

Süss MA6 Bond Align (BA6) User Manual

Version of 2016-07-21. Get the latest one at <http://cmi.epfl.ch/photo/files/MA6/BA6.std.manual.pdf>

6. Introduction

This user manual explains how to operate the Süss MA6 mask-aligner in BA6, “bond-align” mode. Users should already be experienced with the MA6 standard “photolithography mode”. The manual can be found here:

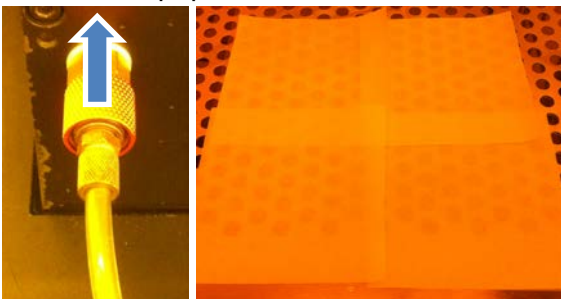
<http://cmi.epfl.ch/photo/files/MA6/MA6.std.manual.pdf>

7. Login & BA6 configuration

- Login for “Suess MA&BA6” with CAE on zone 6 accounting computer.

Z06 Süss MA&BA6 - Double side mask aligner and bond aligner

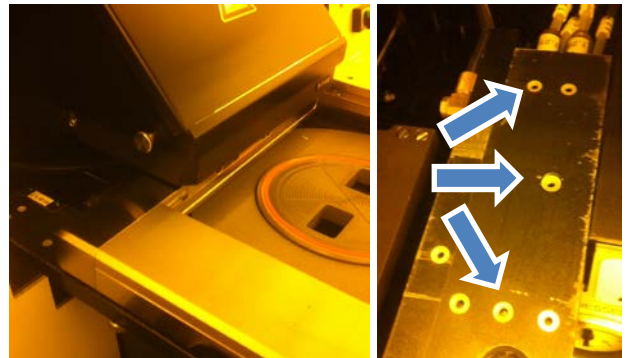
- Before turning on the MA6/BA6 machine, users should prepare the Bond-Align BA6 configuration.
- Start by unplugging the mask-holder vacuum cable (quick-connect) and remove the mask holder. Put it on a table next to the machine on clean-room paper.



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



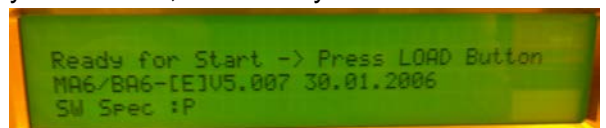
- Remove the mask-holder frame and put it on the table. **Make sure not to touch the lamp house!** Once the frame is removed, check that no rubber ring is missing on the left and right side of the bottom frame.



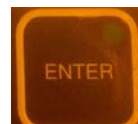
- Switch on the MA6/BA6 main power (short clockwise rotation towards “On”).



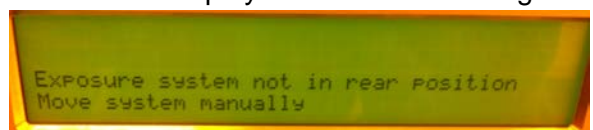
- Press the “LOAD” key when the display asks you to do so, i.e. “Ready for Start”.



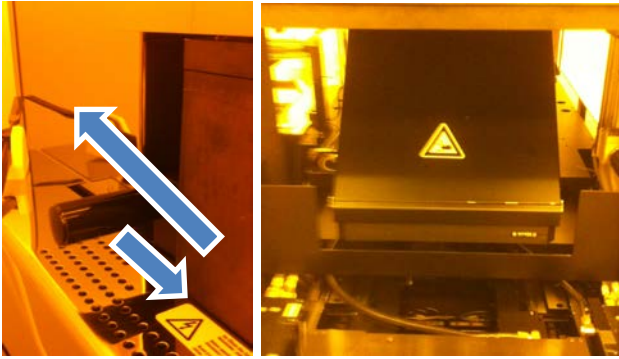
- The system will ask you: “Please wait”. **DO NOT WAIT!** Instead press the blinking “ENTER” key.



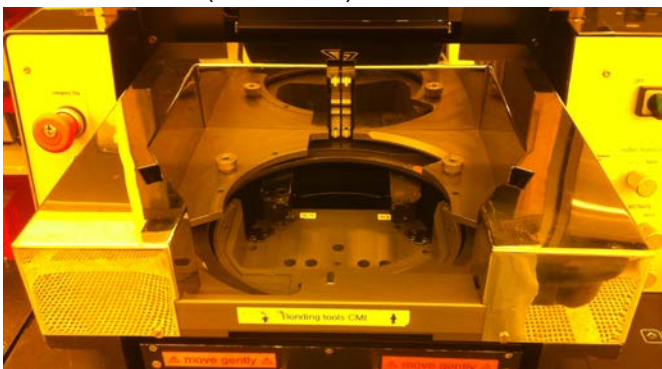
- Wait for the display to show this message:



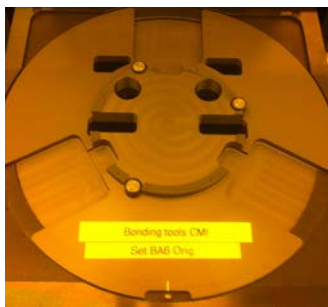
- You will need to move the lamp house at the back of the machine. First pull the handle on the left of the machine in your direction until you hear a distinct sound and then push it at the back of the machine until it is clamped.



- The display will show: "Insert correct adapter plate". Find the BA6 frame labelled "Bonding tools CMI" in the locker left side of the machine and install it (see below).



- Screw the BA6 frame with the four screws located under the frame.
- Confirm the change was done by pressing the "ENTER" key.
- Replace the wafer chuck with the chuck dedicated for BA6 mode, labelled "Bonding tools CMI".



8. Editing the recipe parameters

- Enter the recipe's edition menu by pressing the "EDIT PARAMETER" key. LED will turn on.



- Navigate through the parameters with the arrows key "←" and "→". Change the values of the parameters with the arrows "↑" and "↓".

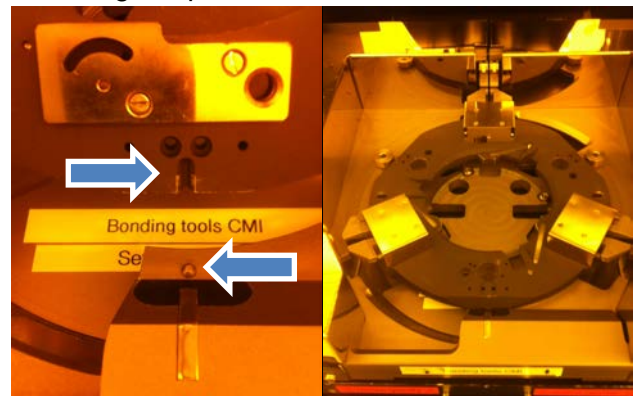
- Recommended parameters on BA6 for standard anodic bonding of Silicon & Glass:
 - Load Type: Slide
 - Unload Type: Fixture
 - Lower Subs: Glass
 - Al. Gap [um]: 100
 - WEC Type: Cont
 - Spacer thick: 100
 - Clamp: with Spacer
 - WEC-Offset: OFF

Note on other bonding types: It is possible to align two silicon (or non-transparent) wafers for other type of bonding (eutectic, glue, etc...). To do this, change the following parameter: Lower Subs: Si. The alignment will operate similar to BSA mode. It will grab a picture of the alignment marks of the first wafer and align with features on the backside of the second wafer.

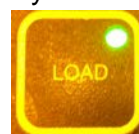
Note on spacers: Spacers are only really effective with anodic bonding. Do not use spacers with any material that could contaminate them, mainly glue type polymers (Su8, cyclotene, parylene, etc. ...)!

9. Loading the fixture and wafers

- Insert the SB6 fixture, facing down, into the frame. Make sure the orientation is correct. See image below of the trench in the fixture, matching the pin on the frame.

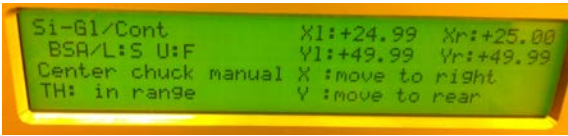


- Start the procedure by pressing the key "LOAD" and follow the instruction given on the MA6 display.

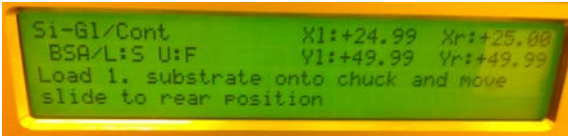


- Chuck and Fixture are already inserted. Confirm with "ENTER". The fixture will be clamped.

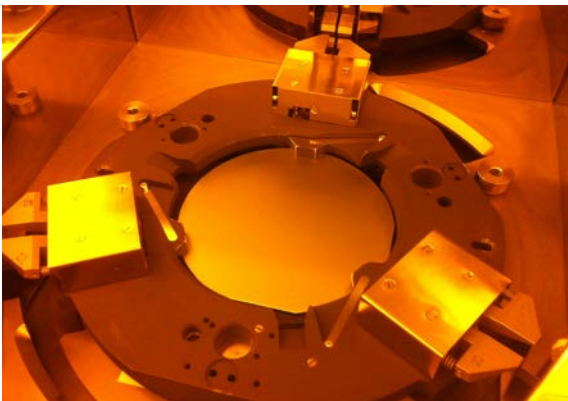
- In case the chuck is not centred, follow the indication on the display. Confirm with “ENTER” when done.



- Load the first wafer, i.e. silicon in case of anodic bonding. **The side to be bonded should be facing down!**



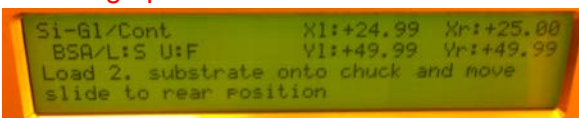
- Move to rear position, confirm with “ENTER”. The wafer will move up and be fixed by vacuum.



- Move the left and right BSA objectives under the alignment markers on the first wafer and adjust the focus. For details on how to move the BSA objectives, check section 6.c. here: <http://cmi.epfl.ch/photo/files/MA6/MA6.std.manual.pdf>

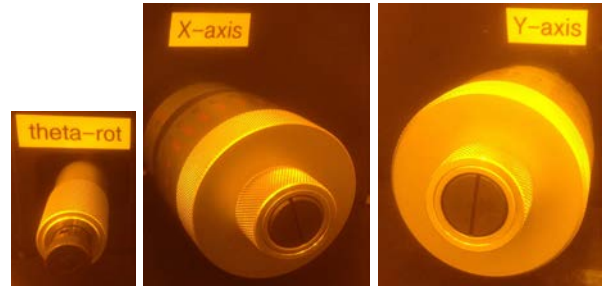
Note: In case you are aligning non-transparent wafers, you will need to press “GRAB IMAGE” at this point to capture an image of the markers on the first wafer.

- Load the second wafer, i.e. glass in case of anodic bonding. **The side to be bonded should be facing up!**

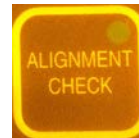


- Push the slide back, confirm with “ENTER”. The second wafer will move up and perform WEC procedure with the first wafer, and then move to 100 um alignment gap

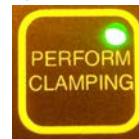
- Move the second wafer using x-axis, y-axis and θ -axis knobs in order to align with the first wafer.



- Pressing “ALIGNMENT CHECK” will move the wafers in contact. If alignment is good, move on with clamping. If it is not the case, press on “alignment check” and try again.



- Once a correct alignment is achieved, press the “PERFORM CLAMPING” key. Spacers and Clamps will move in position.



- Check the alignment accuracy after clamping. The machine will give you the options: press “LOAD” to unclamp and re-align, press “ENTER” to complete the procedure.



5. Unloading the fixture

- Remove the fixture from the chuck and transfer to the SB6 loading fork. **Take extreme care during this step. Inappropriate handling of the fixture can de-align the wafers by several micrometers!**



- Confirm with the “ENTER” key when done.

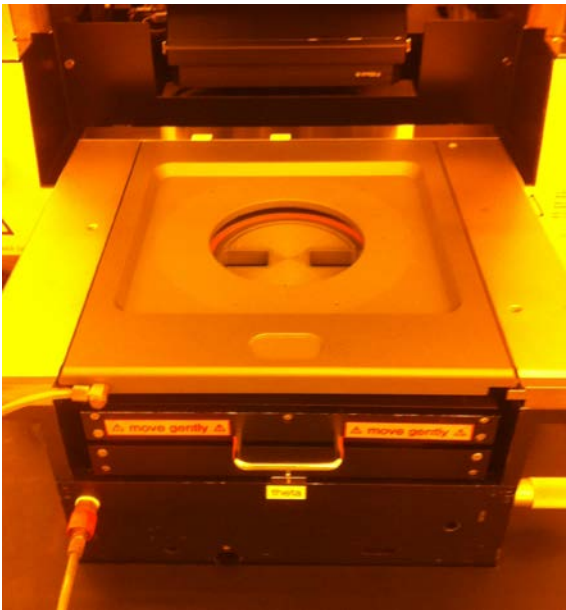
6. Switching configuration to MA6

- To put the machine back in “MA6” configuration, do the following:

- Switch off the MA6/BA6 main power (short counter-clockwise rotation towards “Off”).



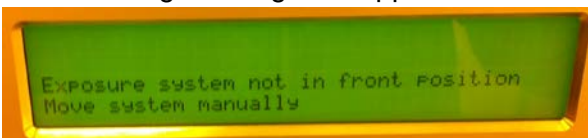
- Exchange the chuck and the frame to the standard MA6 ones. Make sure to screw the frame correctly.
- Put the mask-holder back, including the vacuum cable.



- Switch on the MA6/BA6 main power (short clockwise rotation towards “On”).



- Press the “LOAD” key when the display asks you to do so, i.e. “Ready for Start”.
- The following message will appear:



- You will need to move the lamp house back in front position. Pull the handle on the left of the machine in your direction until you hear a distinct sound, indicating proper clamping.
- Switch off the MA6/BA6 main power (short counter-clockwise rotation towards “Off”).
- Logout of “Suess MA&BA6” with CAE on zone 6 accounting computer.