

REQUIREMENTS FOR INSPECTION OF MECHANICAL PARTS

Spartan IR Camera for the SOAR Telescope

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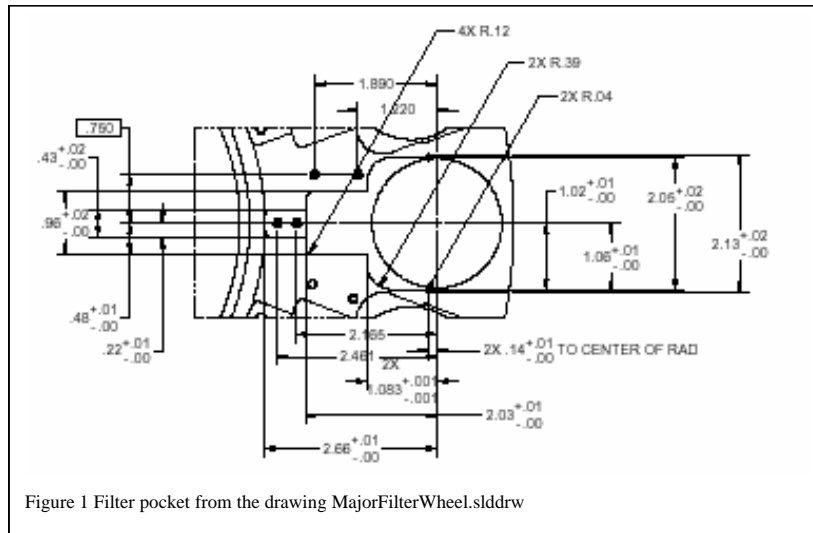
The requirements for inspection of the mechanical parts derive from the science requirements.

1 Filter Wheel

The requirement is that the loss in light due to the placement of the Lyot stop be less than 0.3%. The radii of the stops are 19.6mm for the f/21 channel and 22.8mm for the f/12 channel. The loss, $2\Delta/(\delta R)$ for a shift Δ of the stop of radius R, requires a placement error of $\pm 90\mu\text{m}$ for the f/21 channel and $\pm 110\mu\text{m}$ for the f/12 channel. We adopt the requirement that the filter cell be placed to $\pm 90\mu\text{m}$.

Define the center of the wheel to be the center of the $\phi 40\text{mm}$ hole, which will be used to locate the wheel on the rotation stage. Align the coordinate to the center of the hole for one filter.

Define the location of the filter pocket to be the intersection of the shoulder and a side of the pocket. The pocket location is defined to be the corner (See Figure 1) of the well. The pocket should be 12.22mm [0.481"] from the centerline of the hole for the filter and 142.49mm [5.610"] from the center for the major wheel and 81.51mm [3.209"] for the minor wheel.



These are the measurements.

1. Check the filter wheel, rotation stage, and cradle of the rotation stage for fit.
2. What is the location of the pockets?
3. Is the placement of the filter cell in the filter wheel repeatable?
4. Measure the force needed to remove the filter cell.

2 Cradle

The cradle must support the rotation stage centered between the two mounting surfaces. The requirements for centering along the long axis are 0.63mm for the f/21 collimator, 0.36mm for the f/12 camera mirror, and 0.14mm for the filter wheel. (For the filter wheel, the error must not change the radius by more than 0.09mm. We adopt the tightest requirement of 0.14mm.

The length of the cradle must be 406.40 ± 0.08 mm [16.000 ± 0.003 in]. Measure it along one edge of the cradle.

The two mounting surfaces should be parallel with an error of no more than 0.02mm.

These are the measurements.

1. Measure the length of the cradle.
2. Measure the parallelism of the mounting surfaces. Set up the coordinate system to be along one surface aligned to a corner. Then measure the corners of the other surface.
3. Position the rotation stage and measure the center of the stage. (The tapped holes in the cradle are for helicoils, not the actual bolts.)
4. Measure the pads for the rotation stage. Determine whether they are perpendicular to the mounting surfaces of the cradle.