
Target and Dump Proton Beam Imaging Systems CDR

Target System CAD Integration

	Name	Role/Title
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Approver		

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1. SCOPE

This document describes the process that has taken place for the CAD integration of optical system inside the PBIP (Proton Beam Instrument Plug) and the target connection cell.

2. INTRODUCTION

To ensure sufficient space for optical system and no collision of mirrors and/or beam path towards the PBIP inner wall interfaces, 3D models have been used to communicate required space and space limits. As the persons involved in the work uses different CAD programs, step files have been used to share models. As can be seen in section 5, the models had to be sent back and forth a couple of times, until a final solution was found. Both due to updates for the PBIP model that was not known to us, and to find the most optimal beam path.

3. GLOSSARY

See also: <https://confluence.esss.lu.se/display/BIG/Abbreviations>

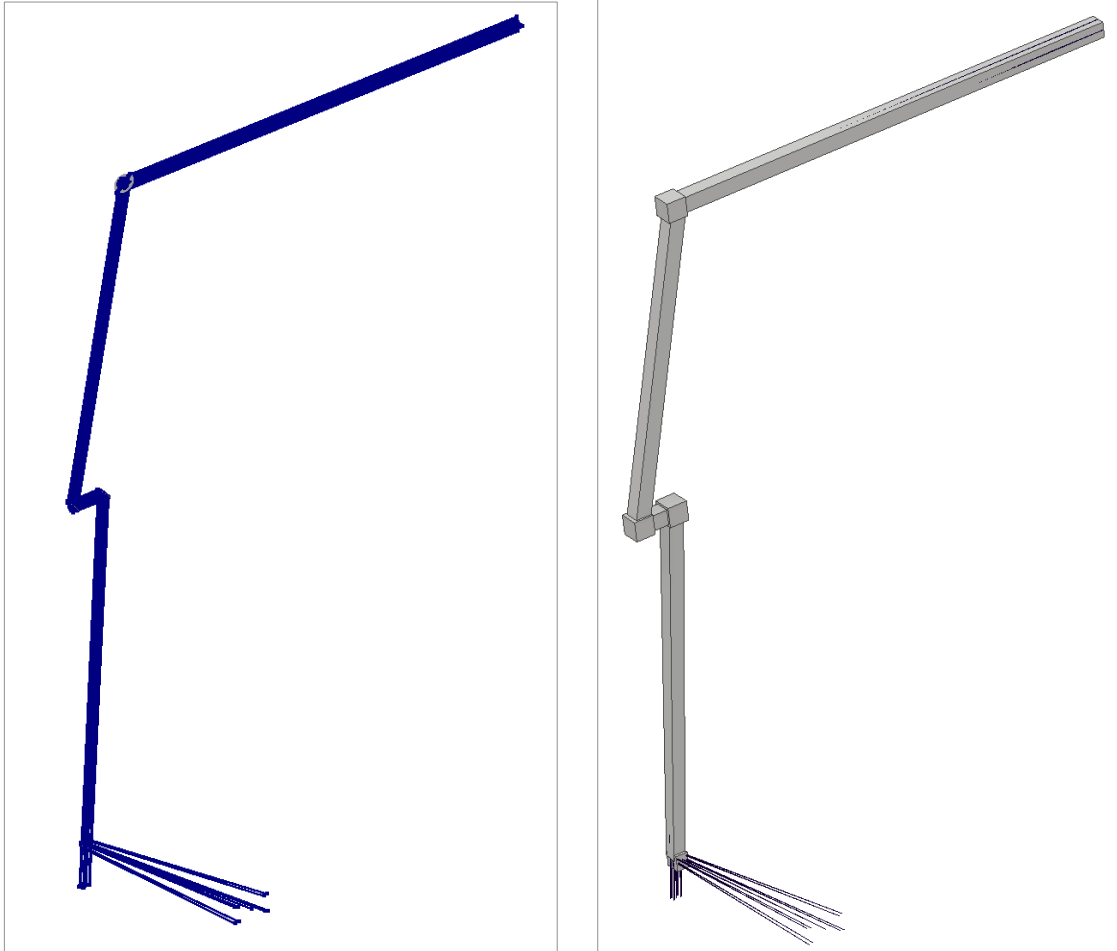
4. DOCUMENT REVISION HISTORY

Revision	Reason for and description of change	Author	Date
1	CDR	Maren C. Lithun	2017-10-01

5. INTEGRATION PROCESS – INSIDE PBIP

(18 Oct. 2016)

Beam path transported as step model from Zemax to Autodesk inventor. Simple boxes were modeled in Inventor, to mark required space for beam path and mirrors.



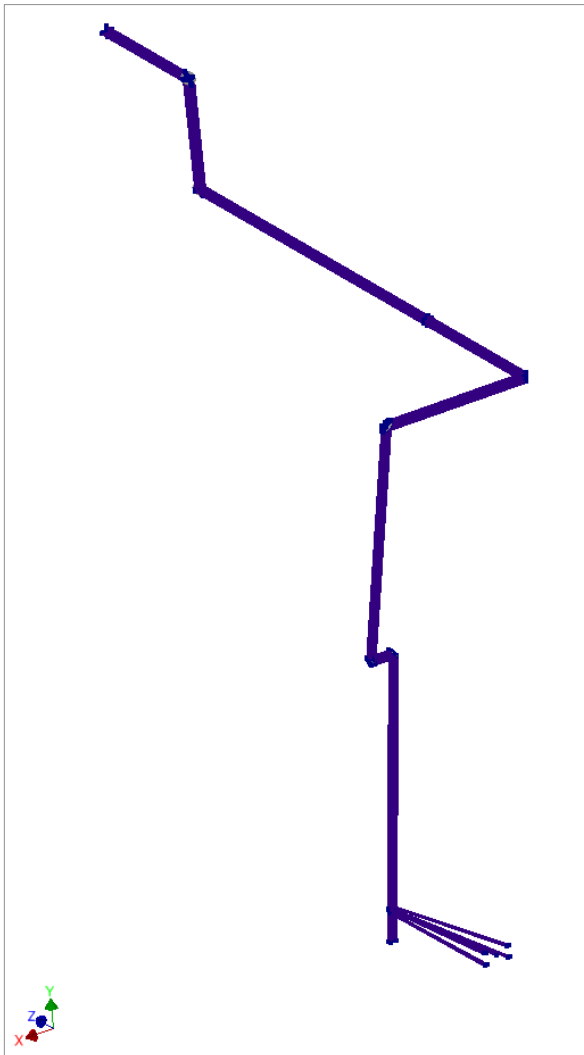
Integrating the above model into model of the Plug, showed that there were collisions between the models, and parts of the beam path was also located outside the PBIP. Thus a new adjusted beam path was created.

Adjustments (19 Oct 2016):

- Angle of path up from the first mirror is closer to vertical
- Distance from mirror 2 to mirror 3 is reduced slightly
- Angle of path up from mirror 3 is closer to vertical
- Distance between mirror 3 and 4 has increased.
- In addition, angle is adjusted towards mirror 1. Looking towards the path projected in xz plane in PBIP coordinates was previously one degree away from z-axis, now it is 0,9 degrees.

To get the path imported correctly into the plug:

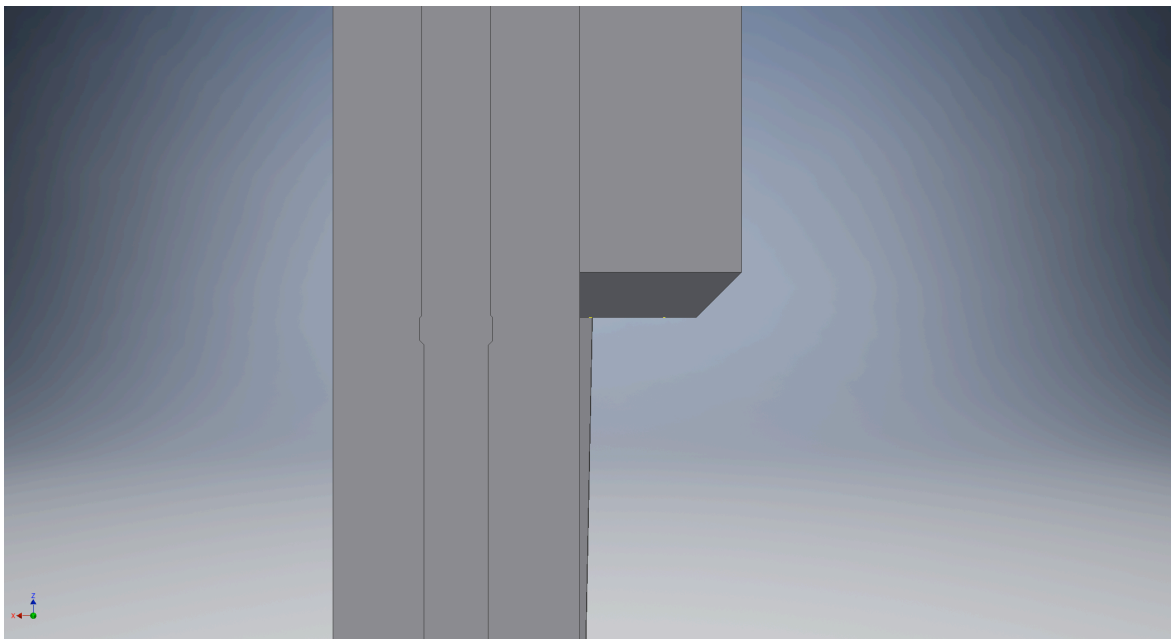
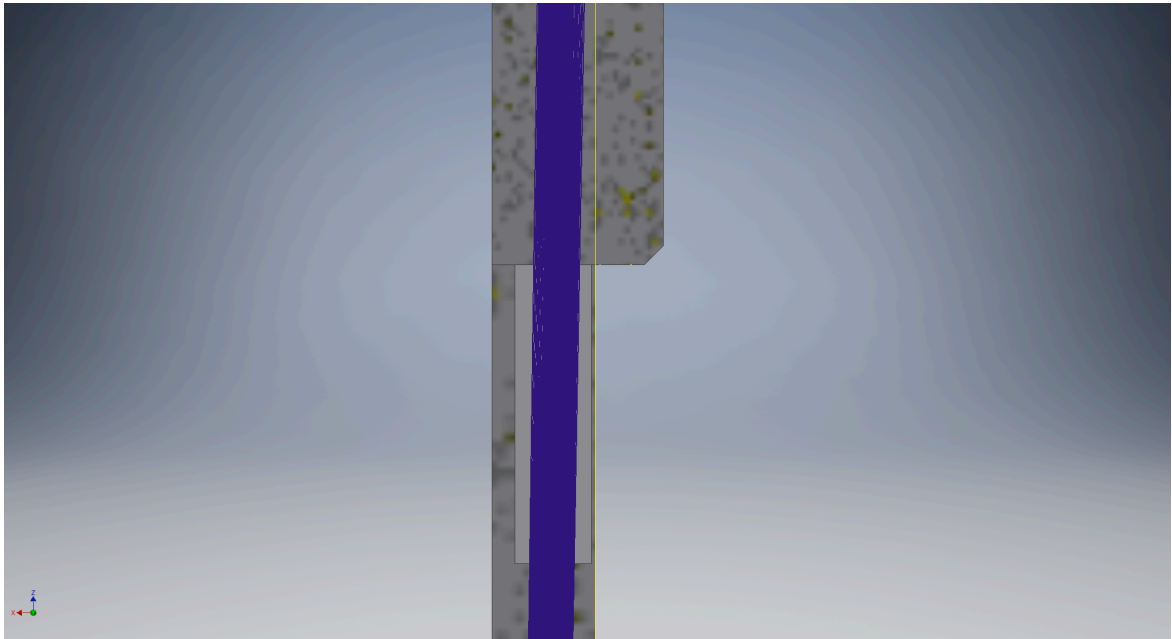
- * Rotate path 90 degrees around x-axis
- * Rotate path 90 degrees around z-axis
- * Move path 1540mm along x-axis

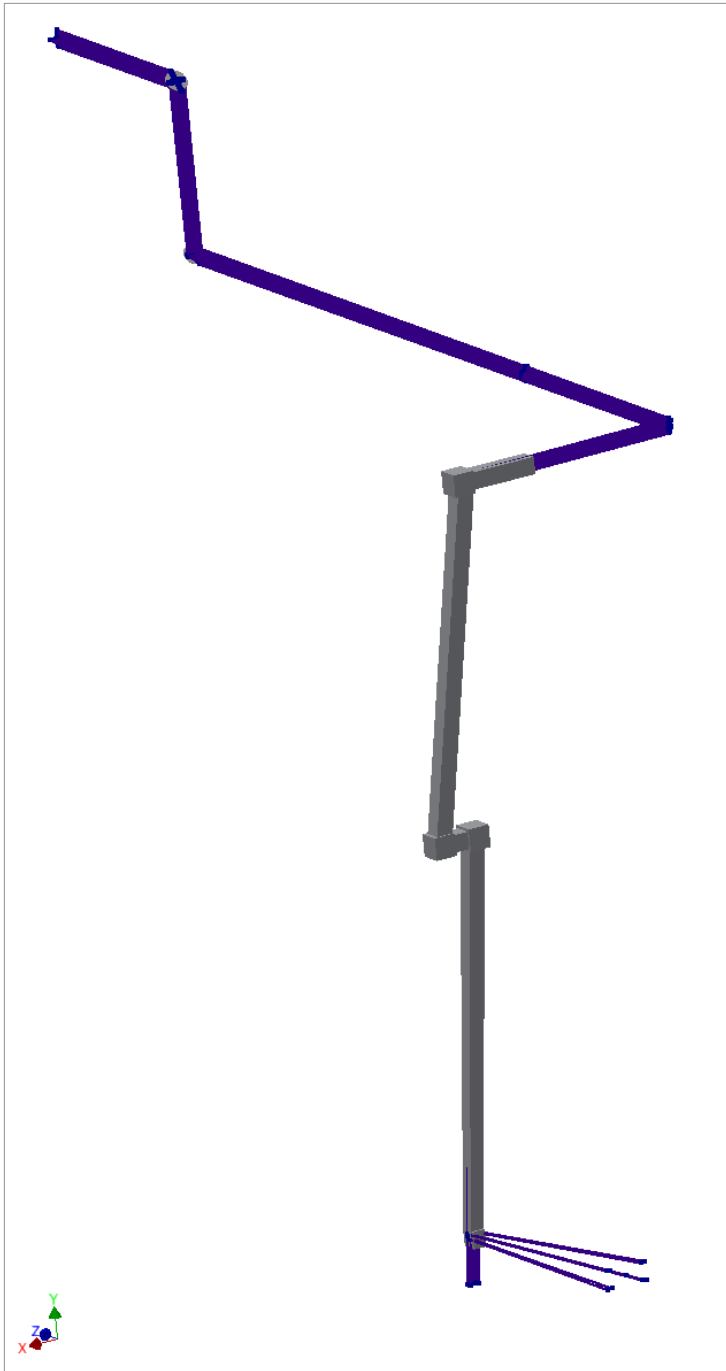


File: NONE_4_req_space

(21 Oct. 2016)

New beam path fits much better into the plug, compared to the previous beam path, but one of the space marking boxes lies slightly outside the plug (5,5 mm)





Model: NewModel_boxex_space

(21- Oct 2016)

To solve conflict, (1546mm instead of 1540mm)

Small adjustments – no conflict

(22 nov 2016)

“Hello Reinhard,

The single chicane design for the PBIP was approved. Attached is a CAD model containing rays, mirrors, as well as a volume around the rays and mirrors in the PBIP.

If the PBIP part of the system needs adjustment, please let us know.

The path from the top of PBIP that extends through to the AT2 access area, will for sure need some adjustments, for now we are focusing on the PBIP path.

(6 Dec 2016)

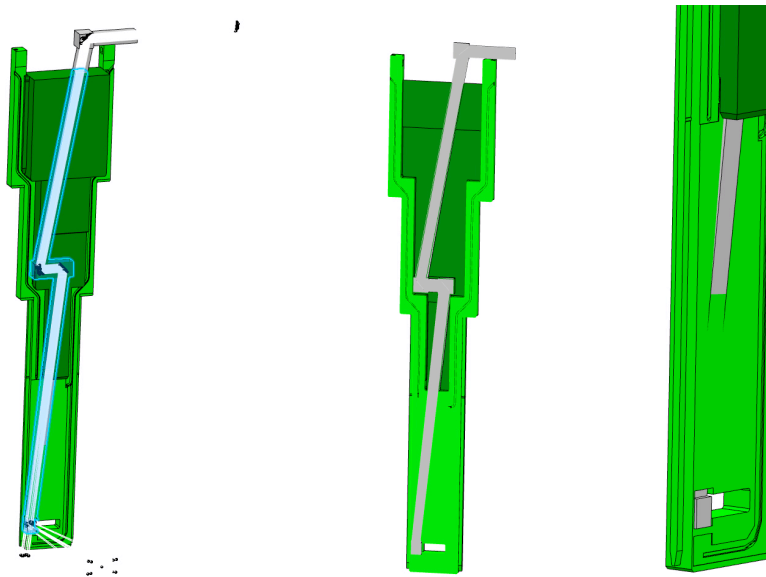
Hello Håvard and Maren

Now I can send some pictures and a STEP file after the implementation of your optical path into our model of the PBIP.

The STEP file contains only the two blocks with the new apertures for the optics.

The volume around the rays is sticking out a bit from the front of the (lower) Slice Body, but the rays “stay inside” the optical blocks of the PBIP.

Best regards,
Reinhard



Model: PBIP-Optical Slice Body A and Optics Block upper.stp

(6 Dec 2016)

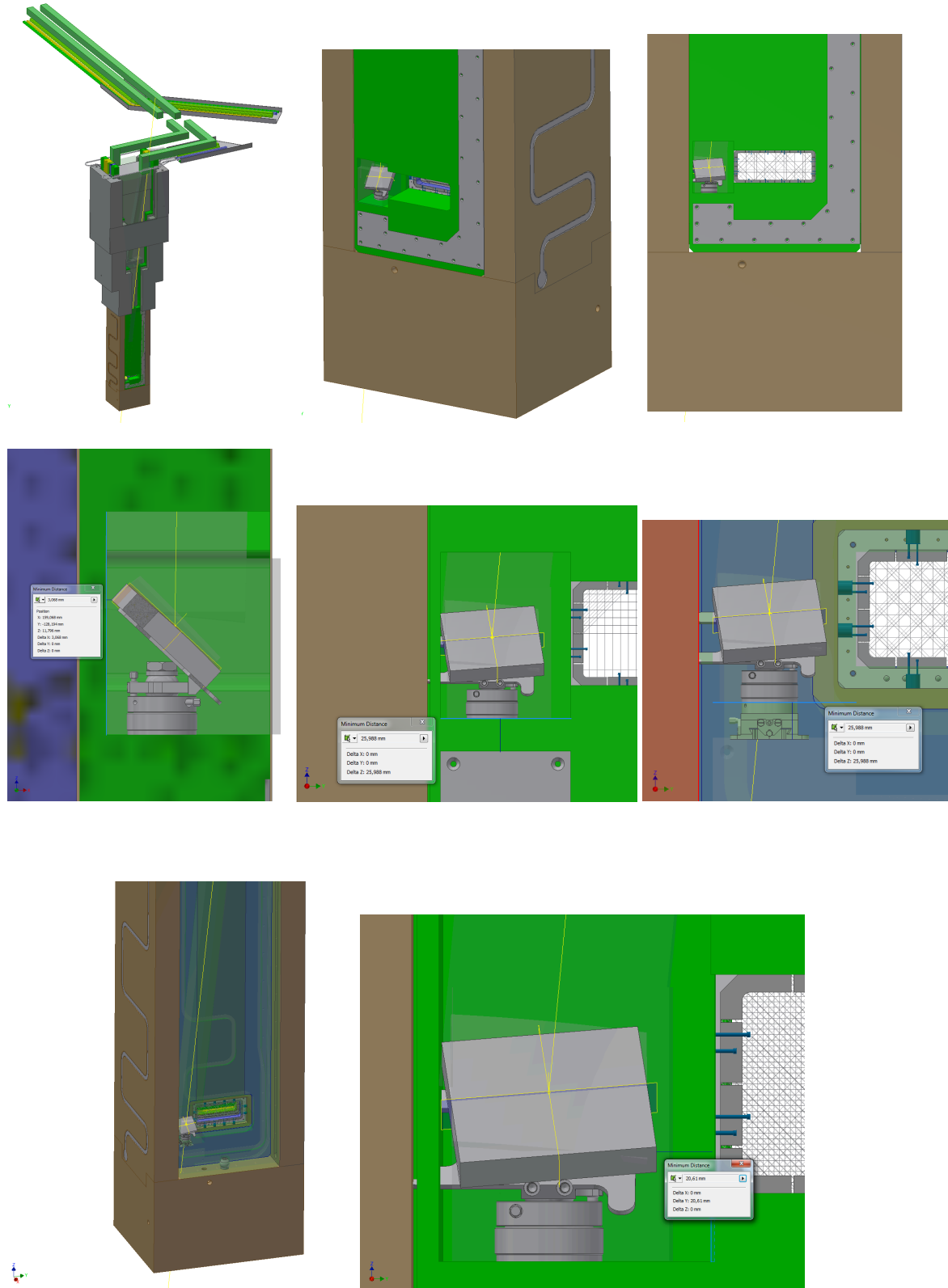
Thanks a lot, Reinhard,

We will make adjustments, so that the volume does not stick out.

Håvard

(14 Feb. 2017)

Temp. model, with simplified sketch for rays:



Update of model:

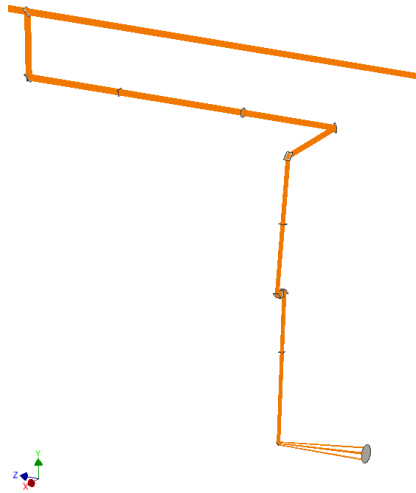
1. New model of Bendamount, with tilts closer to the final solution
2. A new model of mirror with rays. In the updated version, the first mirror is not rotated around the optical axis, and it includes some apertures, as in Zemax.

Figures of mirror with mounts for the 1st and 3rd mirror:



(22 Feb. 2017)

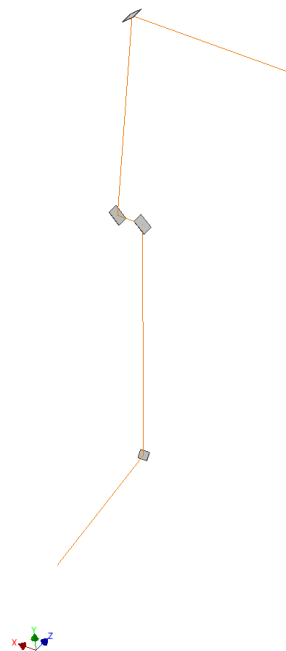
New model with adjusted mirror 3:



(23 Feb. 2017)

Updated CAD file of PBIP mirrors. Almost identical with previous model, but some errors in Zemax has been corrected.

The file was integrated into PBIP model and sent to Reinhard. (See next page)



(24 Feb. 2017)

Hi Reinhard,

Attached is PBIP step model with mirror positions. (PBIP_n_mirror_positions_23_Feb.stp)

I have also attached model of each of the models placed inside the PBIP model:

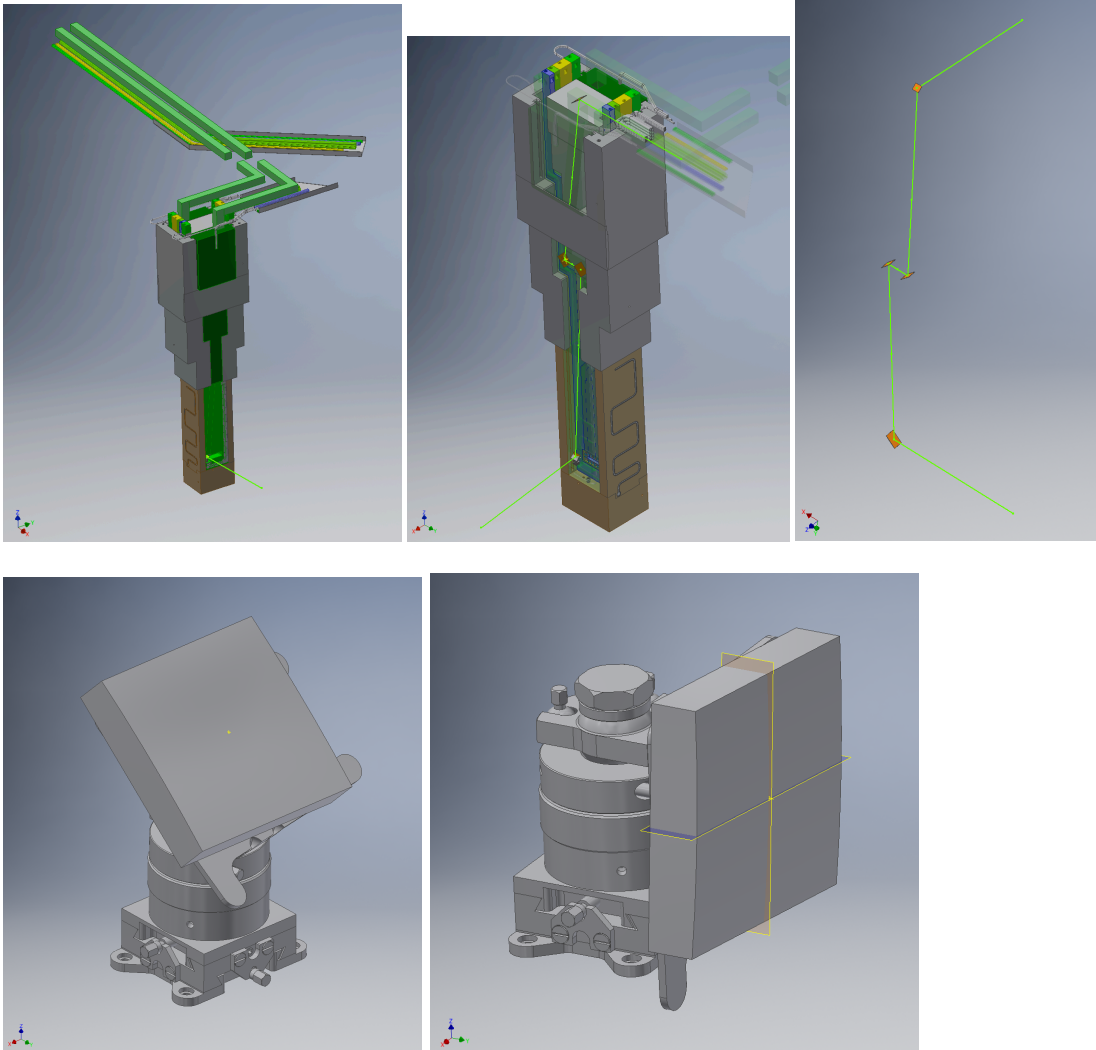
- Only mirror positions (final-PBIP-mirror-positions.step)
- Mirror mount 1 (Bendamount -1)
- Mirror mount 2 (Bendamount -2) This model is just a quick model (modified Bendamount -1 model), to get an indication of required space.

Attached pictures show the attached step files, and mirrors located inside the PBIP.

Don't hesitate to ask if anything is unclear.

Best regards

Maren C. Lithun



(24 Feb. 2017)

Hi all,

Now I have inserted the model from Maren with mirror positions into "our" PBIP model.
It seems to fit fine.

Best regards,
Reinhard

(24 Feb. 2017)

Thanks! This is then our nominal mirror positions going forward, and we do not intend to change them unless something unexpected happens.

This model should also contain the single ray going from the center of the object to the center of the image, as requested by Fabien.

Regards,
Håvard

(24 Feb. 2017)

Hello all,

This afternoon when I "double checked" our PBIP models with included Optics I discovered an important deviation:

The center of the object is not at the same position in X-direction when we compare "Maren's model" and "my model"!

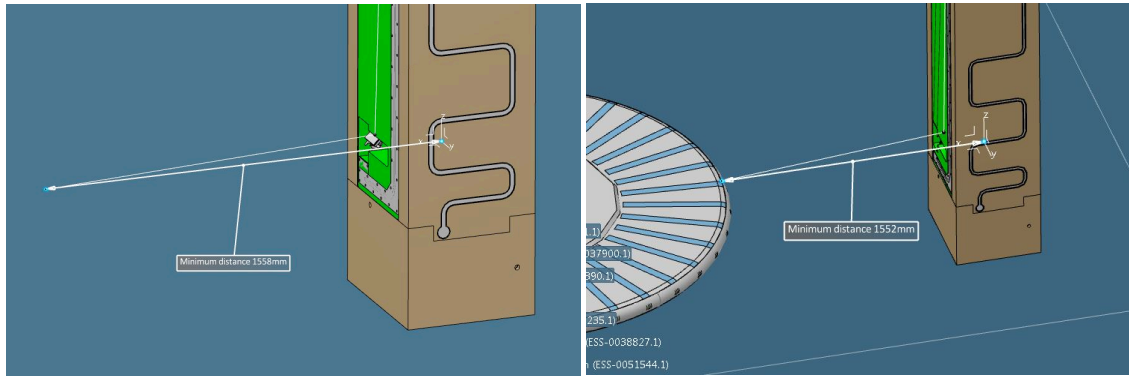
There is a deviation of $\Delta x = 6$ mm
As an illustration I add two pictures.

One first conclusion is, that there is an urgent need to supply from Lund to Oslo a better "overall – model" that includes even the Target Wheel (and the TCS).

Of course it can be discussed where we choose to lay the "Center of Object" in relation to the curved edge of the Target Wheel.

How do you define this position currently with respect to the TCS?

Best regards,
Reinhard



(24 Feb. 2017)

Hello Reinhard,

You are right. The difference is due to us moving the optical path forward as a CAD object, and me not adjusting the distance to the target in Zemax afterwards.

The error in the angle for the first mirror is about half an mrad, but I will send you an updated CAD file of the mirrors + central ray so that you have them Monday morning.

Regards,
Håvard

(27 Feb. 2017)

Hello Reinhard,
Attached is a STEP file with the object 6 mm closer to the mirror.

You are right that we do not have a good overall model in Oslo. Naja once supplied us with a model of the target wheel, the proton beam window, the two plugs, the viewports in the vacuum vessel and the shielding wall. Several of these elements have now changed, so it would be good to have an up to date version of all this. Would you be the one to ask for something like that?

Thanks for double checking, and pointing out the error!

Regards,
Håvard

(27 Feb. 2017)

Hello Håvard,
Thanks for supplying new STEP files.
Now I will put in the new model with only optics into our PBIP model and compare the result with your PBIP model with included optics.

Best regards,
Reinhard

(27 Feb. 2017)

Hello again Håvard,

Now I have inserted the model from the file "final-PBIP-only-mirror- positions2.STP" into my PBIP model. I add two pictures of this configuration.

The resulting distance of the object (first point on Single Ray) is now 1546 mm.

The resulting distance of this point to TCS is 184 mm.

I want to ask the following questions:

- 1) Is this reflecting your intended configuration?
- 2) Which should be the distance of the object from TCS?
- 3) Which is the intended distance of the first point on ray (object) from the center of the PBIP?
- 4) Which is the "mate" or ("engineering connection" in Catia) of the Optics relative to the Optical Slice in your models?
- 5) Could you send another Step file representing the PBIP with integrated Optics?
(An update of "PBIP_n_mirror_positions_23_Feb.stp")
(Your file this morning "integrated.step" shows only the Single Ray and not the PBIP.)

When checking this updated file I would like to verify, that we implement the Optics into the PBIP in the same way, with other words, that we have the same relative position between Optics and Slice Body.

As I wrote this morning, we want to provide a better overall model to you, but meanwhile I would like to list some basic dimensions, just for a quick check:

Distance TCS – Center of PBIP:	1730 mm
Diameter Target Wheel:	∅ 2616 mm
Distance rotational Axis of Target Wheel from TCS:	1122 mm
Distance from TCS to edge of Target Wheel (BEW):	1308 mm –1122 mm = 186 mm

I am aware that my questions are partly redundant, but I would like you to answer them all, in order to get more clarification.

Best regards,
Reinhard

(27 Feb. 2017)

Hello Reinhard,

Hopefully, the attached file contains more information this time around. I tried comparing this with the model that Maren sent you, but my free CAD program is not really able to deal with files of this complexity. What she sent should be the reference.

The position of the mirrors in this version should be virtually identical to the mirrors in the model Maren sent to you, with a fraction of a mm difference on the edges of the first mirror due to the adjustment of the tilt.

The exact distance and position of the beam entrance window is not something we have focused a lot on. If the distance is wrong, this can be fixed by refocusing the lens. If the position is wrong, this can be fixed by adjusting the angle of the first mirror, without us needing to move any of the mirrors. It is clearly something we should start to think about, however, since we may now end up with a less flexible first mount.

What me and Maren have focused on is mainly positioning the mirrors within the plug. They must be positioned so that the clear aperture between them is as large as possible. Basically, we want as much as possible of the mirror surface to be visible through the aperture above, while having sufficient space for adjustments and mounts.

Inline image 1

The central ray and the mirror positions are exported from Zemax optics studio. This is not a CAD program, the mirrors are placed not by position, but by local coordinate transformations to adjust the optical axis, and propagation distances along this axis. We then import them by hand into the CAD models we've gotten from ESS to make sure the positions are ok. This makes some of your questions hard to answer directly.

1./2. I'm not even sure what TCS stands for, it is not something we have used as a reference. What we have thought about is the rim of the wheel, and the position of the first mirror. For now, the central ray should be within a couple of mm from the center of the nominal beam footprint in x and y on the rim. Looking at the old model with the target wheel we got from Naja, this appears to be true for this model.

The coordinate system transforms I used to insert the optical path into the model of the slice you sent is to rotate 90 degrees about x, -90 degrees about z, and translate along x by 195. I'm not sure Maren did exactly the same transform, I will check with her. The translation distance needed has varied in different step files we have gotten from ESS, so they do not all appear to have the same coordinate system, and they do not appear to have an origin at the TCS. This may come from problems with exporting or importing the files, I do not know.

3. This is modelled as a propagation distance in Zemax along the local z-axis, which points from the object towards the center of the beam aperture in the PBIP. The propagation distance is currently 1351mm, with the center of the mirror 158 mm to the side.

4. I do not think there is a mate for the mirrors, we apply rotations and translations by hand to center the mirrors on the apertures. We've iterated between CAD and Zemax to optimize the positions.

5. See attached. Using the position of the mirrors in the file Maren sent is better than using this file, though.

If the attached file does not contain sufficient detail, we may have to wait until Maren is back and has more time for our project. I'm also sure she can give better and more complete answers to your questions, if needed.

If you can send me a STEP file containing only the mirrors + ray and the optical slice + block, I can verify that we have the apertures we need pretty quickly. I then use a different export from Zemax containing several additional apertures used to model the plug in Zemax. If you'd include the rim of the wheel as well, I can make adjustments to the Zemax model too.

Regards, Håvard



(27 Feb. 2017)

Hello Håvard,

Thank you for your mail and the attached file. Unfortunately I didn't have the possibility to look at it yet.

Regarding TCS: It stands for "Target Coordinate System" and is the main coordinate system within Target (and the whole ESS facility).

It is of great value for us, when placing different components together and defining relative positions.

(But even the PBIP and the Target Wheel have their own coordinate systems, which are located on precise positions relative to TCS; PBIP: $x=1730$, Target Wheel $x=-1122$)

When I position your Optics Design (Mirrors and Rays) I anchor these to the local coordinate system of the Optical Slice (or more exact: to an "envelope assembly", that is named "Optical Set").

Regardless how a detail is actually anchored, the position relative to the TCS can always be determined.

Before sending a new STEP file to you, containing mirrors + ray and optical slice + block, I want to be sure, that I place mirror + ray correctly. (What that means, is what we must agree upon.)

Best regards,
Reinhard

(27 Feb. 2017)

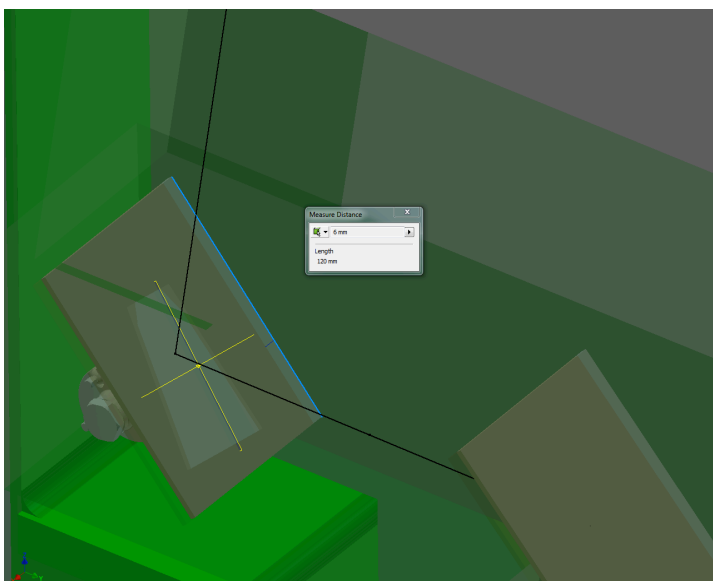
Hei Håvard,

Differensen som Reinhard kommenterer på 6mm har same størrelse som endring jeg kommenterte da jeg skulle sette inn siste versjon av mirror position. Når jeg satte modellen inn i PBIP assembly, så måtte jeg endre distanse fra 295 mm til 201 mm, for å få speilene til å ligge riktig.

Jeg har nå satt inn den siste modellen som du sendte i mail til Reinhard ("integrated.step")
Speilene i "integrated.step" modellen ligger 6mm lenger ned i PBIP, sammenlignet med siste versjon av modell som vi jobbet med sist du var innom verkstedet. Se vedlagt bilde.
Ettersom "integrated.step" fila ikke inneholdt ray, så får jeg ikke sammenliknet ordentlig med den forrige modellen, med tanke på lengde på første ray som går fra "curved edge of the Target Wheel" (som Reinhard refererte til)

Kan du sende over siste versjon du har med ray inkludert? (gjerne som igs fil)

Maren



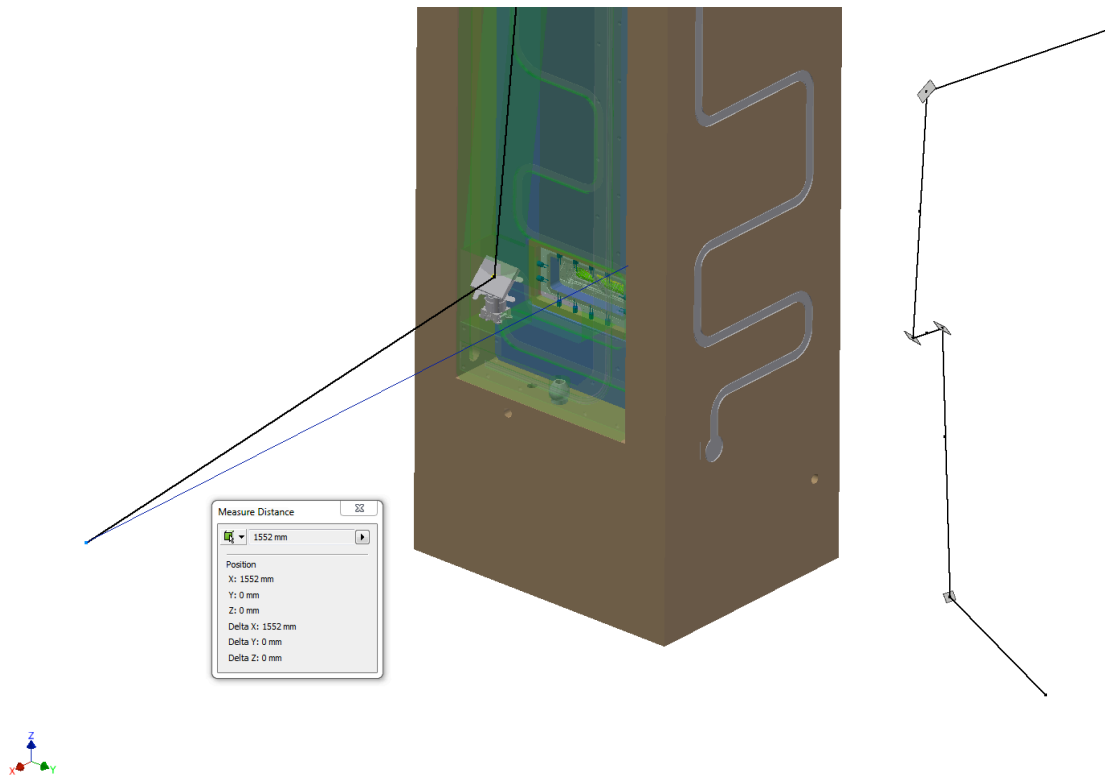
(28 Feb. 2017)
Hi Reinhard,

The step file "integrated" that was sent to you yesterday (27. Sep) , has wrong location of mirrors relative to the PBIP.

Attached is new model (PBIP_n_mirror_positions_377_28_Feb_2). This new model has both correct location of mirrors inside the PBIP and correct distance to curved edge of the Target Wheel (1552 mm)

I have also attached step file of the mirrors, including ray. (Se figure "Capture_final-PBIP-mirror-positions2_2 ")

Best regards
Maren



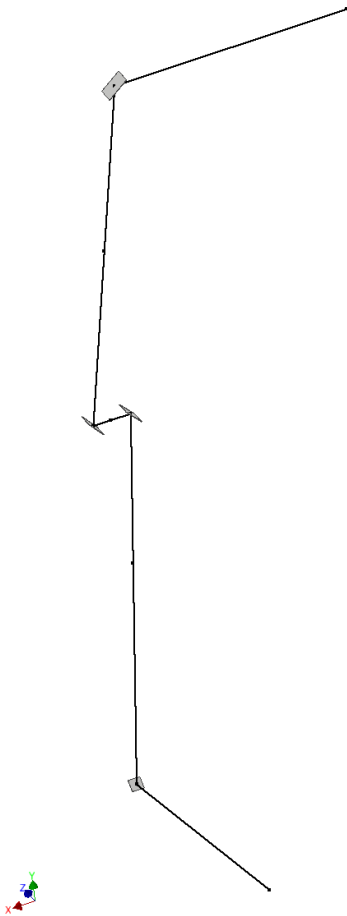
(28 Feb. 2017)

IGES file, two adjustments for the Zemax file:

1. The object is now 6mm closer to the PBIP
2. Since the object is moved towards the centre of the PBIP, and not towards mirror 1, the angle must be adjusted ($< 1\text{mrad}$)

The ray and mirror position is identical to the previous model, after mirror 1.

Issue flagged earlier is solved; new distance to "curved edge of the Target Wheel" is 1552 mm.



(28 Feb. 2017)

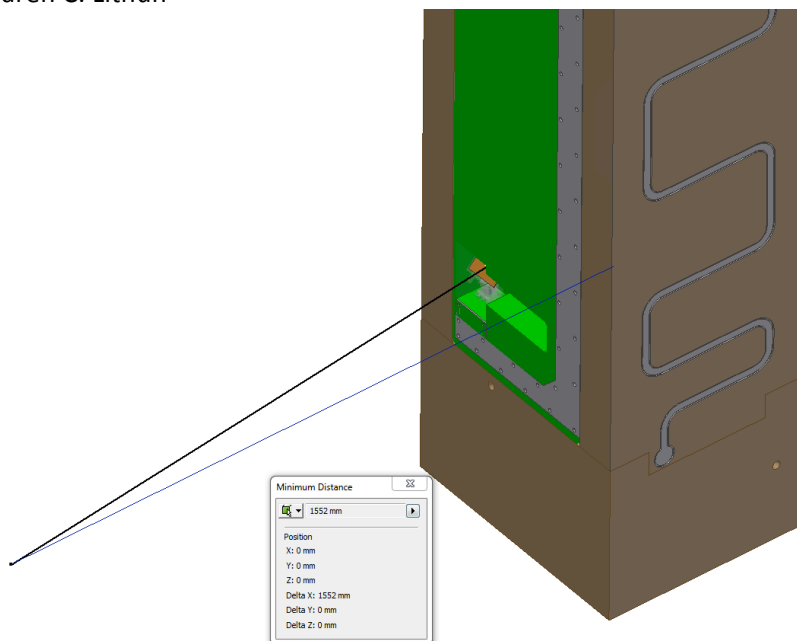
Hi Håvard and Reinhard,

Here is updated model, after some final adjustments.

The distance to curved edge of the Target Wheel is still 1552 mm, but the mirrors have been moved for better alignment inside the PBIP.

In this 3rd version of the assembly (PBIP_n_mirror_positions_377_28_Feb_3), we have used the original mirror model, se attachment "final-PBIP-mirror-positions3.stp"

Best regards
Maren C. Lithun



(2 March 2017)

Hello all,

Here I want to send simplified work files in order to clarify the dimensional context of our various coordinate systems. I hope these files could be useful for our talk on Tuesday and for the continuation of our work.

Work model_1 contains the rim of the Target Wheel (BEW = Beam Entrance Window) and Optical Slice Body, Optics Block upper and the latest Optics design (mirrors and single ray).

Work model_3 contains the rim, Optical Slice body, Optics Block upper and representations for the TCS and the coordinate system of the PBIP.

I add pictures of these models and a pdf showing the top view of workmodel_3 with indicated dimensions.

I think these are the main aspects that we should talk about:

1) Position of Object (first point on ray) in relation to the rim:

The object position in the latest design is 8 mm inside of the rim. Is this ok, regarded the curved surface of the rim?

Must we consider the layout of planned fiducials on the outside of the rim?

2) Anchoring of Optics relative to PBIP:

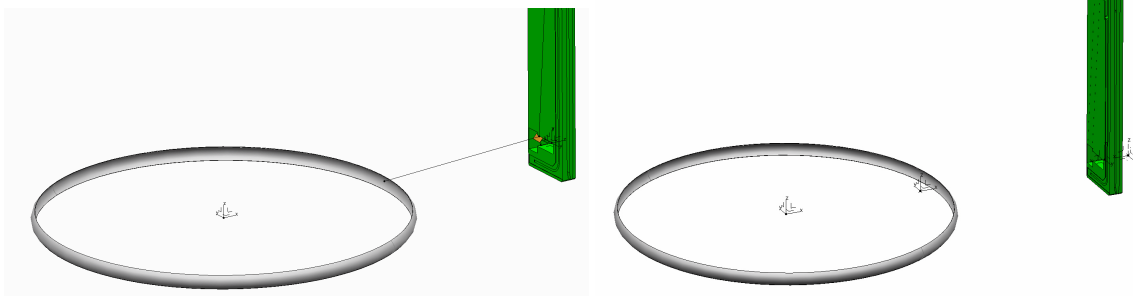
Now the Origin of the Optics is situated on the x-axis with 195 mm offset from the origin of the PBIP. This is all right for me. (The second point on ray is situated 158 mm sideways from the Optics origin.)

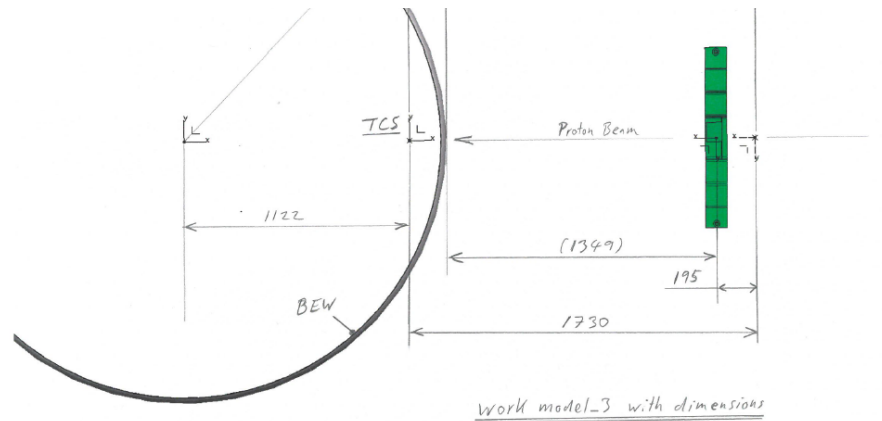
3) We should think about the implementation of the Mirror Mounts.

For me it is not obvious whether the Mirror Mounts are implemented by us in Lund or by you in Oslo.

Do you have preferences regarding this question?

Best regards,
Reinhard





(2 March 2017)

Hi Reinhard,

Thanks for the files! I am able to run them easily on my laptop in freeCAD, and will study them more in depth before Tuesday.

I have some clarifications to the list of topics for Tuesday, but we can discuss it more in detail then.

1) The short answer here is that the exact depth does not matter a lot.

The length of the ray from the first mirror to the rim can be adjusted by turning the focus ring on our lens, but the direction of it is fixed by alignment. If the direction is bad, it means the image is not well centered in the PBIP aperture. The lateral shift away from the true center of the BEW that comes from missing it by 8mm in depth, means that the direction is off by less than an mrad, which is small compared to the tolerances we have from installation.

I am not sure what the "correct" depth to focus on in the rim is. A colleague is now looking into what the beam footprint will look like when projected on the toroid and viewed from the side, which may give some answers. It may be a good idea to be centered at the BEW at the depth of the fiducials, as these are the extremes of the field of view we are required to see.

3) When we have our nominal mirror positions and the central ray in the official model, we can send it to Fabian and Tomasz, who will use these mirror positions and apertures to make sure the mirror mounts fit. The mount we will use for mirror two and three are not yet fully finalized. It is a smaller, stripped down version of the bendamount. This is something that me and Maren will have to look into as well, as we are wondering how thick the mirrors can be (they will have to be significantly thicker than the volumes from the Zemax export, we are hoping for >20 mm).

So it will take some more time before we are ready to integrate the mounts into the official models.

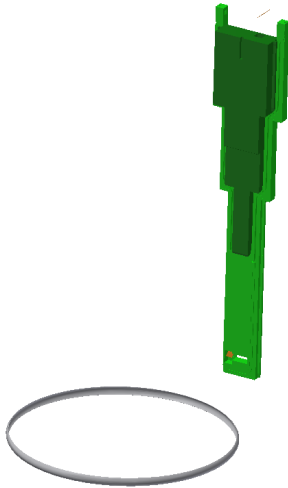
Regards, Håvard

(9 March 2017)

Hello Maren and Håvard,

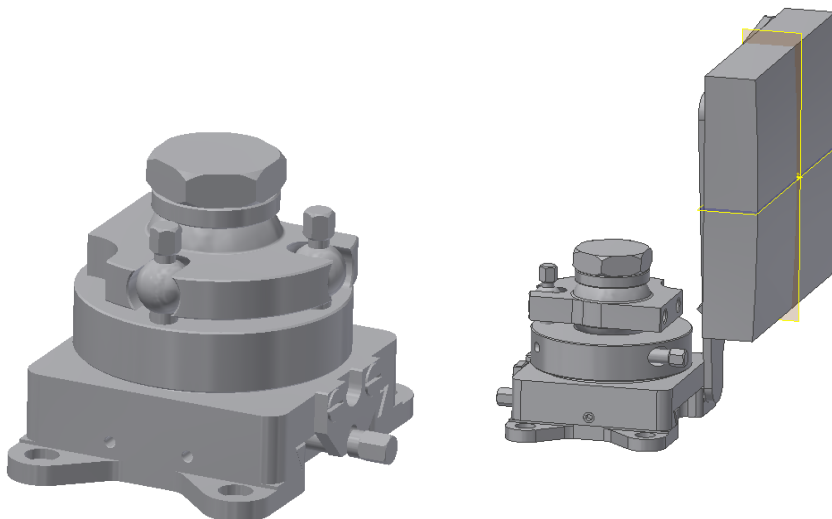
Now I want to send a new work model in STEP format again, because I have been thinking about another way of marking the optical path in the model: I put in new lines manually along the ray. I hope that these lines are shown on Maren's cad system, when she imports the file.

Best regards, Reinhard



(13 March 2017)

4dof bendamount design:



Model:- Product1144785 - Rev 1.0 - Preliminary

(4 May 2017)

Hello Mattias and Reinhard,

I am now working on finalizing the optical paths for both the target wheel and the proton beam window. CAD files for both paths are attached below. The TW path is the same as we sent earlier, only extended all the way to the camera.

The transformations for including them in the PBIP coordinate system are the same as last time for the TW system:

90 degrees about x
-90 degrees about z
195mm along x

The PBW system is just rotated 180 and shifted in the opposite direction. The positions of the mirrors within the plug are the same, but the continuation from the top of PBIP to the camera is different. The mirror sizes are also the same. The difference is the curvature and angle of the first mirror. Transformations are

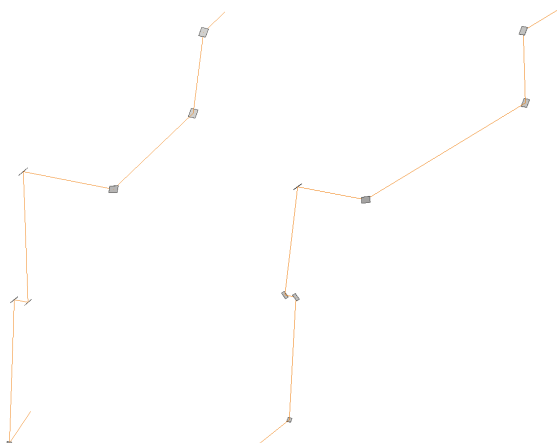
90 degrees about x
90 degrees about z
-195mm along x

From what I can see, the mirrors stay within the path both in the plug, and up to the shield wall.

From the models I have, I am not sure how much space we have for the mirrors behind the shield wall. Translating the mirrors along the x axis is easy to do in Zemax, and does not affect performance much.

Would it be possible to either get a simple model that indicates how much space there is behind the wall, or better yet, how much I have to translate the mirrors?

Best regards
Håvard



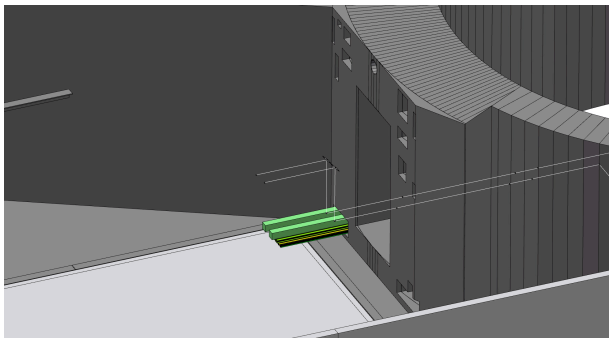
(9 May 2017)

Hello Håvard

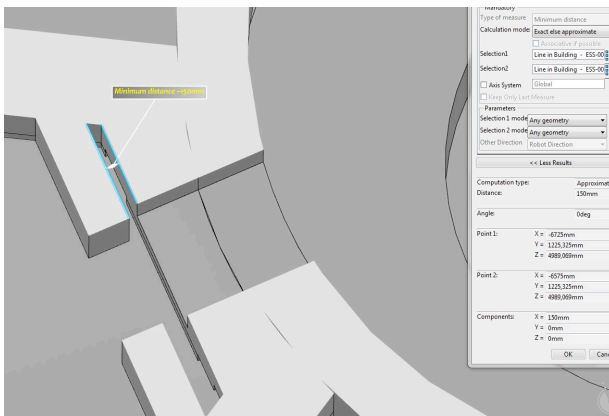
Thanks for your mail with the latest optics design last week. I have implemented your design into our model and checked with the building model. As we can see in pic 69 the rays end up quite good in room D02.115.4005 ("Tom's room"). But when I compare with another preliminary building model that even contains supplementary shield walls in Tom's room, I would say that further investigation is needed (see pic 70 and 71).

Unfortunately our colleague who is working on that is absent during this week, so I can check with him not before next week. Than we need to coordinate the routing of the optical path within this room.

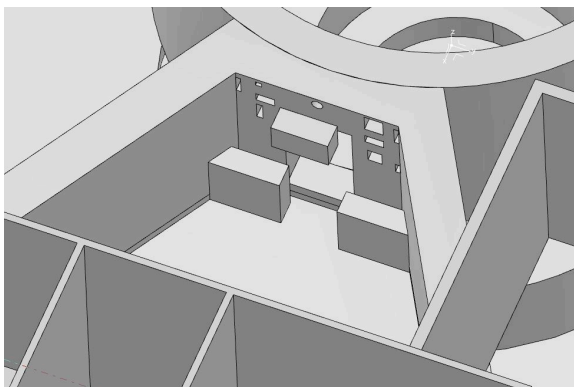
Best regards,
Reinhard



(69 PBIP Optics in Building)



(70 Fluid Syst Building model)



(71 Shield walls in Toms`s room)

(9 May 2017)

Thanks for the pictures, Reinhard,

Is the position of the main shield wall the same in both models? If so, I could adjust the path so that the mirrors are a little closer to it. 150mm should be sufficient space for the mirrors and path.

Regards,
Håvard

(10 May 2017)

Hello Håvard

Thanks for your mail yesterday.

When I compared the 2 building models I recognized a deviation of 15 mm regarding the flat surface of the main shield wall.

Another aspect concerning the building is the big hatch in the floor of Tom's room. This is needed to have access to the Beam Drift Room (the last meters of the Proton Beam on its way to Target).

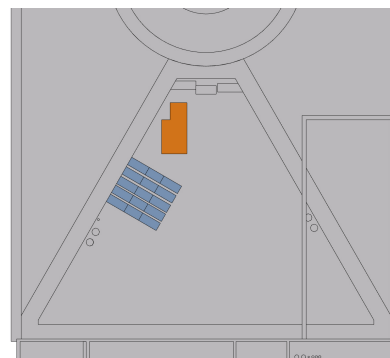
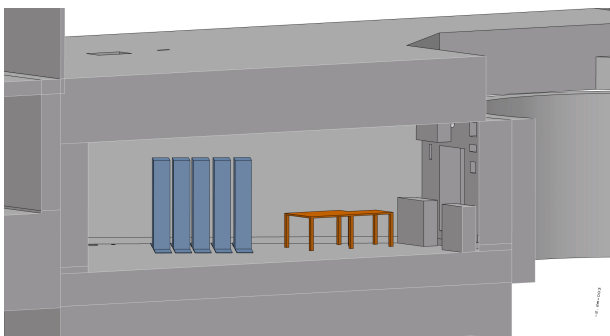
This hatch seems to interfere with the additional shield blocks that are represented in the other building model; however it will probably be opened only very seldom.

Furthermore I have become aware of design work that has been done earlier by Naja for Tom's room: a table for the optics and electrical cabinets as space claims; see pic 72.

I would like to suggest that I first should discuss these different aspects with the involved persons here in Lund, not at last with Cyrille and Tom, and come back to you later with a 2D sketch in a X-Z plane to indicate a proposal for the final routing of the Optical Path. (The Y positioning of the 2 rays seems to be correct already.)

Tom's room has the room number D02.115.4005 (as written before) and the official name "Target/A2T access area".

Best regards,
Reinhard



(11 May 2017)

Hello Reinhard,

Thanks for the info. Your suggestion is a good one, I will wait for further input.

Regards,
Håvard

Hello Håvard

Now I can provide more information regarding the positioning of the last mirrors for both optical paths. However this input is still only preliminary, as the final design for the equipment in the Target/A2T access area (Tom's room) has not been made yet. There is even some uncertainty left regarding the building model.

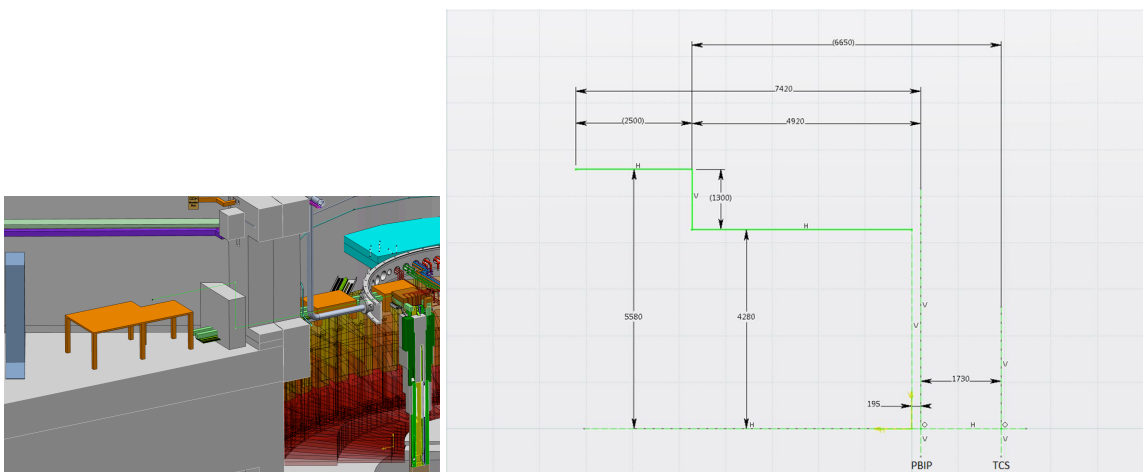
What I can provide now is a "guiding sketch" that indicates the final part of both paths in an X-Z plane.

Pic 77 shows the dimensions of the guiding sketch with respect to the PBIP-center and its relation to TCS. This sketch is a simplification as it does not take into account, that the first parts of the optical paths within the plugs are tilted.

Pic 78 is an illustration of this sketch in the building environment.

If you have questions regarding this proposal, don't hesitate to ask.

Best regards,
Reinhard

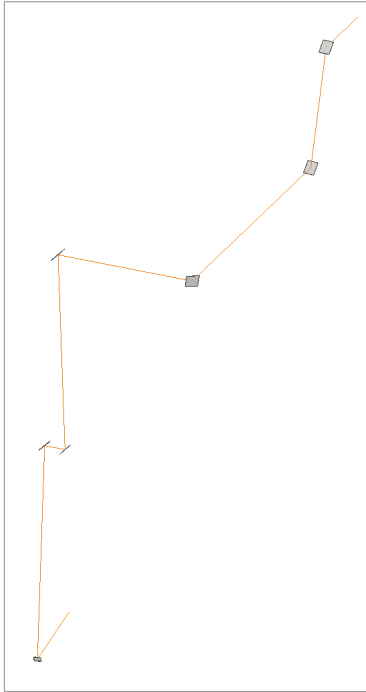


(16 May 2017)

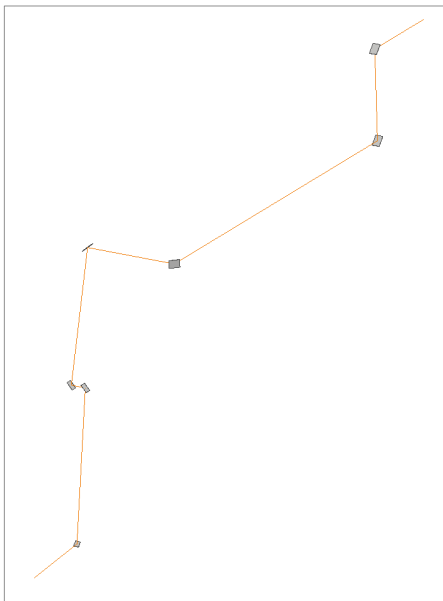
Thanks Reinhard!

CAD models made to fit the sketch are attached. If anything needs to be changed, just let me know. Adjustments to the position of the last two mirrors should not be a problem, as long as we have enough space to place them and enough clear aperture between them.

Regards,
Håvard



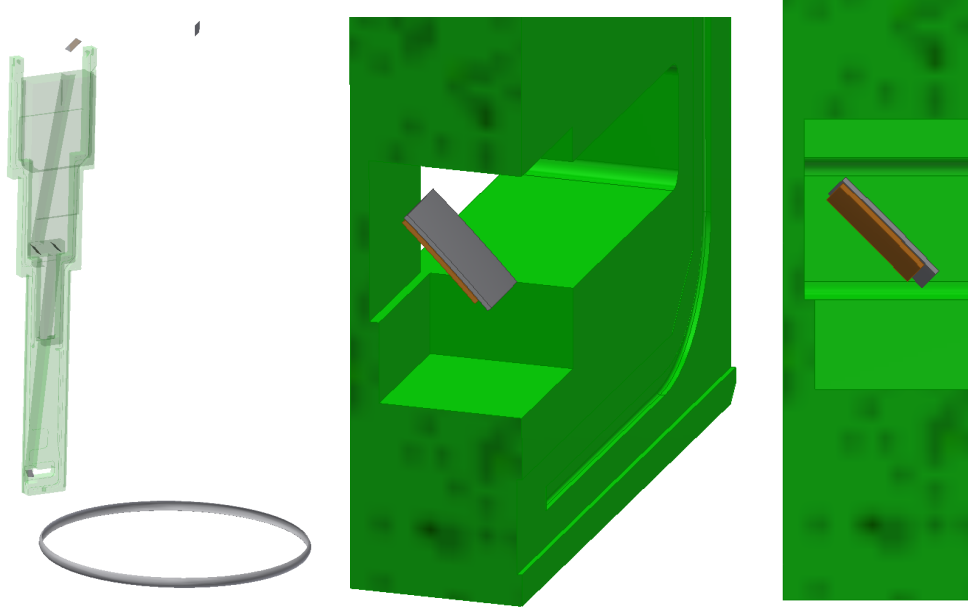
Model: PBW-mirror-positions



Model: TW-mirror-positions

(26 Sep. 2017)

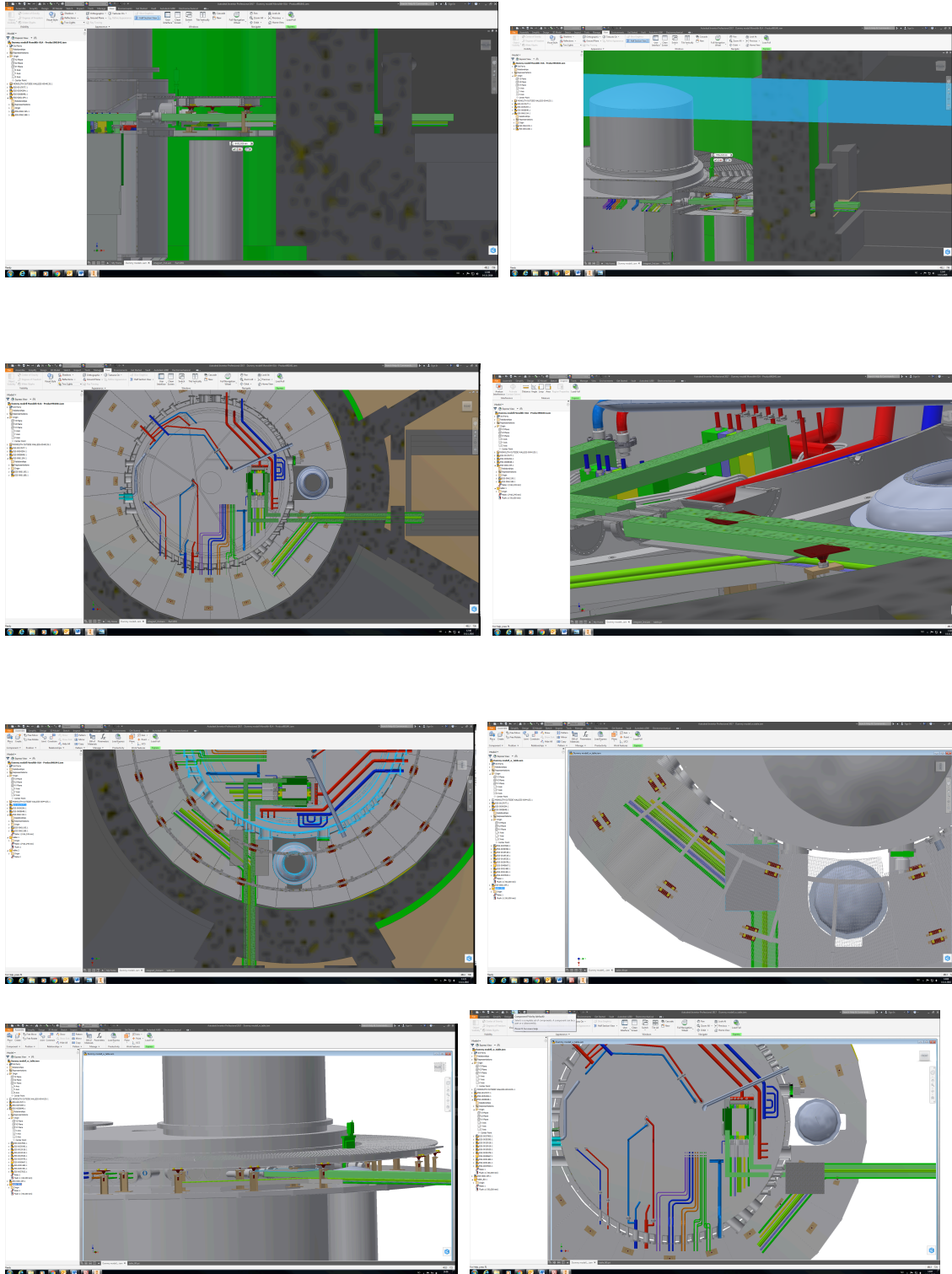
Mirror 1 has been modified in size, and the mirror position has been shifted towards to opening in the Plug. Old mirror size and position in orange color, new in gray color. (Model: work model_4-2017-09-26 with TW-CDR from Håvard)



6. INTEGRATION PROCESS – TABLES WITH CAMERA

To reserve space for tables and cameras, some simple models were generated, to discuss available space and most optimal position.

(14 Nov. 2016)



Info:

Floor above the optical wall is not locked. We might be able to place a mirror with lenses there.

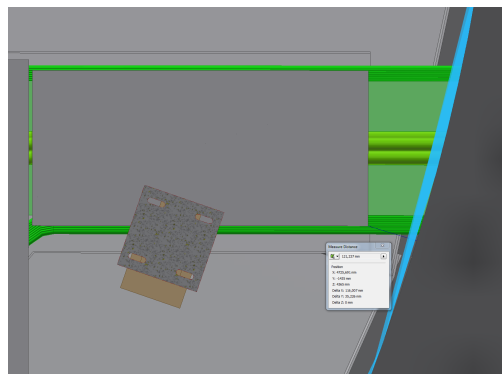
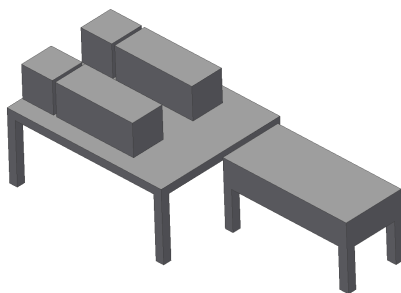
It is also a possibility to place a table under the optical path, that is wide enough for the legs to be located outside the cables that lies under.

Conclusion:

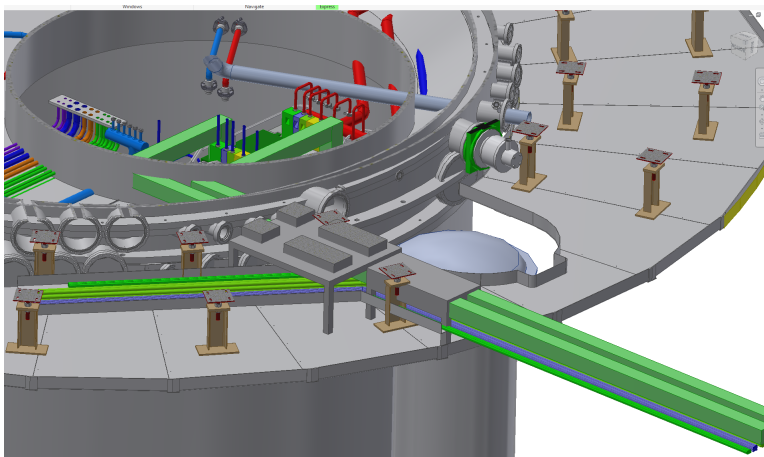
To reserve space for the official models, we will send CAD models of tables, including components to be placed on top of the table.

(25 Nov. 2016)

Model for new table and indicated space for camera.



Model: Assembly_Tables_n_Camera

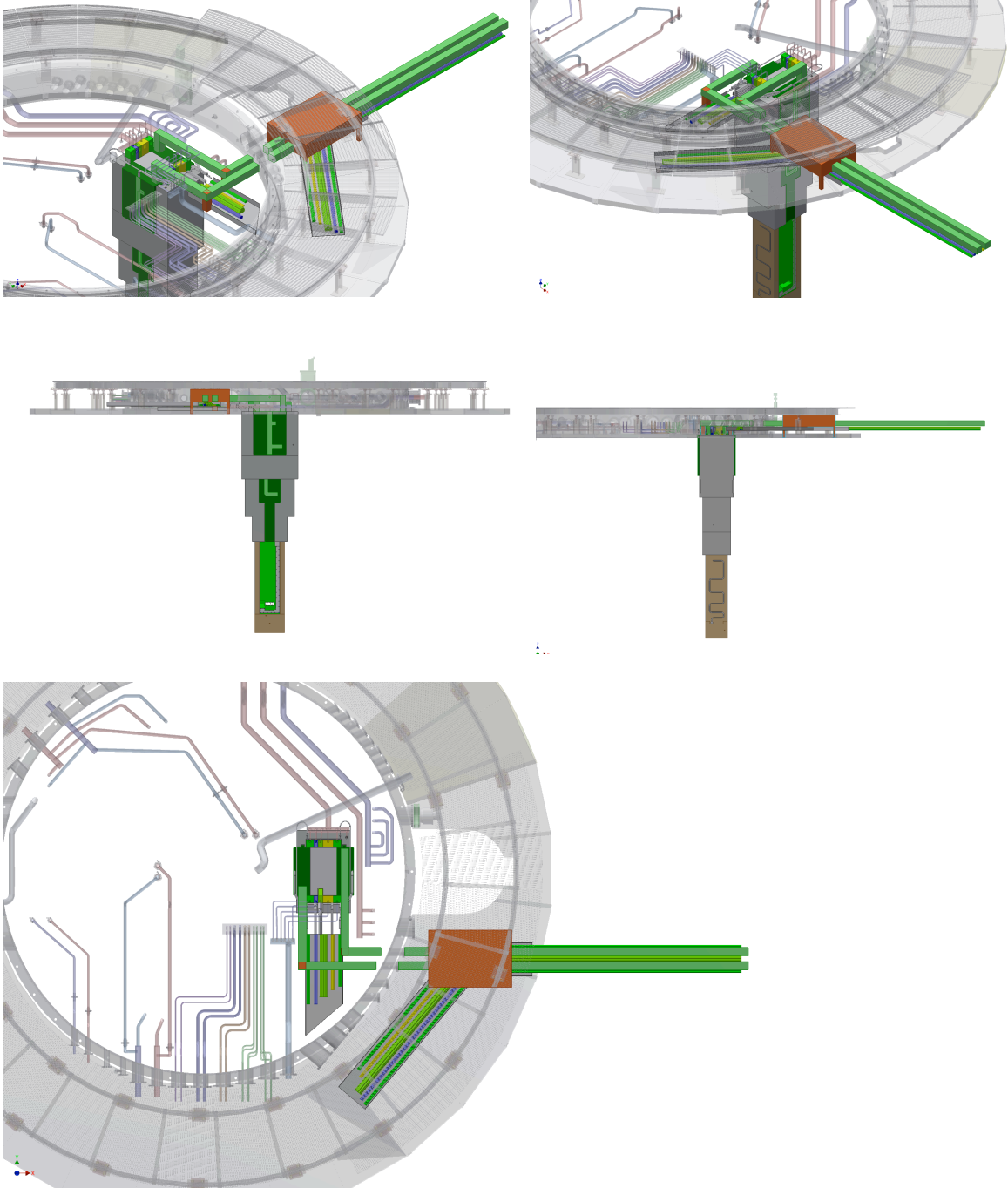


(10 Jan 2017)

Update: some changes of model between PBIP and camera.

(11 Jan 2017)

New model: Dummy model Monolith-01A-Product981841_table_ver03

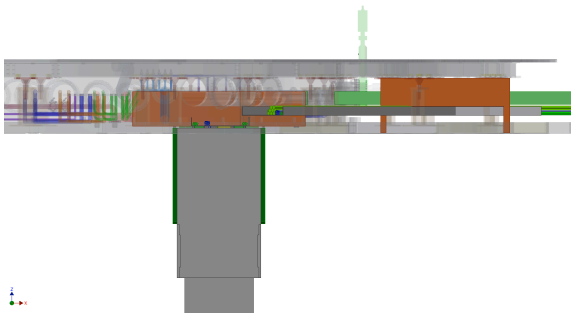
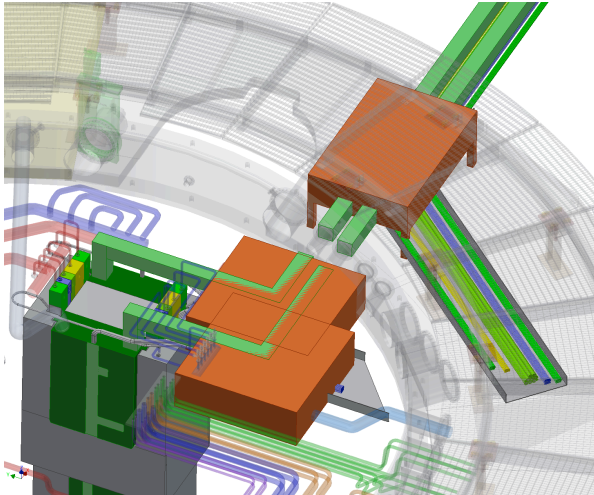


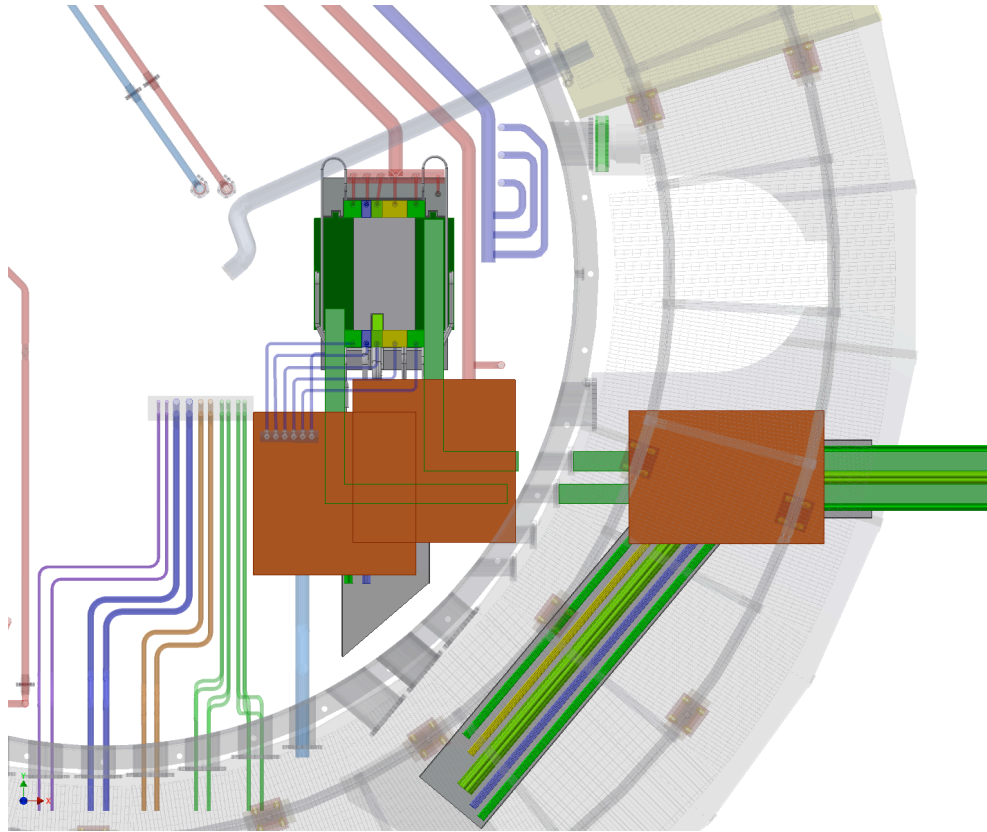
(11 Jan 2017)

Status: Mirror OK, Pedestal for mirror shall be enlarged to about 1m x 1m, since we need space to stand next to them, and they shall include optical enclosure from PBIP to vacuum wall.

(12 Jan 2017)

New model with larger space marking:

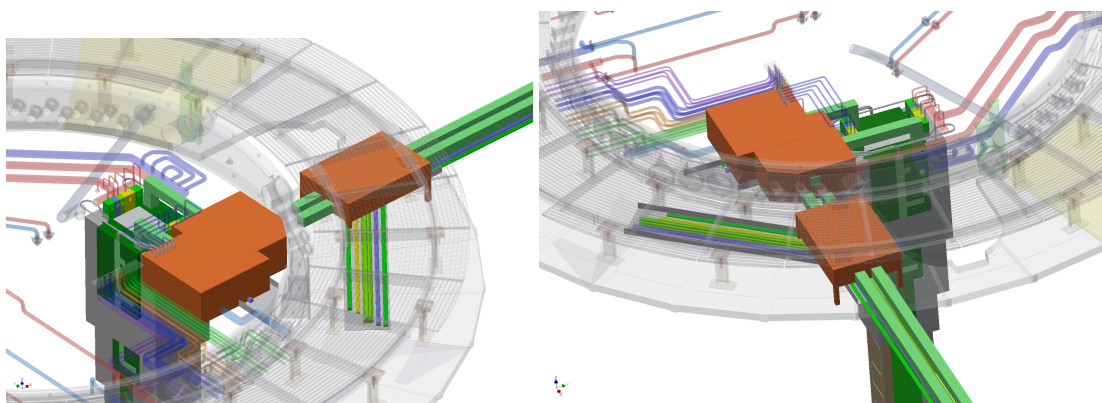


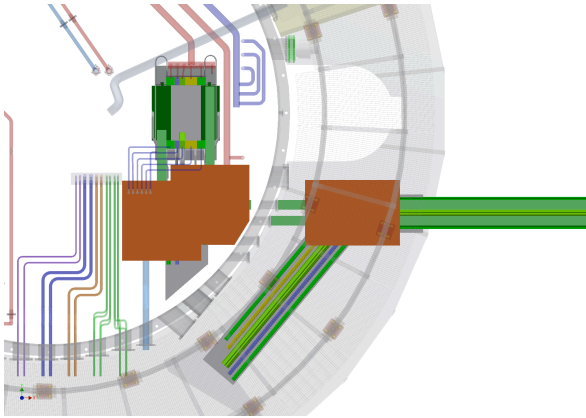
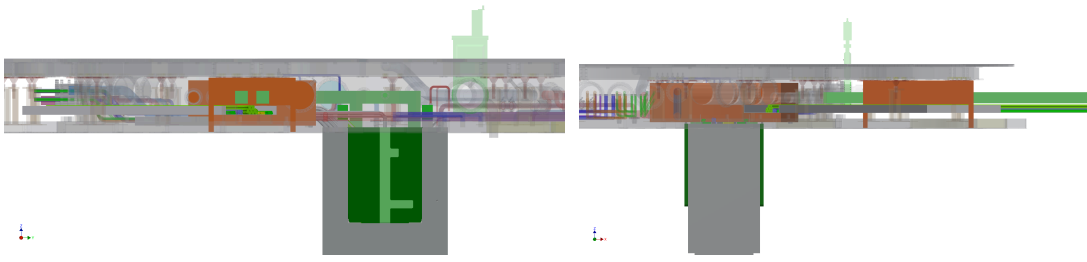


(17 jan 2017)

Updated Step files and figures sent.

Model: Dummy model Monolith-01A-Product981841_table_ver03_17Jan





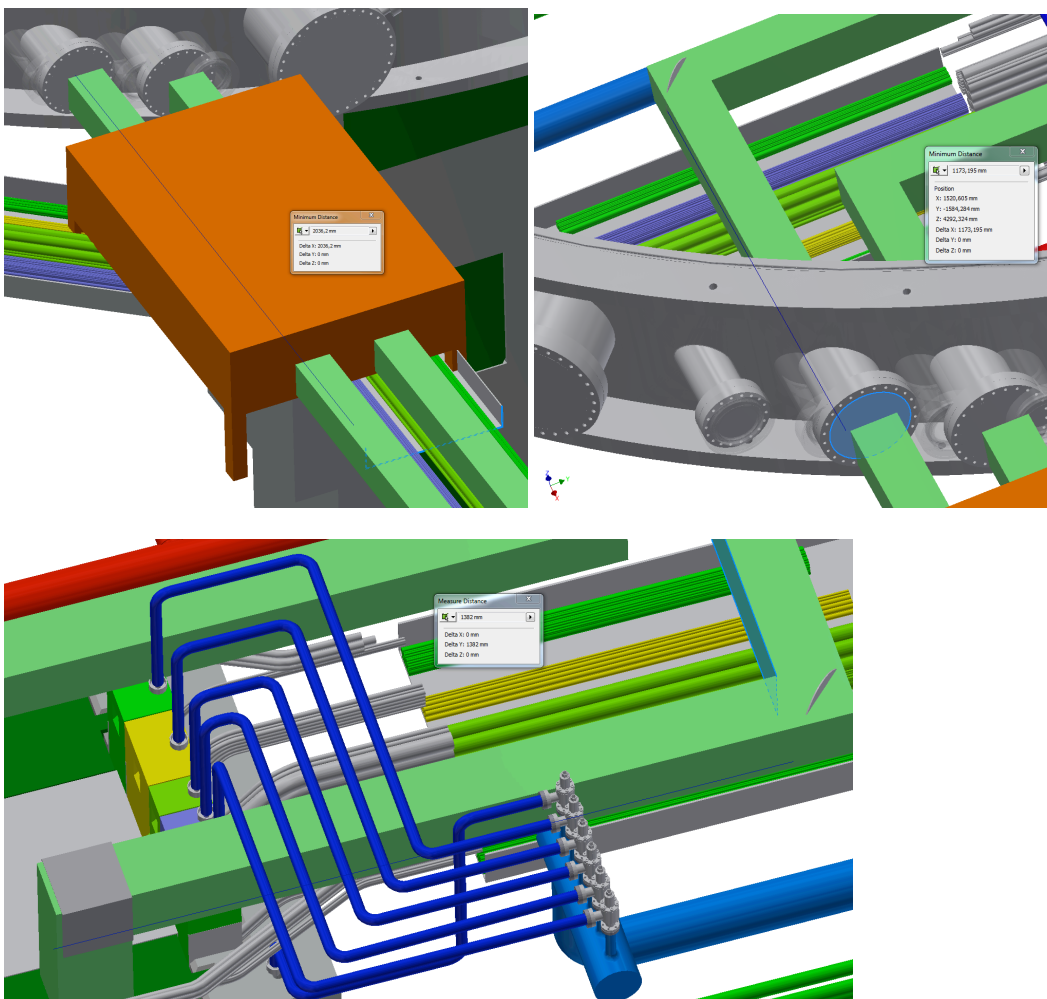
(27 Jan. 2017)

New adjustments:

- Distance from mirror on top PBIP to the mirror that guide us in direction of the camera is now larger.
 - How much must the mirror be moved?
- The optical path through connection cell must also be moved, including tables and equipment. Is the distance between the two optical paths larger than earlier?
 - Might need to enlarge the table.
- Vacuum tube shall be included in the newest model.
 - After model has been updated with new table position and size, is it space for the lens next to the path?

Figures showing most critical distances:

For distance out from wall, (31Jan_3), 62,5 mm must be added (total distance of approx. 210 cm.)



(26 Jan. 2017)

Hi Håvard,

We managed to open your file at last. We have looked at your requested space claim and we have a few comments:

1. It seems like you are using an old model of the connection ring. In the current model the flanges for the optic paths are changed from DN100 to DN150, they are also moved a bit in order to fit. See the pictures below.
2. Your space claims are quite big. Inside the monolith vessel, right next to the PBIP, there are a lot of piping and cabling as you can see in the picture below (in this picture you can see both the DN100 and the DN 150 flanges). We cannot give you this much space, you need to decrease the size of your boxes. Can you explain why you need all this space?
3. There is probably a collision between the optic table in the connection cell and the big vacuum pipe you see in the picture below. Maybe this will be ok when the latest model with DN150 flanges are used.

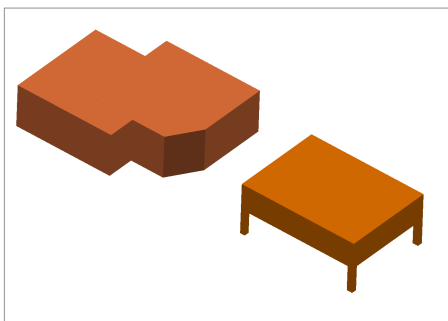
It seems to be some mistake in the communication, the change in the connection cell were made in the middle of November about the same time as when we exchanged models. I am sorry for any inconvenience this may have caused you. Stig will send you a step file containing the latest model of the connection ring, he will also include the vacuum pipe.

Regards,
Mattias

Hi,
Attached is STEP file of space indication. (It should have the same point of origin as the model we got from Stig last week.)

Stig:
The vacuum pipe was not included in the model we got.
Can you please send a new model, including; the vacuum pipe, floor (were the table in our model will be standing) and wall (MONOLITH OUTSIDE WALL)?

Best regards
Maren C. Lithun

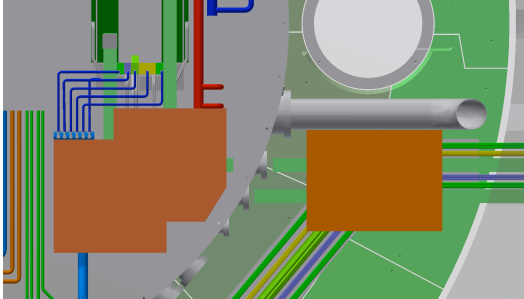


Model: Only_space_marking_31Jan

(1 Feb. 2017)

Model included in CAD model of monolith wall:

No collision between table and piping (3.5 mm)



(1 Feb. 2017)

Update: Consider to model one table that can contain both mirrors.

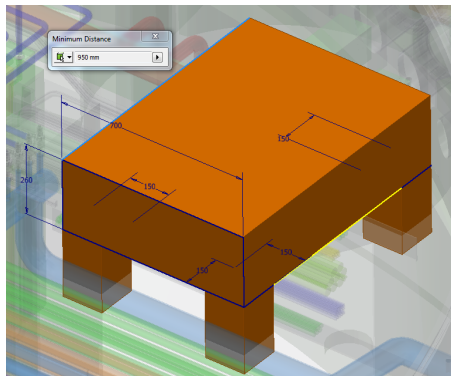
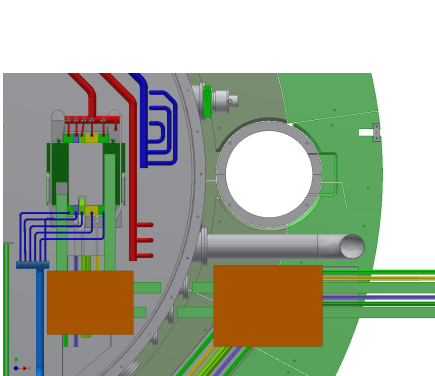
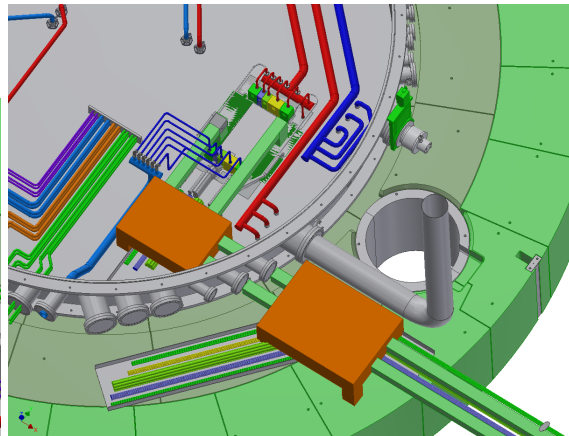
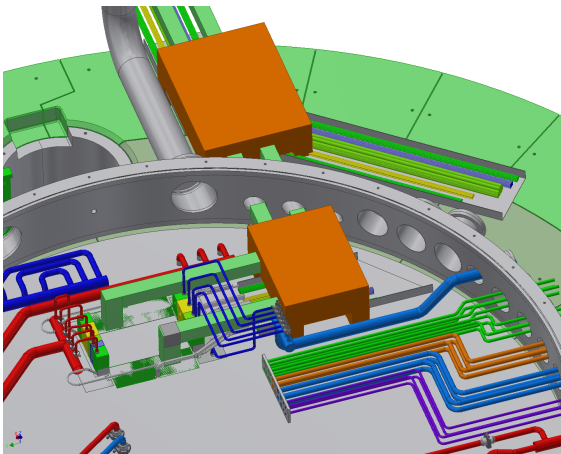
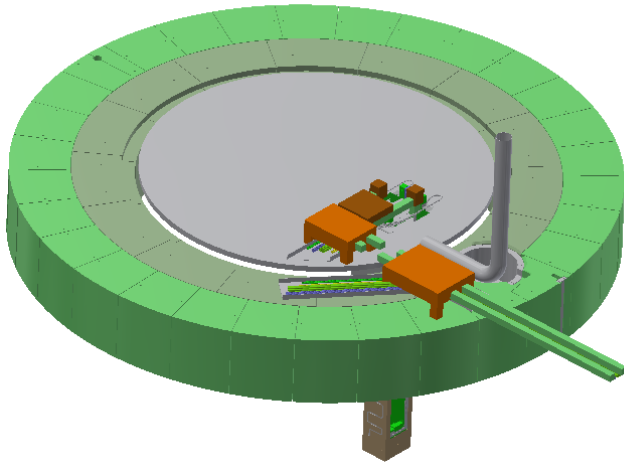


(3 Feb. 2017)

Hi,

Attached are figures of table (for mounting of rails and mirrors), inside the Vacuum Vessel.

Best regards
Maren C. Lithun



(3 Feb. 2017)

Thanks, Maren!

This is the biggest table we could fit in the vacuum vessel without causing collisions with the other things in the model. To me it looks large enough for mirror mounts as well as support for the rails we need to block in the optical path.

The table legs are now 15cm x 15cm, do you think this is ok?

The table in the connection cell is the same as previously, but with larger legs.

Please comment. We will send the CAD model to Stig and Mattias on Monday.

Håvard

(3 Feb. 2017)

Maybe we should actually reserve the air between the optical paths up to the blue cooling pipes to make sure we have some way of reaching the mirror mounts and other things on the table when the outer lid is on.

It does not have to go all the way down to the floor, just between the paths.

Håvard

(3 Feb. 2017)

Hi Maren,

Very nice. It gives the right impression and marks the space. Thank you for that.

Also, I agree with Havard, we need to mark the space so that we can work around the table, and have access to the equipment on the table.

For instance we will need to align the optics on the table so we need to stand near.

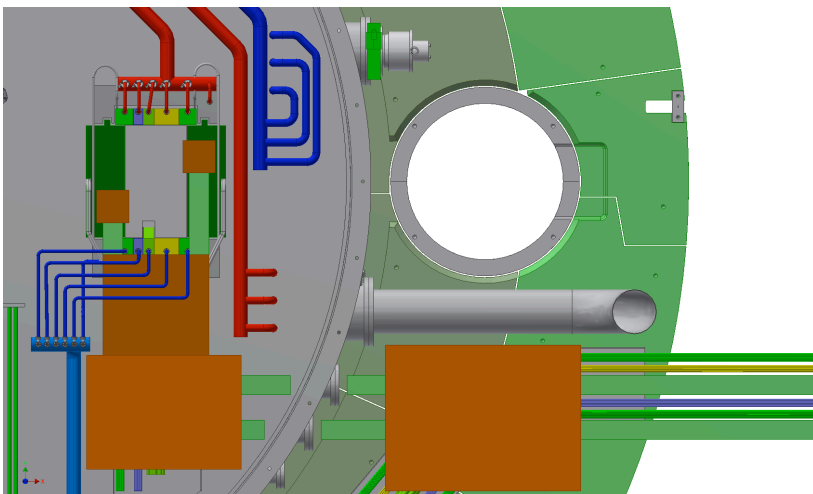
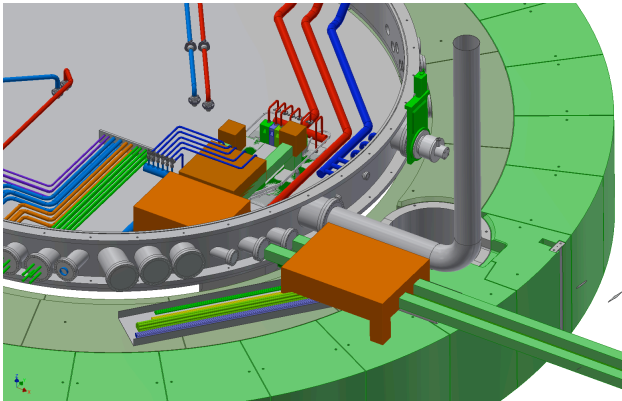
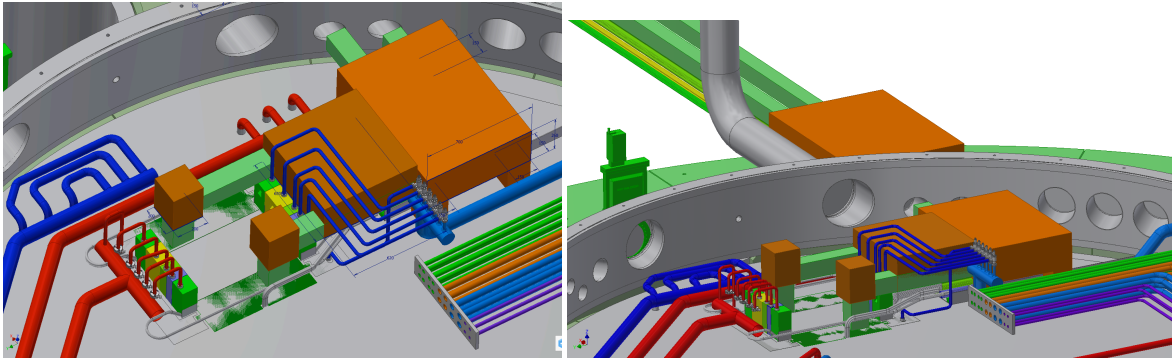
Cheers,
Cyrille Thomas

Hi,

Attached are some pictures of updated model. (Including new space marking for reserving the air between the optical paths up to the blue cooling pipes, and space around mirrors were the beams exit the PBIP)

Let me know if you want any additional adjustments.

Best regards
Maren C. Lithun



Hi,

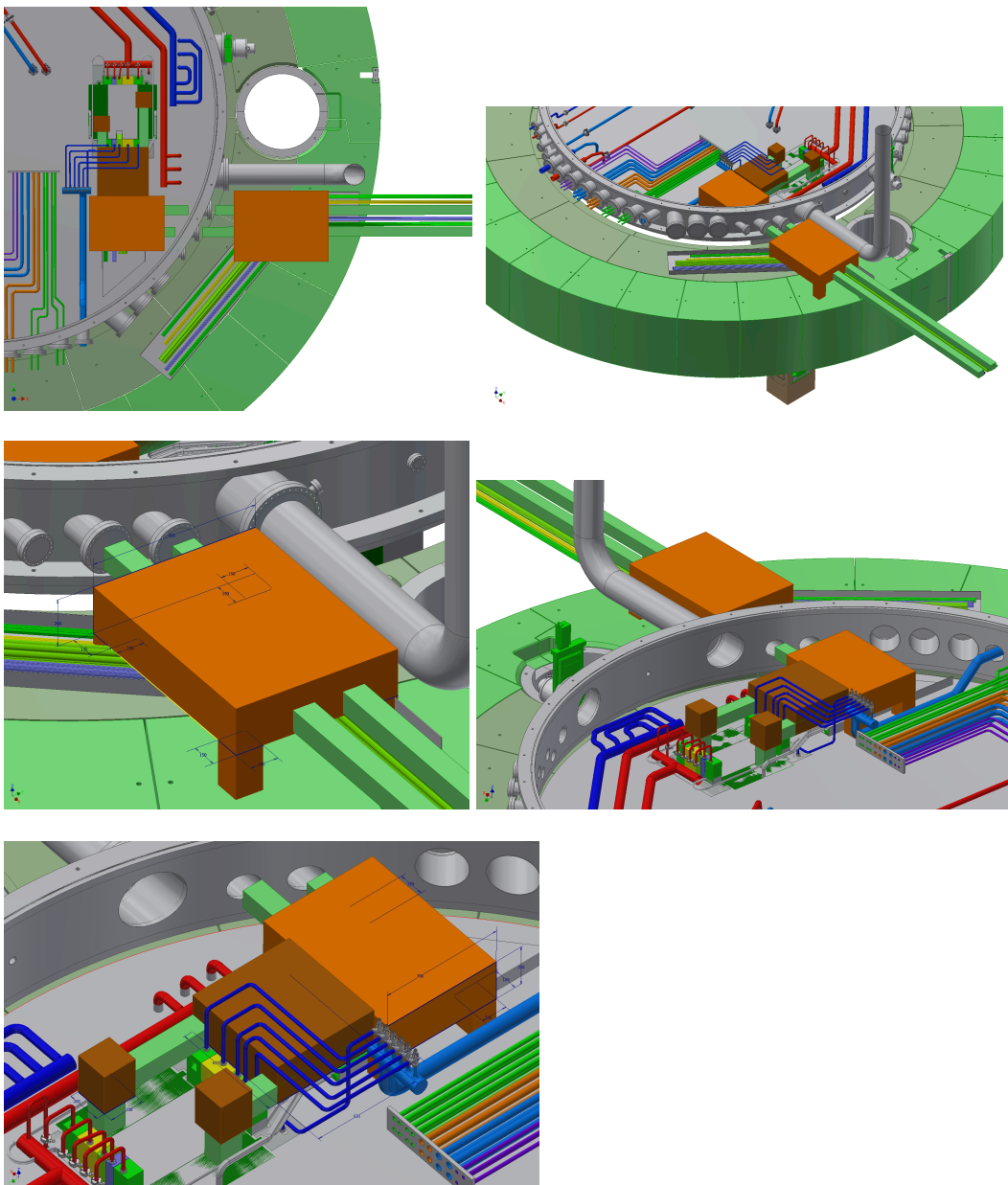
Attached is STEP file of updated model.

I have also attached some pictures of the model.

Orange space marking inside the monolith vessel (right next to the PBIP), has been adjusted.

The new dark orange/brown boxes are space marking of space needed for alignment access.

Best regards
Maren C. Lithun



Model: Dummy_Assembly_for_Optic_System-Product1157814-Rev1.0-Preliminary-7Feb

(7 Feb. 2017)

Hei Maren,

Takker for modell. Har du mulighet til å lage en enkel sammenstilling bare av dine modeller med sentrum i TCS?

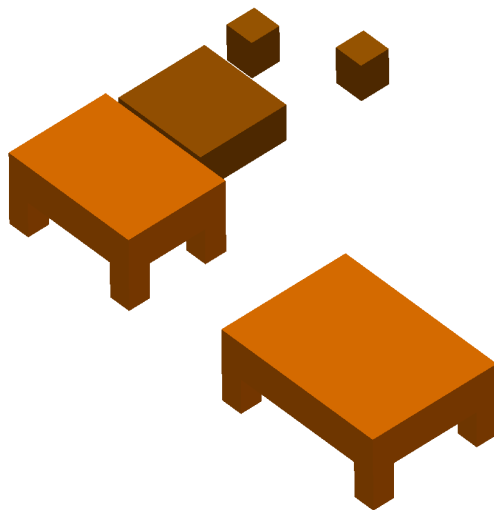
Dette ble gjort på en tidligere modell som du sendte til oss.

Mvh
Stig

Hei Stig,

Vedlagt er STEP fil med kun plassmarkering.

Vennlig hilsen
Maren C. Lithun



Model: Dummy Assembly_space_marking_7feb.stp

(17 May 2017)

Hello Håvard

Thanks for the STEP files yesterday. Now I have inserted this design into our model. I add a picture as an illustration.

Best regards,

Reinhard

