Camalot Prodigy Measure Function Issue Troubleshooting

(S/N 8300-21889)

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Electronic Assembly Equipment

Real Wafer Mapping and Programming Paths



Electronic Assembly Equipment



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

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1 (Call	133.082	302.523	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BCVL	1	Π			
2 (Call	168.152	302.629	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BCVL	2	Γ			
3 (Call	203.139	302.660	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BCVL	3				
4 (Call	238.080	302.719	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BCVL	4				
5 (Call	273.061	302.830	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BCVL	5				
6 (Call	273.210	276.662	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	5				
7 (Call	238.223	276.563	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	4	Γ			
8 (Call	203.214	276.458	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	3				
9 (Call	168.296	276.460	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	2				
10 0	Call	133.167	276.346	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	1				
11 (Call	133.296	240.299	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	10				
12 (Call	168.290	240.408	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	9				
13 (Call	203.243	240.473	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	8				
14 (Call	238.268	240.633	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	7				
15 (Call	273.243	240.634	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	6				
16 (Call	273.349	204.664	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	15				
17 (Call	238.421	204.547	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	14	Γ			
18 (Call	203.463	204.514	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	13	Γ			
19 (Call	168.417	204.543	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	12				
20 (Call	133.329	204.256	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	11				
21 (Call	133.543	168.106	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	20				Progress
22 (Call	168.403	168.360	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	19	<u> </u>			1
23 (Call	203.408	168.481	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	18				
24 (Call	238.444	168.619	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	17				
25 (Call	273.323	168.557	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVL	16				
26 (Call	273.501	132.633	0	C:\Camfiles\new1102\New ALL WAFER LINE\VRM LINE BVCL	16				
27 (Call	238.590	132.573	0	C:\Camfiles\new1102\Wew ALL WAFER LINE\VRM LINE BVCL	17				
28 (Call	203.573	132.497	0	C:\Camtiles\new1102\Wew ALL WAFER LINE\VRM LINE BVCL	18				
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Γ						Save As	Save	<u>Q</u> o	se	-

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

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Alam Condition Severity State Date	
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Sub Program 2 (20 Calls between VRMs & VRMs at the central area)

Benchmark - Loaded Process Program: C:\Camfiles\NEW1102\0209\New ALL VRM LINE 5 X 5_BVL	– 🗆 X							
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4 Measure 192.695 273.834 C:\Camfiles\NEW1102\New ALL WAFER LINE\Edge BVLD line								
S Measure 214.979 273.816 Utility C::Clamites intervin Uz/werk Linkt/coge by LD line 6 Line 192.106 273.857 216.920 273.854 500 22.000 -2.500 C::Clamites intervin Uz/werk Linkt/coge by LD line							T.	0
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8 End			11	12	12	14	15	
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Save As Save Qk	ose							
Alarm Condition Severity State Date								
Ready Dispense Off	, SP=15.0							

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

Benchmark - Loaded Process Program: C:\Camfiles\NEW1102\0209\New ALL VRM LINE 5 X 5_BVL	- 🗆 X]						
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3 Z-Sense 157.172 280.081		C	v	v	v	v	V	C
6 Line 136.092 282.172 158.735 282.226 500 22.000 -2.000 c:tcamfiles\line conn 80 mg 7 Line 158.735 282.226 136.092 282.172 500 22.000 -C:tcamfiles\line conn 80 mg			1()	Q	8	7	6	
8 End		с	V	V	v	v	V	с
			11	12	13	14	15	
		с	V	v	v	v	V	с
			20	19	18	17	16	
	Progress	с	v	v	v	v	V	с
	1		2.1	2.2.	23	24	25	
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c >				29	28	27	4 26	
Save As Save Qose	_		С	с	с	с	с	
Alarm Condition Sevenity State Date								
Ready Dispense Off	SP=15.0							



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.

		Creation Info Properties	
Directory: C:\Carrilles\NEW1102\New ALL WAFER LINE\ Name: 23sug22 23sug22 25cdgc CL line 25dgc CL line 25dgc PL line 25dgc	OK New Edt Save As Benance Deleta Cancel	Creation Info Properties Creation Info Properties Creation Info Properties Creation Info Properties Commission of the cursor keys for fine adjustment. Press the left trackball button to exit trackball mode. Camera Settings Trackball First Feature C-\camfiles \new 1102\new all wafer dot\Edge U Adjust Use cursor keys to offset search region Teg Score: [98,91] Second Feature C-\camfiles \new 1102\new all wafer dot\Edge D Adjust Use cursor keys to offset search region Teg Score: [99,13] Limits Minimum: [0.600 mm Maximum: [1.200 mm Results Minimum: [0.578 mm Maximum: [0.579 mm	



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





CamalOt Measure Function Troubleshooting

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.





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%)</p>
- 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.

Camera Settings	×	Camera Settings	×
Zoom: @0 Brightness: 40 Contrast: 70 Display Needle Gauge: None ↓ Exposure/Strobe Control I Enable Light Control 1: 28000 µs Set Original Vision Settings Close		Zoom: Brightness: Contrast: Display Needle Gauge: None Exposure/Strobe Control Exposure/Strobe Control Enable Light Control 1: 40000 Set Original Vision Settings Close	
Original camera setting parameters	5	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)





Measure Function Testing Result Success

- 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%)
- 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 !

