

## Analysis - Feature #1967

### diffuser geometry

09 May 2018 16:22 - Rogers, Chris

<b>Status:</b>	Open	<b>Start date:</b>	09 May 2018
<b>Priority:</b>	Normal	<b>Due date:</b>	
<b>Assignee:</b>	Rogers, Chris	<b>% Done:</b>	0%
<b>Category:</b>		<b>Estimated time:</b>	0.00 hour
<b>Target version:</b>			
<b>Description</b>			
Update to diffuser geometry...			

#### History

##### #1 - 09 May 2018 16:30 - Rogers, Chris

- File *vb\_diffuser\_note.pdf* added

##### #2 - 10 May 2018 10:25 - Rogers, Chris

- File *diffuser\_geometry.pdf* added

Aim is to update the diffuser geometry to include the full aperture including e.g. support material. Just digging around I noticed that the irises as implemented have radius ~ 70 mm rather than the nominal 100 mm. That might not help! Looks like there is some darkness (step files?) interfering with the geometry at 70 mm... digging...

##### #3 - 10 May 2018 11:13 - Rogers, Chris

- File *diffuser\_geometry\_v2.pdf* added

My mistake, I had a factor of  $\sqrt{2}$  in the last plot.

ps: red is metal, blue is tufnol, yellow is gas

##### #4 - 10 May 2018 16:05 - Rogers, Chris

- File *diffuser\_support.gdml* added

- File *diffuser\_geometry\_v3.pdf* added

Well, it might be better. I made the TUFNOL bits so that they fit to the diffuser bits. Not sure if that should really be flush, but it sort of looks that way from the CAD. I added an Aluminium insert at the downstream end. I got rid of all the holes in the previous implementation.

I note that the downstream end of the diffuser is not quite flush with the Air:Helium window interface; that there is air missing in several places; that the fibres, which run around the outside of the diffuser, and the diffuser can itself are not represented. I more or less had to guess at the length of the tufnol pieces because I could not figure out how to map the CAD picture from Joe on to the note from Victoria and the actual stuff implemented in MAUS. It's probably reasonable.

ps: red is metal, blue is tufnol, yellow is gas

##### #5 - 11 May 2018 09:54 - Rogers, Chris

By email from Joe Tacon:

[What I called an Aluminium insert] is the stainless backing ring with a ID of 260mm and is 10mm thick

The drawing in the document you sent [vb note] is VERY old and changed since then, but looking at the assembly I sent you there have been changes to the final diffuser since I did that assembly; the 2 iris's closest to the opening of the "top hat" had to be made with a mixture of brass backed tungsten so they will be slightly thicker this was never put into the final model because we didn't have time and were doing it on the fly.

So it sounds like we don't have a good model of what was actually used. I guess my "guesswork" is probably reasonable; though I have changed the Aluminium backing ring to a (vanilla) steel one.

##### #6 - 17 May 2018 11:42 - Rogers, Chris

- File MICE Diffuser Dimensions.pdf added

Add measurements made by Tony Millington

**#7 - 24 May 2018 01:46 - Rajaram, Durga**

I got rid of all the holes in the previous implementation.

Are you referring to the tessellated tufnol bits in the SolenoidUS geometry?

**#8 - 24 May 2018 09:27 - Rogers, Chris**

- File SolenoidUS.gdml added

For information I put diffuser\_support.gdml in SolenoidUS.gdml. I removed some TUFNOL step files to get rid of the old support structure (you can find them if you search SolenoidUS.gdml for TUFNOL, I can't remember whether upper case or lower case).

For reference, I attach my SolenoidUS.gdml (run 10052)

**#9 - 25 May 2018 02:12 - Rajaram, Durga**

Add measurements made by Tony Millington

What is key to the the color code in the drawing?

**#10 - 25 May 2018 02:49 - Rajaram, Durga**

Also, seeing no iris metal in the open geometry. Probably some overlap.  
Shouldn't the spacers extend up to 160 to stow away the irises when they're opened?

**#11 - 25 May 2018 10:54 - Rogers, Chris**

What is key to the the color code in the drawing?

I assumed they were just meant to indicate different Irises (looks like a powerpoint drawing). Do you want me to ask?

Shouldn't the spacers extend up to 160

Looking at the CAD drawing it looks like even in the open position the irises don't extend beyond 130 mm.

**#12 - 25 May 2018 13:20 - Rajaram, Durga**

Rogers, Chris wrote:

What is key to the the color code in the drawing?

I assumed they were just meant to indicate different Irises (looks like a powerpoint drawing). Do you want me to ask?

That'll be helpful!

The drawing shows almost double the thicknesses of what we have. For e.g. iris1 in the geometry is defined as 2.97mm Brass and the drawing shows two disks 2.92 and 3.05?

And also iris2 is shown as thicker than iris3, contrary to the diffuser note and what we have.

Slightly puzzled

Shouldn't the spacers extend up to 160

Looking at the CAD drawing it looks like even in the open position the irises don't extend beyond 130 mm.

Hm..ok..if that's really how it was

**#13 - 31 May 2018 18:01 - Nebrensky, Henry**

- File *MICEDiffuserDimensionsSurvey-RevA.pdf* added

Attached is updated drawing from Tony Millington including the Perspex(?) and aluminium windows across the ends.

For reference, there is another Tufnol ring ("Support Ring B" in the CAD drawing) just upstream of the Perspex window ("Iris Protection Plate") which carries the limit switches for the actuators - this is visible at the front in [photos](#) - and has a clear aperture about 250 mm dia.

The 200mm dia. apertures mentioned on this drawing will be those in the Tufnol rings right by the petals (background of photo). These apertures can have 1 or 2 mm of the *back* of a few of the petals intrude when the iris is open; but that will be a right hassle to measure.

Neighbouring petals must slide past each other, so each iris actually has two layers - I presume that's why they're drawn like that. I guess he's measured the thickness of one petal in each layer (I wasn't there for either survey).

It's hard to tell by eye, but the thick brass (2) could well be slightly thicker than thin "Tungsten" (3) and FWIW this is also consistent with the cartoon in the controls panel - see [Diffuser/EPICS Sanity check](#) . Materials given in that eLog entry match the artefact on the Tracker Lab floor.

**#14 - 04 June 2018 12:34 - Rajaram, Durga**

Hm ok the two-petals-theory makes sense.

Except for iris4 -- surprising that the two layers would be significantly different in thickness? [ 7.21 and 8.08 ]  
For the rest, the layers are ~ thickness, so I'm willing to maybe treat them as consistent and take an average.

FWIW, the geometry describes it as made up of Brass (2mm) + Tungsten (5.6mm). For irises 3 and 4, were the individual brass and tungsten elements surveyed?

**#15 - 17 June 2018 18:36 - Nebrensky, Henry**

I've added a couple of close-up pictures - looking in from the upstream side - in the [MICE Photo Album](#) under 5 June 2018:

<http://www.mice.iit.edu/mico/jpg/hn/20180601/MICEHall1067.JPG>

<http://www.mice.iit.edu/mico/jpg/hn/20180601/MICEHall1068.JPG>

I've deliberately closed the irises a little bit to try to make the petals easier to distinguish.

**#16 - 22 June 2018 15:33 - Rajaram, Durga**

- File *diffuser-fix-closed.png* added

- File *diffuser-fix-open-closed.png* added

Realized I didn't update this..

Had to implement the spacers in the iris modules to avoid overlaps.

Also made changes to the iris thickness + the iris-iris spacings to reflect what's in the drawing.

Attached closed & partly-closed

The two colors in the irises are the brass and tungsten

**#17 - 22 June 2018 15:35 - Rajaram, Durga**

This is already in the 2017/03 production geometry for runs  $\geq 10299$

However the support top hat requires the latest trunk to correctly apply the gdml

**#18 - 30 August 2018 09:28 - Rogers, Chris**

See the slides here:

[https://indico.cern.ch/event/750692/contributions/3107524/attachments/1706309/2749460/2018-08-28\\_emittance-evolution.pdf](https://indico.cern.ch/event/750692/contributions/3107524/attachments/1706309/2749460/2018-08-28_emittance-evolution.pdf)

Summary:

- The diffuser support is not implemented
- Probably we need to represent the upstream apertures (TKU butterfly, PRY) to get the correct answer

**Files**

File Name	Size	Date	Author
MICE DIFFUSER.pdf	228 KB	09 May 2018	Rogers, Chris
vb_diffuser_note.pdf	1.23 MB	09 May 2018	Rogers, Chris
diffuser_geometry.pdf	184 KB	10 May 2018	Rogers, Chris

diffuser_geometry_v2.pdf	182 KB	10 May 2018	Rogers, Chris
diffuser_support.gdml	4.44 KB	10 May 2018	Rogers, Chris
diffuser_geometry_v3.pdf	97.2 KB	10 May 2018	Rogers, Chris
MICE Diffuser Dimensions.pdf	191 KB	17 May 2018	Rogers, Chris
SolenoidUS.gdml	4.26 MB	24 May 2018	Rogers, Chris
MICEDiffuserDimensionsSurvey-RevA.pdf	235 KB	31 May 2018	Nebrensky, Henry
diffuser-fix-closed.png	7.78 KB	22 June 2018	Rajaram, Durga
diffuser-fix-open-closed.png	7.77 KB	22 June 2018	Rajaram, Durga