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Author(s) Allan DeMello	Department Mechanical Engineering	Location Berkeley	Date 9/15/2006		
Title Advanced Light Source PEEM 3 Microscope Vacuum Vessel Lid Removal Procedure					

To safely lift and remove the lid of the PEEM 3 vacuum vessel and to protect the endstation equipment please follow these steps:

1. Be sure to clean any dirt and debris from the top of the lid.
2. Vent the vacuum vessel to nitrogen. Do not exceed 0.50 pounds of positive pressure.
3. Pull out the bore scopes inserted through the lid (see Figure 1).
4. Remove the bellows between the vacuum vessel lid and the sample transfer system (see Figure 1).

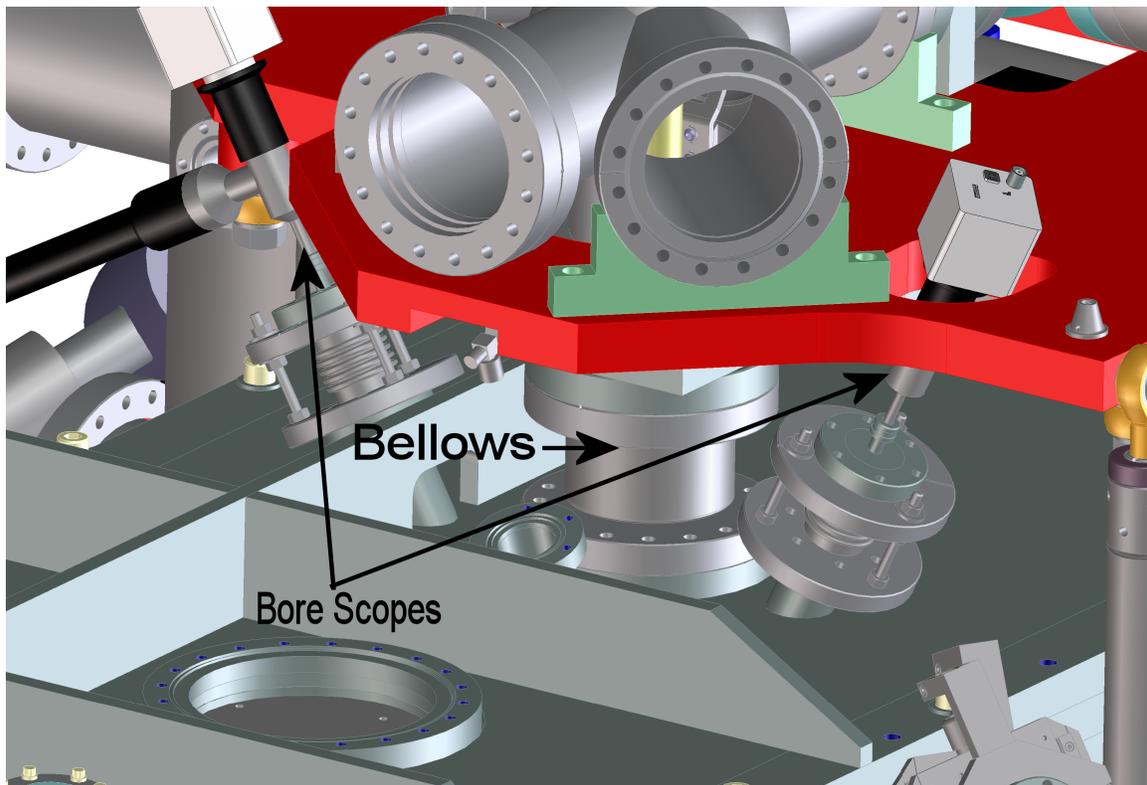


Figure 1. Location of sample transfer bellows and the bore scopes.

5. Remove the vacuum pump tube from the vacuum vessel lid (used to pump out between the o-rings).

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5. “Cork” (with the aluminum piece made for this purpose) the tube going into the ultra high vacuum box (see Figure 2).
6. Remove the three screws of the inner flange plate (see Figure 2).

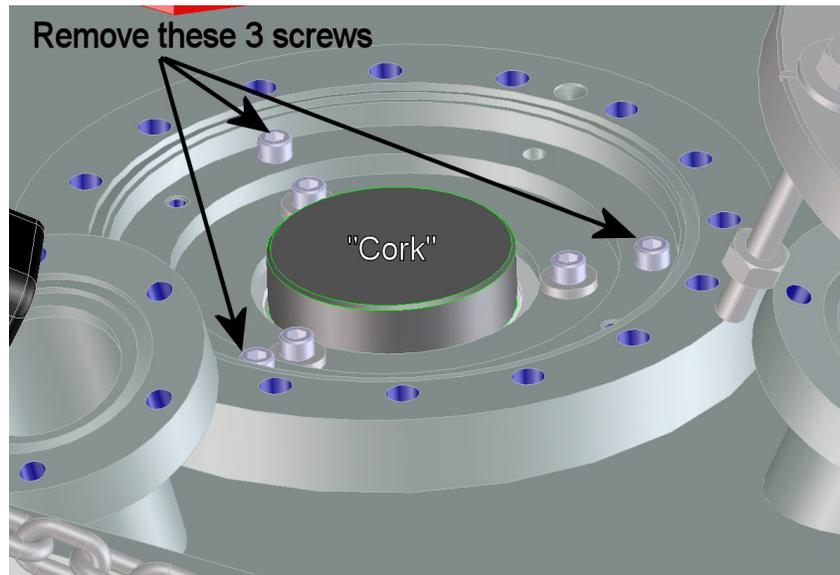


Figure 2. Location of the flange mounting screws and the placement of the “cork” into the sample transfer tube.

7. Put two of the flange mounting screws into the two tapped “jacking screw” holes. Remove the inner flange plate by grasping the jacking screws and gently rotating the flange while pulling it upward (see Figure 3).

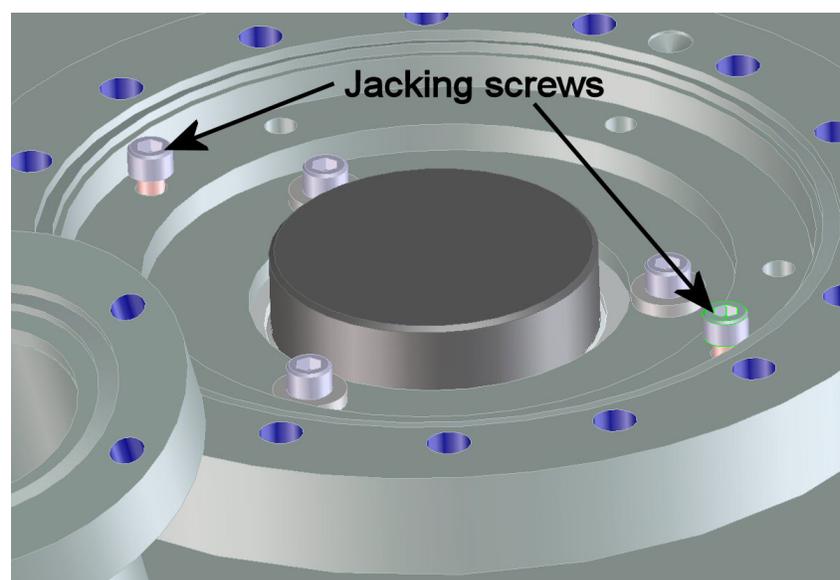


Figure 3. Location of the flange jacking screws.

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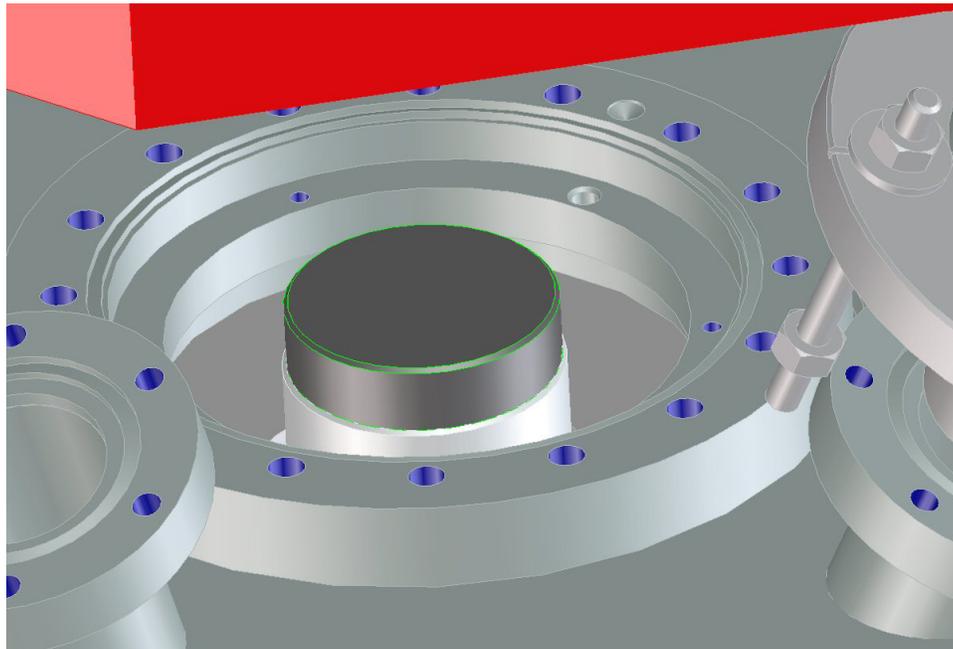


Figure 4. Flange removed.

8. Install the two swivel rings onto the lid in the tapped holes at the locations shown in Figure 5.

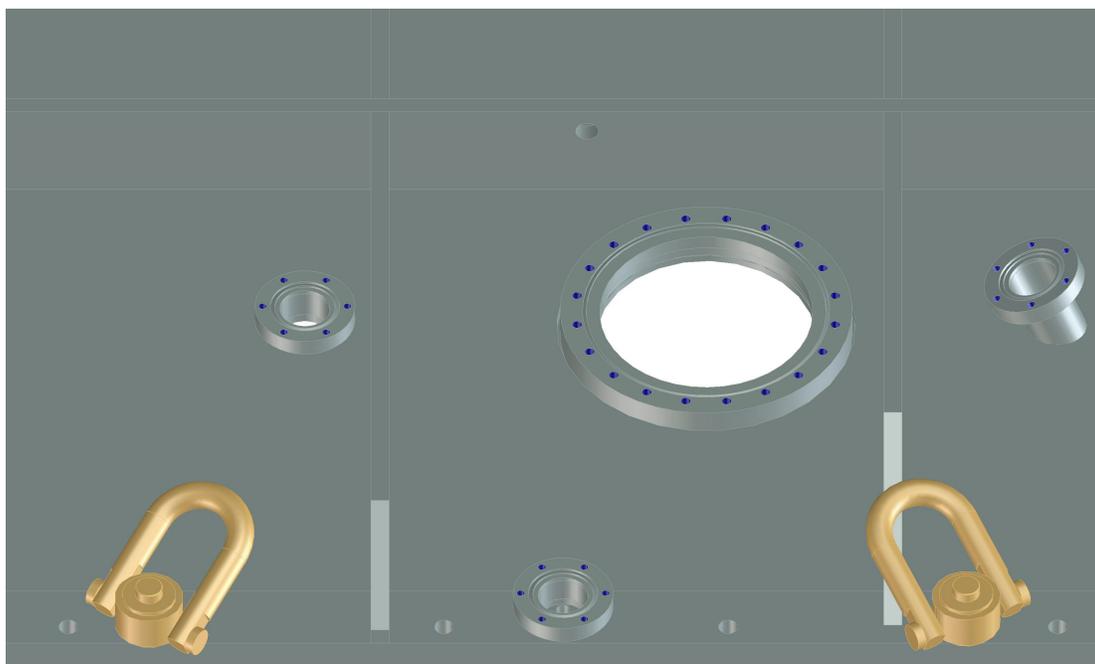


Figure 5. Two swivel rings installed onto the lid.

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9. Put a shackle through the black ring of the under hook rigging. Attach the shackle onto the PEEM 3 vacuum vessel lid through the hole in the rib. Make sure that the two small beige rings are on either side of the black chain as shown in Figure 6.



Figure 6. Under hook rigging installed.

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10. Attach the two CM Series 602 mini hoists (Figure 7) onto the swivel rings and the under hook rigging as shown in Figures 8 through 10 below.



Figure 7. CM Series 602 mini hoist.

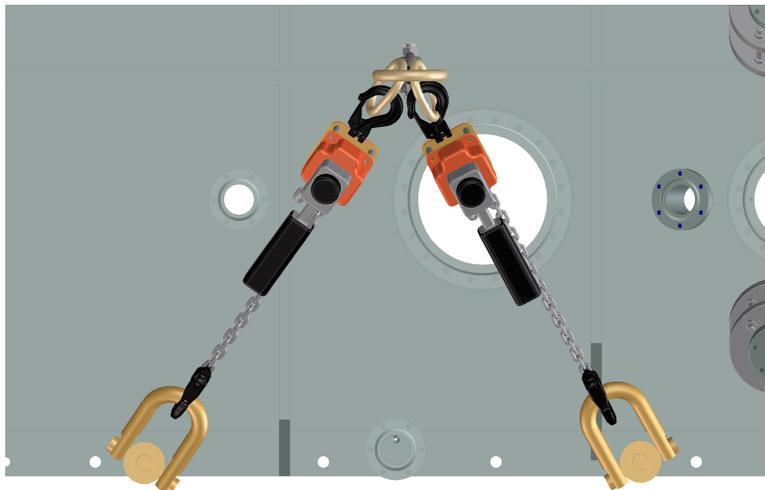


Figure 8. Rigging top view.



Figure 9. Rigging side view.

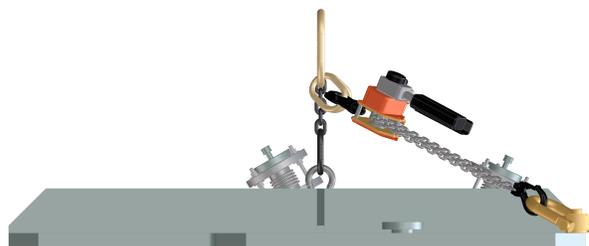


Figure 10. Rigging end

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11. Loosen all of the vacuum chamber lid bolts and remove all but the four bolts that are approximately at the four corner of the lid. These are used for guidance as the lid is lifted. Remove the nuts of these four bolts.
12. **Slowly** raise the lid with the crane hoist until it breaks free of the vessel at the O-ring.

CAUTION: BEWARE OF THE O-RING STICKING!

If the lid does not easily break free of the vessel then back off on the hoist. First check to be certain that all of the lid bolts are removed then insert (if not already in place) jacking screws into the holes indicated in Figure 11. Use these screws to jack the lid O-ring free of the vessel then proceed to step 13.

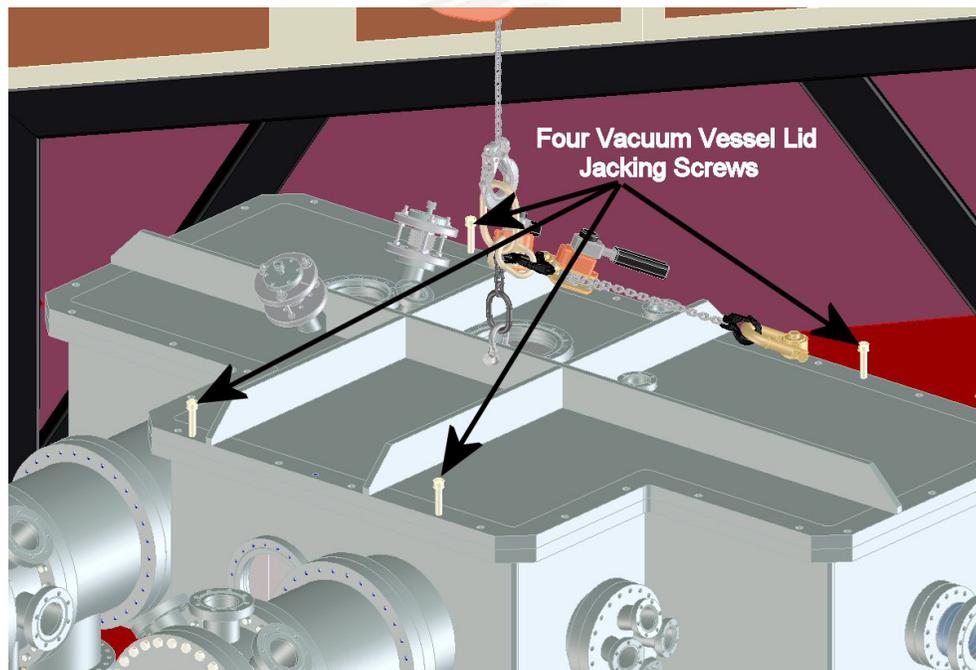


Figure 11. Four vacuum vessel lid jacking screws.

13. Raise the lid until it is above the sample transfer tube and the four corner guidance bolts are free of the holes in the vessel flange. **Remove the four remaining “alignment” bolts.** Level the lid using the mini hoists. Once the lid has been leveled it can be moved off of the vacuum vessel by pulling the hoist and trolley straight down the crane beam until the lid clears the sample transfer system (see Figure 12 below). After it is clear of the sample transfer system the lid can be swung out and away from the vacuum vessel (see Figure 13 below).

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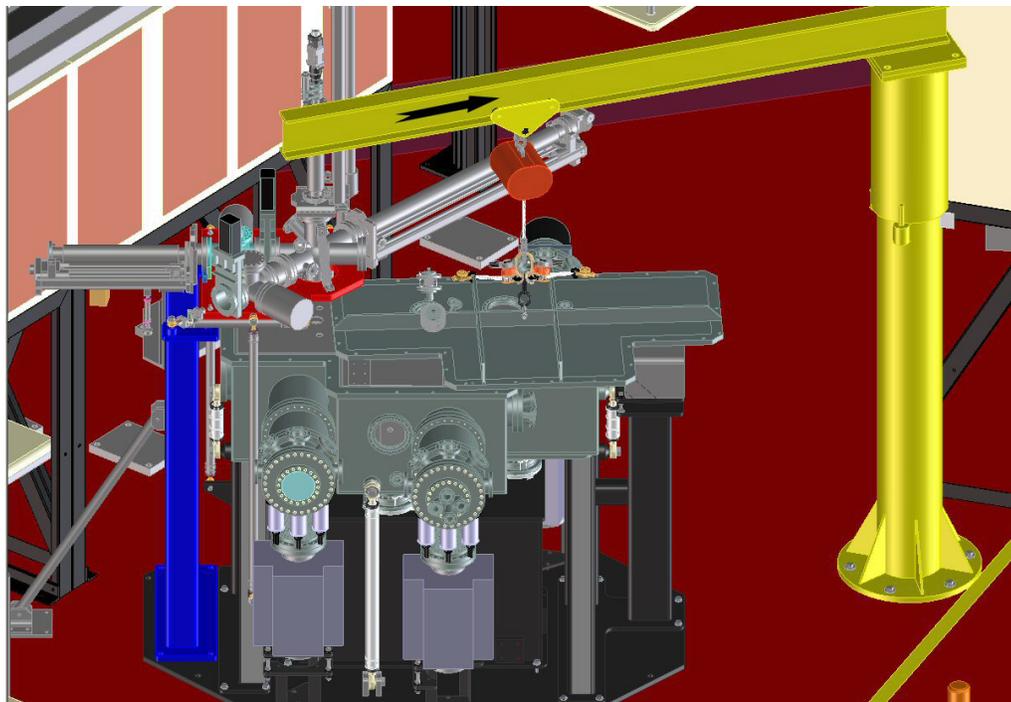


Figure 12. Lid moved down the crane beam and out from under the sample transfer system.

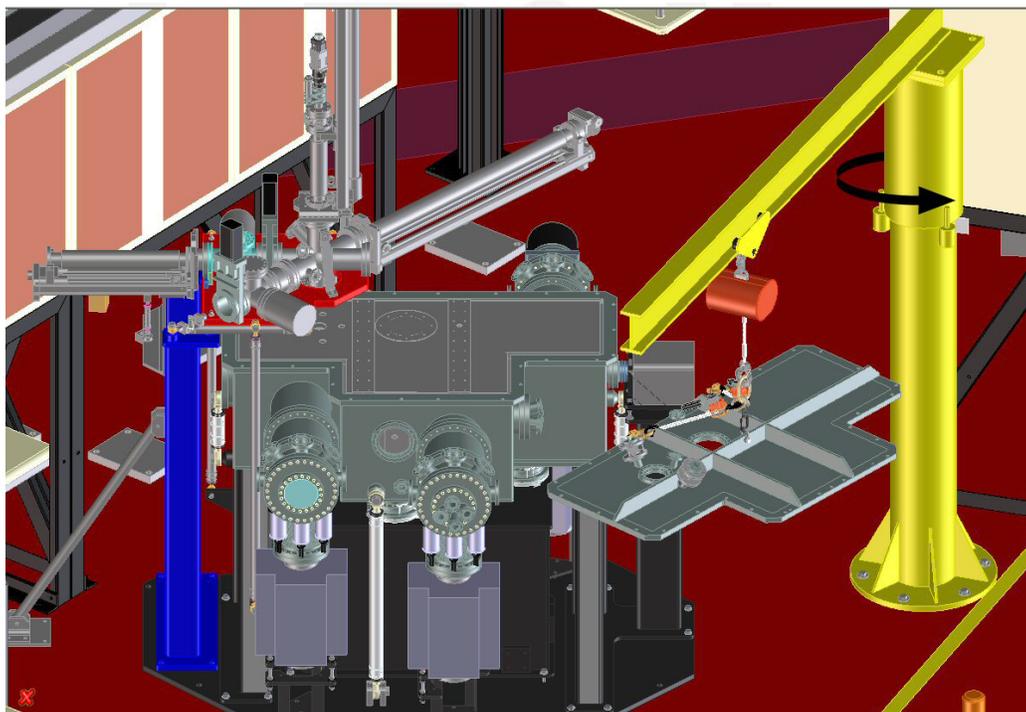


Figure 13. Lid swung out and away from the vacuum vessel.

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Replacing the lid onto the vacuum vessel

1. Clean the O-ring mating surface of the vessel
2. Slowly raise the lid with the crane hoist and make sure the O-ring is completely seated into the O-ring groove of the lid and that the O-ring is clean.
3. Level the lid using the mini hoists. Replace the four bolts that are approximately at the four corner of the lid.
4. Move the lid over the vacuum vessel.
5. When the lid is roughly aligned over the vacuum vessel slowly lower it using the four corner bolts to keep it aligned.
6. Line up the edges of the lid and the vacuum vessel flange and completely lower the lid.
7. Replace the inner (sample transfer tube) flange by first aligning the two alignment holes (see Figure 14). Gently rotate the flange while pushing down until it is seated. Replace the three fasteners (removing the two in the jacking screw holes)
8. Remove the “cork” from the sample transfer tube.
9. Replace the bellows and the bore scopes.
10. Replace the lid to vacuum vessel fasteners and tighten.

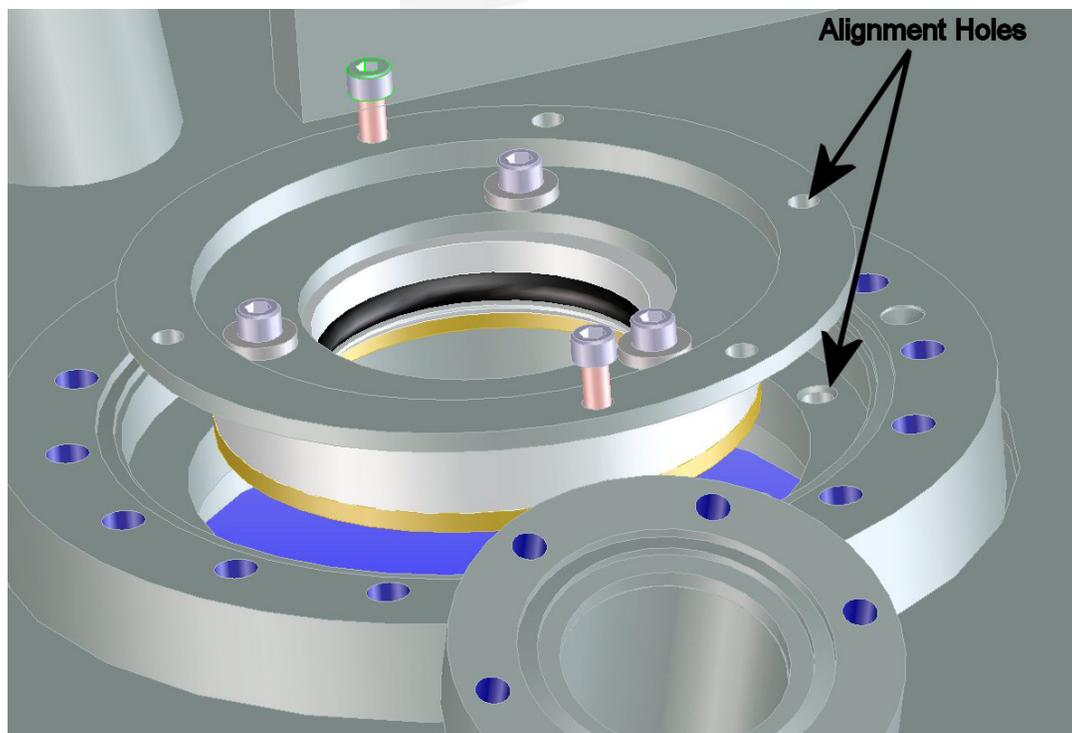


Figure 14. Align the two alignment holes – one in the inner flange and the other in the lid flange – before replacing the inner flange.