Camalot Prodigy Measure Function Issue Troubleshooting

(S/N 8300-21889)

September 27, 2023

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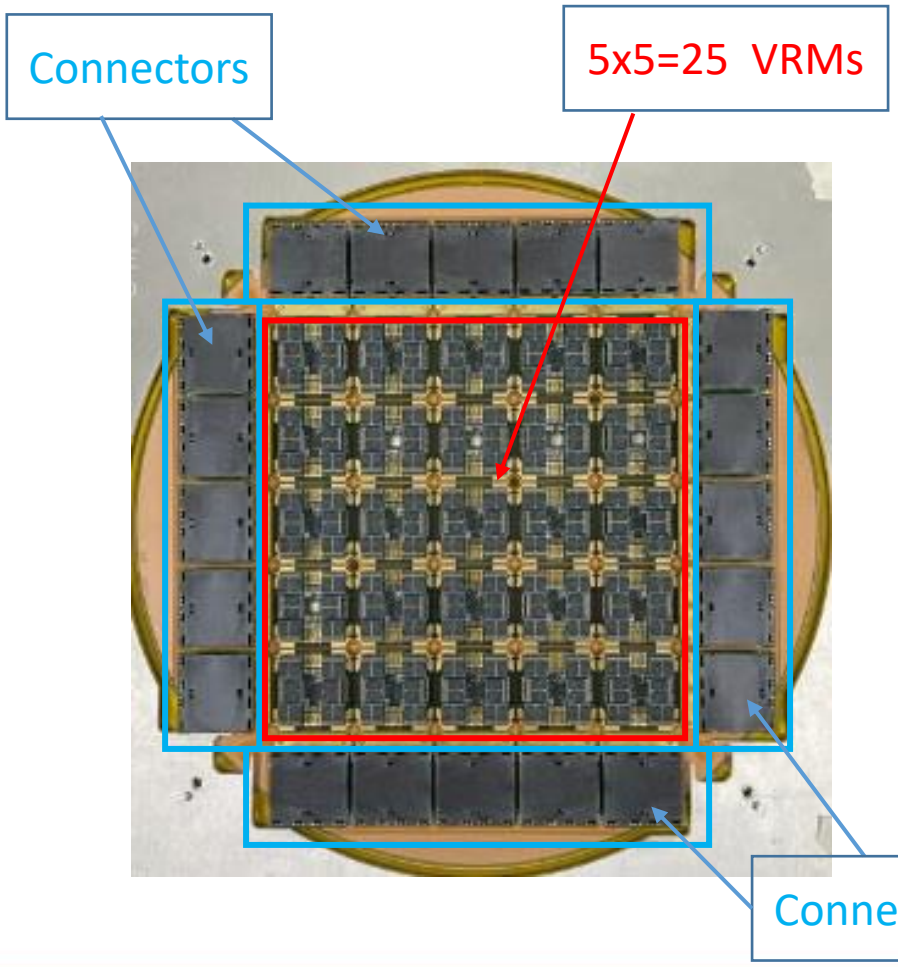
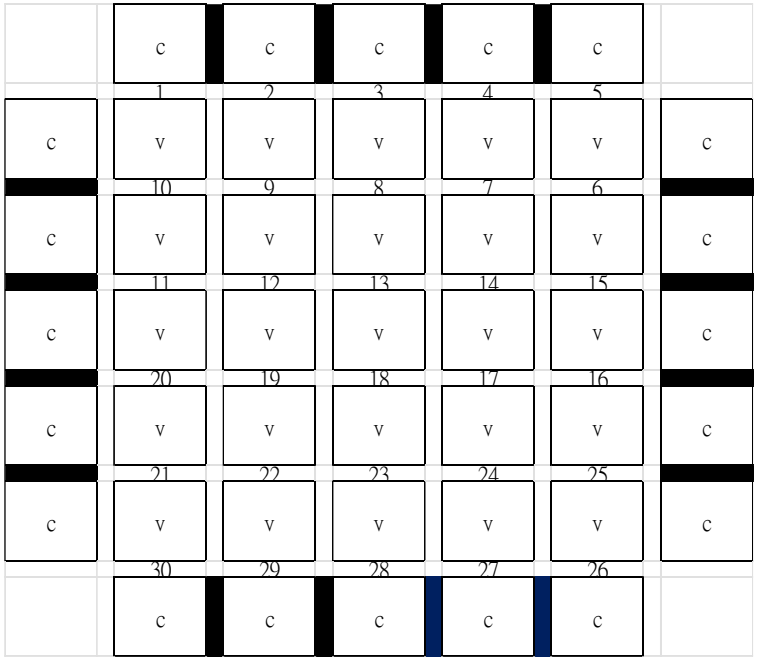
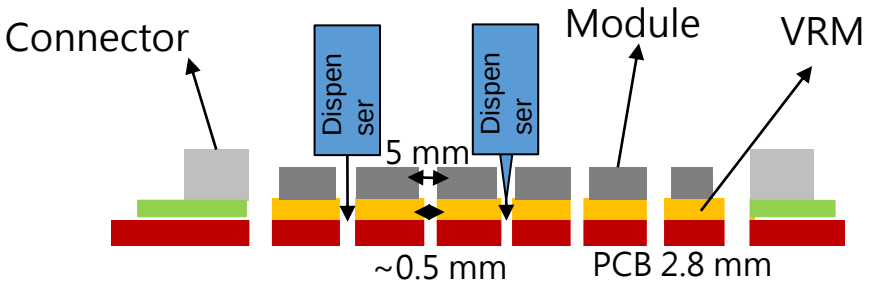
Real Wafer Mapping and Programming Paths

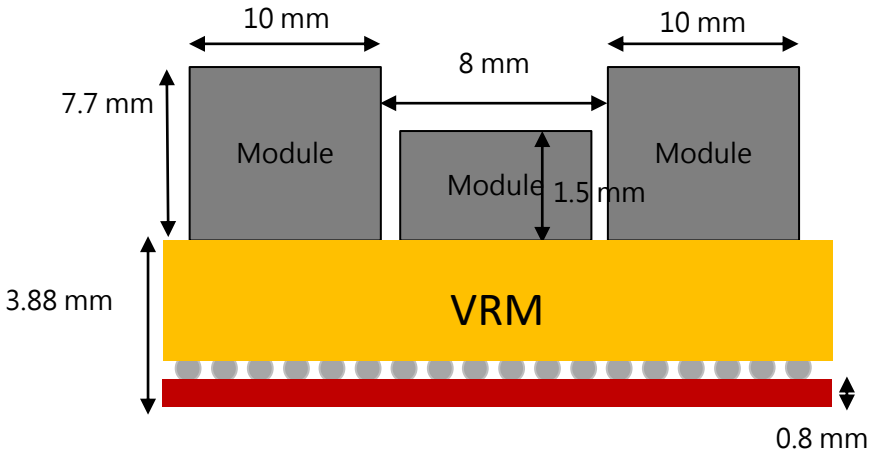




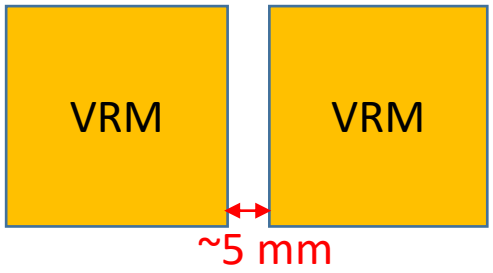
Passes sequence from 1 to 30

W company Underfill Process

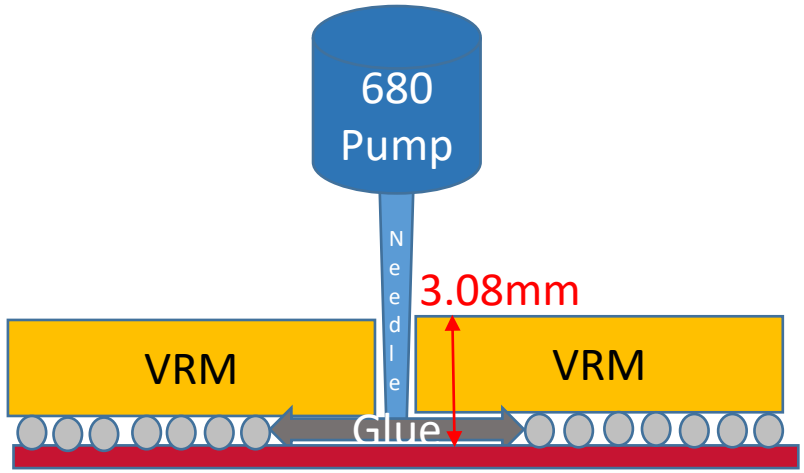




Top view of two VRMs

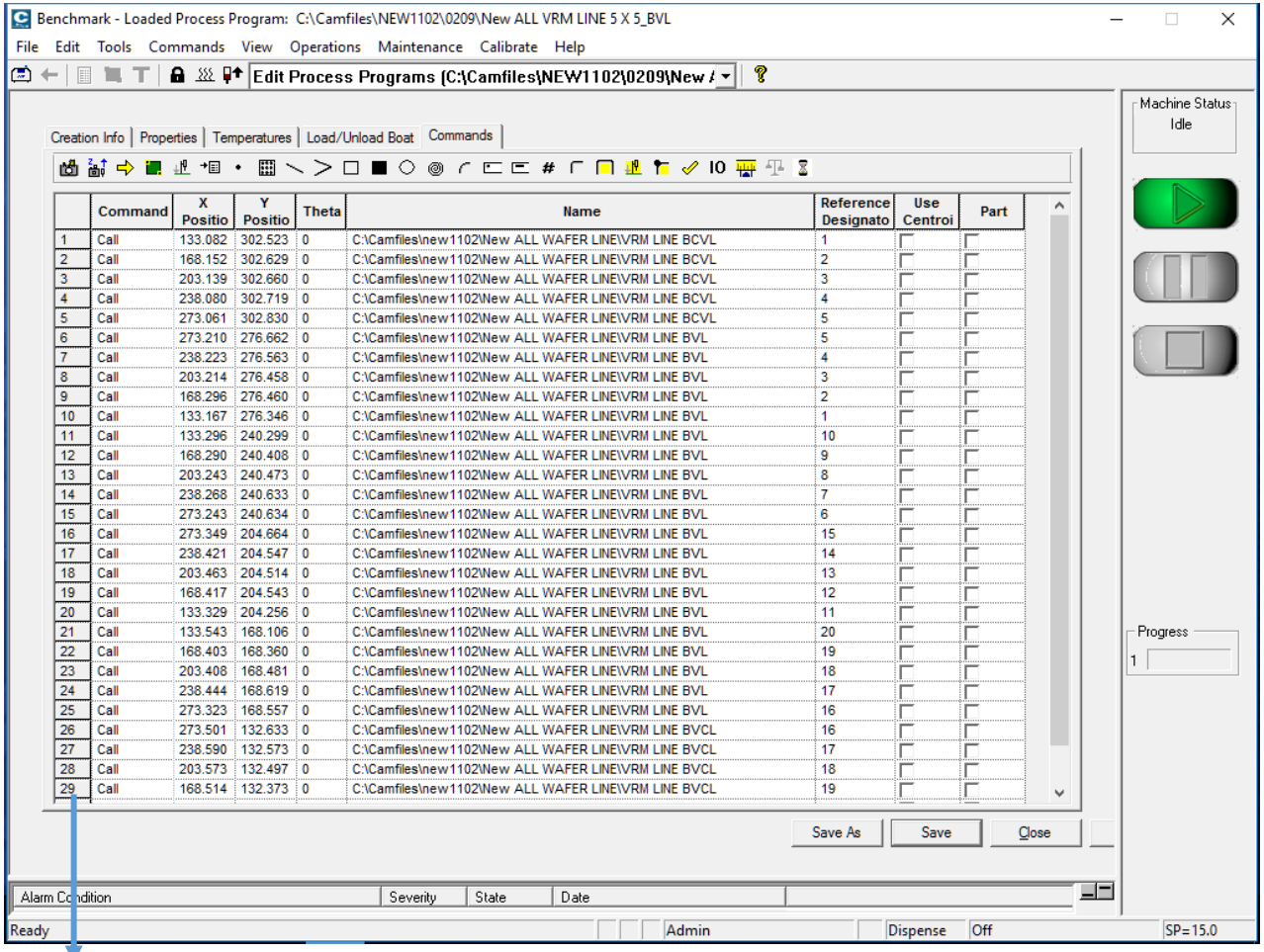


Side view of two VRMs

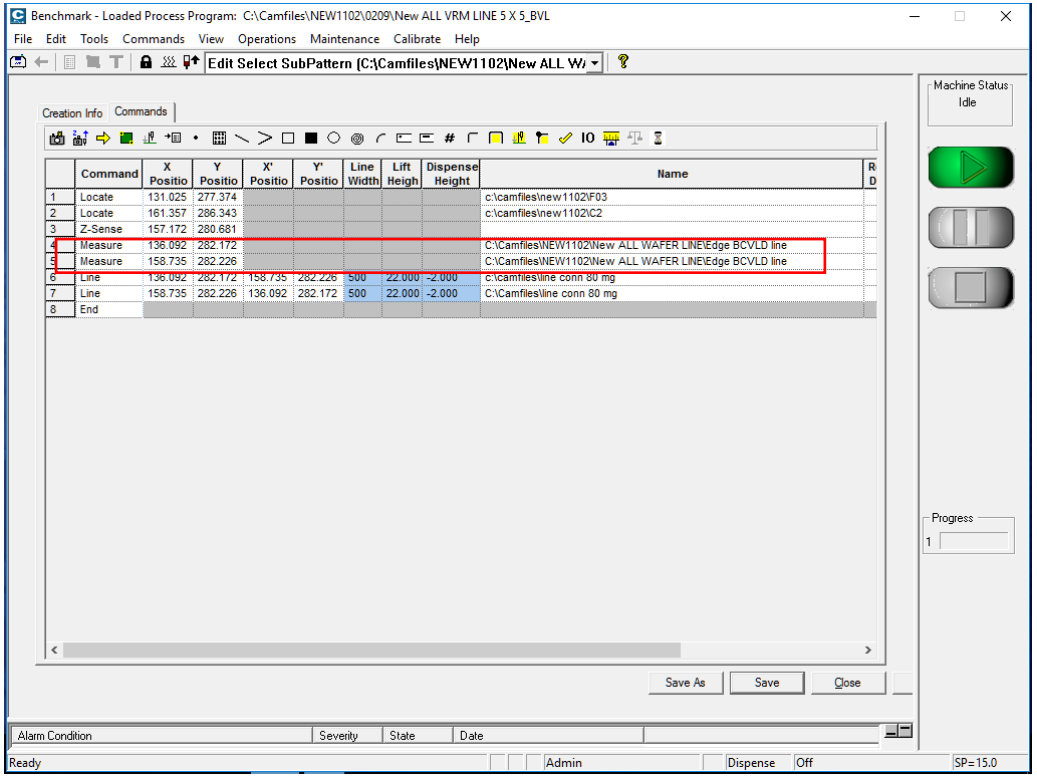


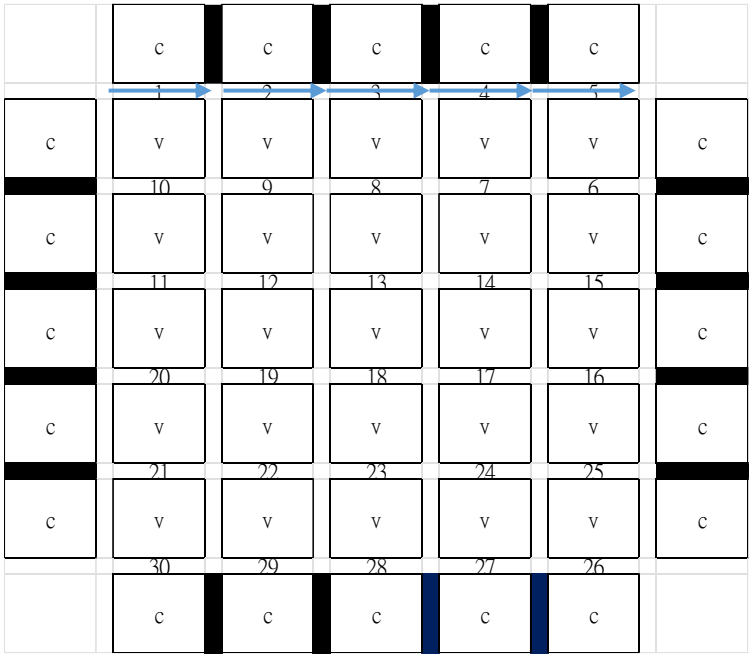
Must add the measure function into the program to prevent the glue dispensing needle hitting & damaging the VRM components during the underfill process.

Main Program content with 30 Calls for 30 Paths

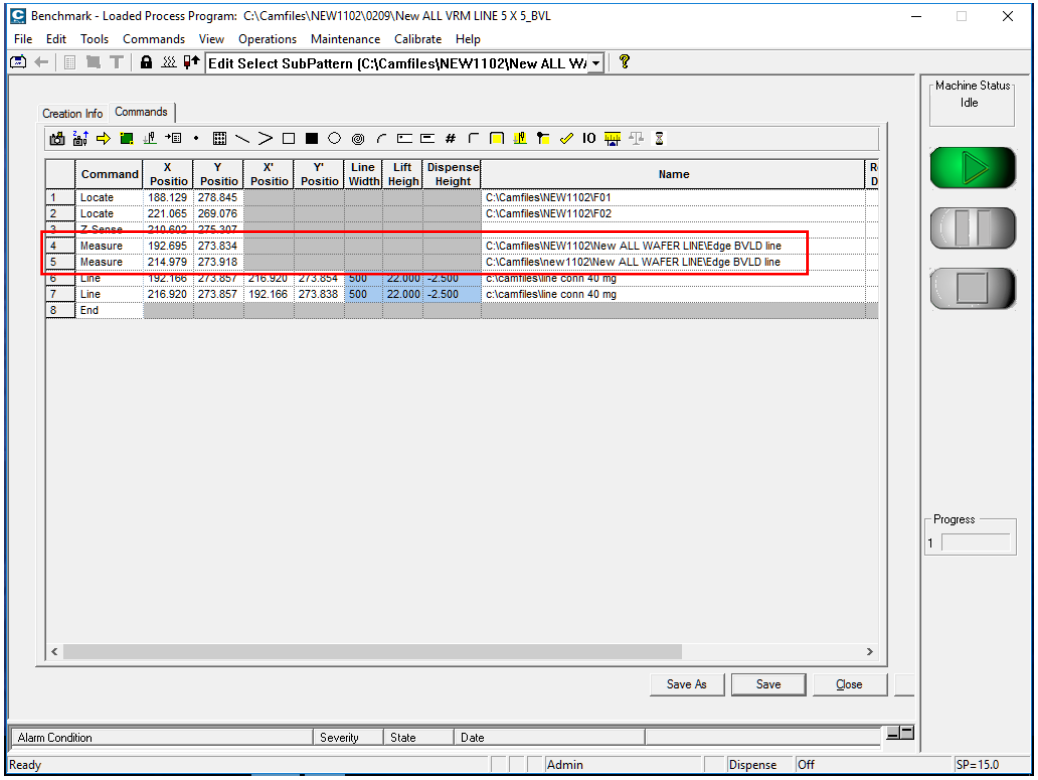


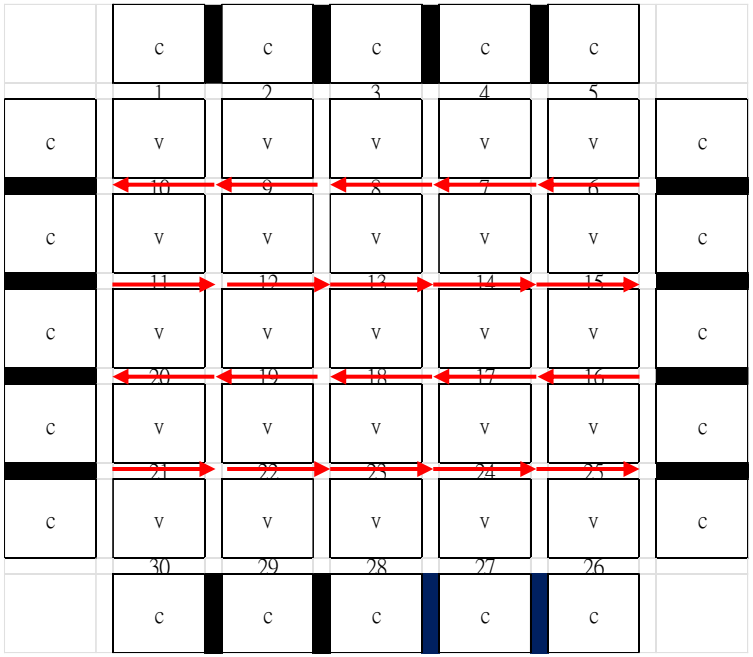
Sub Program 1 (5 Calls between Connectors & VRMs at the Top area)



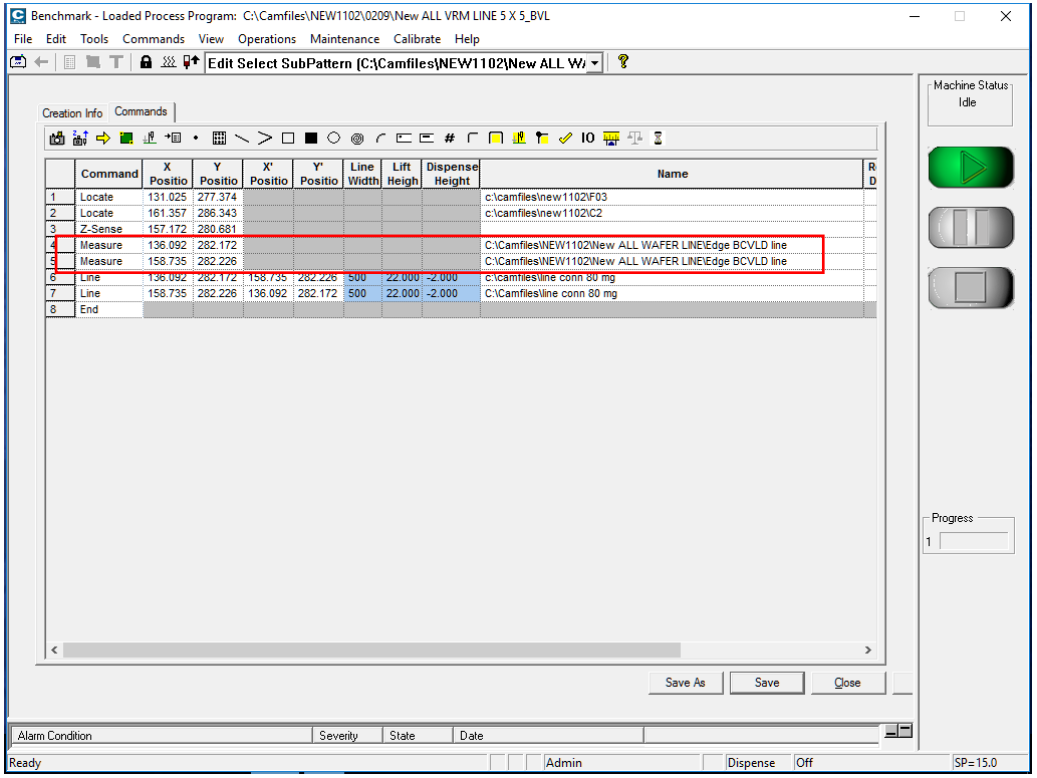


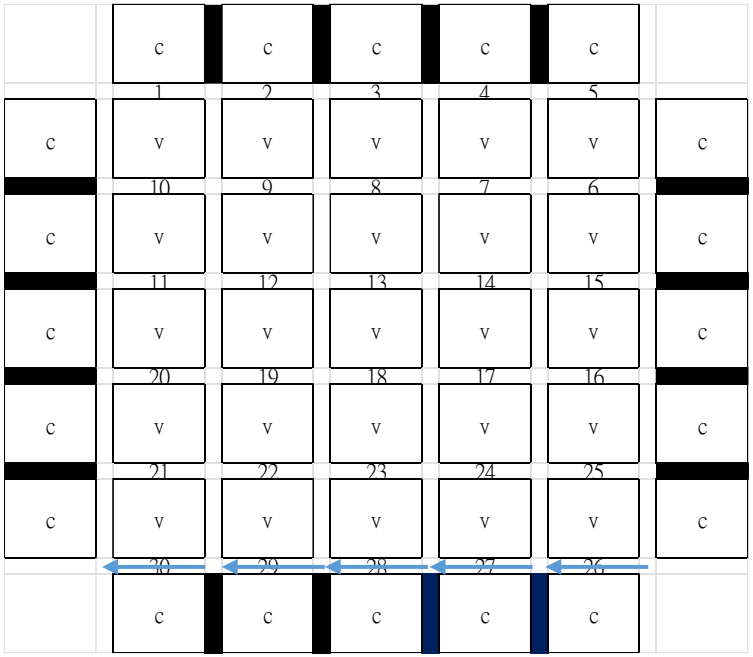
Sub Program 2 (20 Calls between VRMs & VRMs at the central area)





Sub Program 3 (5 Calls between VRMs & Connectors at the Bottom area)

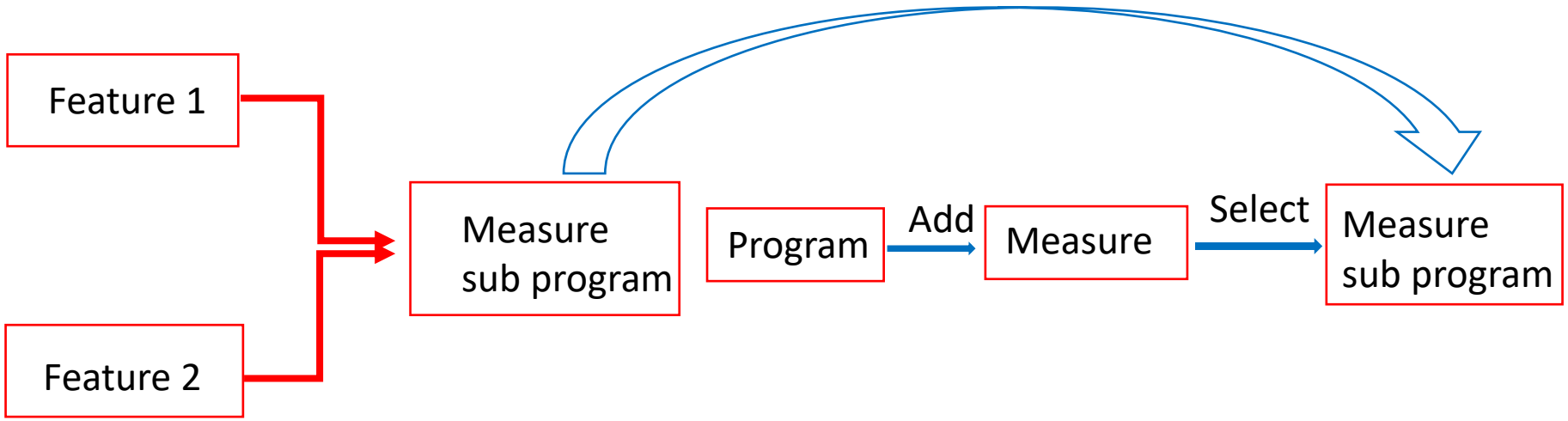




Measure Detect setting structure and procedure

1. Set the discerning features of measure detect, and set two sets of features according to the detection target.

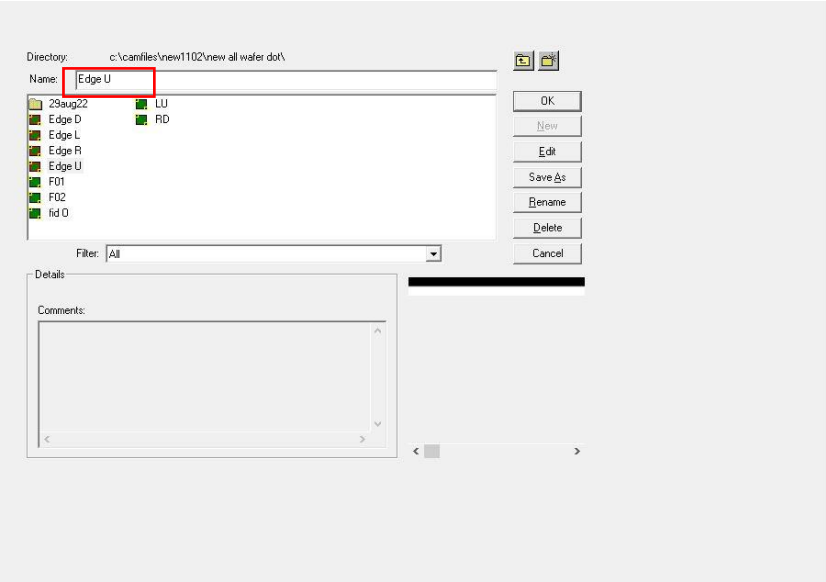
2. Combine two sets of feature into a subroutine of measure detect

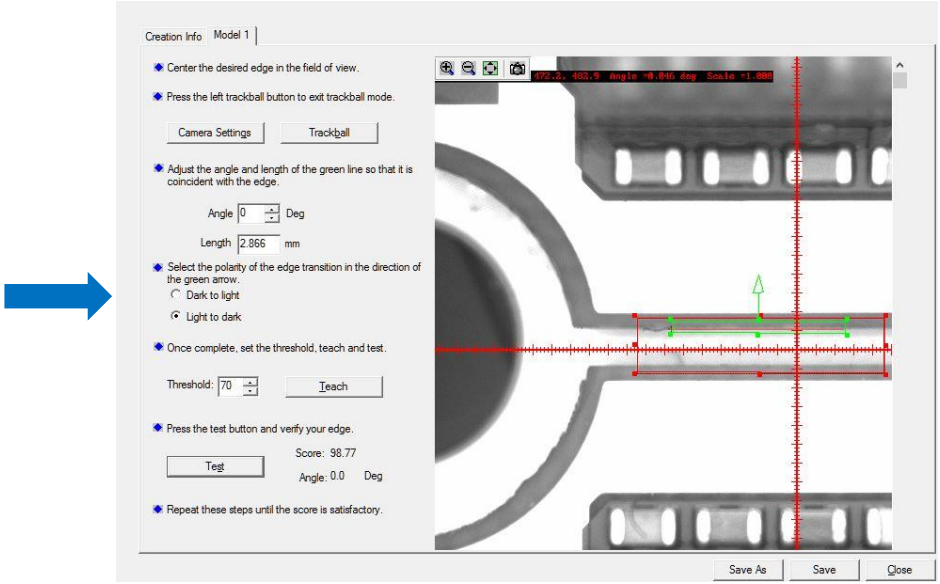


Feature setting:

1. Name the feature target, and then enter the feature point for teach and test, the setting method is to move the green box to the position to teach, as shown on the right in the figure below.

2. After Teach is completed, you can run test to see the score after teach, the higher the score, the better result.

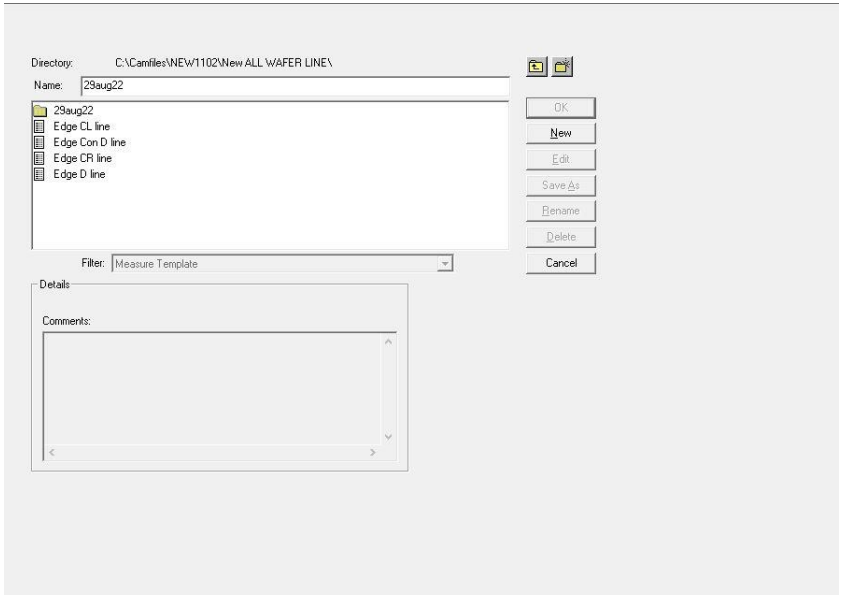


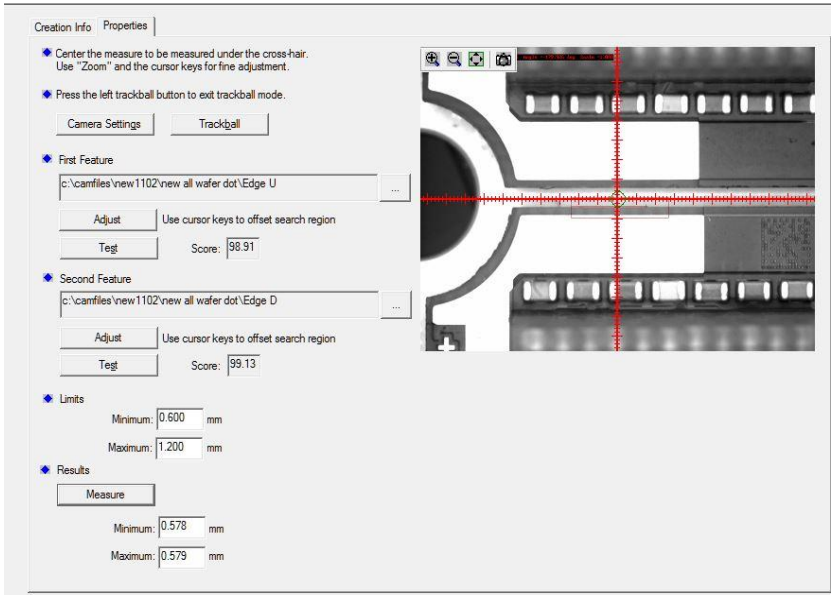


Measure subprogram settings:

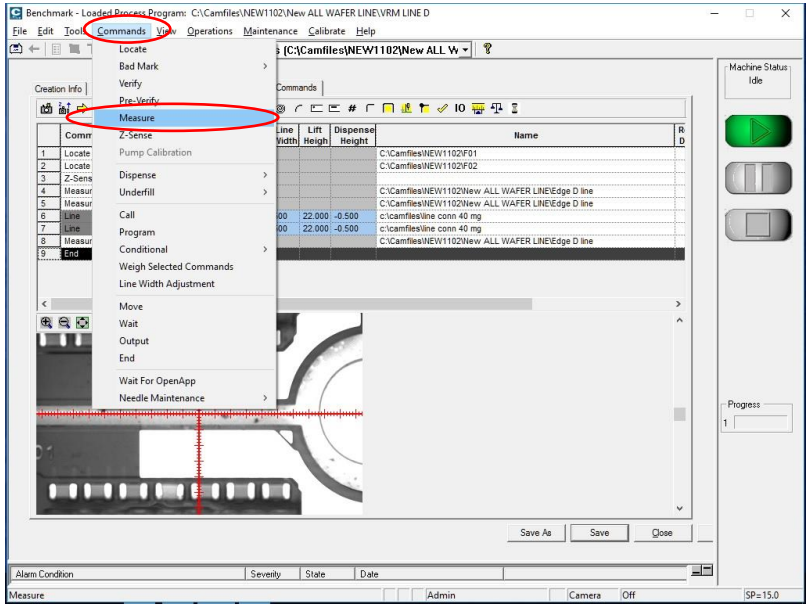
1. Creat a name for the measure detect subprogram, then enter the subprogram setting screen, bring in the completed feature points for teaching and test respectively.

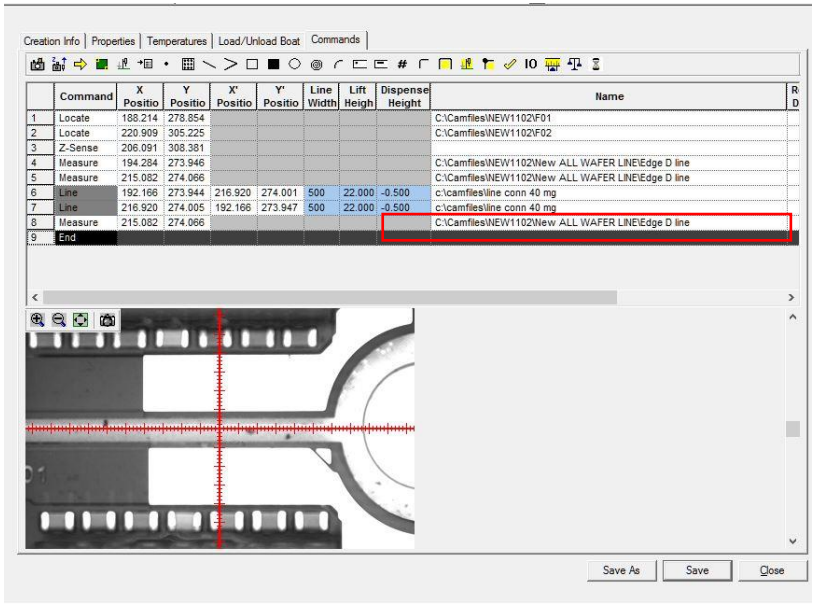
2. Set the Limit range according to the customer's specification, and after completion, you can measure and get the reading value of the current teaching position.





Add a new measure command to the program interface, move the camera to the target position of the detection measure detect, and bring the measure Detect subroutine

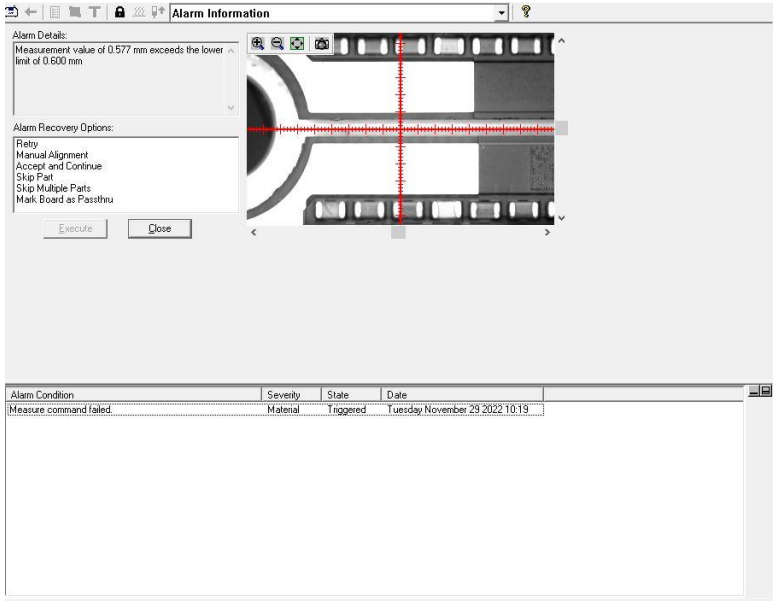


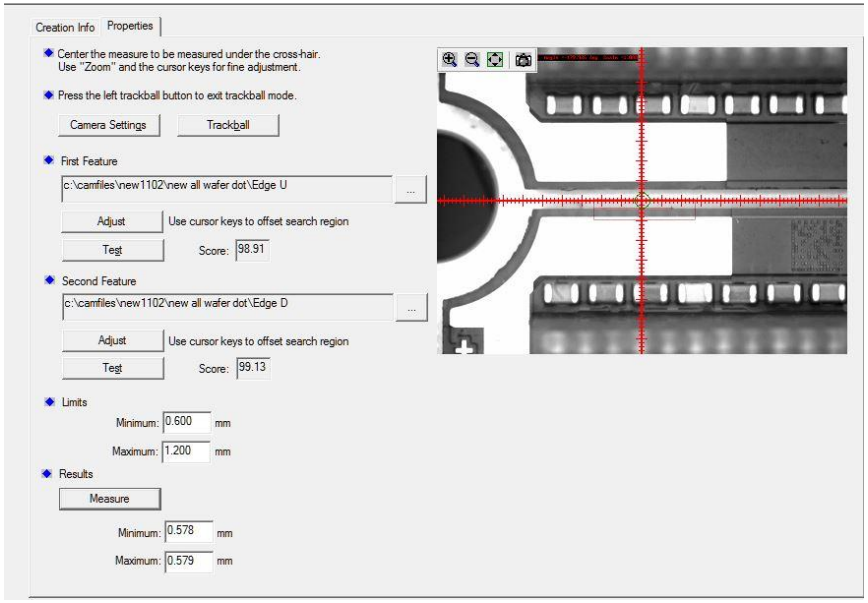


1. When executing Auto Run, if measure detect that the gap is greater than the set limit minimum, the machine will directly perform the next point detection.

2. When executing Auto Run, if the measure detect that the gap is less than the set Limit minimum, the machine will report an error and prompt the test result, which is judged by the operator.

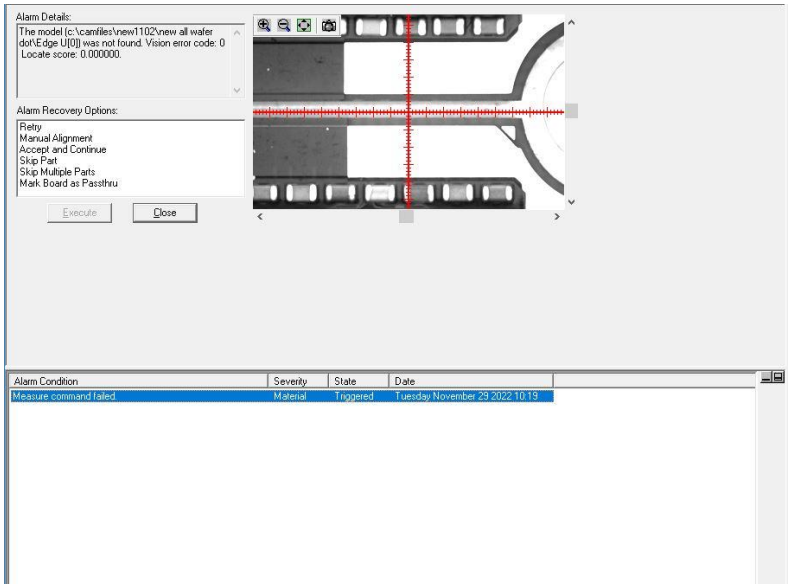
EX : As shown in the figure below, the measure value is 0.577mm, the set Limit value is 0.6mm, 0.578 < 0.6 mm, the machine will report an error and prompt the test result for operator to make the proper action.

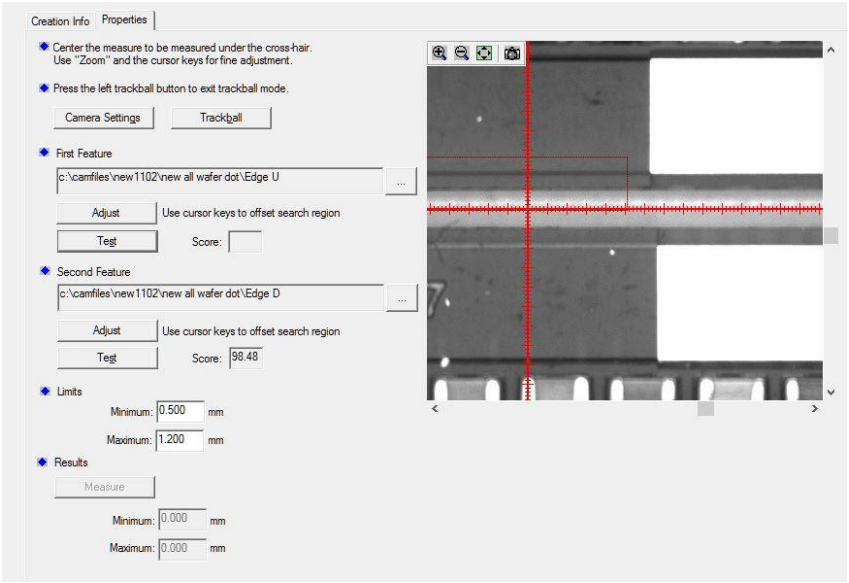




EX: As shown in the figure below, when measure detect cannot detect the setting edge feature, the machine will report an error and prompt the detection result.

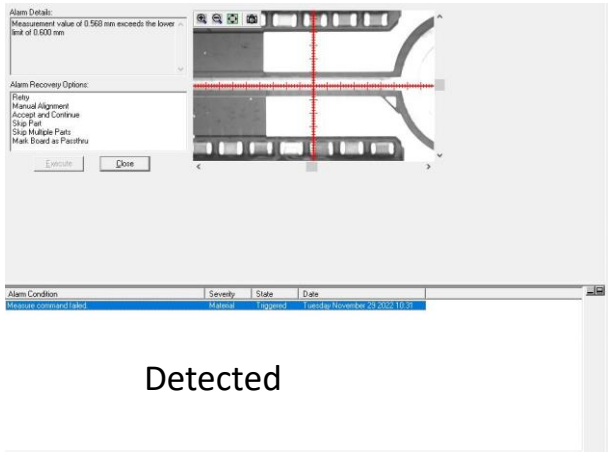
- The first feature can’t be detected.



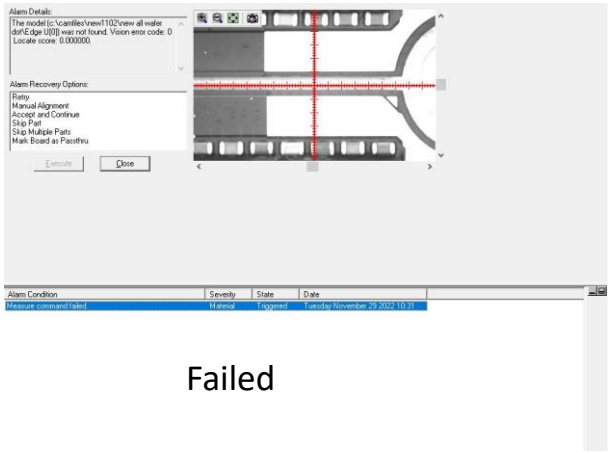


After setting up and repeating measure detection, the failure rate of measure detect was too high in W compnay, it's about more than 30% due to the edge can't be found or caught the wrong edge issue.

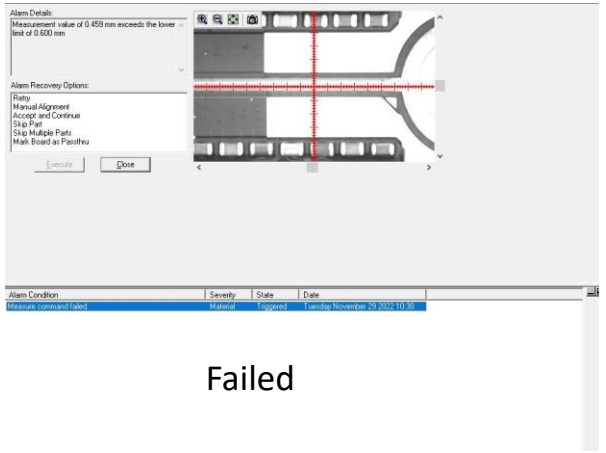
The respective gap between each group of VRM & VRM modules or VRM & Connector modules, the feature edges are not clear or cut unevenly, resulting in no catching & wrong grasping.



Detected



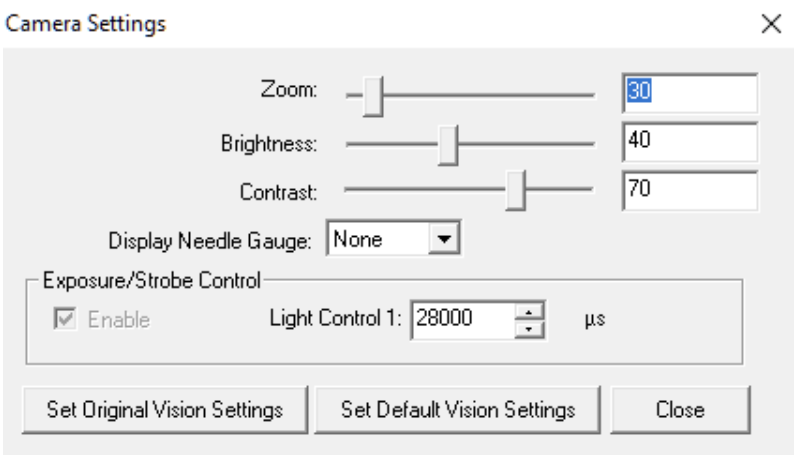
Failed



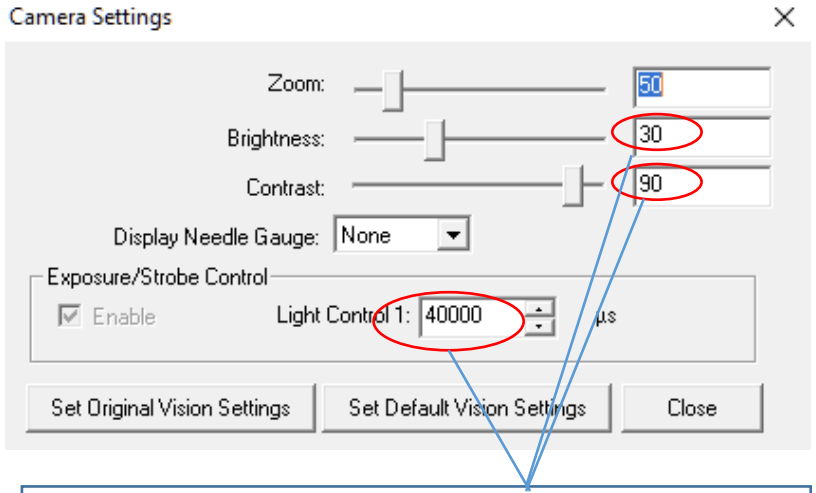
Failed

Troubleshooting 1st step:

- Adjusting camera setting brightness & contrast matching, the measure failure rate from 30% reduced to around 10%. (Customer's measure detect failure rate requirement specification < 2%)
- W company was complained the camara vision device capacity issue and requested it need to be changed to another type for the complete VRMs & Connectors edge detection function requirement.



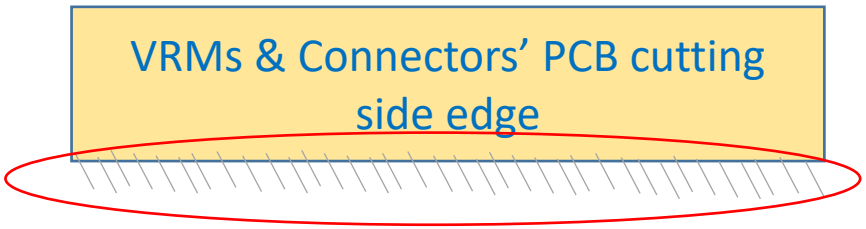
Original camera setting parameters



New camera setting parameters matching

Troubleshooting 2nd step (root cause):

- Gaps between each group of VRM & VRM modules or VRM & Connector modules, the edge line of features were not clear or cut unevenly, color inconsistency , resulting in features were no capturing or wrong feature captured.



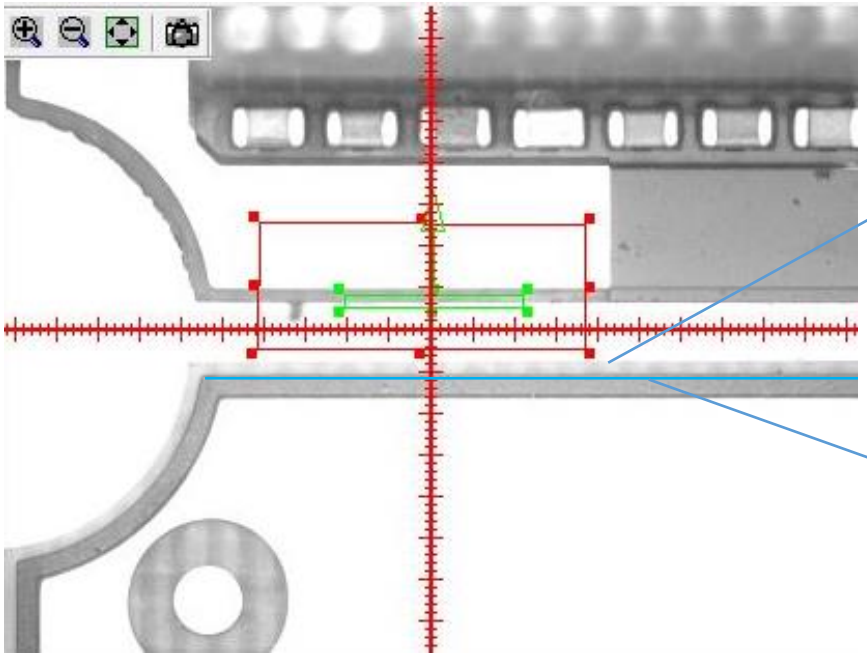
PCBs' edge cutting lines weren't have the clear line feature for the vision identification

Troubleshooting 2nd step actions:

1. Used the inner clear line which is just beside the edge to be the edge detect feature.

2. Increasing the low limit (5 + 3mm). (3mm is the gap from the edge to inner clear line pattern)

3. Increasing the high limit (8 + 3mm). (3mm is the gap from the edge to inner clear line pattern)



PCBs' edge cutting lines weren't have the clear line feature

Inner clear line to be the feature for measure function

Measure Function Testing Result Success

1. After changing the inner clear line to be the measure feature and re-defined the Low & High limit the measure function detect failure rate from 10% reduced to 1%. (Customer's measure detect failure rate requirement specification < 2%)

2. Three full wafers testing which with measure function and real dispensing the glue were success, the detected failure rate which no feature captured or wrong feature detection < 1%.

Thank you !