

Procedure to assemble the NAB

(Simon Zeidler)

General Notes

- Please read the section of this document you are going to work on today BEFORE you start the work and remember as much as possible as sometimes the work does not give you time to read this document.
- Clean the clean room everyday.
- Take the log. Leave them on k-log.
- Take many pictures. Leave them on k-log.
- Fix the suspension and cover it when you leave, and when you open the top window of the clean booth.
- When you moved tools, circuits, and so on, which belongs to the other subsystems, please make the log, and be sure to return it when finished. Especially, the information about where the circuits is necessary to be updated on the JGW doc DB.
- Take enough rest. If you feel tired, do not hesitate to go outside and take a rest.
- Wear proper items if necessary (safety gloves, helmets,,)
- You need two people who have crane licenses when you use the crane.
- If you got injured, please tell the responsibility person as soon as possible.
- When you work around/inside the vacuum chamber, wear clean inner wears and class-1 clean wear, which is the blue ones or ones with separated hood. And blow the air to remove your dust when you enter the clean room.
- Bring the clean suits outside for cleaning every Friday. After you brought them to the office, count the number of the suits w/ hood, suits w/o hood, hood, mask, gloves, and shoes.

*** Attention ***

In all steps of working, be advised to take special care of handling the (black-coated) baffle!

The special “solblack” coating is easily scratched or removed when touching it. Pay special attention to the most sensible parts of the baffle in terms of dumping scattered light:

- baffle edges of the inner hole
- The whole inner surface of the baffle-hole
- The surface (on both sides) closely around the inner hole

Drawings

Should be found in the JGW document server (Authors: Bungo Ikenoue and Sakae Saito).

List of Items

Detailed Description

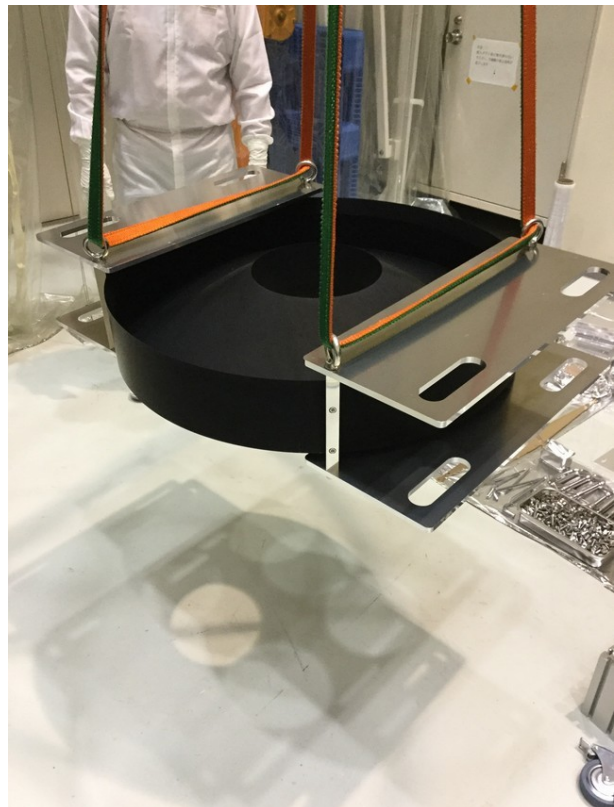
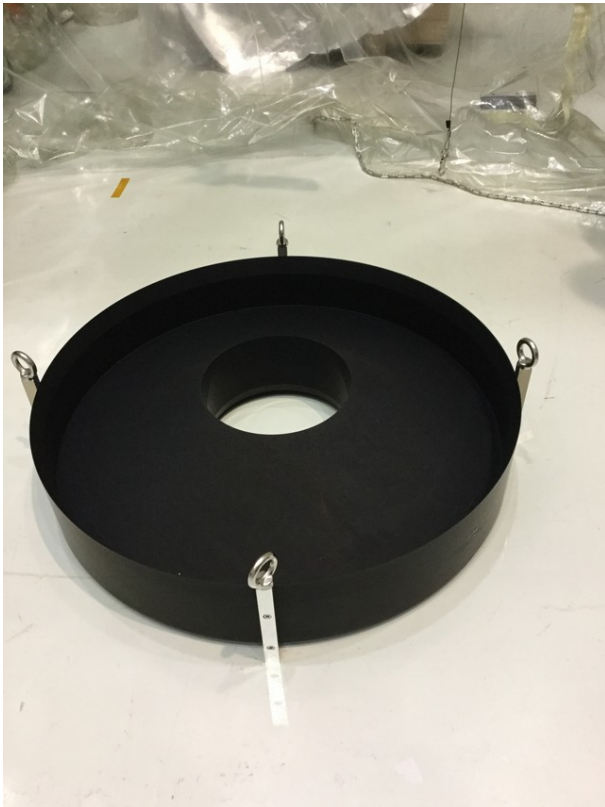
1. Preparation of Baffle

For an easier handling of the Narrow-Angle Baffle (NAB) itself, we have to exchange first the baffle feet on all four positions with a {stainless-steel feet having two M12 Screw-holes up and down}.

Procedure:

- As the baffle should not touch the ground, the feet has to be removed one by one
→ while two people take care that the baffle is not yawing to much, one guy is replacing the feet
- Screw [M12 eyelets] into the upper screw-holes and lift the baffle out of the wooden box with their aid (can be done by hand)
- Unscrew the eyelets and set a {handle-plate} with its two screw-holes on top of two feet and screw it again with the eyelets. Do the same on the other side
- Lift the baffle up again with a crane (and the 4 eyelets) and mount the {handle-plates} on their respective positions at the bottom side (screw them with common [M12 screws])

After this preparation, set the baffle aside.



2. Set up the Assembly-Jig

(Because we already assembled the jig, this point can be skipped)

- Construct the lower-half of the Jig by forming a rectangle with 2 *{long}* and 2 *{medium-long*}* frame bars and fix them together with brackets on the inner part
 - **Important:** it is necessary for the next steps to insert *{Screw-holder-nuts}* into the rails of the bars before actually mounting the bars together! – in each rail put 2 in the upper and 2 in the lower bar, and each 3 in both side bars
- Set 4 *{short}* bars vertically on the corners of the frame and 2 in the center of each side-bar. Also fix them with big brackets (for the corners) onto the frame and small brackets for the side-bars
 - Also here, insert some *{Screw-holder-nuts}* now inside the rails of the *{short}* bars in order to fix them accordingly
 - Insert the same amount of *{Screw-holders-nuts}* again into the small bars in order to fix brackets for the upper half of the frame
- Set up the upper-half of the frame, which is the same as the lower-half
 - Insert the respective amount of *{Screw-holder-nuts}*
- Put both halves together and fix them with the brackets on the *{short}* bars
- Lift the main-body on the top side to place the whole jig upright; thereafter, lift up the whole body with a crane by at least a half a meter
- Mount 2 *{wheel-holder}* on the *{medium-short}* bars
- Mount the 2 *{medium-short}* bars on the bottom side of the lifted frame (parallel to the *{short}* bars)
- Mount the wheels on the *{wheel-holder}* on the bottom side of the mounted *{medium-short}* bars

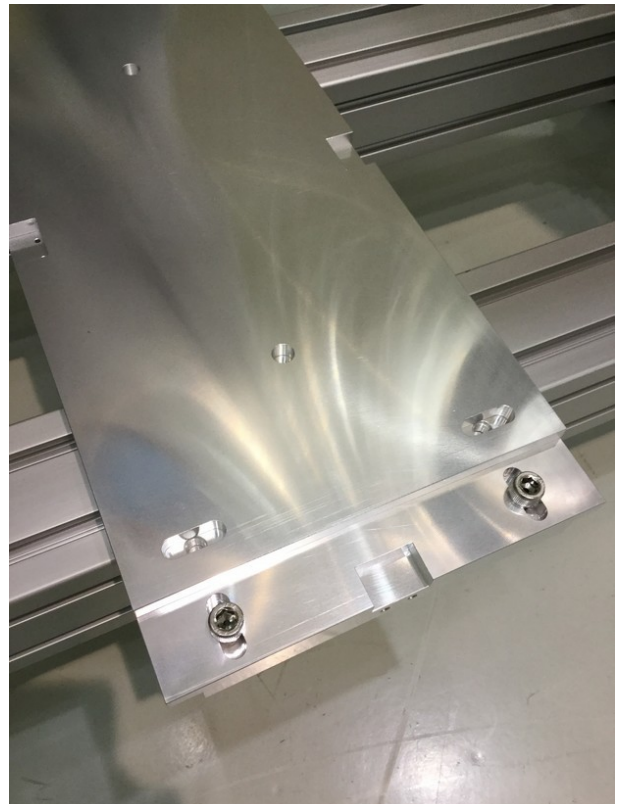
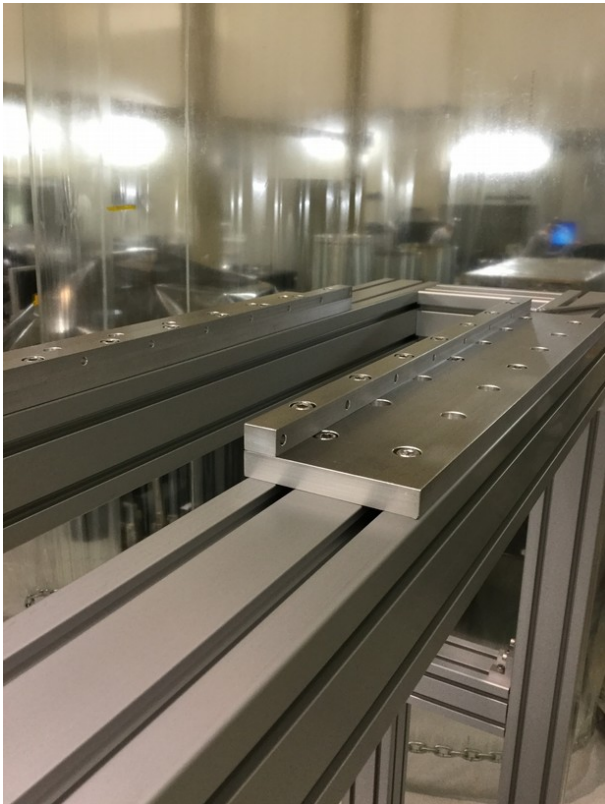
Note: The (Aluminum) bars for the jig usually have an error in their aspect length! Due to this, it is somehow natural that the jig will not be 100%ly straight or plane-parallel. It may be thus necessary to insert shims under the *{jig-NAB-connector plates}* in order to make the NAB-suspension plane-parallel.



3. Setting-up Top-Stage

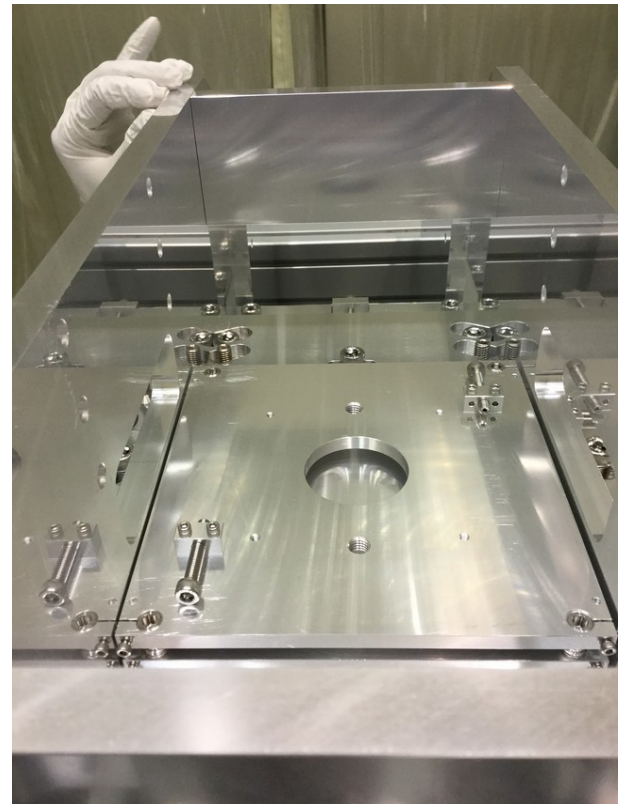
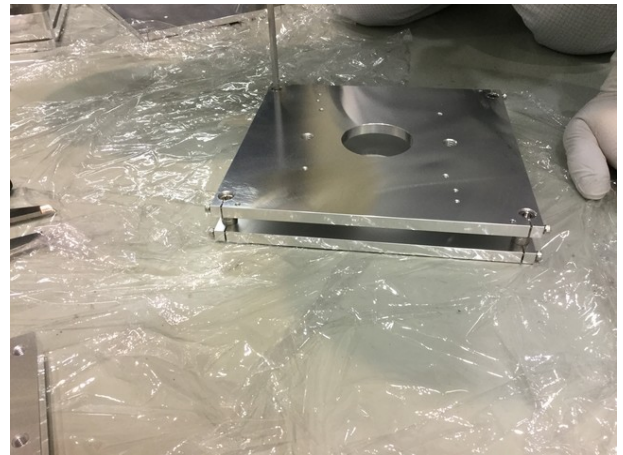
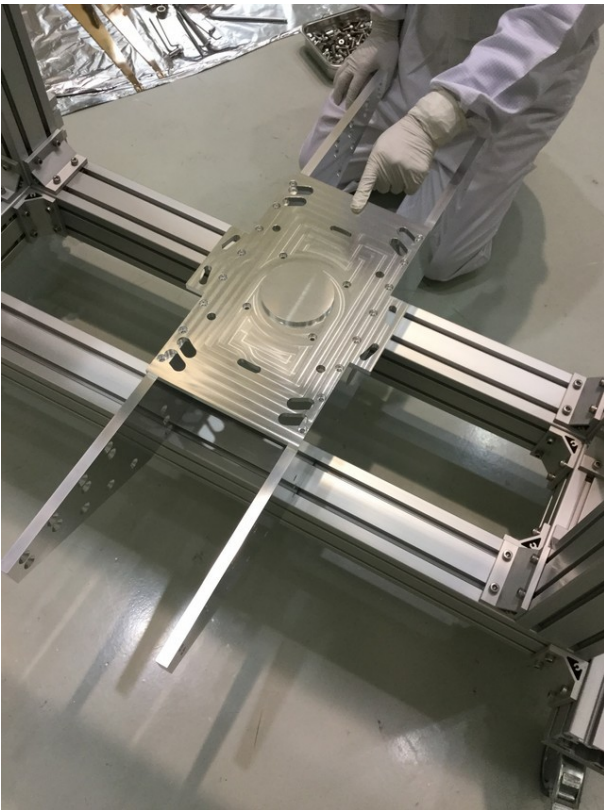
The top-stage needs to be assembled first as it will hold everything related to the NAB on the Jig. Furthermore, the top-stage is also hosting the horizontal translator, the yaw-adjuster, and the vertical adjustment stage.

- As a very first step, one should attach the 2 *{jig-NAB-connector plates}* on top of the jig. They are to be placed on each side (front and back) of the frame
 - Make sure that they are placed centered on the respective bar/frame-side
 - Insert *{screw-holder}* in each rail of each bar (3 per rail should be enough)
 - Assure they are plane-parallel with each other
- Take the *{base-plate}* and mount *{horizontal side-adjustment plate}* on top of it
- Mount the *{horizontal front/back-adjustment plate}* on top of them
- Mount the *{base-plate yaw-adjuster}* (the plate with the big hole) on top
 - There are also *[M8 jack-screws]* to be inserted from top of this plate which are an additional possibility for a +Z vertical and tilt/roll adjustment



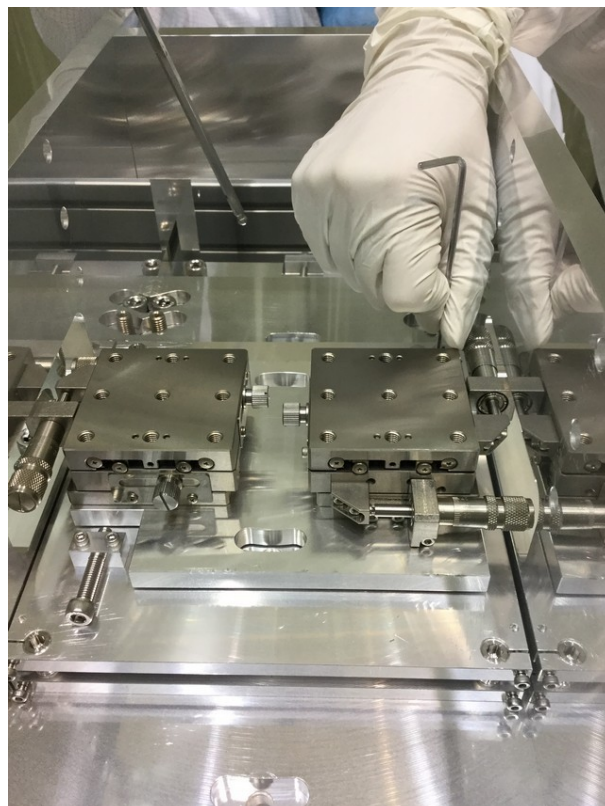
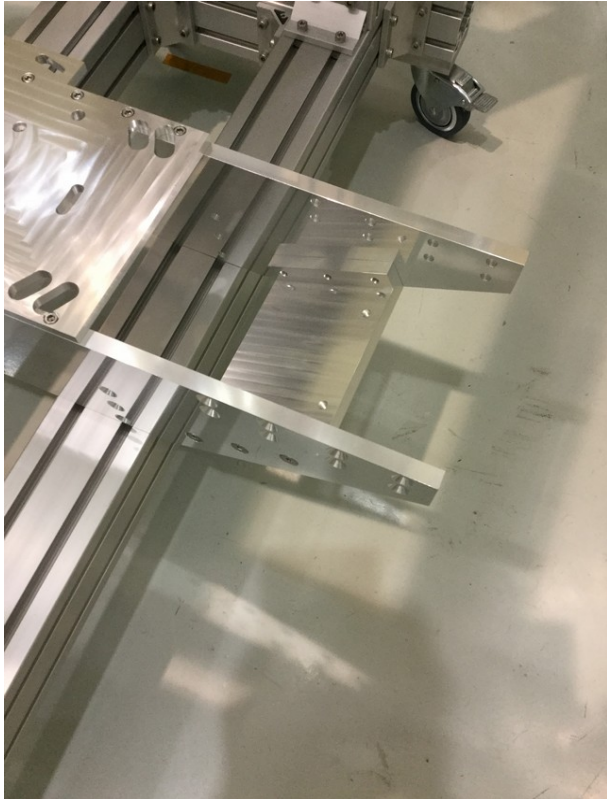
- Apart from that, connect the *{base-plate yaw-adjuster counterpart}* to both *{front/back shields}* separately
 - The shields are to be mounted on top of the *{base-plate yaw-adjuster counterpart}* and the screws are inserted from the bottom**Note:** do not tighten the screws yet!

- Assemble the *{vertical-adjustment stage}* and set it on top the *{base-plate yaw-adjuster counterpart}*
 - The *{vertical adjustment stage}* consists of 2 square plates with counter-threaded screw-holes at the corners
 - 4 *[M6 jack-screws]* should be put in between the two plates to be inserted in between the respecting screw-holes at the same time
 - mount the *{yaw trigger screw holder}* on the *{vertical-adjustment stage}* and insert *[M6x50 screws]*
 - Fix the *{vertical adjustment stage}* with screws from underneath the *{base-plate yaw-adjuster counterpart}*

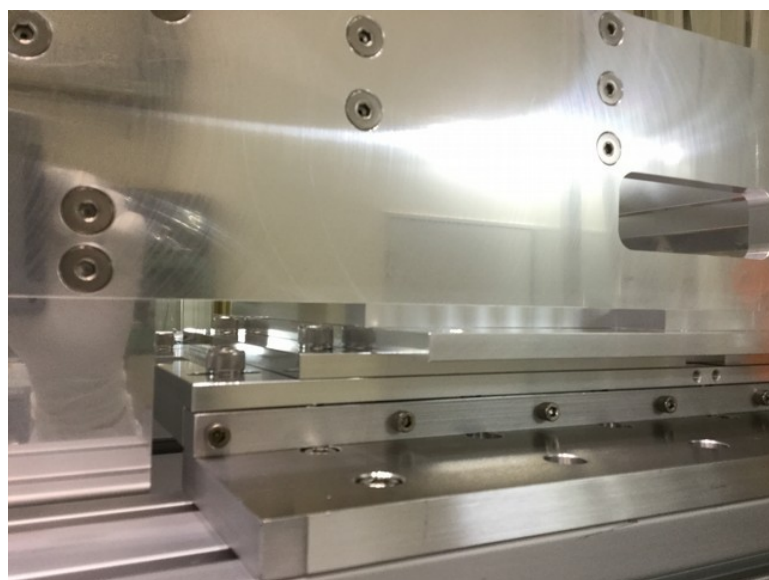
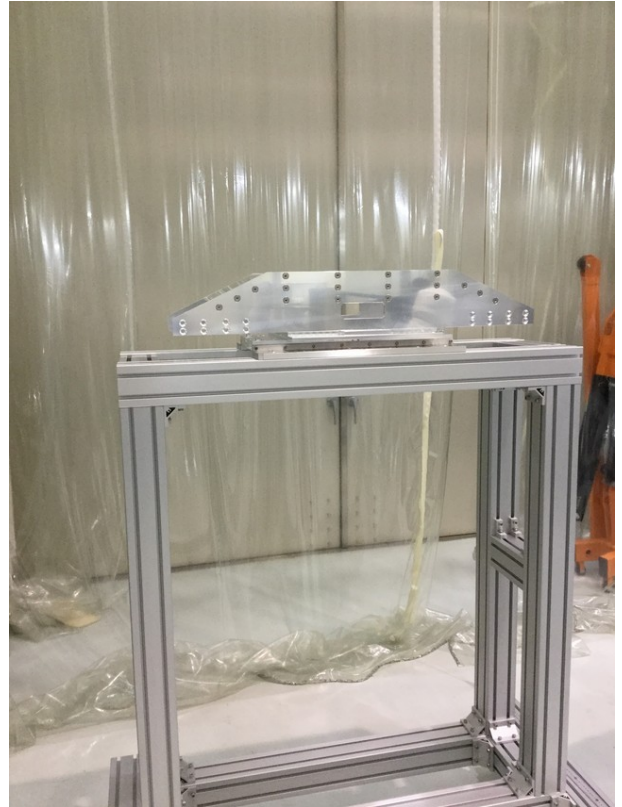
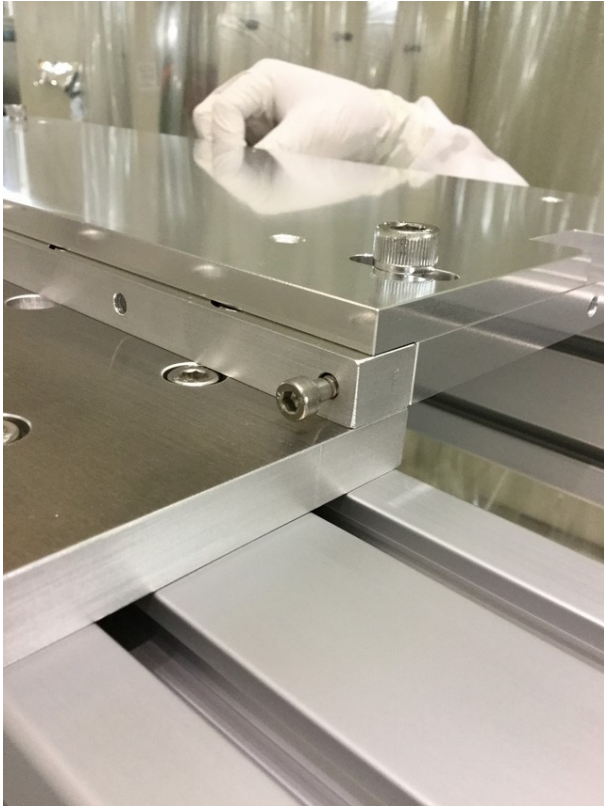


- Fix the *{side distance holder}* between the *{front/back shields}*, but do not tighten their screws yet

- Take the *{second yaw adjuster and blade-spring base}* and mount the two *{XY translators}* on it
→ the horizontal adjuster screws for the translators would be need to be assembled too
- Set the *{second yaw adjuster and blade-spring base}* with the translators inside the hole on top of the *{vertical-adjustment stage}* and fix both by two *[M8x20 screws]*; take care that the orientation of the base is the same as in the picture below!



- Put the *{base plate}* with the horizontal adjusters on top of the *{jig-NAB-connector plates}* and screw them together
- Put the assembled yaw- and vertical-adjuster with the shields on top of it. Screw them together from upside with *[M8x16 screws*]*



4. EQ-Stopper Wings

The EQ-Stopper wings are assembled from the top-stage sitting now on the jig.

Attention: Do the installation only on one side first (front or back*)! Do consider that the baffle has to be inserted yet!

- Screw the *{upper wing part}* (each wing consists of an upper and a lower part) at the side of the top-stage
→ screws are inserted from outside, the wings are placed from inside against the *{front/back shields}*
- Screw the *{lower wing part*}* to each upper part



* There are two lower parts with a small separation for the photodiodes and two without! The parts with the separation are the front of the assembly and will face the 3km arm cavities in the final installation!

5. EQ-Stopper

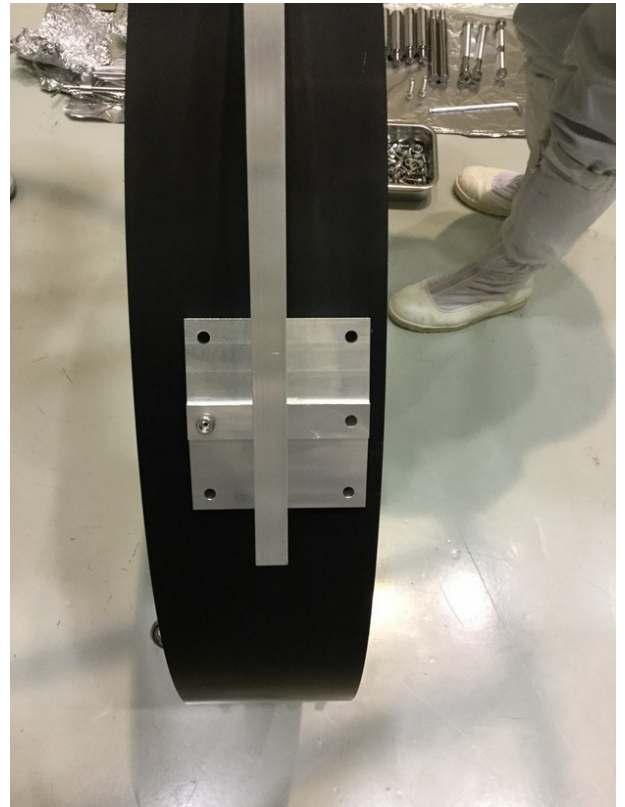
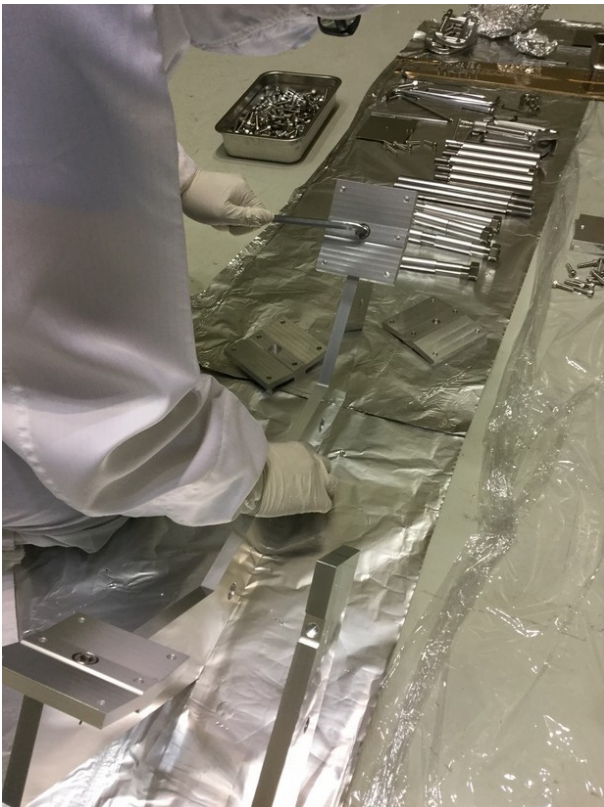
The actual EQ-stopper are to be mounted directly on the *{EQ Stopper Wings}* at four places symmetrically aligned along the baffle. They are designed to hold the “ears” of the baffle within a certain margin defined by the tips of screws (the actual “EQ-Stopper”).

- At first, assemble the *{EQ-Stopper plates}* separately by mounting the *{EQ-Stopper Screw-holders}* on a *{Mounting plate}*
 - **Note:** let one side of the plate without a screw-holder (mount only 2 of 3 holders), as pictured in the photograph below!
Remember that the side to be left open is defined whether the *{EQ-Stopper}* is to be placed on top or bottom of the *{EQ Stopper Wings}*!
This is important for inserting the baffle! So, please consider beforehand!!
- Mount the plates on the *{EQ-Stopper Wings}* at each of the four designated places



6. Inserting and Fixing the Baffle

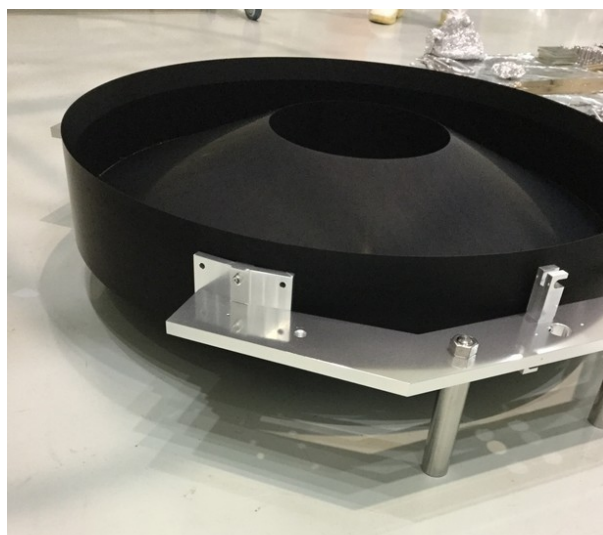
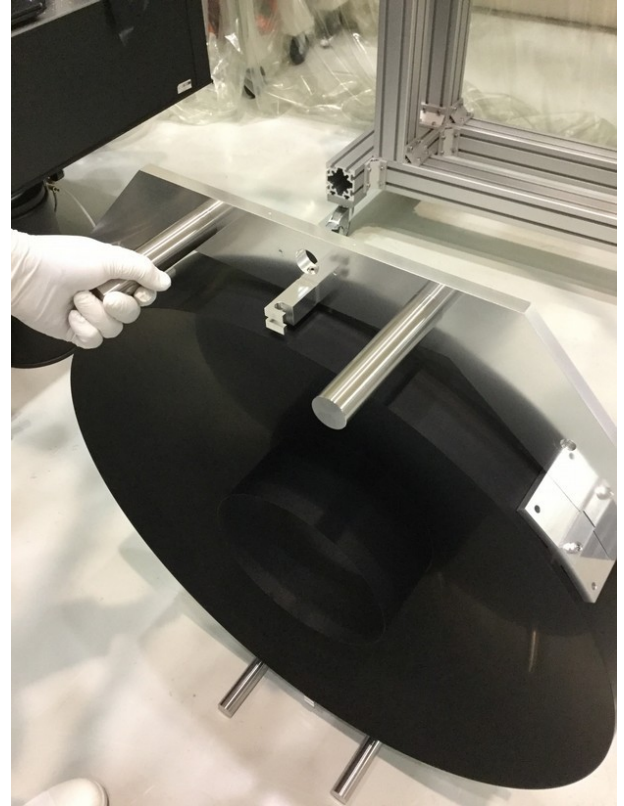
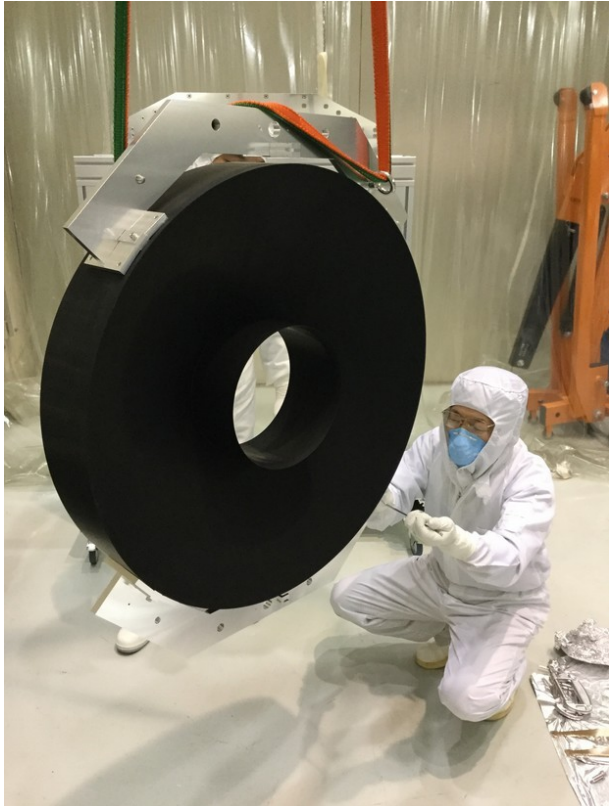
- Mount the *{ear fixing plate}* to each end of the *{baffle ear}* (there are two “ears”) with a *[M8x20 screw]*
 - take care that each *{ear fixing plate}* has the same orientation on one ear as their fixing screw-hole is not in the plate’s center position
- Mount a *{wire-drum holder}* inside the central opening of each ear with a *[M8x20 screw]*
 - Be careful! For one pair of ears, the *{wire-drum holders}* should have the same however the *{ear fixing plates}* on each ear the opposite orientation
- Put the baffle in an upright position by using the *{handle plates}* on one side as feed, and detach the *{handle plates}* on the upper side
- Mount the *{baffle ears}* on the baffle with the aid of the *{ear fixing plates}* and their two central M6 screw-holes on the upper side of the baffle
 - Place the ear in a way as shown in the picture below, so that it is positioned along the center-of-gravity-plane of the baffle itself



- Screw eyelets (counter-oriented) into each of the two M8 screw-holes on the ear and lift-up the whole baffle structure with the aid of a crane
- Replace the bottom *{handle plate}* with the other prepared ear in the same manner as the first one
- Now, on the bottom ear mount *{baffle foot pedestals}* by putting their threaded part inside the M10(?) holes and fix them by nuts; put the baffle back to the ground

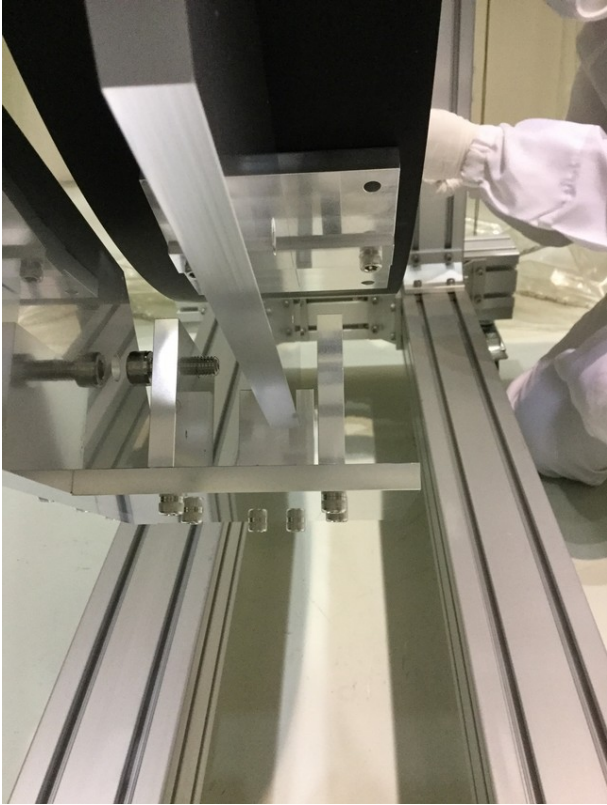
→ although the *{baffle foot pedestals}* should give stability enough in this position, an additional support by human hand is necessary

- Remove the eyelets and mount another pair of *{baffle foot pedestals}* on the upper ear in the same orientation as the bottom ones
- Lay the baffle down so that it rests on these pedestals



- In each bottom part of the mounted *{EQ-stopper wing}* there are 3 openings. In each central opening mount a *{baffle guiding pedestal}* by using washers and nuts
- Take the baffle structure by the *{baffle foot pedestals}* (one person on each ear) and hook the big central opening on each ear onto the *{baffle guiding pedestal}* of each wing's bottom part
 - Take care that the openings of both *{wire-drum holders}* show to the ground!
- Remove the *{baffle foot pedestals}* and insert the 4 *{baffle fixing pedestals}* in the now disposed openings so that they also pass through the opposite openings on the wings; fix them by using nuts
 - Don't forget to slip a *{baffle distance holder}* over the *{baffle fixing pedestals}* before inserting it into the wing's opening
- Slide the baffle structure along the pedestals to its destined position (defined by the distance holders)
- Complete the *{EQ-stopper}* assembly by mounting the last *{EQ-Stopper Screw-holder}* onto it (the ears should be covered by the *{EQ-stopper}*)
- Assemble the wings on the other side (back or front depending on which side the first wing assembly started)
 - Don't forget to insert a *{baffle distance holder}* before the bottom wing parts are striped over the *{baffle fixing pedestals}*!





- Insert all remaining screws for the wings and the respective nuts for the *{baffle fixing pedestals}*
- Remove the *{baffle guiding pedestals}* and insert all screws for the *{EQ-stoppers}*

