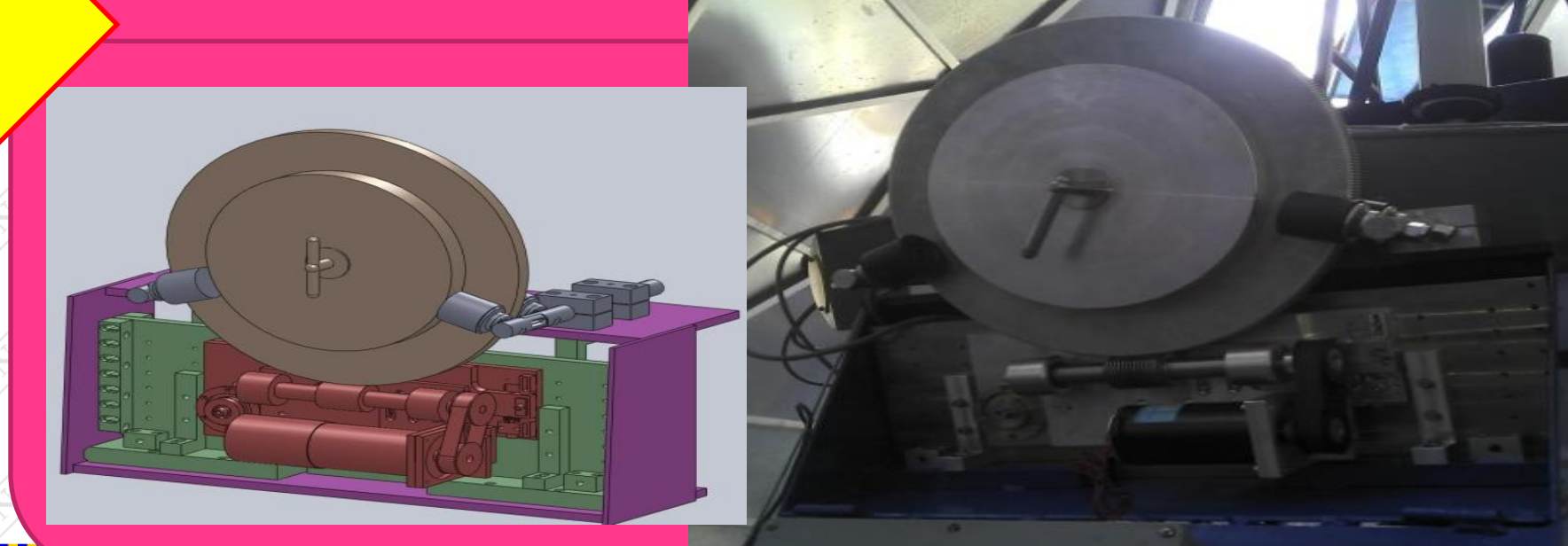
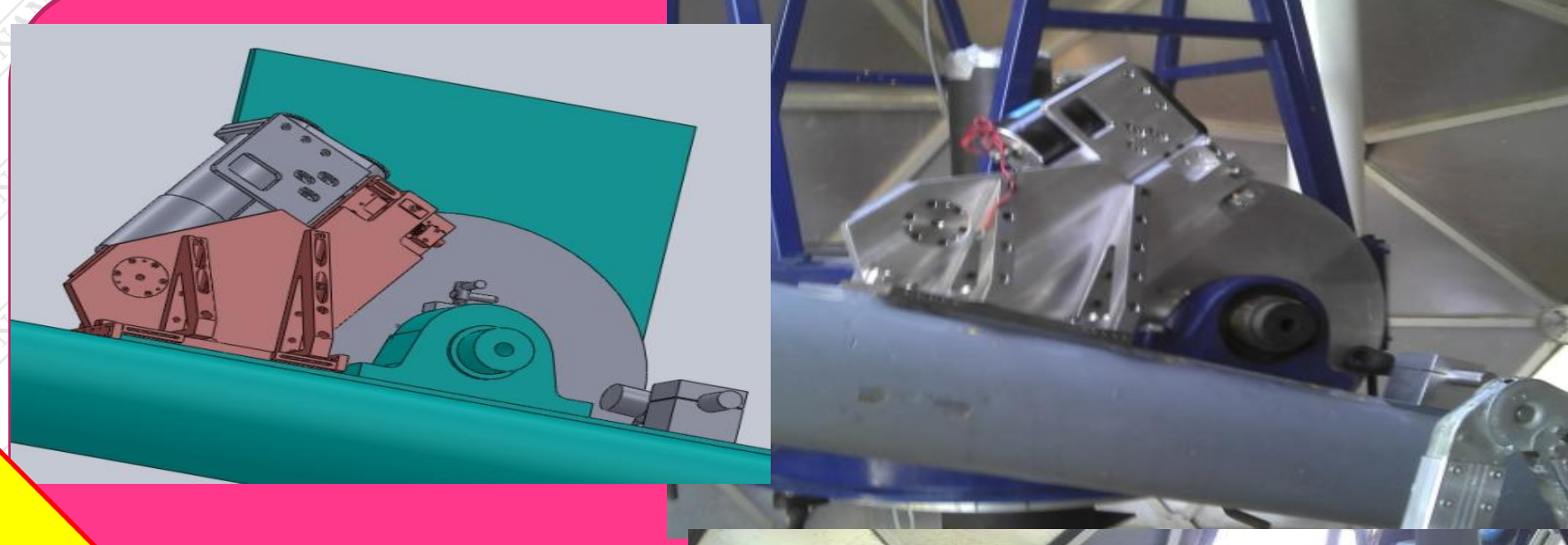
RA rotational friction damper



DEC worm-gear traction mechanism to achieve resolution



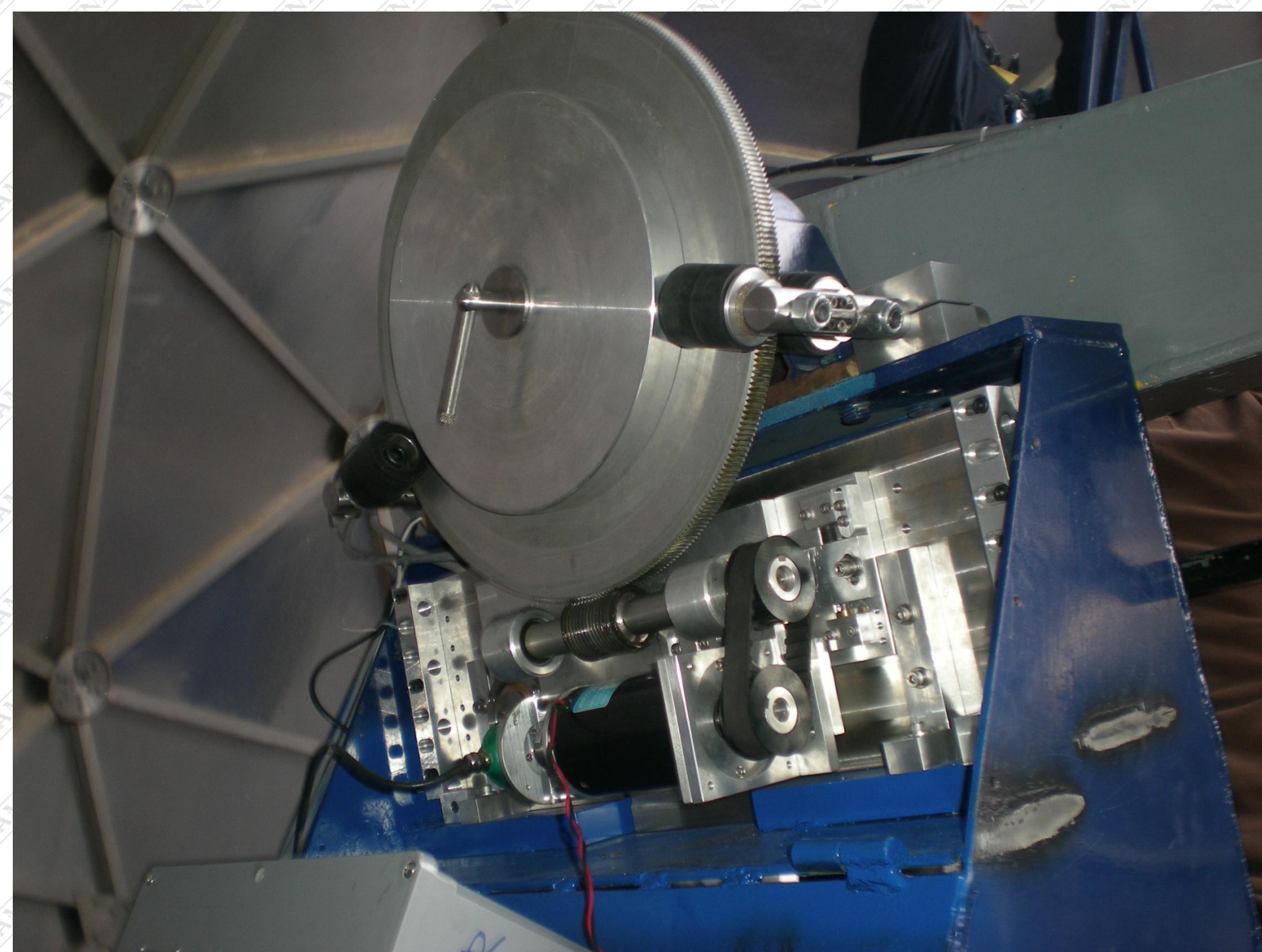
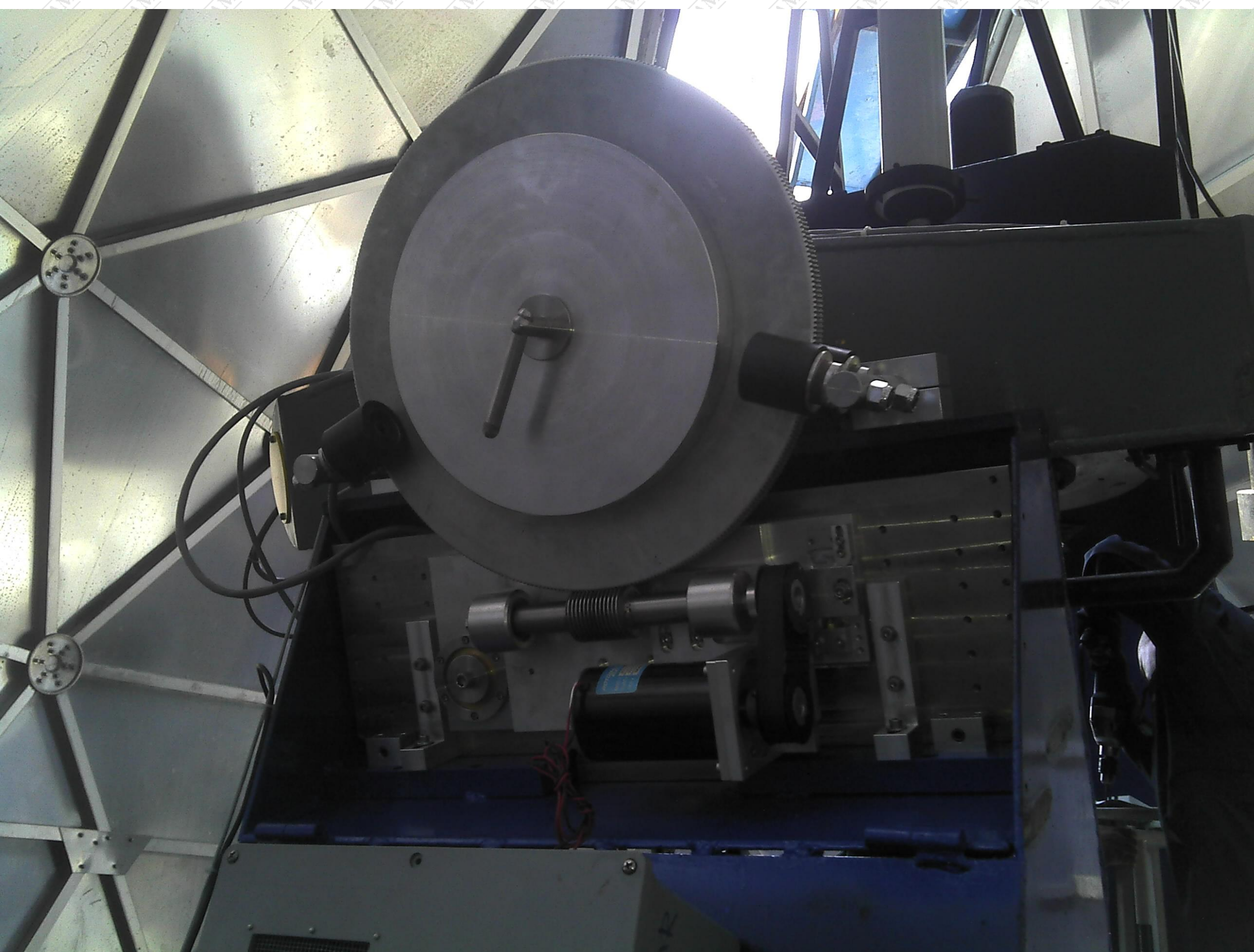
RA worm-gear traction mechanism to achieve resolution The repeatability was negligible in the test



Commercial mechanical components and both motion mechanisms that are equal in the Power Transmission. They differ in the coupling to telescope.



This is the telescope now.





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- Thanks for your attention.
Questions?

- Gracias por su atención,
¿Preguntas?