

**Subject:** Re: Stay mount issues - Decision on FM / BS structure acceptance criteria

**From:** Norna Robertson <nroberts@ligo.caltech.edu>

**Date:** 3/21/2011 4:34 PM

**To:** joe.odell@stfc.ac.uk

**CC:** ctorrie@ligo.caltech.edu, bland\_b@ligo-wa.caltech.edu, janeen@ligo-la.caltech.edu, justin.greenhalgh@stfc.ac.uk

Colleagues

Janeen and I talked this over and we believe the best way forward is to have the UK ship all parts over here and we get all the rework done together. It may be that for the one arm test at LHO we should get the parts for the first FM out as soon as possible since they are needed soon, and we can take a bit more time over the others, although that is not as efficient.

Janeen and I will discuss logistics with Betsy.

Norna

On 3/18/2011 5:55 AM, [joe.odell@stfc.ac.uk](mailto:joe.odell@stfc.ac.uk) wrote:

Thanks for this Calum.

Betsy/Janeen,

With the plan to electro-polish the parts for the BS/FM stays in mind, we need to figure out where this is going to be done, as the parts are somewhat spread around at the moment.

The table below shows the numbers from Betsy, of the parts that are in the US, compared to the numbers that are required in Kurt's matrix.

RAL parts	Required according to Kurt Matrix	Parts at				Tot parts in US (numbers from BB)	Outstanding	Surface finish issues?
		LHO	Parts at LLO	Parts at Stanford	Parts at CIT			
*D080506	7	6				6	1	Yes
*D080507	2	3		1	1	5	0	Yes
*D080508	5	3		1	1	5	0	Yes
*D090001	14	14		4	4	22	0	Yes
*D090002	20	10	7	4	4	25	0	No
*D090003	14	16		4		20	0	No

As you can see, nearly all the parts required are already in the US.

On top of the parts in the US, I have the following in the UK, which presumably we will use as spares, other than the one outstanding D080506....

	Parts at RAL	Surface finish issues?
*D080506	14	Yes
*D080507	7	Yes
*D080508	1	Yes
*D090002	8	No
*D090003	6	No

The question is, do we all go away and get the parts we have, treated, or do we get all the parts together in one place, and get them electro-polished together, and if so, where? We have a company in Germany that we used for the trial run, and could give them the LIGO spec etc. Lead time 4-6 weeks + shipping from/to the US.

Thoughts?

D090002 and D090003 have good surface finishes, and can be eliminated in terms of surface treatment, but will need to be shipped to where they are needed. I suggest that I send the ones I have at RAL to the sites, so that CIT/Stanford can keep theirs for analysis/prototype work....

Cheers

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**From:** Calum Torrie [<mailto:ctorrie@ligo.caltech.edu>]

**Sent:** 14 March 2011 14:53

**To:** ODell, Joe (STFC,RAL,EID); Betsy Bland

**Cc:** Greenhalgh, Justin (STFC,RAL,EID); [coyne@ligo.caltech.edu](mailto:coyne@ligo.caltech.edu); [jlewis@ligo.caltech.edu](mailto:jlewis@ligo.caltech.edu); Norna Robertson; Kurt Buckland; Janeen Romie

**Subject:** Re: Stay mount issues - Decision on FM / BS structure acceptance criteria

All

Sending this again as there was problems with one of the links before. Kurt has come up with the following matrix, [LIGO-T1100150-v1](#) for all of the FM / BS structures stays etc ... in the 5 unique advanced LIGO chambers layouts. This matrix proposes a combination of existing and new parts. (An updated visual representation of this matrix will be added to [LIGO-T1000734-v4](#) on Monday the 14th March 2011.)

I. In order for the existing parts to be used in the above plan, the following items should be electropolished to remove 0.001" from both surfaces (a recent US electro-polish RFQ is attached for reference). It is my understanding that these parts are in both the US and the UK.

DCC NUM / LINK / REASON FOR MITIGATION

D080503 [LIGO-D080503-v2](#) - stock surface finish In addition the holes should be oversized and the "windows" added \*  
D080506 [LIGO-D080506-v2](#) - shot peen  
D080507 [LIGO-D080507-v2](#) - shot peen  
D080508 [LIGO-D080508-v2](#) - shot peen  
D090001 [LIGO-D090001-v2](#) - stock surface finish

II. In addition (and for completeness) the following items should be inspected and a decision made with regard to electropolish. It is my understanding that these parts are all in the US. It might be that these parts can just be cleaned and baked. (Betsy - could you and John have a look over the following? Also have I missed any?)

DCC NUM / LINK / REASON FOR MITIGATION

D090003 [LIGO-D090003-v1](#) - surface finish?  
D080502 [LIGO-D080502-v2](#) - surface finish?

This decision has essentially been on hold while we investigated struts. While we have a solution that is tentatively been agreed we have decided to move ahead on all fronts, hence the information above.

\* Betsy I owe you the FEA which shows the windows have negligible effect, while this is complete I have not written it up yet.

Any questions give me a call.

cheers, Calum

On 3/11/2011 3:39 PM, Calum Torrie wrote:  
Joe and Betsy

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D080507 [LIGO-D080507-v2](#) - shot peen  
D080508 [LIGO-D080508-v2](#) - shot peen  
D090001 [LIGO-D090001-v2](#) - stock surface finish

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Any questions give me a call.

cheers, Calum

On 3/11/2011 10:14 AM, [joe.odell@stfc.ac.uk](mailto:joe.odell@stfc.ac.uk) wrote:

The pictures are of the one that has been electro-polished. It is very shiny compared to the ones you have a Caltech. I will get hold of a better camera, and get you some better shots on Monday.

Cheers

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**From:** Calum Torrie [<mailto:ctorrie@ligo.caltech.edu>]  
**Sent:** 11 March 2011 18:09  
**To:** ODell, Joe (STFC,RAL,EID)  
**Cc:** Greenhalgh, Justin (STFC,RAL,EID); [coyne@ligo.caltech.edu](mailto:coyne@ligo.caltech.edu); Jeff Lewis  
**Subject:** Re: Stay mount issues

Hi Joe

I agree the picture are a bit ropey. Are these post shot peen pictures and do they match the stay mounts I have here at Caltech on loan from Betsy? If so I can show Dennis and Jeff (QAME) those ones instead.

As you mention if you share the images of post electro-polish and post acid dop that would be really useful.

Cheers, Calum

On 3/11/2011 9:50 AM, [joe.odell@stfc.ac.uk](mailto:joe.odell@stfc.ac.uk) wrote:  
Hi Calum,

As we have discussed, we have an issue with the stay mount parts. We had put this issue on the back-burner for a while, since it looked like re-make would be necessary, and it did not look like we were going to use these parts.

The issue is that the parts were shot peened. This was done to remove the poor surface finish left by the 3D machining with a ball nosed cutter. The spec for the glass shot is attached. The shot does not impregnate the surface, it bounces off, leaving a slight pit.

Before we had put this on the back-burner, I had been working with the company to try to find a suitable solution to this problem, without re-make (these have already been re-made once – long story!!). They had sent out one of the parts for electro-polish, to see if that would be a suitable solution.

I have attached some rather ropey pictures of this part. A visual summary is that the part displays some machining marks, and a very slightly pitted, shiny finish.

I am visiting the company again on Monday. They have tried doing an acid dip, and I am going to take a look. I will get some pictures etc, but I want to be able to very quickly give them an answer about whether these need to be re-skimmed. The re-skim is quite a big job. I have been considering whether we can slightly modify the geometry of the part to make machining easier (like to have an octagonal barrel, rather than round). I know you were planning to talk to Dennis about this, so hopefully this info will be useful.

If there is any doubt, I think we would rather bite the bullet and get the parts re-made. I would guess this would take 4-6 weeks (although we may be able to get batch earlier)

I'll keep you up to date of my visit to the company on Wednesday.

Regards

Joe

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(Note - the mail stop number has changed)