BA6 Operation

Overview

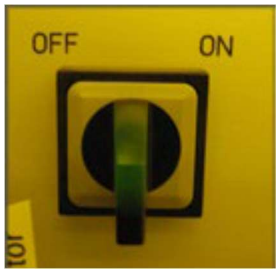
This SOP explains how to configure and operate the SUSS MA6 mask-aligner in bond-aligner (BA6) mode. Users should already be experienced with the MA6 standard photolithography mode and have been trained by Staff on the bond aligner mode operation.

Restrictions & Precautions

- There is a RED EMERGENCY Off button located on the left of the front panel next to the main power switch. If it is pressed the machine gets isolated from the power supply. Press only in an event of danger.
- Watch out for the microscope movement at all times.
- You must always return the system to mask aligner mode.

Switching Configuration from MA6 to BA6

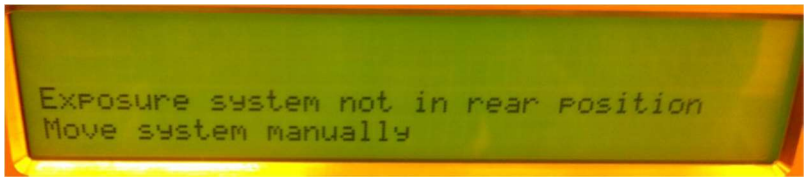
1. Center the stage micrometers.
2. Disconnect the mask-holder vacuum cable (quick-connect). Leave the mask holder on the mask holder shelf or place it on the work surface next to the machine. DO NOT PLACE IT IN THE VIDMAR ON TOP OF ANOTHER MASK HOLDER!
3. Remove the chuck from the transport slide and place it on the work surface next to the machine. DO NOT PLACE IT IN THE VIDMAR ON TOP OF ANOTHER CHUCK!
4. Power off the chassis by turning the power switch on the front panel counter-clockwise to the OFF position and release.



5. Unscrew the mask-holder frame completely. Two screws are on the right side and two screws are on the left.

NOTE: 3/4 screws are captive and will not fall out.

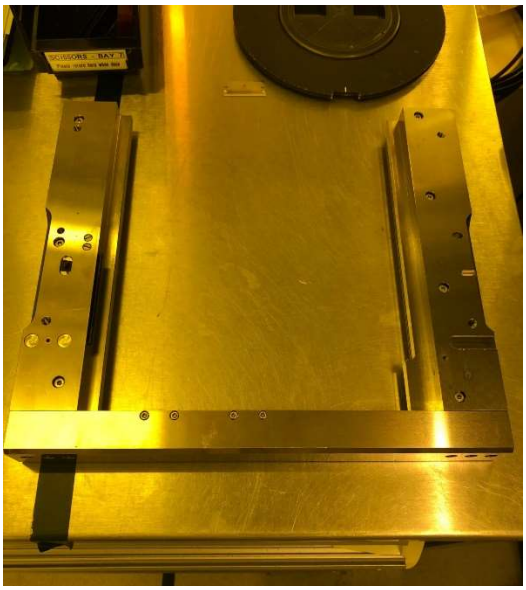
6. Power on the chassis by turning the power switch on the front panel clockwise to the ON position and release. The system will prompt you to press the LOAD button and then it goes through a start-up process. The system will then ask you to choose MA6 (mask align) or BA6 (bond align) mode by using the Y-ARROW and ENTER keys. Select BA6.
7. Wait for the display to show this message:



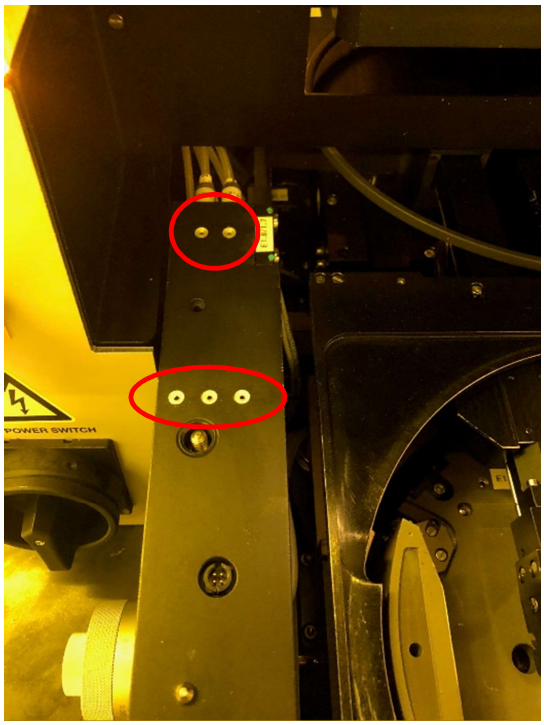
You will need to move the lamp house toward the back of the system. First pull the black handle on the left of the machine in your direction and then slowly push it toward the back of the machine until it is clamped (you will hear a distinct latching sound).

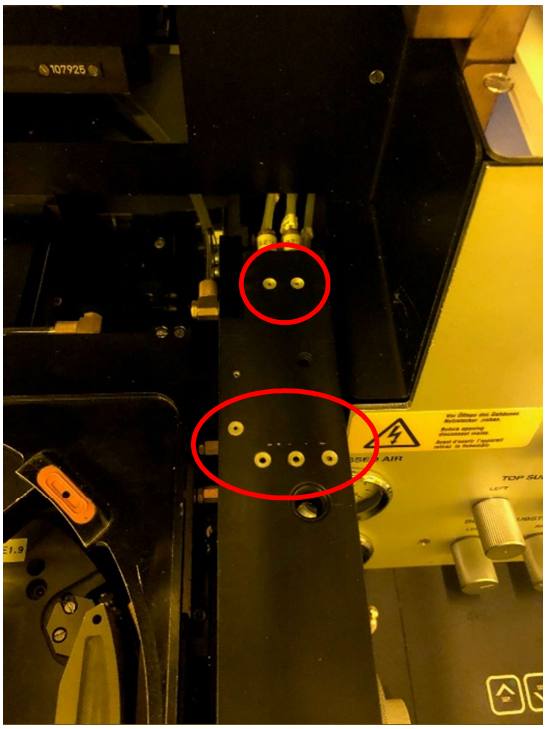
Wait for the microscope to move down and back up before proceeding.

8. Carefully lift up on the mask-holder frame to remove it. There are two indentions on each side to help grasp it. Flip it over and place it on the work surface next to the machine. THE FRAME IS HEAVY AND SLICK, HANDLE IT WITH EXTREME CARE AND DO NOT PLACE IT FACE DOWN!!!

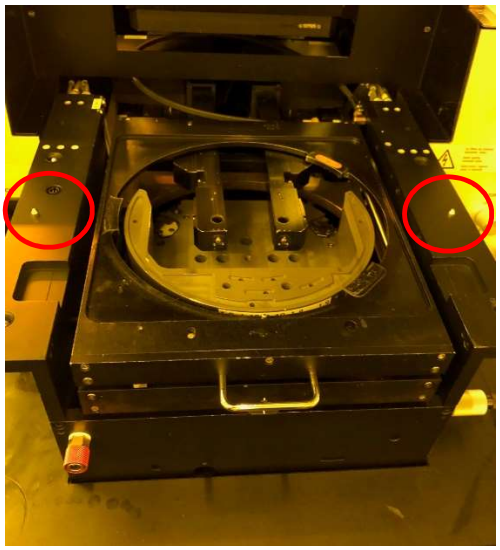


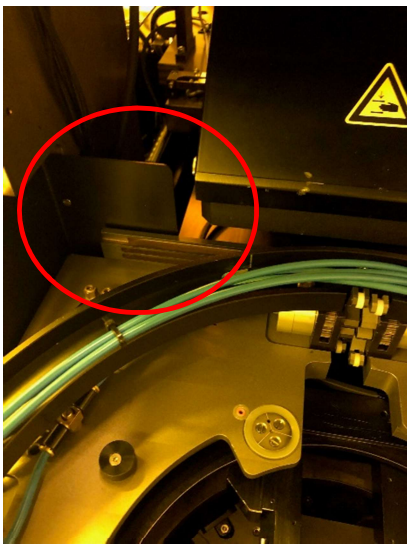
9. Once the frame is removed, check that none of the clear rubber gaskets (11 total) are missing on the left and right side of the bottom frame. If any are missing, check the bottom of the frame you just removed. Contact Staff if needed.

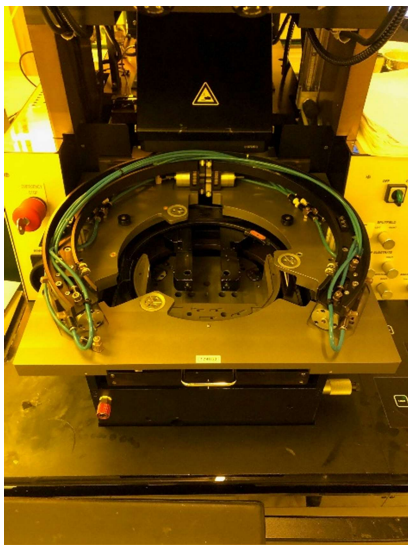




10. Retrieve the bond aligner frame for the bottom drawer of the Vidmar and place it on the system. There are pins on the left and right side for frame alignment and it should sit close to flush with the vertical panels at the rear of the bottom frame.







11. Screw in the bond aligner frame with the four screws from Step 4.

Editing the Recipe Parameters

1. Press the EDIT PARAMETER key.
2. Adjust the bond alignment parameters by using the X-ARROW keys to cycle through the available parameters and the Y-ARROW keys to adjust the values for said parameters.

Parameter	Description	Range
Lower Subs.	Lower substrate is transparent or opaque	Glass or Silicon
WEC Type*	Type of the Wedge Error Compensation	Cont or Spacer
Clamp	Clamping of substrates with or without spacers in between	with Spacers or without Spacers
Spacer thick	Thickness of spacers	50, 100, 125, 200, 1000, 2000
Al. Gap	Alignment distance during the alignment	10 - 300 µm
WEC-Offset	Substrate height offset in respect to 0 position (contact)	-50 to 50 µm

***IMPORTANT:** There are two other WEC types in the menu, GlobCont & GlobSpac, our system is not configured to support these. If you try to use them, your substrate will break!

3. Recommended parameters on BA6 for standard anodic bonding:
    - Lower Sub: Glass or Silicon
    - WEC Type: Spacer
    - Clamp: with Spacer
    - Spacer thick: 100
    - Al. Gap [um]: 100
    - WEC-Offset: 0

    NOTE ON LOWER SUB SELECTION: It is possible to align two silicon (or non-transparent) wafers. When "Lower Subs: Silicon" is selected, the alignment will operate similar to BSA mode. You will grab an image of the alignment marks of the first wafer and align with features on the backside of the second wafer.

    NOTE ON WEC TYPES:
    - Cont (contact) is only available for glass lower sub, this means that the wafers will touch briefly during WEC.
    - Spacer places the spacers in between the wafers prior to WEC and keeps them there throughout the alignment process.

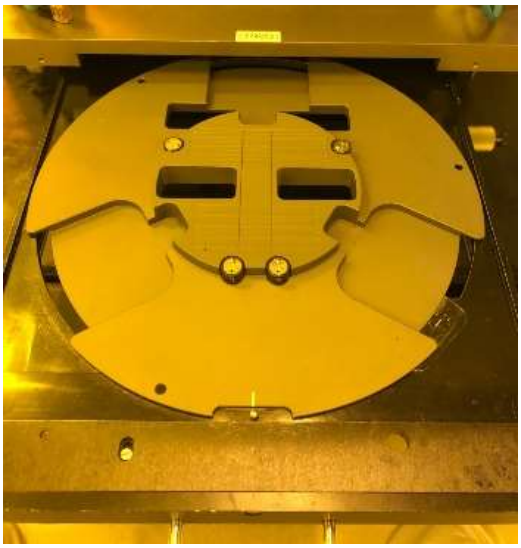
    NOTE ON CLAMPING WITH SPACERS: Spacers are only really effective with anodic bonding as they allow the bonder to effectively remove air between the substrates. DO NOT use spacers

with any material that could contaminate them, mainly glue type polymers (Su8, cyclotene, parylene, etc. …)!

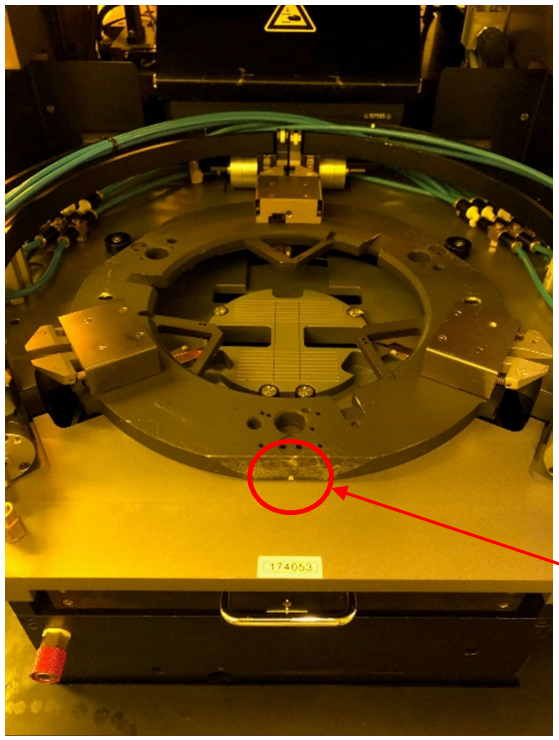
4. Press the EDIT PARAMETER key again to save your changes.

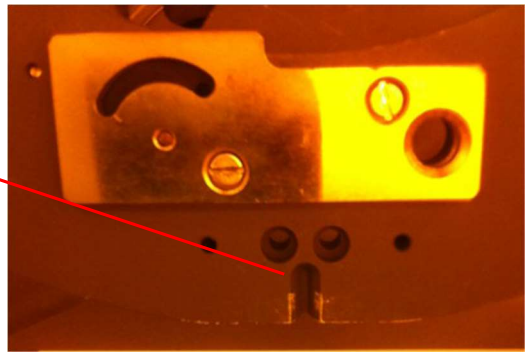
Operation

1. Place the chuck you require into the transport slide. Make sure to orient the chuck so that the white hash mark on the chuck is facing out toward you and lined up with the pin on the transport slide.

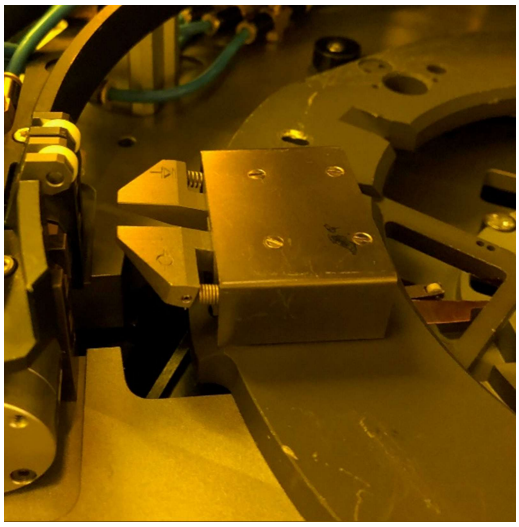


2. Insert the bond fixture, facing down, into the frame. Make sure it is pushed up against the large black stops and that the orientation is correct. See image below of the slot on the underside of the fixture, matching the pin on the frame.





3. Press the LOAD key and then press ENTER key 4 times:
    - 1st press confirms chuck and fixture type, setting cannot be changed.
    - 2nd press asks you to insert chuck, which you have already done.
    - 3rd press asks you to insert bond fixture, which you have already done. Once you press ENTER, the tool actuates the clamps and spacers. You must verify all six clamp and spacer effectors (three sets of two) are in the up position after this and if they are not, move them manually. Failure to do this can result in damage to your wafer and the system!



    - Press enter once more and you will get the following message is on the display:

4. In case the chuck is not centered, follow the indication on the display. Confirm with ENTER when finished.
5. With the transport slide out, carefully place your first wafer on the chuck with the side to be bonded facing down. Manually manipulate your wafer as needed to get it positioned correctly on the chuck.
6. Slowly move the transport slide to rear position and confirm with ENTER. The wafer will move up and be fixed by vacuum to the bonder fixture.
   NOTE: If you experience a vacuum error, reposition your wafer and try again.
7. Move the left and right BSA objectives under the alignment markers on the first wafer. Adjust the focus and magnification as needed. In case you are aligning non-transparent wafers, you will need to press GRAB IMAGE at this point to capture an image of the markers on the first wafer.
8. With the transport slide out, carefully place your second wafer on the chuck with the side to be bonded facing up. Manually manipulate your wafer as needed to get it positioned correctly on the chuck.

9. Slowly move the transport slide to rear position and confirm with ENTER. The second wafer will move up, perform the WEC procedure with the first wafer, and then move to the specified alignment gap.
   NOTE: If you selected the Spacer WEC type then the spacers should actuate and be in between your samples. If they are not, you have time to manually manipulate them.
10. Move the second wafer using the stage micrometers in order to align with the first wafer.
11. Once the wafers are aligned, press PERFORM CLAMPING, the spacers and clamps will move in position.
12. Check the alignment accuracy after clamping. The machine will give you two options: press LOAD to unclamp and re-align or press ENTER to complete the procedure.
13. When prompted, you can remove the bond fixture from the frame and transfer to the SB6e loading fork. Take extreme care during this step. Inappropriate handling of the fixture can de-clamp the wafers or de-align them by several micrometers!
14. Confirm with the "ENTER" when finished.

Switching Configuration from BA6 to MA6

1. Power off the chassis by turning the power switch on the front panel counter-clockwise to the OFF position and release.
2. Unscrew and carefully removed the bond aligner frame. Return it to the bottom drawer of the Vidmar.
3. Carefully reinstall the mask holder frame paying extra attention to the alignment of the serial connection on the bottom of the frame. A good way to do this is to align the front of the mask holder frame with the front of the bottom frame and then slowly lower it on.
4. Screw in the mask aligner frame with the 4 screws.
5. Remove the bond aligner chuck and replace it with the mask aligner chuck you removed.
6. Reconnect the mask holder vacuum line.
7. Power on the chassis by turning the power switch on the front panel clockwise to the ON position and release. The system will prompt you to press the LOAD button and then it goes through a start-up process. The system will then ask you to choose MA6 (mask align) or BA6 (bond align) mode by using the Y-ARROW and ENTER keys. Select MA6.
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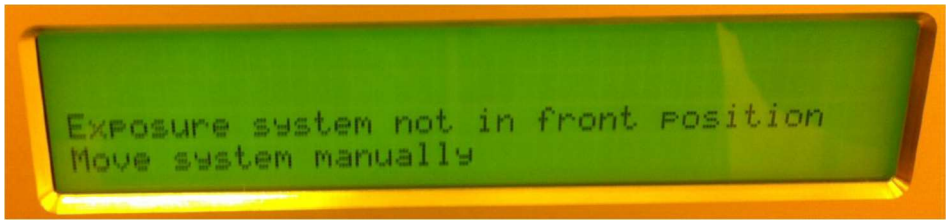

You will need to move the lamp house back in front position. First push the handle on the left of the machine toward the rear of the system and then slowly pull the handle in your direction until it is clamped.