

## **Revised proposal for the alignment of the WFS lenslets**

**wht-naomi-39**

The following is an outline of the proposed approach to the alignment of lenslets to lenslets. A provisional tolerance of  $\pm 100\ \mu\text{m}$  for position and  $\pm 0.01^\circ$  for rotation has been put forward as necessary, but is subject to confirmation. However, the better the co-alignment of lenslets the smaller the corrections to the pick-off offsets and DM position that will have to be made when changing between lenslets.

The procedure depends upon the bores of the holders, into which the lenslets are to be mounted, being centred within an annulus  $50\ \mu\text{m}$  wide (looser than the specified tolerance). This will be checked on the co-ordinate measuring machine before proceeding.

The co-ordinate measuring machine will also be used to determine the step count from the datum that is required to bring each lenslet mount to the height of the optical axis.

1. The lenslets are to be bonded into rings made from stainless steel (to BS 970 416). See drawings BN3035 and BN3314.
2. Set up one lenslet holder and a collimated laser beam of  $>20\text{mm}$ , quad cell and oscilloscope for centroiding as illustrated in drawing 17a04a.
3. Rotate the lenslet wheel to bring one of the lenslet mounts to the height of the axis.
4. Mount a lenslet in the holding jig (17a10m) and centre the quad cell on a spot near the centre of the field.
5. Scan the quad cell in the x- direction, rotating the lenslet until the line of spots is horizontal as measured by the quad cell to within  $\pm 6\ \mu\text{m}$  across the field.
6. When that state of alignment has been achieved bond the lenslet ring to the holder.
7. Repeat for the remaining lenslets.
8. Finally drive the lenslet wheel to bring each lenslet array into position in turn and check, using the quad cell, that the offsets are as expected.

### **Notes:**

- ?? The alignment of the reticule to the horizontal is not critical, but it might prove possible to use the diffraction pattern cast by the ruling for alignment.
- ?? The short focal length lenslet will be out of focus with a fixed set-up of the apparatus that is correct for the other three lenslets. However, the Talbert plane will be in focus, and this will provide the same information as the spot pattern for the purposes of alignment, so no refocusing should be necessary.

### **Required apparatus and adhesives**

1. Optical bench.
2. Lenslet wheel.
3. Five lenslet mounting cells.
4. One reticule mounting cell.
5. Five lenslet mounting rings.
6. One reticule mounting ring.
7. Rotation stage for lenslet wheel, plus driver.
8. Lenslet wheel base.
9. ADC rotation stage and base.
10. Driver for the above.
11. Lenslet manipulator.
12. Collimated laser source.
13. Calibrated quad cell and output amplifier.

14. Oscilloscope (two channels).
15. XY translation stages for quad cell.
16. UV adhesive curing lamp.
17. UV adhesive Norland NOA65 for bonding lenslet into metal ring (glass to metal).
18. Loctite 326 for boning the mounting rings into the mounts (metal to metal).

