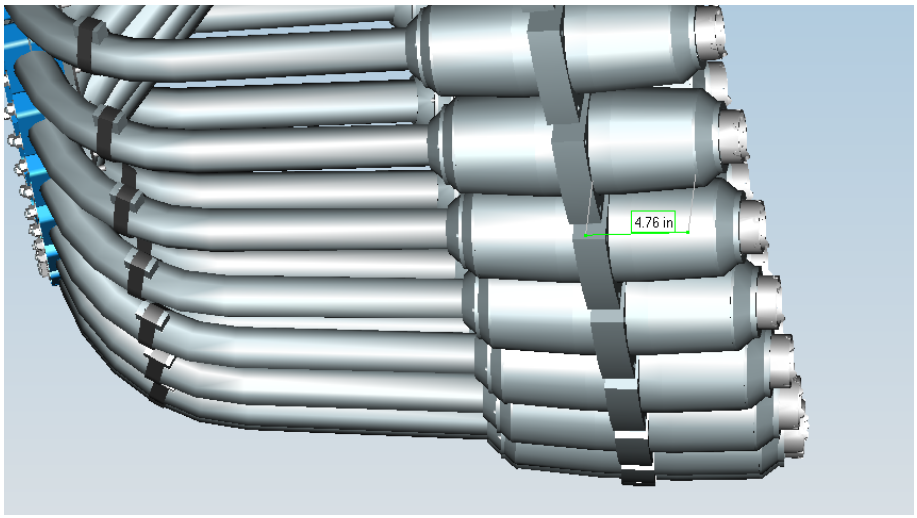
CTOF Installation Procedure

Precautions

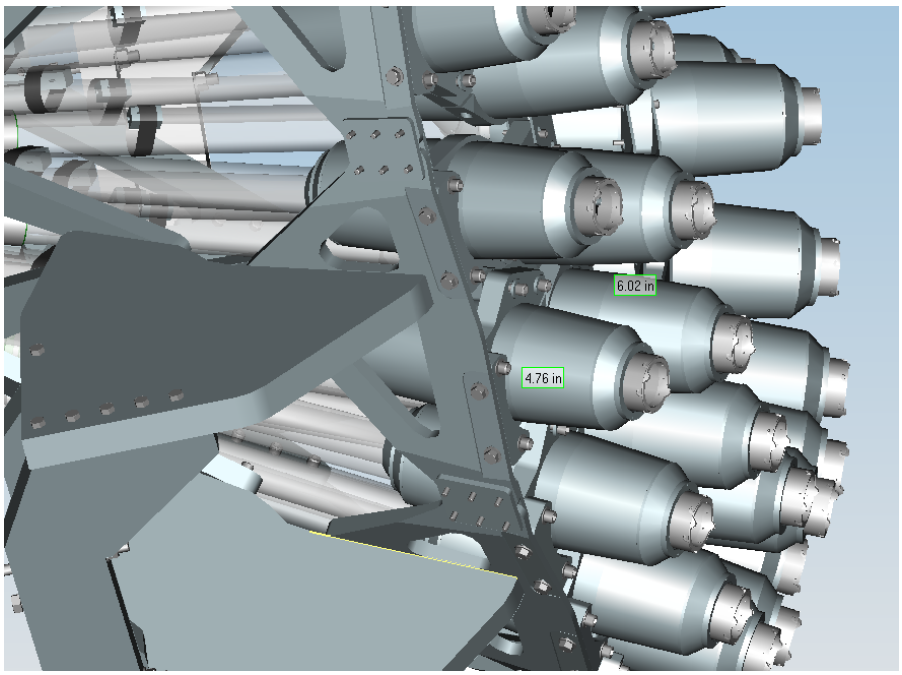
- Counter can only be moved while attached to a strongback – glue joints between scintillator and light guides are fragile
- Do not touch counters – light leaks can occur when touching or moving tape or tedlar

Installing Heavy Shields

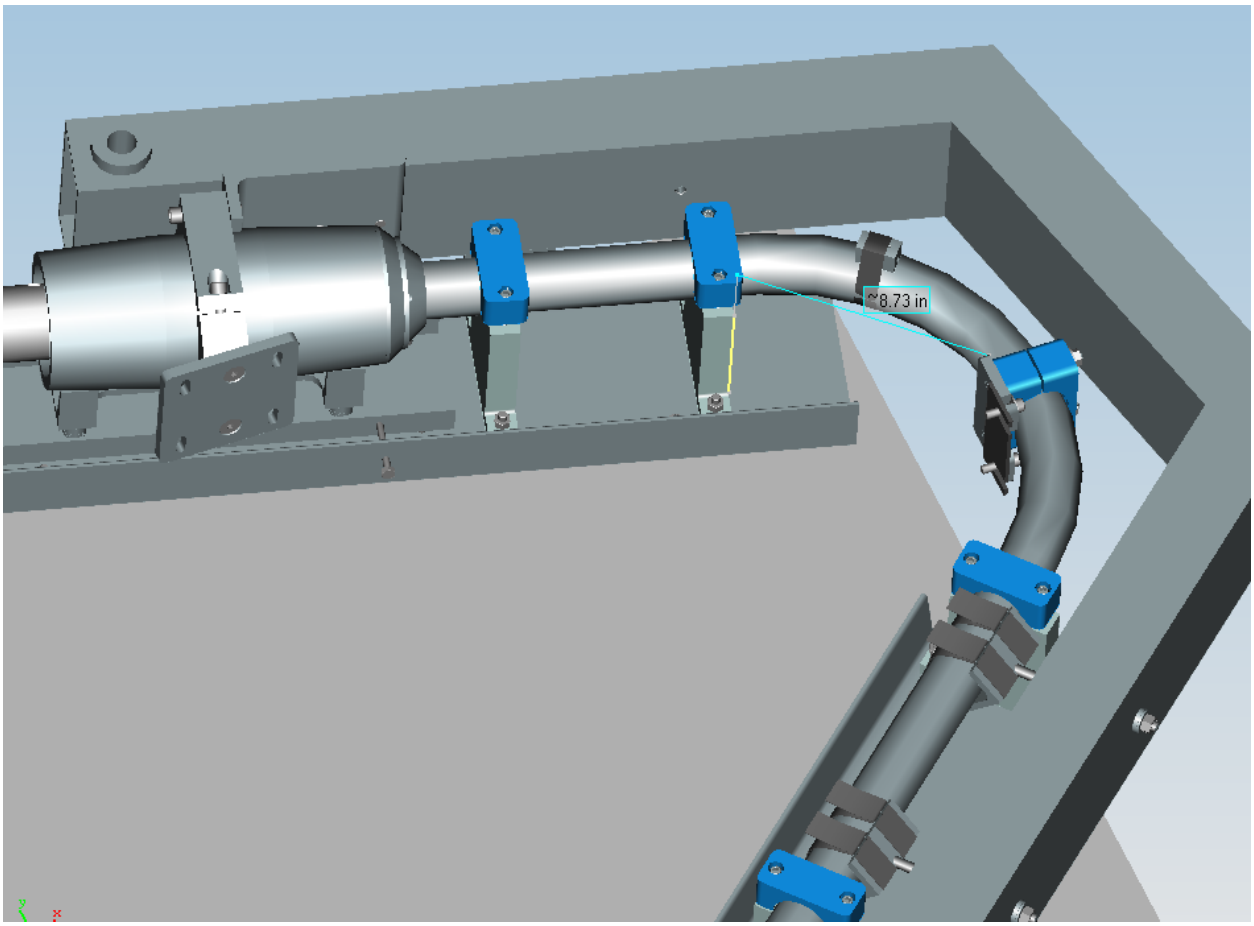
1. Go to -3000 drawing and choose counter to install
    a. Determine counter #
    b. Determine if it is lo or hi
2. Get all parts for the counter to be installed
3. Install clamps on heavy shields
    a. Dimension from clamp to outer end of cylinder
        i. Downstream shield - 4 ¾ inches, torque to 19 ft-lbs



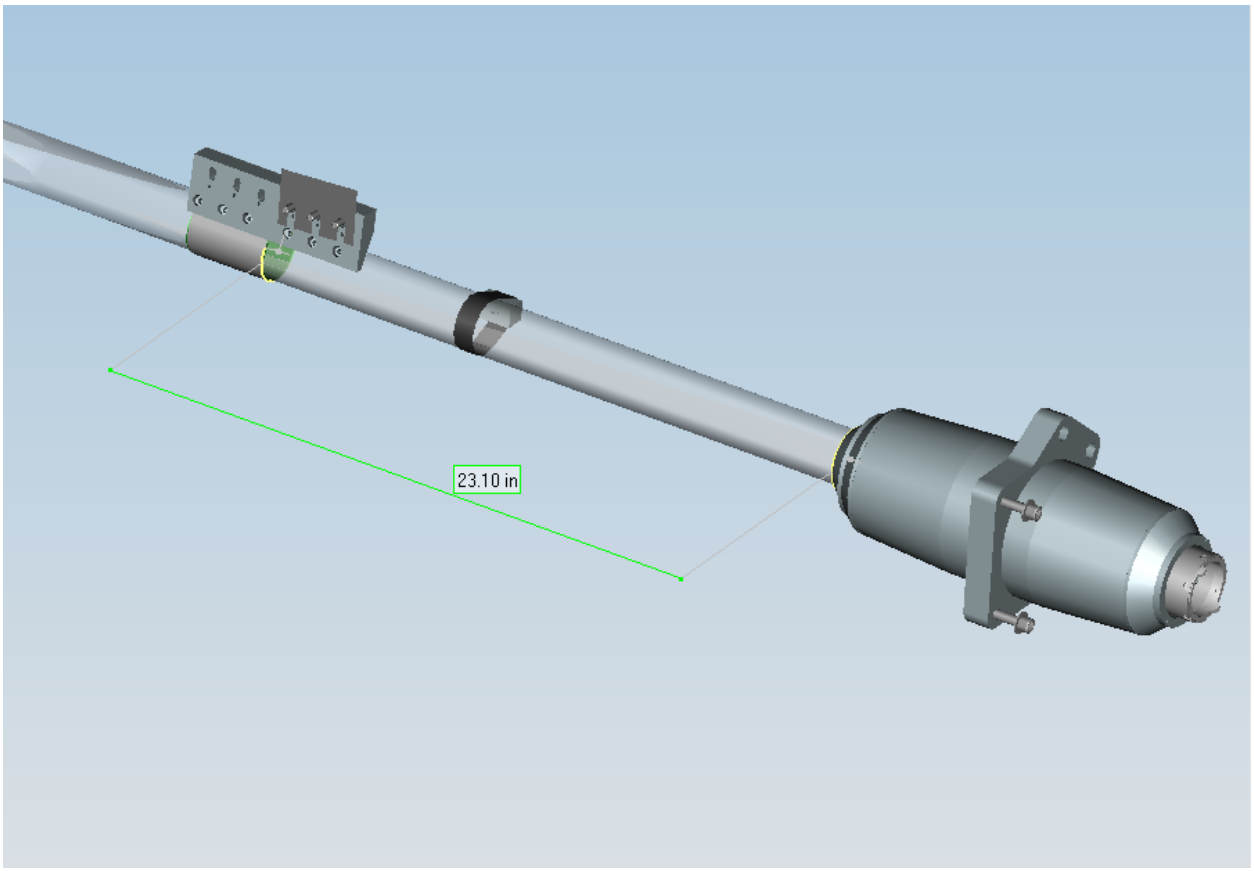
        ii. Upstream hi – 4 ¾ inches, torque to 75 in-lbs
        iii. Upstream lo – 6 inches, torque to 75 in-lbs

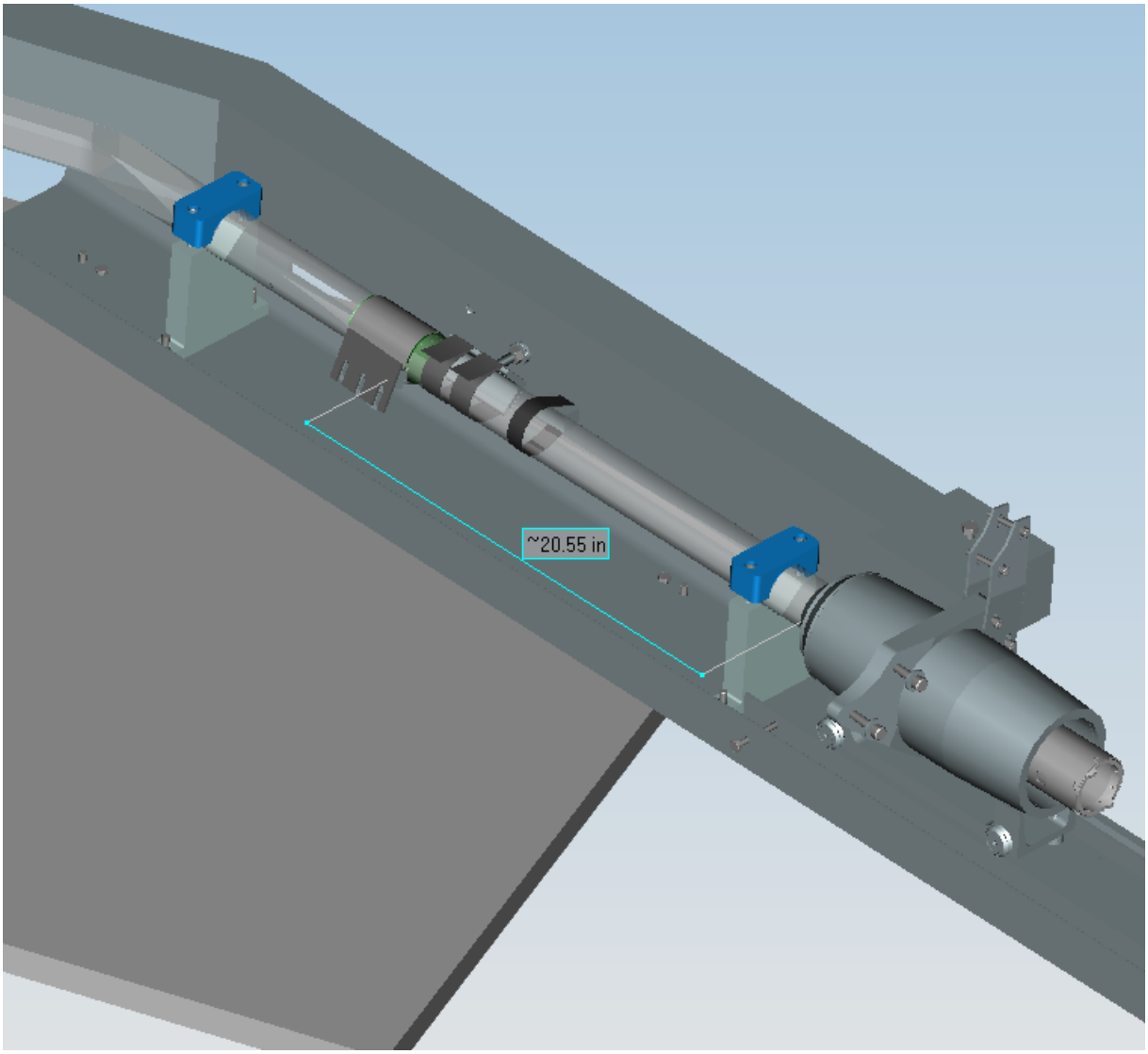
iv. 

4. Preset heavy shield installation table for hi or lo counter – leave bolts for upstream and downstream trays loose
5. Mark counter for V-block location
    a. Dimension from end of cap to V block is
        i. Downstream
        ii. Upstream hi
        iii. Upstream lo
6. Lift counter with transport strongback and place on table, aligning upstream and downstream trays so counter sits on all 6 V-blocks
7. Install blue clamps to hold counter in V-blocks
8. Install downstream blue clamp in position on counter with felt, leave nuts loose



9. Install band on counter
    a. Hi counter distance is 23 1/8 inches
    b. Lo counter distance is 20 ½ inches


23.10 in



10. Verify that trolleys are on their tracks and install heavy shields on trolleys with clamps in proper orientation
11. Adjust heavy shield inner trays so heavy shield is coaxial with pmts
12. Using trolley, slide heavy shield over PMT
13. Fit end caps over PMT, remove tape if necessary, install nuts and leave them loose

Installing Installation Strongback

1. Retract v-mounts to ensure they don't contact counter pre-maturely
2. Position installation strongback onto table (3 person job)
3. Align mount holes to downstream clamp, then swing the strongback into position
4. Align strongback to heavy clamps
    a. Adjust height of strongback
    b. Rotate heavy shields
    c. Adjust strongback brackets
5. Torque installation strongback to heavy-clamps – 19 ft-lbs
6. Torque strongback brackets
7. Torque endcap 5 in-lbs using torque screwdriver
8. Adjust & strap v-mounts to counter - ensure that straps are removable from the strong-back side

Transporting Counter to Installation Tooling

1. Remove blue clamps from V-blocks
2. Attach rigging to strongback and crane
3. 3 people lift strongback evenly 1 foot above the table – then crane lifts the strongback and moves it away from the table
4. Adjust rigging so strongback is level
5. Transport to installation tooling and install 2 pins

Installing counter into the Solenoid

1. Rotate installation tooling to go into spaceframe
2. Push tooling into spaceframe far enough to clear the SST
3. Rotate tooling to counter installation position
4. Push tooling to within 1 inch of Z stop on rails
5. Tilt tooling into position while guiding band clamp into place, verify clearance to solenoid at DS counter bend
6. Push tooling to Z stop of rails, verify clearance to solenoid at DS counter bend
7. Rotate to final position while guiding band clamp into place
8. Bolt heavy clamps to brackets
9. Shim and bolt band clamp and downstream blue clamp
10. Disconnect and retract strongback
11. Adjust counter as necessary

---

6. Prepare solenoid for counter reception. Install (loosely):
    a. Angle-plates to outer ring. (fig.1a)
    b. Bone-mounts for upstream heavy-shields. (fig.1b) what dwg calls it
    c. Single mount for R02 (second, right-side) counter. (fig.1c)

7. Counters from rack into crate (Transport strongback)
8. Counters from crate to heavy-shield installation table (Transport strongback)
    a. Cap the v-blocks; straight sections, if not all of them
    b.
9. Install Heavy shields, and mounting brackets
    a. Ensure correct hardware and quantity for each counter type
    (See B00000-01-04-3000_hvy_inst)
    b. Pre-install heavy-clamps onto heavy-shields (but do not tighten)
    (See B00000-01-04-3000_hvy_inst)
    c. Align and install heavy shields (and tighten end-cap?)
        i. Remove excess tape (minimum removal possible) over compensation coil wires (if necessary)
    d. Position installation strongback onto table (3 person job)
        i. Retract v-mounts to ensure they don't contact counter pre-maturely.
        ii. Align mount holes to downstream clamp, then swing the strongback into position
        iii. Adjust height of strongback to position the strongback mounts with heavy-clamps
            1. 5/16"hardware through downstream mounts
            2. Pilot with hardware
        iv. Torque installation strongback to heavy-clamps
        v. Torque heavy-clamp
        vi. Torque endcap (if not already tightened)
        vii. Adjust & strap v-mounts to counter
            1. Ensure that straps are removable from the strong-back side

10. Counter onto installation strongback

    a. !! avoid any contact with the counter !! (equipment, hands, nothing touches the counter)
    b.
11. Installation strongback onto installation fixture
12. Installation fixture into solenoid
    a. Position fixture for entry
        i. Tilt to entry position (via actuator)
        ii. Rotate to relevant counter installation position
        iii. Insert to z-stop
        iv. Tilt to…
13. Affix counter to solenoid
    a. Upstream outer
    b. Downstream
    c. Upstream mid
14. Detach installation strongback
15.

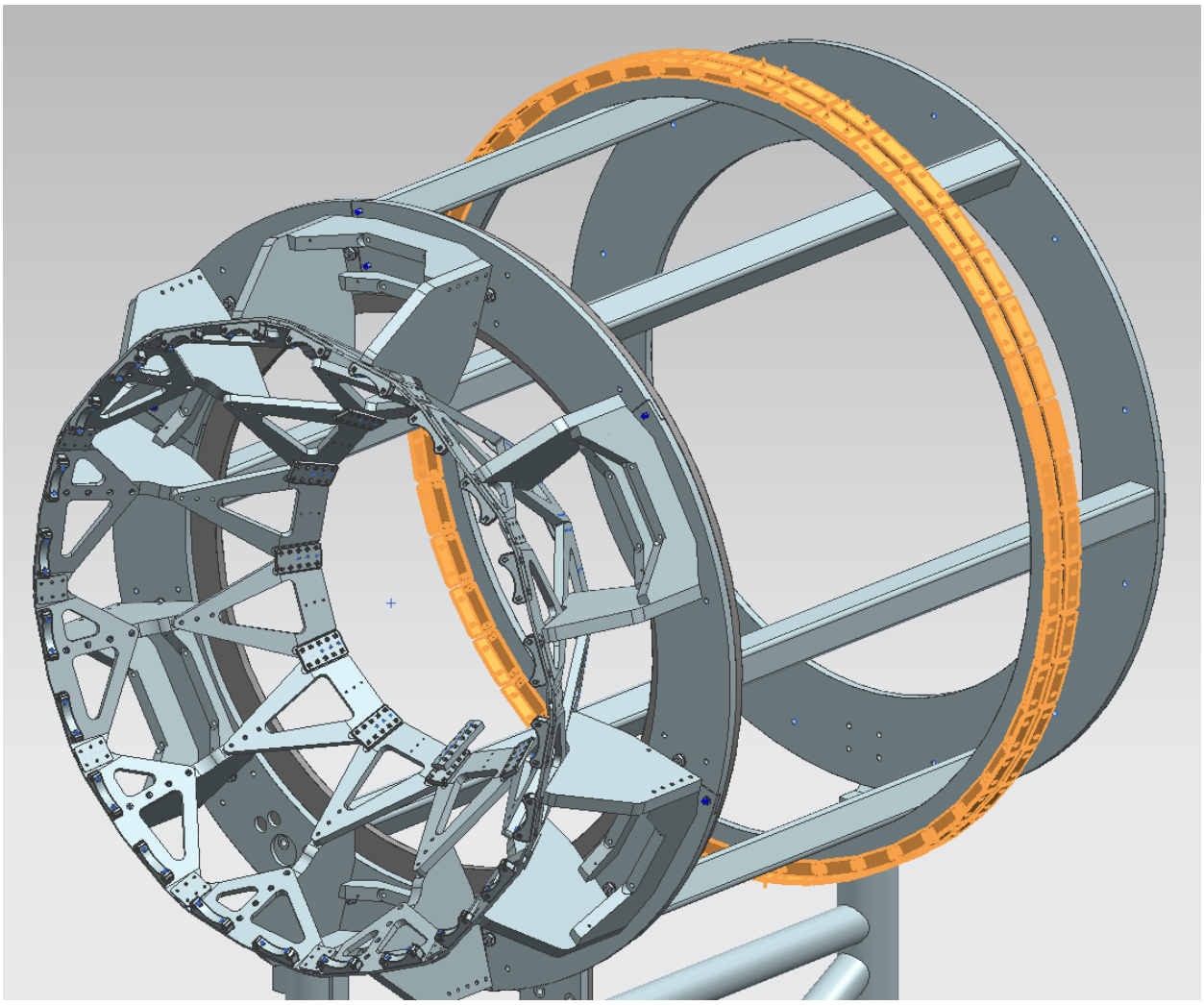
Notes:

Need to:

1. Get 5/16”hardware for mounting installation strongback
2. Gather ctof hardware and kitted parts to the hall
3.

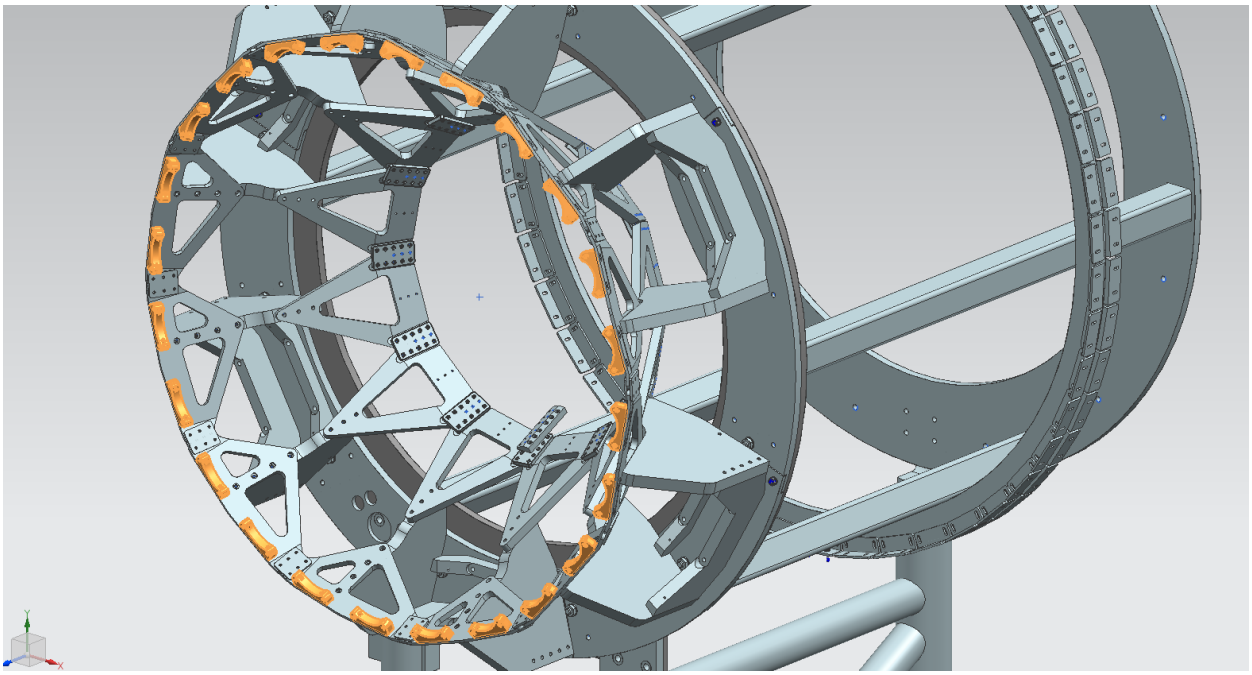
1a) Angle-plates for downstream heavy-shields (bolted loosely)

- Carriage bolts, 3/8 UNC x 2”lg
- Nuts, 3/8 UNC
- Washer, 3/8



1b) Bone-mounts for upstream heavy-shields (bolted loosely)

- Socket cap screw, 7/16-UNC, 1.0”lg, SST
- Washer, 7/16, SST



1c) Bracket, B00000-01-04-3609

- SOCKET HEAD CAP SCREW, ¼-20, 1.0”LG, SST
- SHIM x3, B00000-01-04-3607