

## Findings with trying to assemble D1102029

- 1) Of the two mirrors (D1101014) only SN 001 was able to mate with D1101294.
  - This mate was not smooth however and did require some force. It seems like the holdup was around the opening to the holes on the mirror itself (not deburred well enough?)

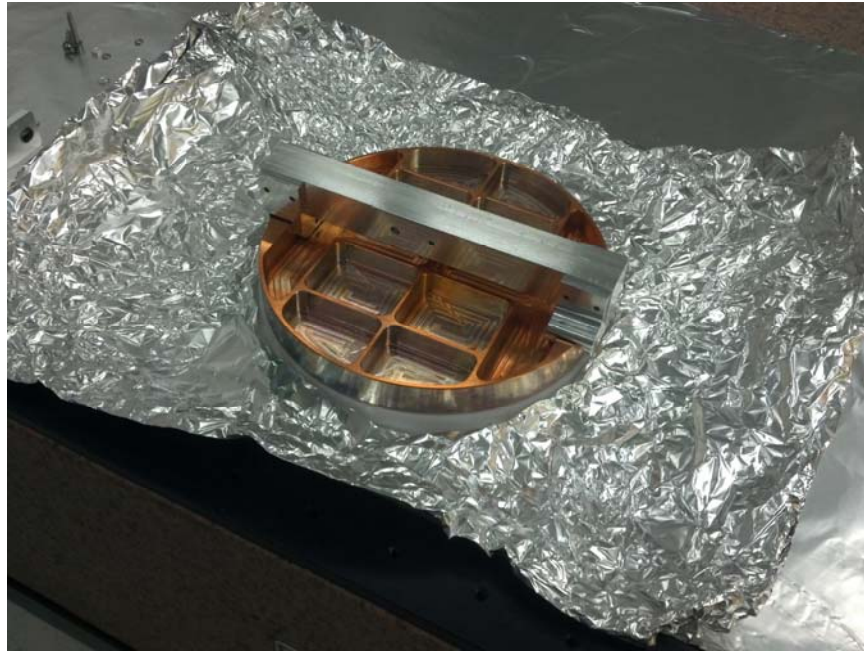


Figure 1) D1102029 successful mating (not without concerns)

- I tried to show how the holes line up to one another but of course the angle of the picture is deceiving... screws can and were installed to show that they can mate to another. (I started testing other things and forgot to take a picture of the screws installed)



Figure 2) Holes align with force

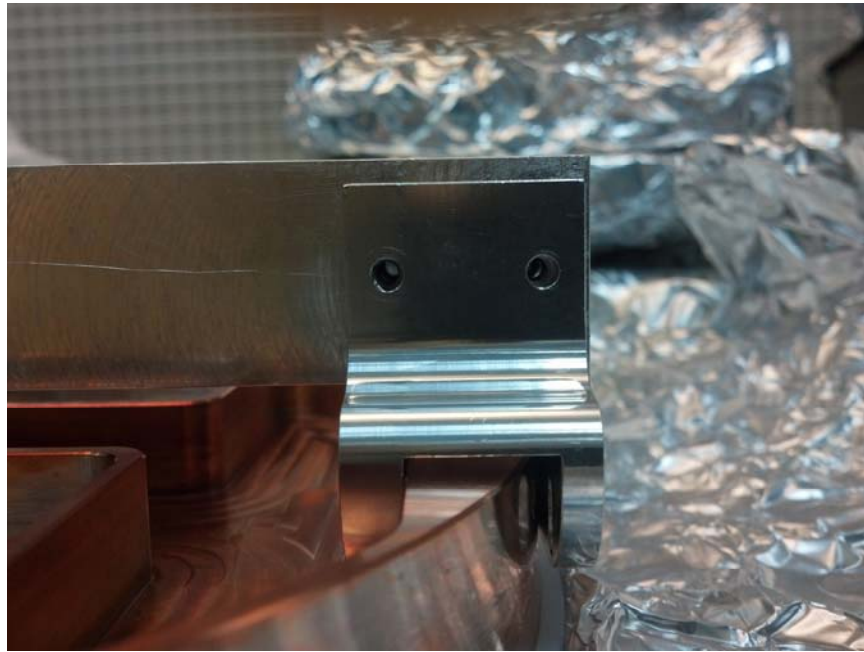


Figure 3) Right side of figure 2

- D1101014-002 seems to have thicker walls making it much harder to force D1101294 on. I think it could be done but it will cause shedding of the metal and it will be hard to manipulate or pivot when we align (this shedding and pivoting problem is also a concern with D1101014-001 but not as critical)



Figure 4) D1101294 doesn't want to go down all the way on D1101014-002

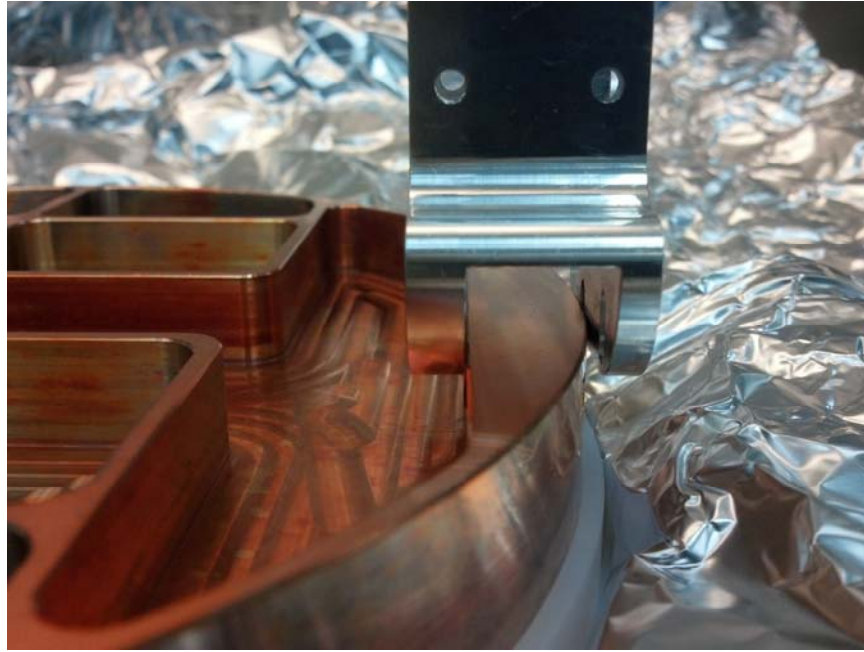


Figure 5) Opposite D1101294 from figure 4

- 2) D1101294 successfully mated to D1101295 the first several times but isn't very repeatable. I think when I was trying to get the whole assembly together, the parts started rubbing tightly against another causing the scratches seen in the picture below. Towards the end of this fit check, it requires some strength to pull the two pieces apart from another...

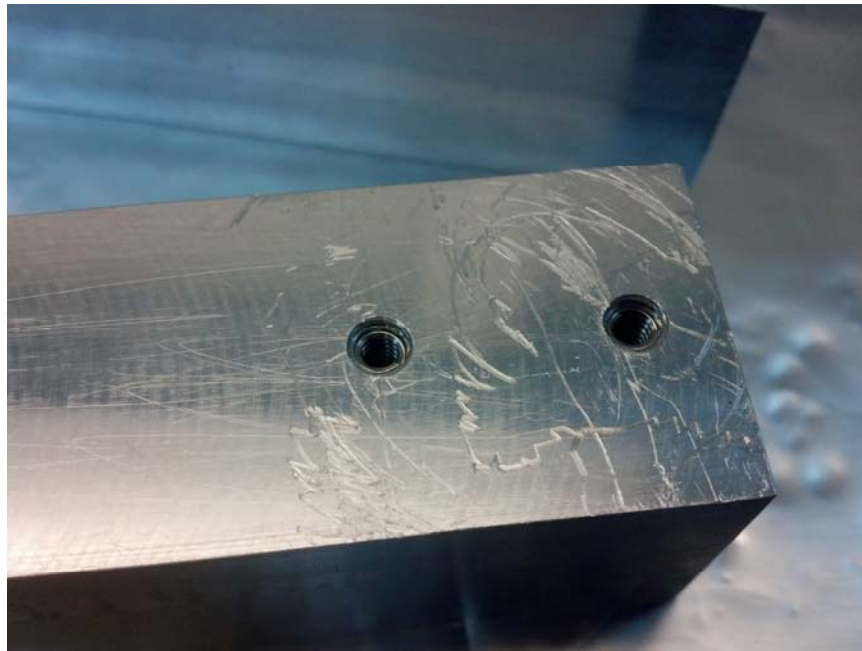


Figure 6) D1101295 scarred from mating with D1101294

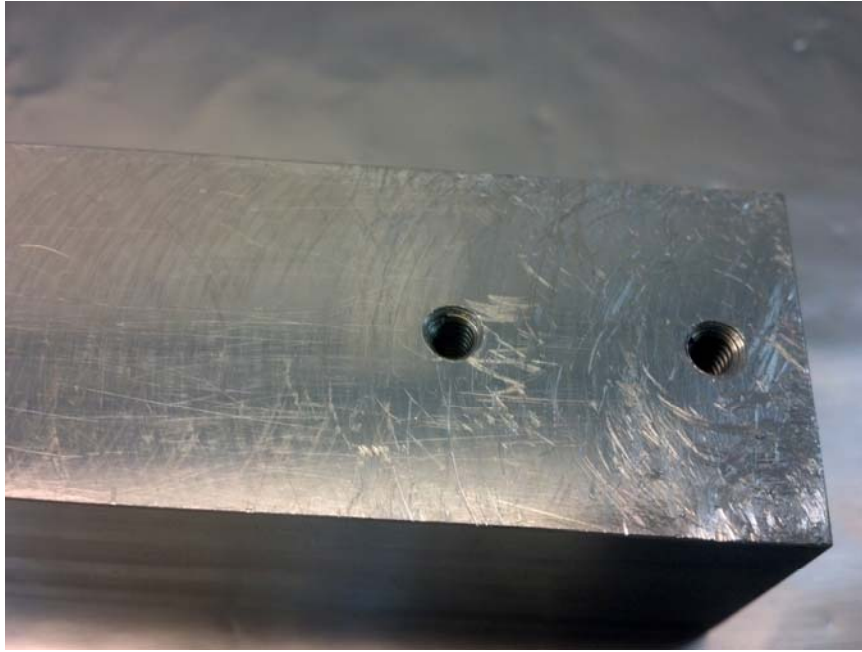


Figure 7) Other D1101295

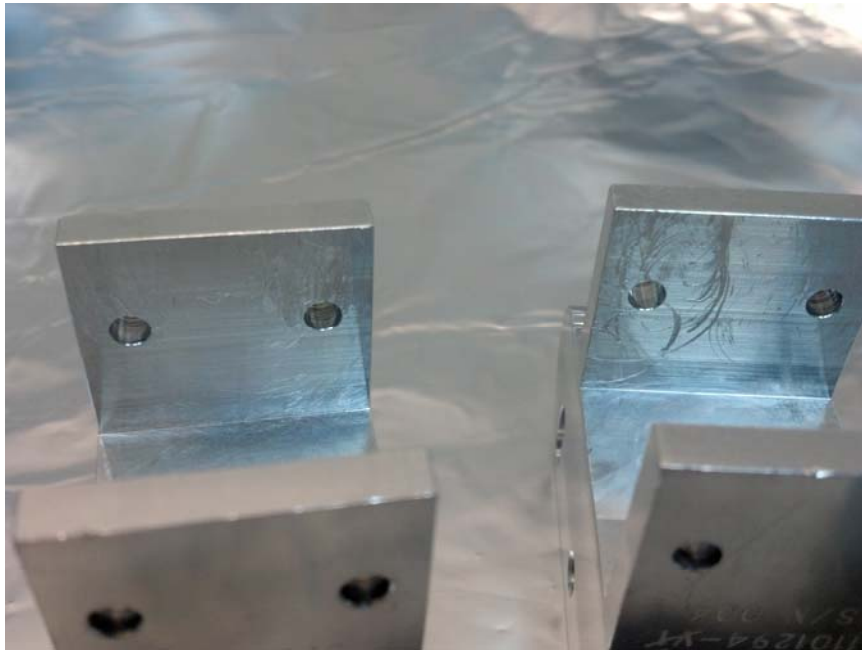


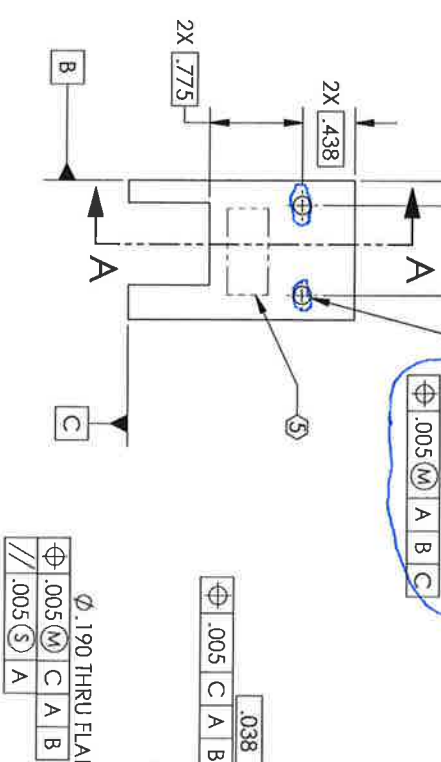
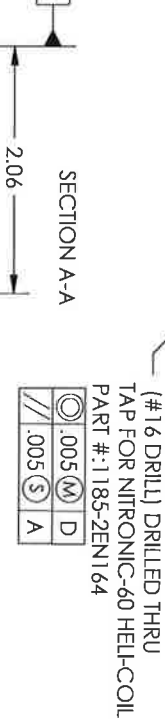
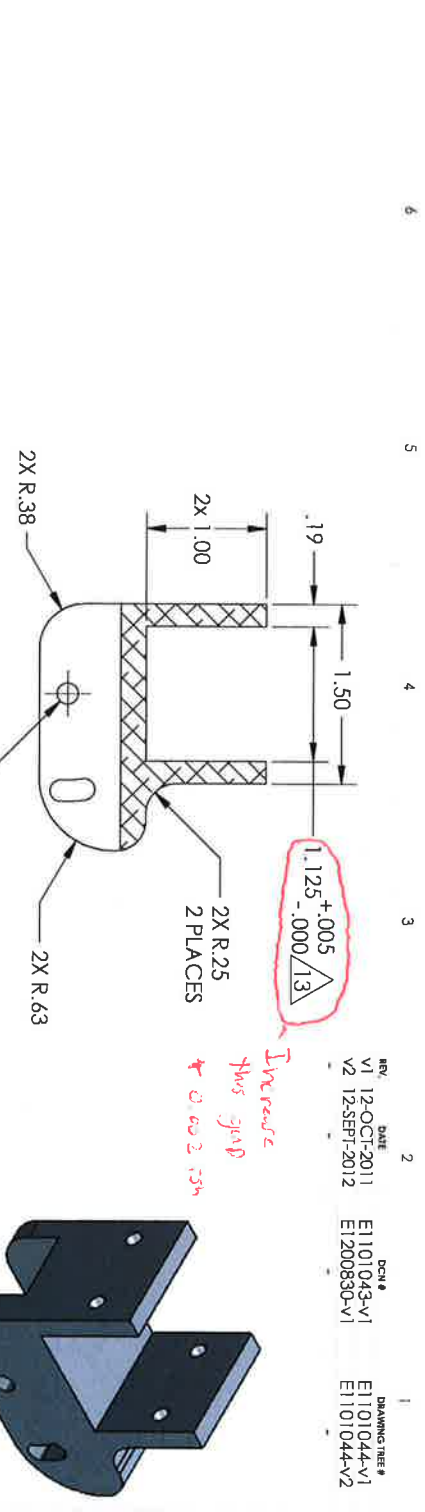
Figure 8) D1101294 after mating with D1101295

### 3) Suggestion for fixing/ conclusions

- I think the easiest way to solve these problems is to work on D1101294. Below is a marked drawing, but I would suggest for ease in the future that we open up the gap (again) on D1101294 where it mates with D1101295 as well as the gap that mates to the mirror by a few thousandths. These will allow for ease of pivoting as well as assembling.
- I would also suggest that we slot the holes to allow for any tolerance differences between the separation of the mating holes on D1101295 and the distance between the mirror walls. This isn't critical since I was able to get the screws in, but it was pretty tight.
- I also don't think any of these findings should hold up the ordering of the remaining SM1 mirrors (D1101014)

- NOTE CONTINUE:
1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
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  4. APPROXIMATE WEIGHT = 0.15 LB
  5. MACHINE ALL SPACES TO REMOVE EXCESS AND FINISH PER TO SPECIFICATIONS.
  6. ALL PARTS SHALL BE MANUFACTURED IN ACCORDANCE WITH LIGO SPECIFICATION 5500384.
  7. ALL HELICOIL HOLES TO BE PREPARED ACCORDING TO LIGO SPECIFICATION 5500384.
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  10. ALL MATERIAL IS TO BE PERSON MATERIAL AND NOT BE REPAIRED OR REWORKED. ALL REPAIRS SHALL BE APPROVED IN ADVANCE AND IN WRITING BY LIGO LABORATORY.
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$\text{Ø} .190$ THRU FLANGE	13
$\text{Ø} .178$ (2 PLACES)	5
$\text{Ø} .150$ THRU ALL 2 PLACE	13

$\text{Ø} .005$ (M) C A B	13
$\text{Ø} .005$ (S) A	5

$\text{Ø} .005$ (M) D	13
$\text{Ø} .005$ (S) A	5

$\text{Ø} .005$ (M) A	13
$\text{Ø} .005$ (S) A	5

NOTES AND TOLERANCES (UNLESS OTHERWISE SPECIFIED)

1. FINISH: ALL DIMENSIONS ARE TO BE HONED TO THE NEXT HIGHER FINISH UNLESS OTHERWISE SPECIFIED.

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3. DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

4. APPROXIMATE WEIGHT = 0.15 LB

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REVISIONS

REV	DATE	BY	DESCRIPTION
V1	12-OCT-2011	E1101043-V1	
V2	12-SEP-2012	E1200830-V1	
		E1101044-V1	
		E1101044-V2	

CALIFORNIA INSTITUTE OF TECHNOLOGY  
LIGO MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DESIGNER: W. JACOBSON  
CHECKER: G. SAKARIEN

DATE: 12-OCT-2011  
DATE: 12-SEP-2012

SCALE: 1:1  
POSITION: 1

PART NAME: H1-L1 STEER M1 AZ BRACKET

SIZE: DWG. NO. D1101294

DATE: 12-OCT-2011

SCALE: 1:1

POSITION: 1

MATERIAL: 6061 Alloy

FINISH: 63 μinches

APPROVAL: W. JACOBSON

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