C040 Vision Flow

—2025.12.16

C040 | Glue path AOI Vision flow change list

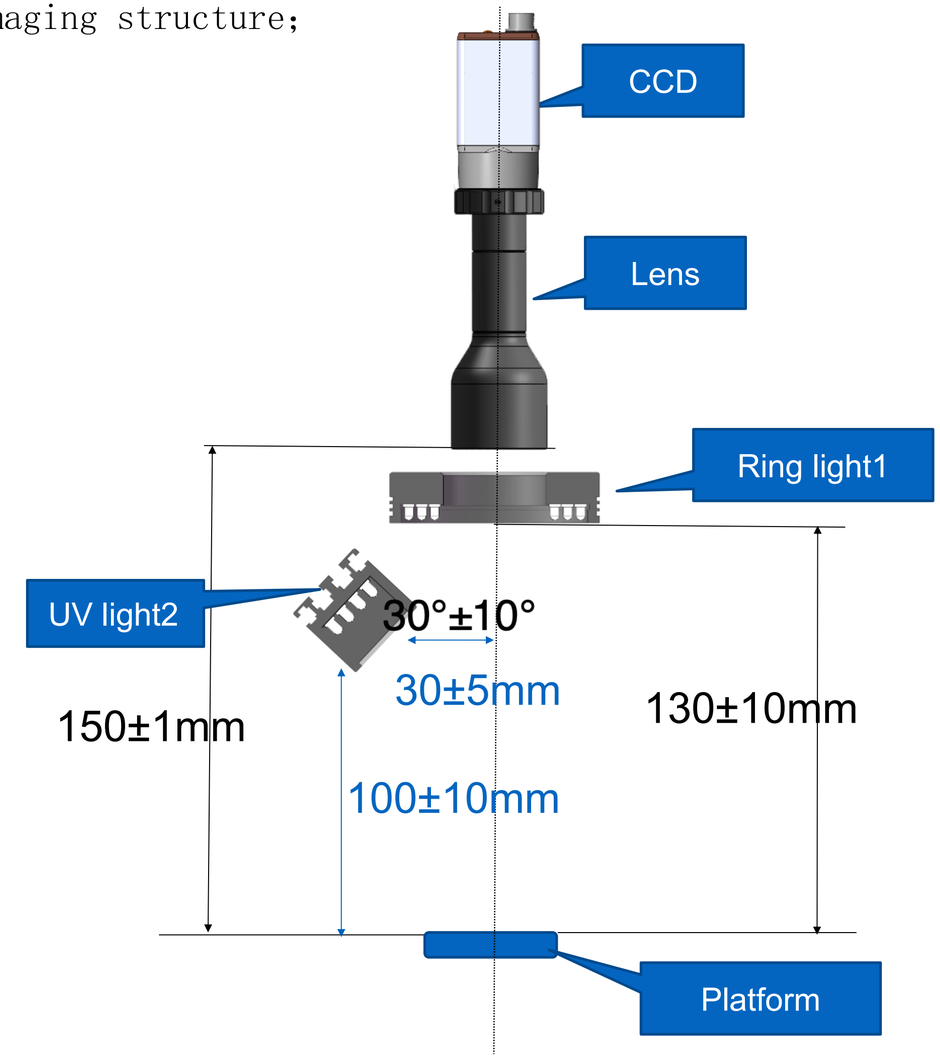
Station ID	Station Description	Vendor	Process Type		MIL
C040		Cowain	Dispense		

Glue Dispense Vision Guidance

The algorithm and work flow to guide the machine to dispense the glue.

Vision solution description: The CCD takes pictures from top to bottom, locates the product position, guides the machine to dispense, and then rechecks after the dispense is completed.

CCD imaging structure;

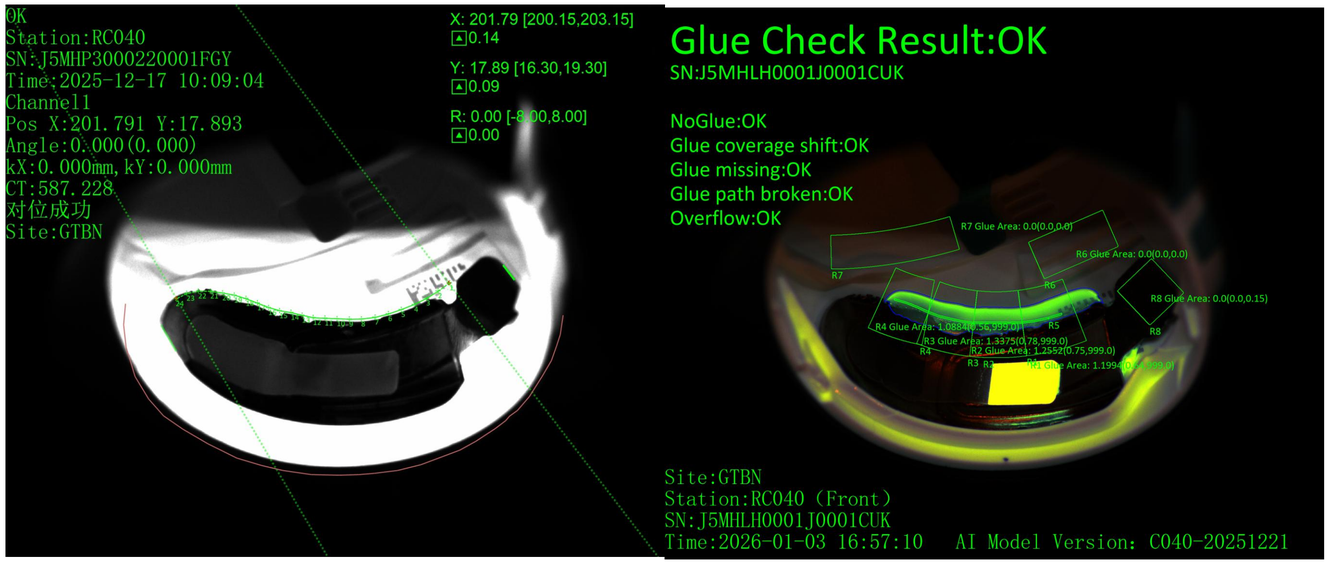


Vision System Diagram

Parameter		
Pixels	FOV	Resolution
2448*2048	21*17.5mm	0.0086mm/pixel

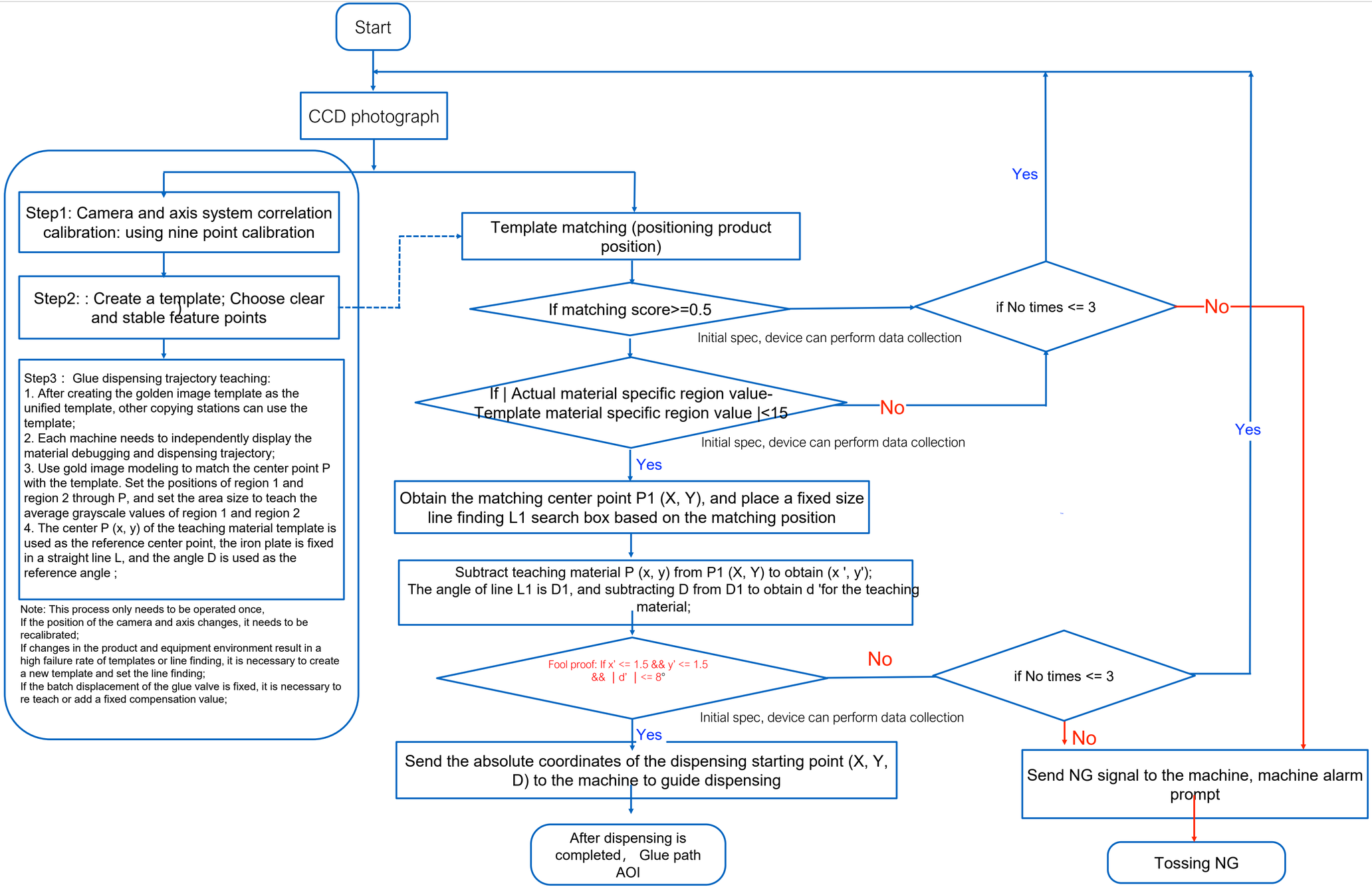
BOM(for Dual station)			
Item	Type	Brand	Quantity
Camera	LY-H500C	Luster	2
Lens	EGXD-RDTD-150-04	Luster	2
Ring Light1	RBM-HRL5390-W	Luster	2
Bar Light2	RBM-HBL8629-UV365-T35	Luster	2
License	VC-5000	Luster	1

Glue path Golden image



Detailed parameters of golden image1	
Pixel dimension	0.0086mm
CCD resolution	2448*2048
Lens resolution	500W, 1’
FOV	21*17.5mm
DOF	2.6mm
Lightning Brightness	200
Exposure time	80ms

Audio | C040 Vision Flow | Glue path – Workflow



Pose 1 Vision Workflow

Select Golden image

↓

Select clear and stable features and draw ‘contour feature area’ according to set fixed parameters

↓

Set up the parameters for modeling (see training parameters attached)

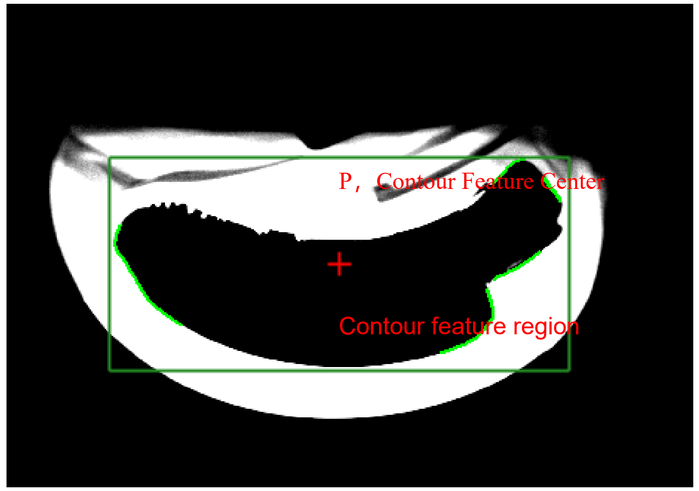
↓

Masking out other unstable and unwanted features in the ‘contour feature area’

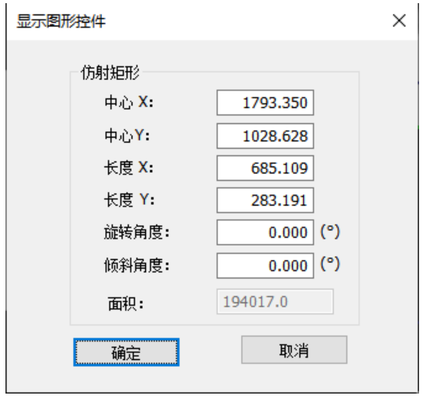
↓

Click on the template training to get the template

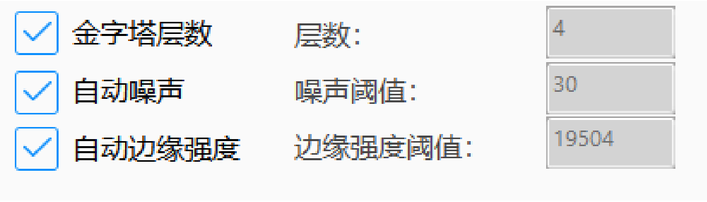
Modeling Process



Template



Contour feature area parameter



Training parameters

Modeling feature requirements:
1. Stable and clear outline edge, no dirty
2. Do not have multi-layer, complex contours
3. Search area, do not have a close shape of the edge of the contour

When modeling, make good use of the masking function to mask out the unwanted edge contour features. Leaving only stable and clear contour features

After the modeling is completed, need offline test with all the previous material images to confirm the compatibility of this template for all incoming materials.

Subsequent parameter changes need to be synchronized and updated to all other machines in this station.

Set matching parameter

↓

Take image for incoming product

↓

Search for the created template in the "Searching area"

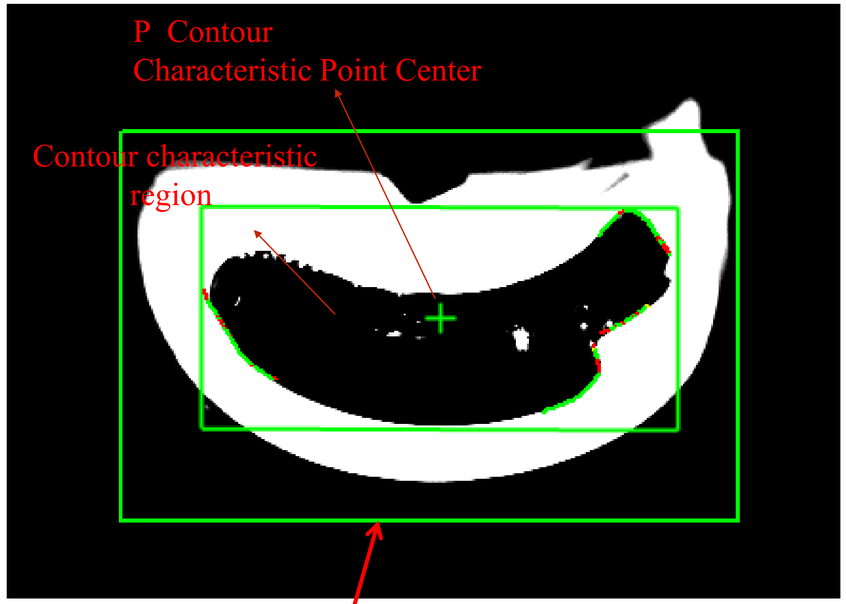
↓

Compare all the contour features in the "search area" with the template for similarity, get all contours with scores greater than 0.5 , and sort all the scores from highest to lowest, then output the contour with the highest score

↓

The algorithm outputs the similarity score, position ("contour feature region" and centroid p), angle, and two-dimensional linear transformation matrix of this contour

Matching process



Actual Materials

ParameterList	
接受阈值	0.500000
对比度阈值	10.000000
重叠比例阈值	0.800000
贪婪度	0.900000
搜索个数	1
是否开启全图搜索	否
搜索区域	1167.689176,
是否外部输入搜索	否
搜索模式	高精
开启支持边界搜索	否
任意极性	否
自动金字塔搜索区	否

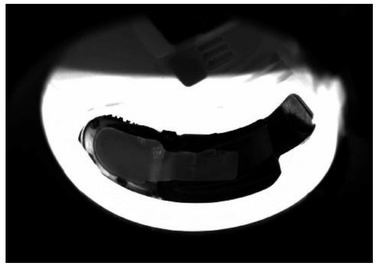
Matching parameter

专业几何定位_6833.搜索结果数组	[1]	vector<scGeomSearchExResult>
[0]	{...}	scGeomSearchExResult
二维线性变换	(-313.294223,-10.692545),(1.00...	scPlanarLinearTransform
匹配点	(2635.997398,1709.835413)	scPlanarVector
角度	-1.940328	double
分数	0.866684	double

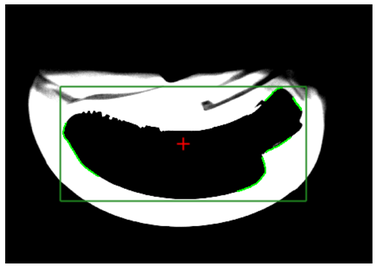
Matching result

Audio | C040 Vision Flow | Glue path – Create dynamic glue path

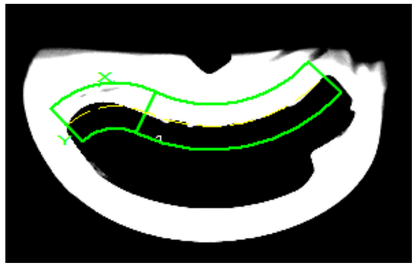
1. Get the image



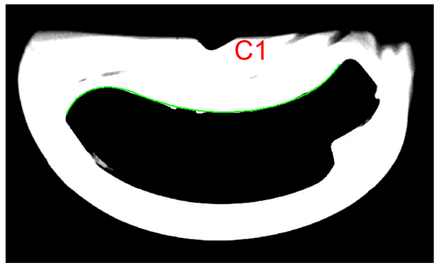
2. Transfer the color image to black and white



3. Do the pattern matching according the black and white image

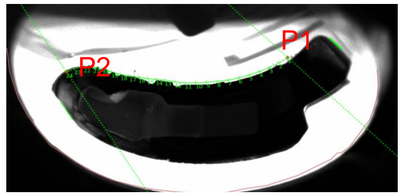


4. Set the edge capture caliper based on the patten position

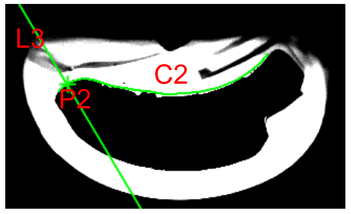


5. Generate the curve C1 based on the caliper

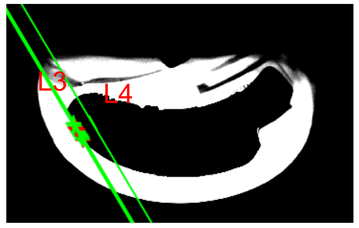
6. Set the edge line caputer caliper based on the patten



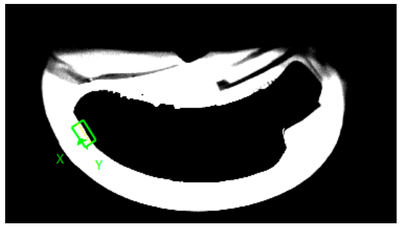
12. Generate 24 points in the curve C2, P1 is the start point and P2 is the end point, every point distance is 24 pixel.



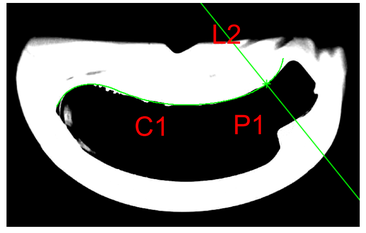
11. P2 is the intersection between L3 and C2.



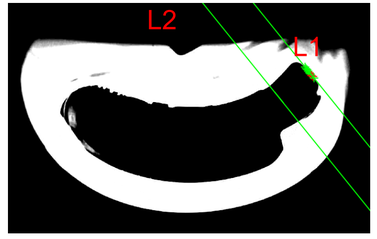
10. Generate the line L3 based on the caliper, L3 shift right 100 pixel and get the line L4.



9. Set the edge line caputer caliper based on the patten



8. P1 is the intersection between L2 and C1.



7. Generate the line L1 based on the caliper, L1 shift left 200 pixel and get the line L2.

1. Get the image
2. Transfer the color image to black and white
3. Do the pattern matching according the black and white image
4. Set the edge capture caliper based on the patten position
5. Generate the curve C1 based on the caliper
6. Set the edge line caputer caliper based on the patten
7. Generate the line L1 based on the caliper, L1 shift left 200 pixel and get the line L2.
8. P is the intersection between L2 and C1.
9.Set the edge line caputer caliper based on the patten
10.Generate the line L3 based on the caliper, L3 shift right 100 pixel and get the line L4.
11.P2 is the intersection between L3 and C2
12.Generate 24 points in the curve C2, P1 is the start point and P2 is the end point, every point distance is 24 pixel.

Audio | C040 Vision Flow | Glue path – Curve finding details

Find Line1 and Contour Line3 get intersection point

Edge grabbing based on template matching benchmark points T1

↓

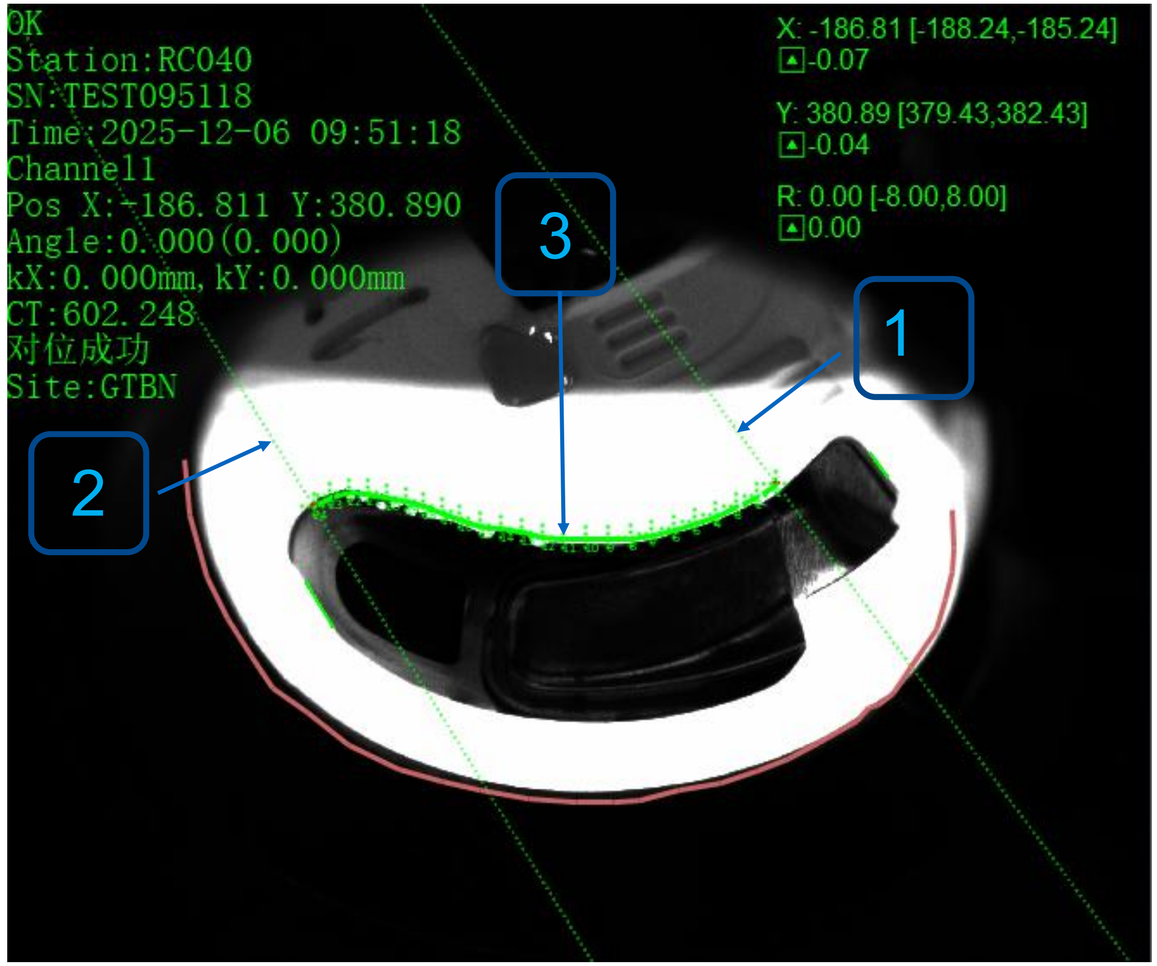
Create Find Line1 and Find Line2 and Find Contour Line3

↓

Use intersection point (P1-P24) calculation tool

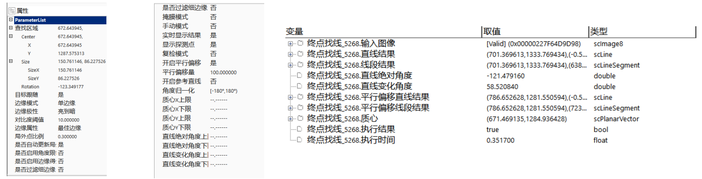
↓

The final intersection point result is the guiding point result

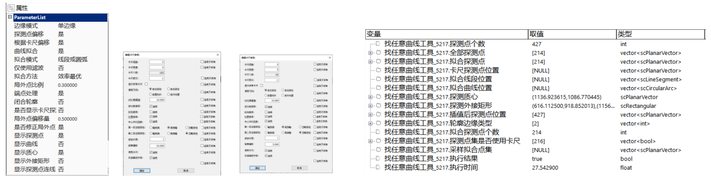


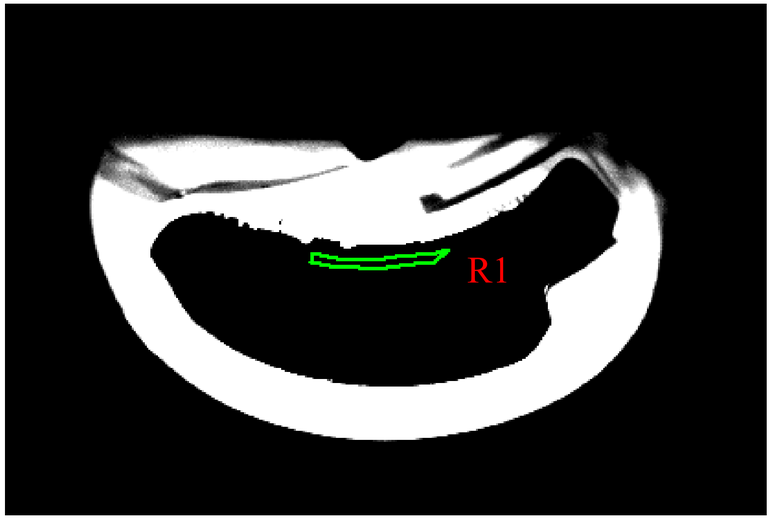
Find Lind Tool1

Find Lind Tool2



Find Lind Tool3





Foolproof area

变量	取值	类型
灰度检测工具_5839.输入图像	[Valid] (0x0000019D73E34428)	sclmage8
灰度检测工具_5839.平均灰度值	0.000000	double
灰度检测工具_5839.合格百分比结果	1.000000	double
灰度检测工具_5839.执行结果	true	bool
灰度检测工具_5839.执行时间	1.003100	float

分支条件:

```
#dFoolProof < 190
```

foolproof:
The area (R1) average grey value should <190

Glue Path AOI MSOP

The algorithm, inspection definition and spec of the glue path AOI.

Audio | C040 Glue path AOI Product Glue Path Edge - Pos1

No Glue

The areas of the glue ＞ 0mm²

Glue Coverage-Shift

The coverage line should be >100 % covered by glue path

Glue Missing

Glue Broken

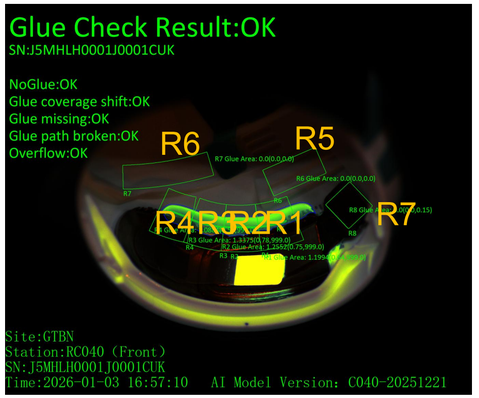
The gap of glue breakage ≤ 0.1 mm

Glue Overflow

The R5、R6 areas of glue ≤(0mm²)
,R7areas of glue ≤(0.15mm²)

Pre-dispense image

Post-dispense image



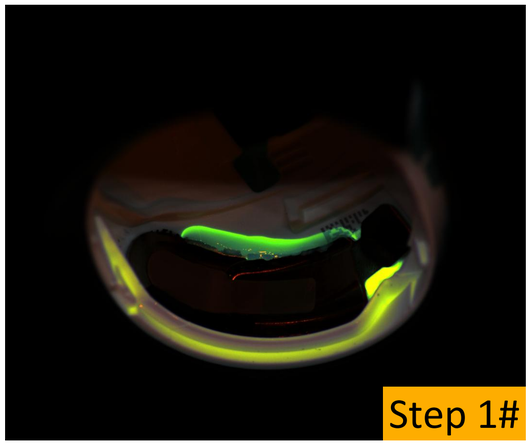
Region	No Glue	Glue Coverage-Shift	Glue Missing-Area	Glue Broken	Glue Overflow
R1	Glue area > 0mm²	100%	Glue area > 0.64mm²	≤0.1mm	\
R2	Glue area > 0mm²	100%	Glue area > 0.75mm²	≤0.1mm	\
R3	Glue area > 0mm²	100%	Glue area > 0.78mm²	≤0.1mm	\
R4	Glue area > 0mm²	100%	Glue area > 0.56mm²	≤0.1mm	\
R5	\	\	\	\	Glue area≤0mm²
R6	\	\	\	\	Glue area≤0mm²
R7	\	\	\	\	Glue area≤0.15mm²

Legend：

- Glue Path Edge
- Glue Coverage Line
- Glue Area Region
- Keep out zone

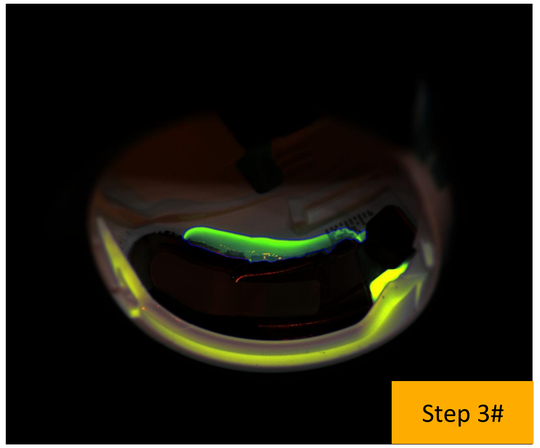
Pix accuracy:0.0086mm/pix

Audio | Glue path AOI Product Glue Path Edge



Source image (post-dispense)

extract glue color



extract result

missing
Step 2#

The purpose of this process is used to extract the Glue path

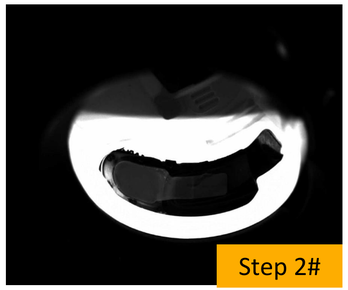
Step 1# Capture pose1 source image

Step 2# Extract the color of glue path

Step 3# Inspect the glue path

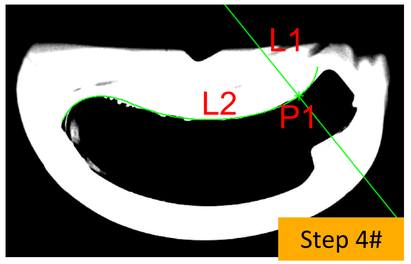
Audio | Glue path AOI Glue Area Region

RGB to gray



pattern match

find line/circle



R1-R4

Index	CenterX	CenterY	StartAngle	Angle	R	Width	Length
1	-7.297	-0.542	--	0.501	--	2.500	1.195
2	-6.110	-0.531	--	0.118	--	2.500	2.534
3	-3.569	-0.526	--	0.432	--	2.500	2.523
4	-1.053	-0.507	--	0.122	--	2.500	1.059

R5

Index	CenterX	CenterY	StartAngle	Angle	R	Width	Length
1	-0.025	-0.967	--	155.262	--	1.261	2.553

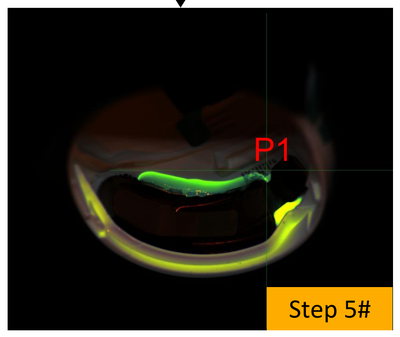
R6

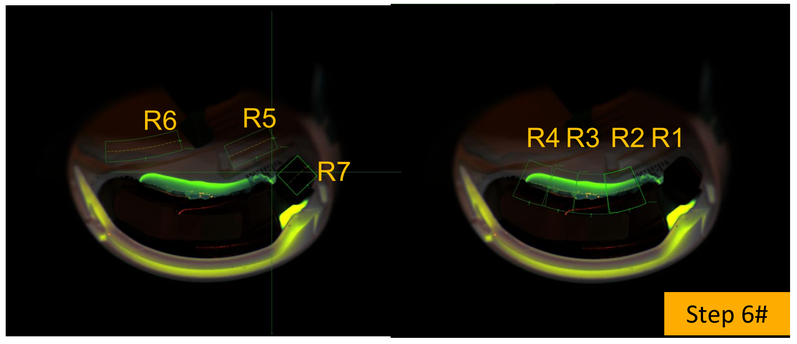
Index	CenterX	CenterY	StartAngle	Angle	R	Width	Length
1	-9.122	-15.919	73.494	15.111	14.675	1.090	4.014

R7

Index	CenterX	CenterY	StartAngle	Angle	R	Width	Length
1	2.476	0.200	--	136.459	--	1.500	1.500

Create
coordinate system

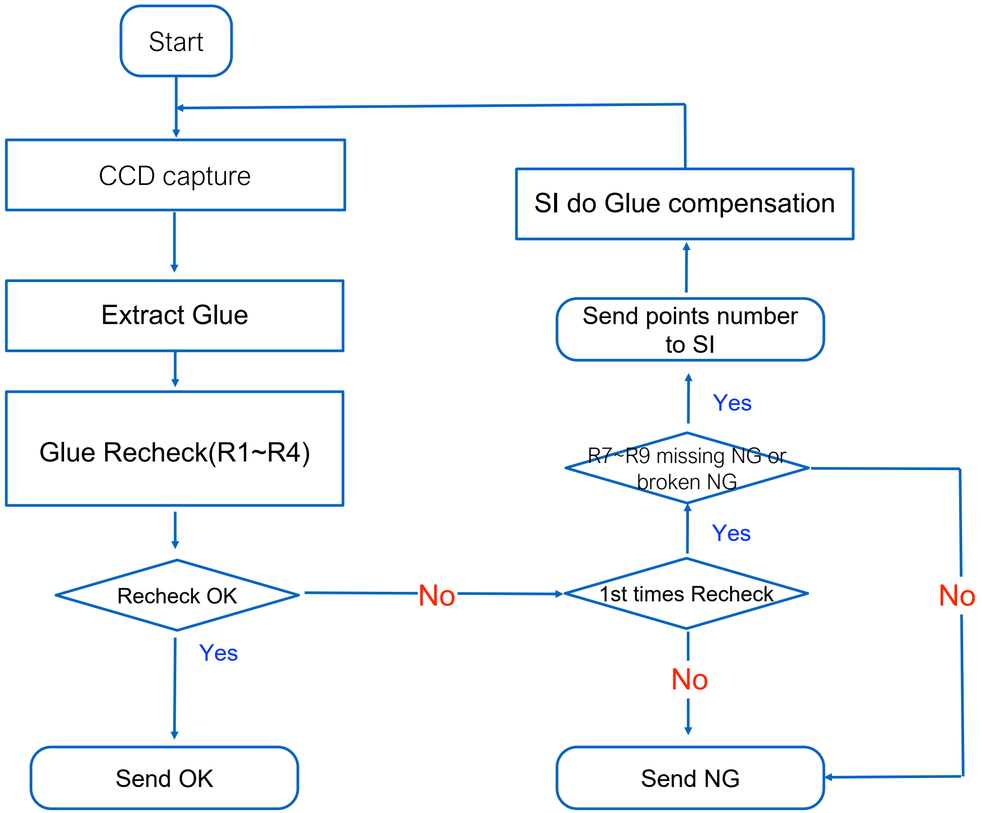


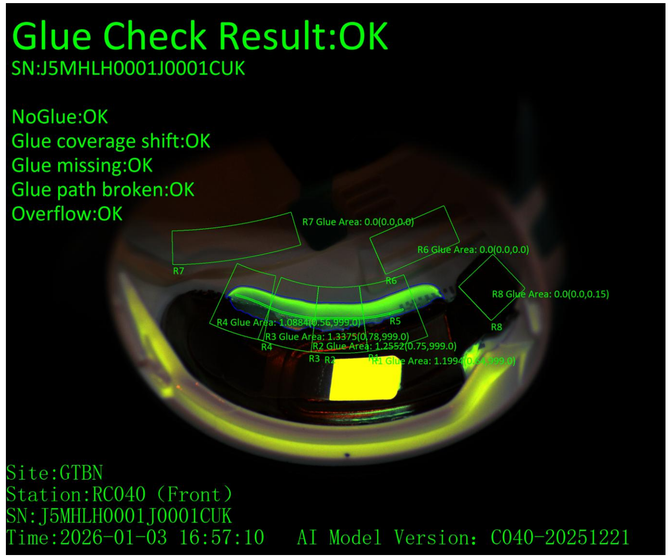


The purpose of this process is used to find the position for dispense and region for coverage inspection:

Step 1# Capture pose1 source image
Step 2# RGB image to gray image
Step 3# Pattern match to get the place of the product
Step 4# Grab the product characteristics of line/circle to obtain L1&L2, P1 is intersection of L1&L2.
Step 5# Establish a product coordinate system by using P1.
Step 6# Place the glue inspection region according to product coordinate system

C040 | Glue path AOI Product Glue Compensation

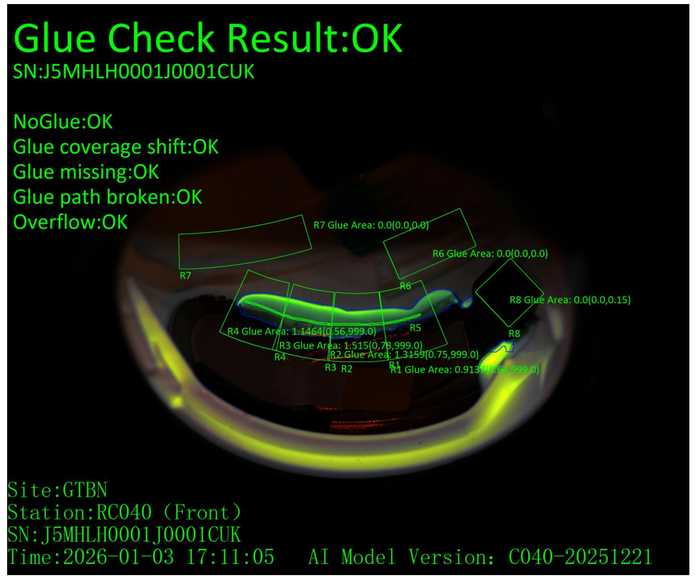




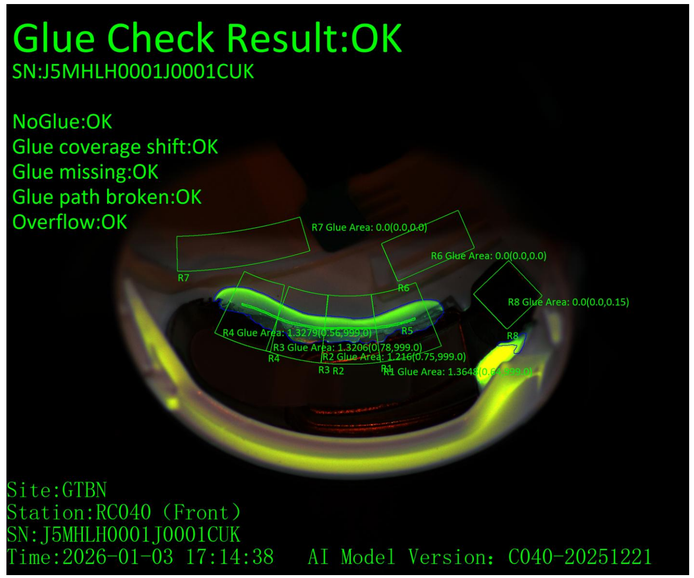
Legend | Glue Path | Product Datum Edge | Glue Area Region | AOI Detection Area | Keep Out Zone

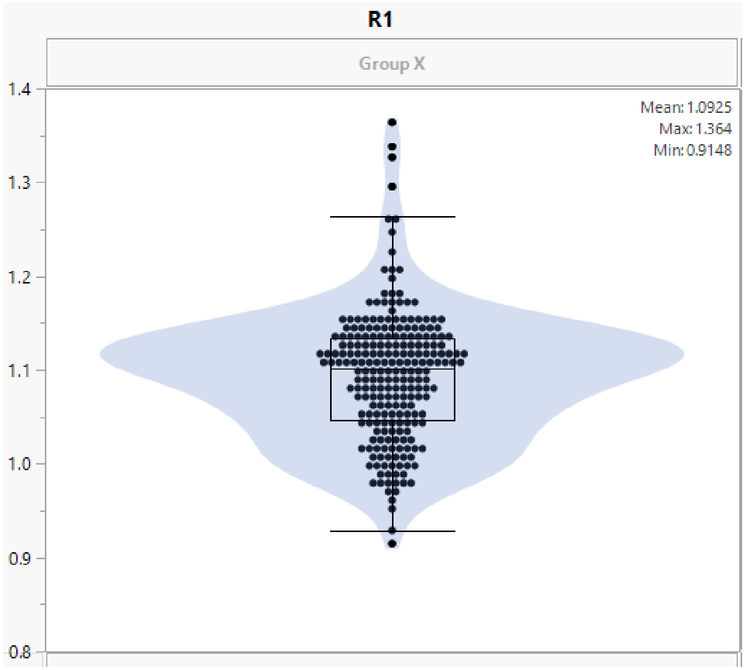
Updated: *rev and date*

Pose1_MissingArea_R1 Min:0.914



Pose1_MissingArea_R1Max:1.36



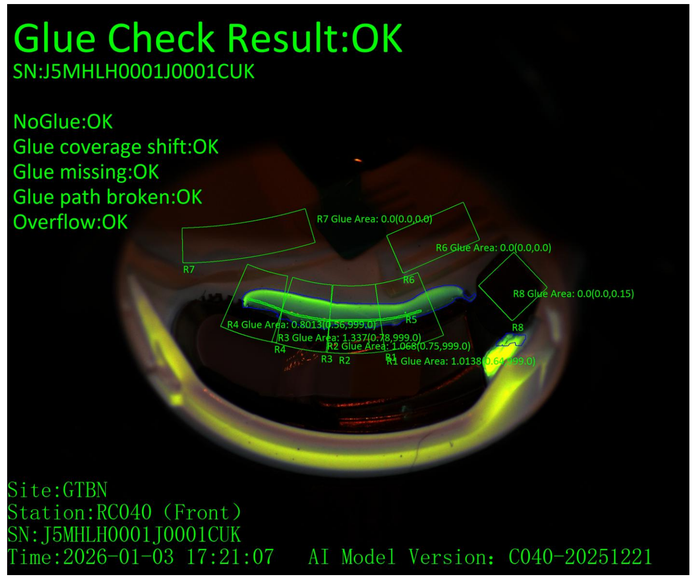


R1 Missing spec= Pose1_Missing_R1 MIN*0.7=0.914*0.7=0.6398

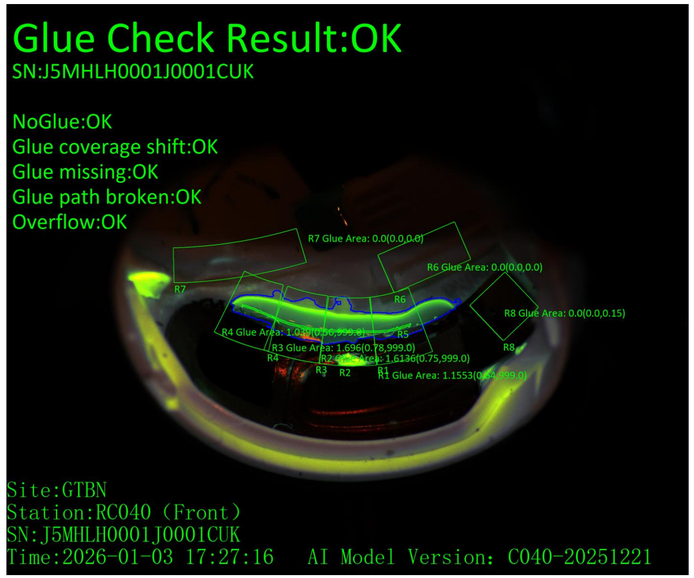
Legend | Glue Path | Product Datum Edge | Glue Area Region | AOI Detection Area | Keep Out Zone

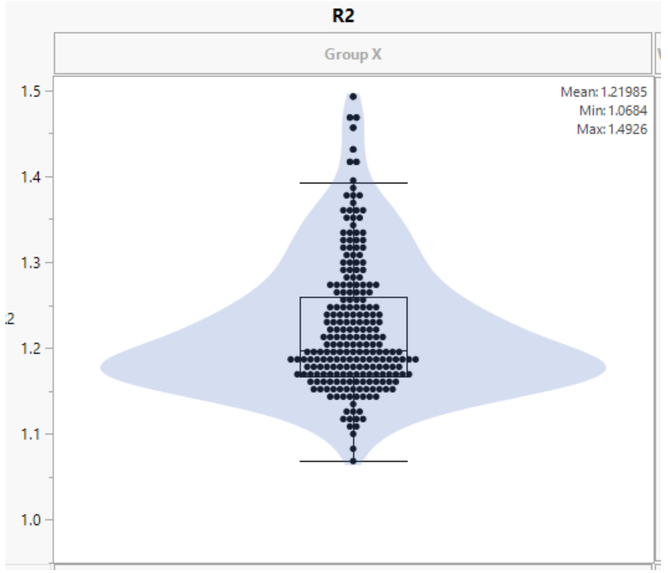
Updated: *rev and date*

Pose1_MissingArea_R2 Min:1.0684



Pose1_MissingArea_R2Max:1.61



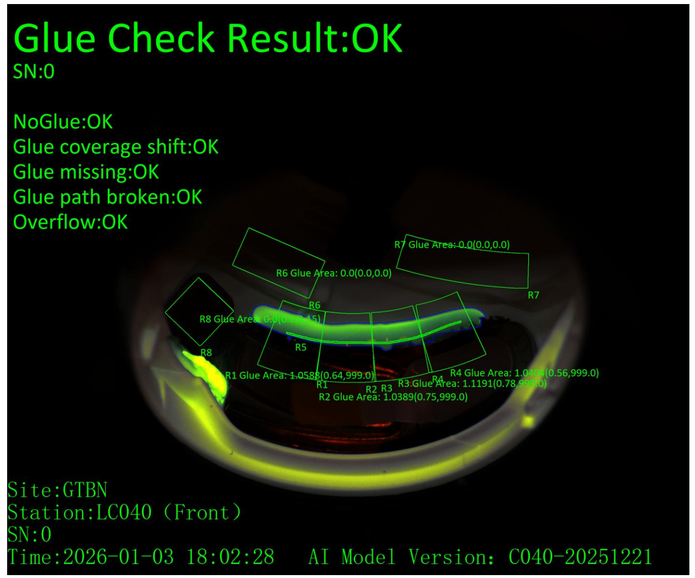


R1 Missing spec= Pose1_Missing_R1 MIN*0.7=1.0684*0.7=0.74788

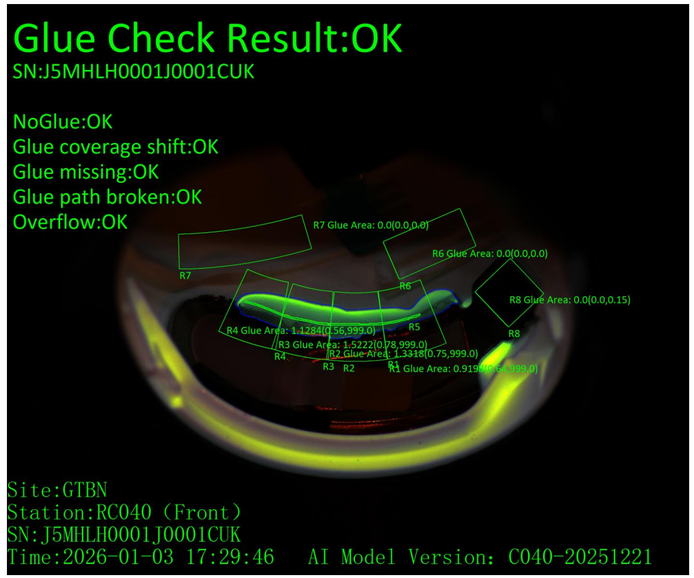
Legend | Glue Path | Product Datum Edge | Glue Area Region | AOI Detection Area | Keep Out Zone

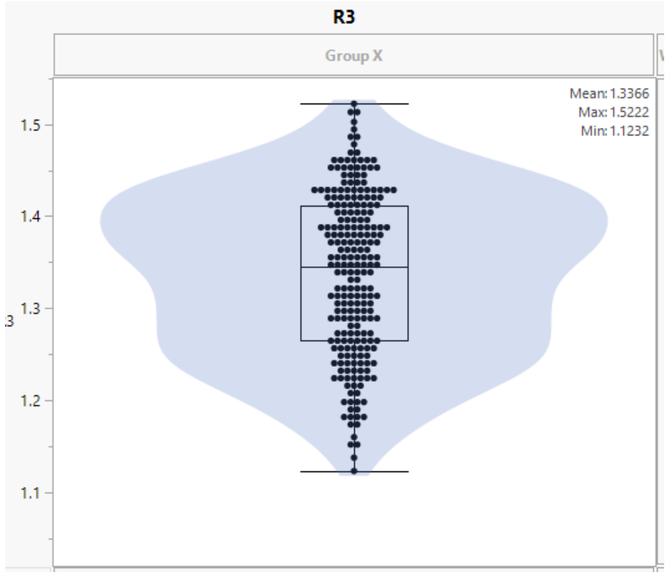
Updated: *rev and date*

Pose1_MissingArea_R3 Min:1.12



Pose1_MissingArea_R3Max:1.522



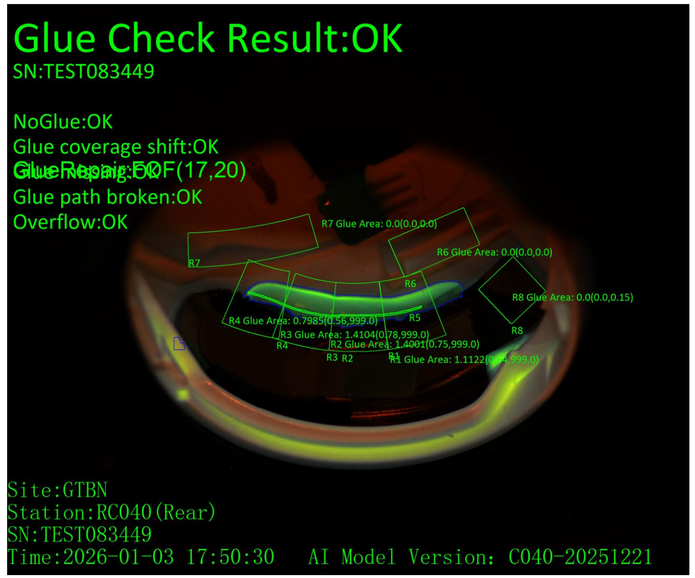


R1 Missing spec= Pose1_Missing_R1 MIN*0.7=1.12*0.7=0.784

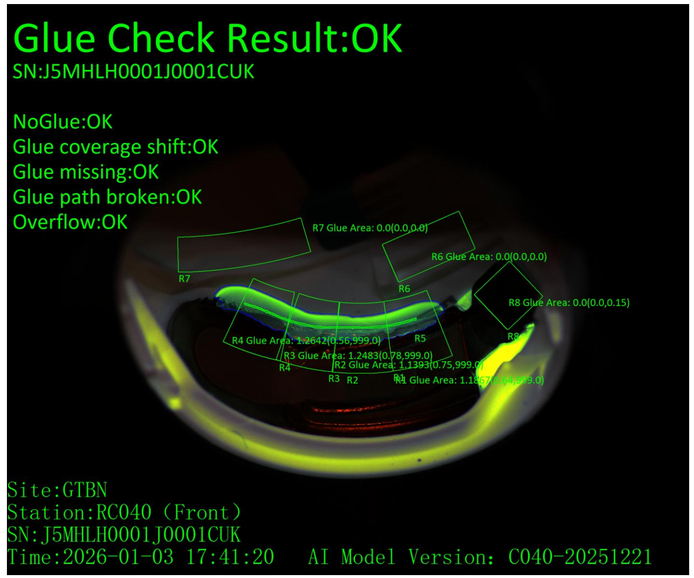
Legend | Glue Path | Product Datum Edge | Glue Area Region | AOI Detection Area | Keep Out Zone

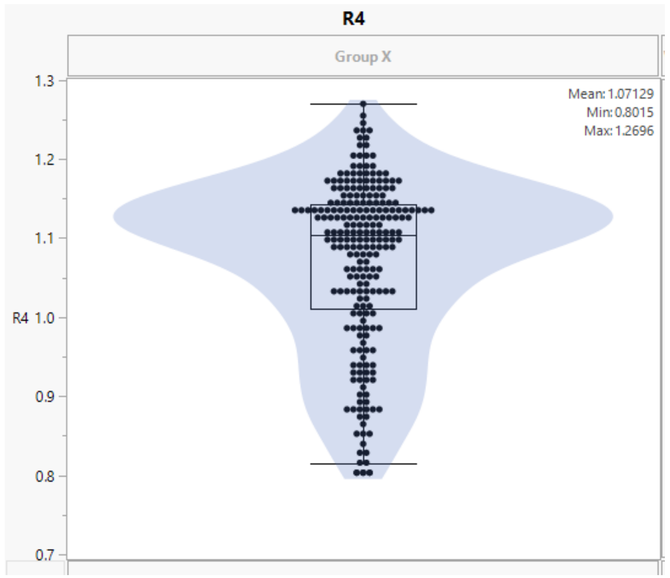
Updated: *rev and date*

Pose1_MissingArea_R4 Min:0.801



Pose1_MissingArea_R4Max:1.269





R1 Missing spec= Pose1_Missing_R1 MIN*0.7=0.801*0.7=0.5607