OMC Suspension: Test results

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This document should be read in association with the OMC Suspension Test Plan E070068-01-D. The numbers below correspond to the items listed in that document. The documents referenced in the text can all be found on the wiki OMC Suspension review page

http://ilog.ligo-wa.caltech.edu:7285/advligo/OMC_Suspension#reviews

following the link to "Documents for the Ptype #2 Fab Readiness Review"

1. **Mechanical fit test.**

Mechanical parts have been assembled and tested. Minor changes have been noted and tasks and actions are being tracked. This is more fully discussed in the document lined at "Output modecleaner mechanical lessons learned".

2. **Configuration Documentation.**

An assembly document has been drafted, see the document link "Assembly procedure". This will be updated when we proceed through an assembly and suspension of the silica bench We will add an appendix which will include a worksheet into which a record of masses, moments of inertia, added mass or adjustment mechanisms etc will be entered when each OMC suspension is built.

3. **Structure frequency measurements**

Structure frequency investigations have been carried out and documented and comparisons made to FEA results. This is more fully discussed in the document links "Structure design and analysis" and "Structure frequency measurements".

4. **Functional electronics and OSEM test.**

See the electronics section of the review page for details of test plans for all the boards used. The OSEM design has been tested by the Birmingham group, see the document link "OSEM preliminary design document and test report".

5. **Pendulum frequency and transfer function measurements**

Several sets of pendulum frequency and transfer function measurements have been made with the old and new designs of metal bench (the main difference being how the suspension wires were attached to the bench). Results have been compared to the MATLAB model with good agreement. Generally frequencies agree to a few percent. See examples of results posted at

http://ilog.ligo-wa.caltech.edu:7285/advligo/OMC_Suspension#testing

6. Damping test

Damping tests have been performed several times and the results show that adequate damping of each degree of freedom can be achieved. Examples of decay curves are shown at

http://ilog.ligo-wa.caltech.edu:7285/advligo/OMC_Suspension#testing

7. Alignment test

Fine angular alignment of the dummy metal bench has been achieved using the OSEMs, with a range of ~ 2 milliradians peck to peak being achieved in pitch roll and yaw. Further alignment and height measurements will be done when the silica bench is suspended.

8. Interface to ISC

A dummy metal bench having mass and moments of inertia close to that of the silica bench, and method of suspension the same as the optical bench has been suspended and transfer functions, damping tests and angular alignment tests were successfully performed (see above). Open issues are the attachment to the upper mass and the configuration of electronic wiring from the bench and the mounting of auxiliary ISC input /output optics. Suitable attachment points and routing points for the wiring have been discussed with the ISC group. In addition the CDS group has been carrying out research on suitable cable materials. The open issues will be explored when the silica bench itself is suspended – due to take place in late September/early October 2007.