

PFIS Critical Design Review Comments

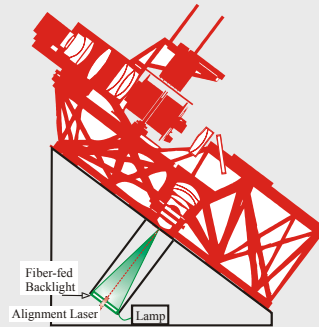
- Detailed response available in document SALT-3100BP0011 (PFIS web site)
- Responses tracked in 19 actions and 9 decisions
- David's: major findings
- Time- critical decisions
- Other actions

Major Concerns

- Mechanism schedule is too tight and requires additional in-house Mechanical Engineers
 - We use a subcontractor to unload design and drawing tasks. Continues to be most efficient because firm already has a full I-DEAS model and is familiar with project
 - Additional personnel are available to monitor manufacturing steps
- No provision for spare optical blanks
 - A spare NaCl blank has been delivered
 - Two spare CaF₂ blanks (one for low-birefringence collimator elements, one for larger standard-grade camera elements) have been ordered: cost \$32,800.
 - University has a mechanism for selling blanks if they are not required

Major Concerns- II

- Project should construct a test fixture with a rotator to verify flexure performance before delivery
 - existing plan: dolly/ holding fixture (“wedge”) that holds instrument at 37 deg, at one of 12 azimuths, to allow testing of mechanisms under gravity load. Est \$7K, 1 wk ME.
 - add rotator to fixture for full verification of flexure model. Est \$30K, 4 wk ME.
 - alternate: horizontal bearing which allows instrument to be tilted to 0 and +/- 37 deg. Est \$12K, 2 wk ME. Prefer this one.



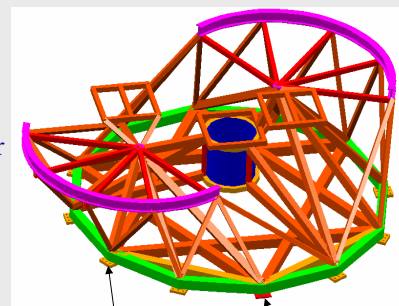
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Major Concerns- III

- Concern that the flexure would not behave in a repeatable way due to stiction in the Z-pads
 - The current design couples the invar instrument structure to the steel rotator ring with an X-Y pin and a Y-slot, while support in Z is in 12 pads which are free in X-Y.
 - If there is stiction at these pads, the instrument will flex unpredictably as the temperature changes.
 - Analysis in progress: We have found a surface treatment that minimizes friction. Initial estimate shows < 5 micron stiction events.



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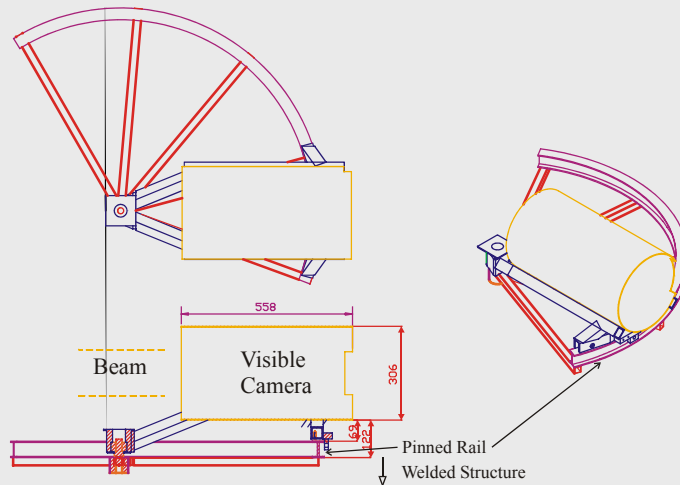
Major Concerns- IV

- Transient thermal effects on optical performance should be modeled
 - will attempt evaluating an extreme case. Do not think it is important.
- The schedule is success-oriented. Schedule slip could be up to 1 year
 - the schedule is deliberately success-oriented. Schedule slips are allocated budget reserve as required. With the current budget reserve, up to 7 months of slip is covered. We consider 1 year unlikely.

Time-critical decisions

- The project should consider full mechanism spares
 - we estimate the cost of mechanism spares to be ~\$30K/ major mechanism> Recommendation: No.
 - desired spares need to be identified as soon as possible to allow efficient ordering of parts
 - per the SOW, spares are not part of instrument cost- they are purchased separately by the SALT project
- The project should consider allowing a larger envelope for the NIR beam
 - We are studying pinning the curved I-beam on the NIR side, rather than welding it. Would allow up to ~120 mm additional envelope below NIR camera.
 - A larger redesign would invalidate the truss concept, and would require a schedule slip

NIR Beam Envelope



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Time-critical decisions - II

- Panel advised compatibility testing of lens fluid and RTV
 - Recommend: no. We have experience in this combination; however, will investigate origin of this disagreement
- Panel advised looking at constructing a jig for testing off-axis images as test of alignment
 - We will look at whether there are any alignment issues that would not be apparent in off-axis images. Suspect not; test would be expensive (\$10 - \$45K).

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Other Actions

- Analyze stray light, especially baffling necessary to capture grating zero-order.
- Do more formal FEA of lens mount gravity deflections.
- Investigate flexure of grating rotator stage. May be necessary to preload bearing.
- Investigate side load capacity of invar beams. All OK; radial top beams closest: will mark with warning and provide safe step.