Ian, Calum

The numbers Calum quotes for the wire lengths and wire radii have been updated since the conceptual design. We have shortened the overall length since then to accommodate the quad in LASTI (as per T040028-00-R). The numbers are

\[
\begin{align*}
\text{pend.ln} &= 0.445; \\
\text{pend.l1} &= 0.304; \\
\text{pend.l2} &= 0.342; \\
\text{pend.l3} &= 0.6; \\
\end{align*}
\]

As Calum notes - this is the length from flexure point to flexure point, so physical length is longer, by the amount given by the flexure equation applied at both ends (which I don't immediately have to hand).

We have also updated the wire thicknesses, to minimise the flexure lengths consistent with a factor of 3 safety, as per my e-mail of 9th February.

\[
\begin{align*}
\text{pend.rn} &= 540\times10^{-6}; \\
\text{pend.r1} &= 350\times10^{-6}; \\
\text{pend.r2} &= 310\times10^{-6}; \\
\text{pend.r3} &= 220\times10^{-6}; \\
\end{align*}
\]

The latter number corresponds to metal wire as for controls prototype - this is not the number for silica.

Let me know if I can provide further info.

Cheers
Norna

At 02:08 PM 3/30/2004 -0800, ctorrie wrote:

Dear Ian

Looks good. I look forward to hearing more next week at the telecon. Hopefully the quad layout .zip file I sent you was what you required? let me know if I can supply who with anything else on that front?

I have a few comments and questions from your wire_jig_thoughts.doc

1) "Wire Clamps" - Similar to method used in MIT quad and others, would you imagine it would be useful for the angle to be adjustable or would you have a unique block for each?
2) "Micro adjuster" Is there provision for an initial clamping position for the wire, like that used in the MC' jigs?
3) "Wire loading" - I really like the concept of it hanging vertically. What would it mount to? Could also use cylinders on the end of the jig to ease the 90 degree bend you correctly pointed out as a potential issue
4) "Wire loading" - why 92kg?
5) "Wire loading" - The lever arm you discussed also sound interesting, could you expand a little for me?
6) "Guard" - good idea. We used guards for breaking the wires. For the wires we sent to MIT I even wore a simple welders mask!

Answers to your questions: -

a) 62 kg - maybe? (The highest table we have is about 3 ft off the ground, again could incorporate your idea of adding tension?)
b) Penultimate mass the wires loop round and therefore the jig must incorporate this extra length
c) Test mass, it will be clamp-wire clamp assemblies with no wrap around
d) Not sure I get the question? Let me try, from analysis we might want to create several configurations of the same clamp wire clamp assembly, thus allowing us to switch out an assembly in a particular stage if we were having problems aligning, installing etc ... (It has proved very useful in the past)
e) Should be in NAR's conceptual design at present these have the following numbers: -

Lengths (m)

\[
\begin{align*}
\text{ln} &= 0.54 * \\
\text{l1} &= 0.304 * \\
\text{l2} &= 0.302 * \\
\text{l3} &= 0.600 * \\
\end{align*}
\]

* Remember the wire length created in the jig will have to incorporate the extra length from the inclusion of the flexure point! ln, l1 etc ... represents the lengths from flexure point to flexure point, which are positioned at 1mm wrt centre of mass.

+ does not include "wrap around length" mass in 314mm diameter and wire breaks off .1635m from the centre of the optic

Thickness (assuming spring steel wire from Knight Precision in the UK with a Young's Modulus measured at 2.2e11 Pa)

\[
\begin{align*}
\text{rn} &= 7.0e-4 \\
r1 &= 4.0e-4 \\
r2 &= 3.5e-4 \\
r3 &= 2.2e-4 \\
\end{align*}
\]

[I'll check with NAR?]
Stresses
Most of the wire once installed is stressed to ~ 1/3 of the BS, sometimes with an extra safety factor. [I'll ask NAR to confirm?]

Stretch
Tend to load wire with ~ weight it will have under load, need to think about factors of 2 depending how many wires you are loading in the same clamp assembly. Preliminary experiments done by me in Glasgow indicated most of the stretch is removed in the initial loading of the wire, this was done for smaller wires.

Hope this helps?

Cheers, Clau

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*****IMPORTANT NOTE*****

The LOKI system which currently handles my e-mail will shortly be shut down. Mail to my current e-mail addresses (norma@loki.stanford.edu, norma@fastloki.stanford.edu) will be forwarded to my new address for the foreseeable future. However to avoid any problems in the future, please update your address book now with my new address, as below.
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