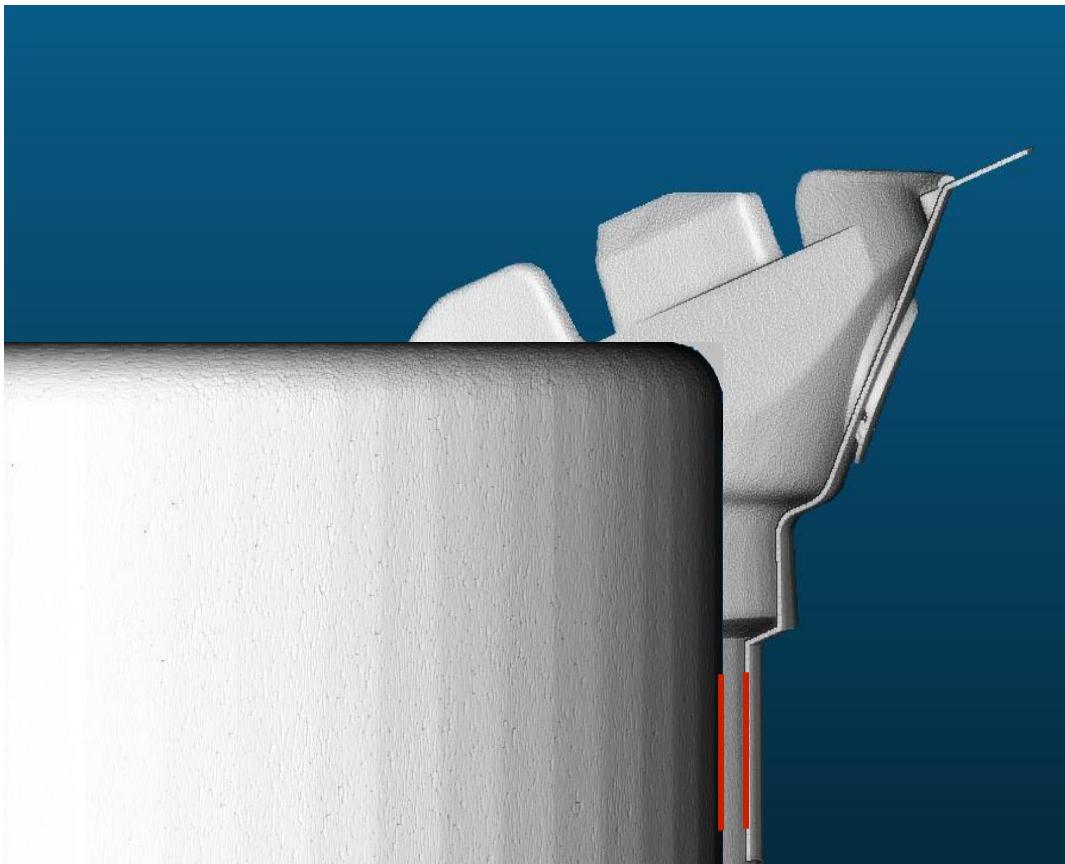


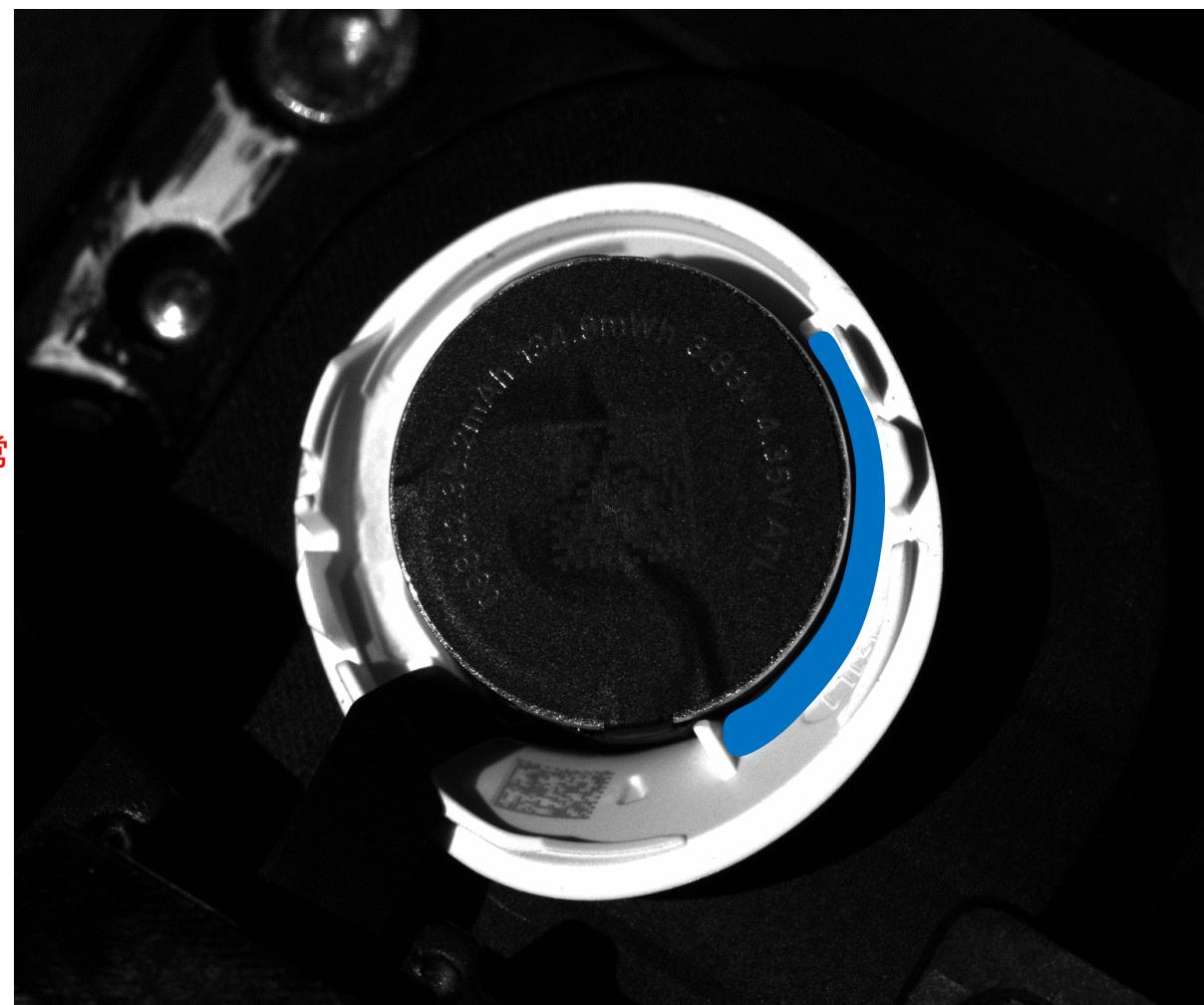
868

H510 Vision Flow Ver 3.0

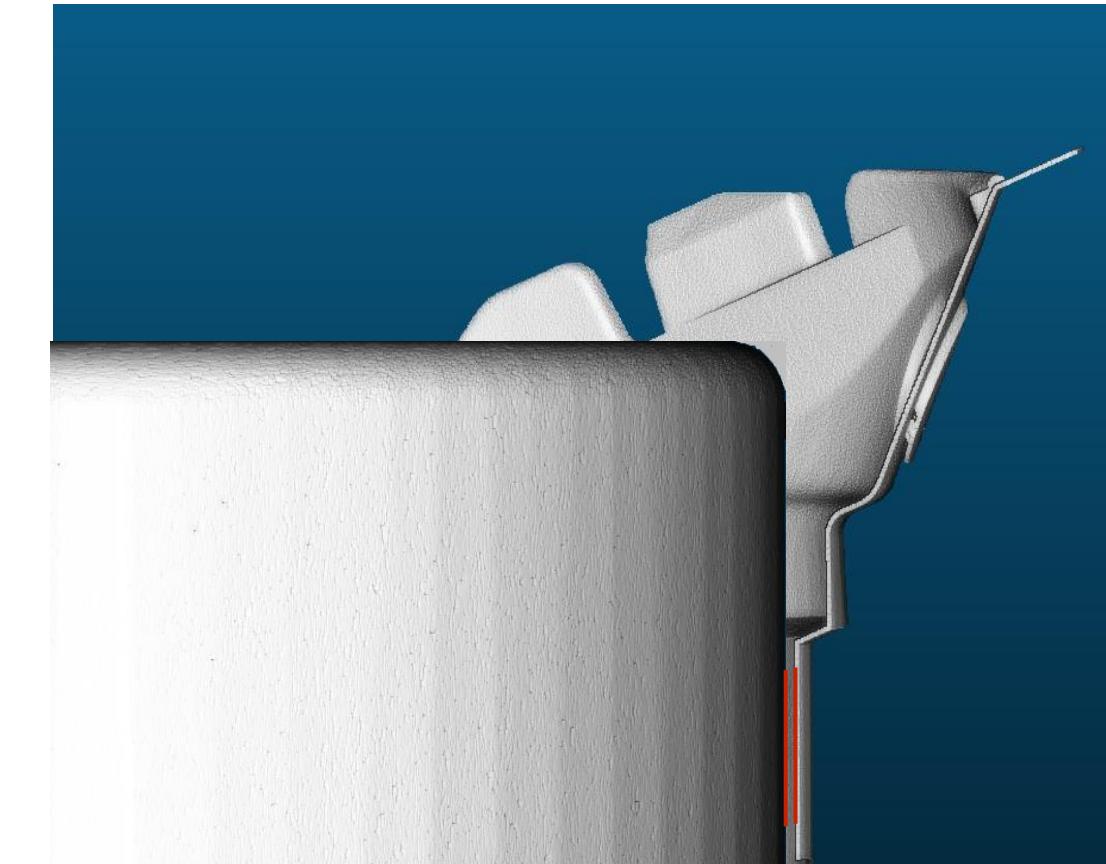
OK



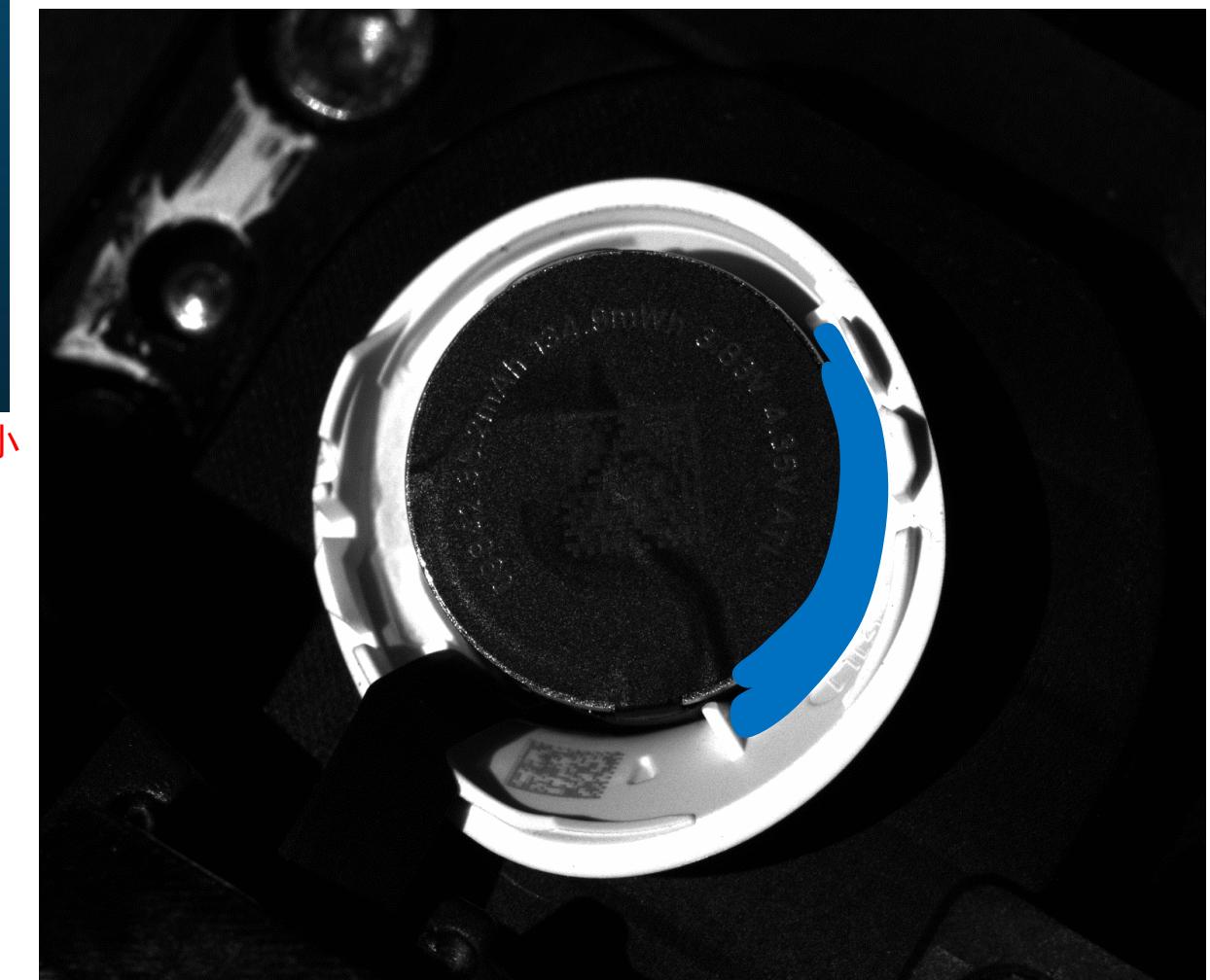
电池与HSG缝隙正常



NG (Glue overflow)



电池与HSG缝隙较小

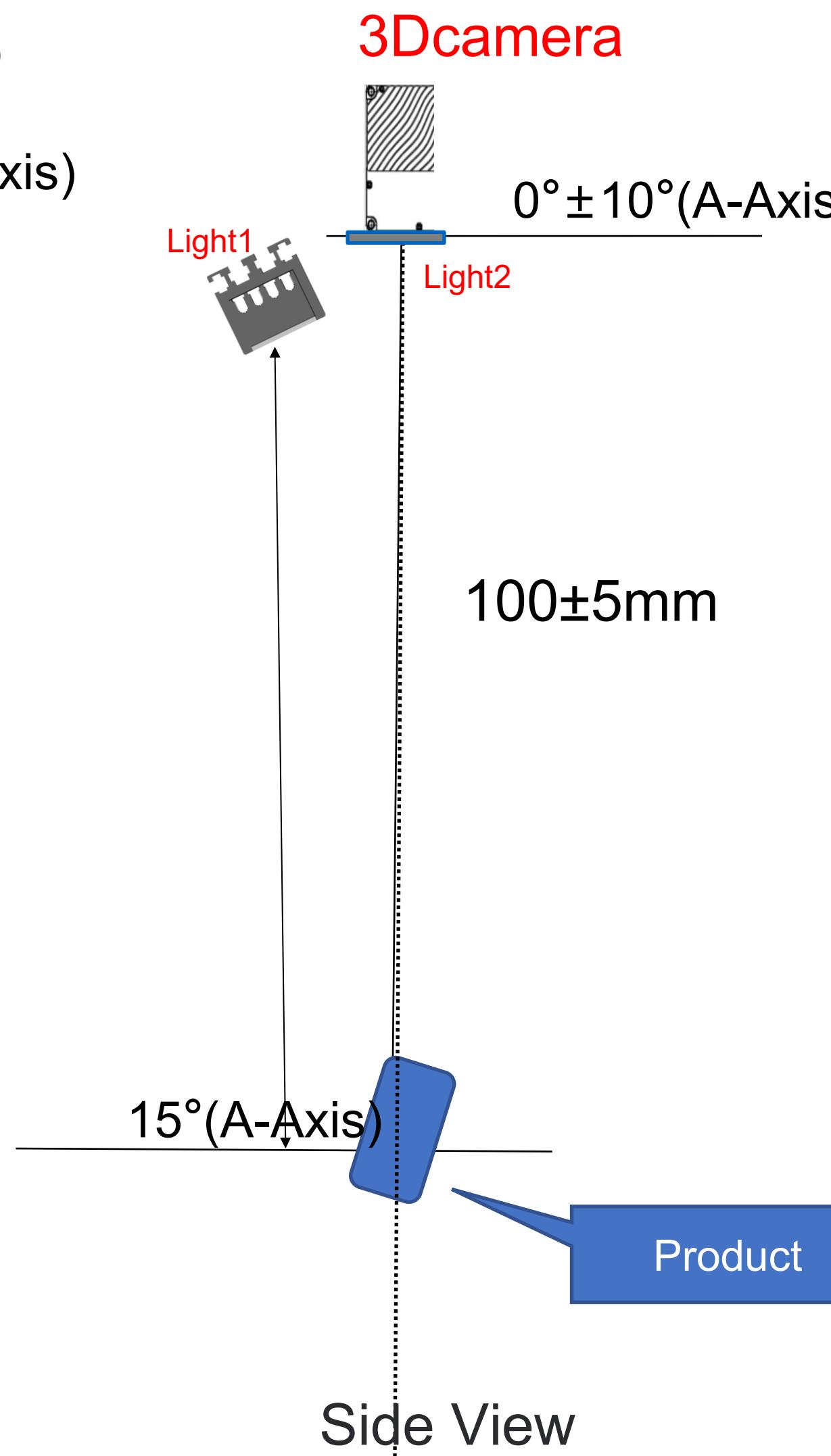
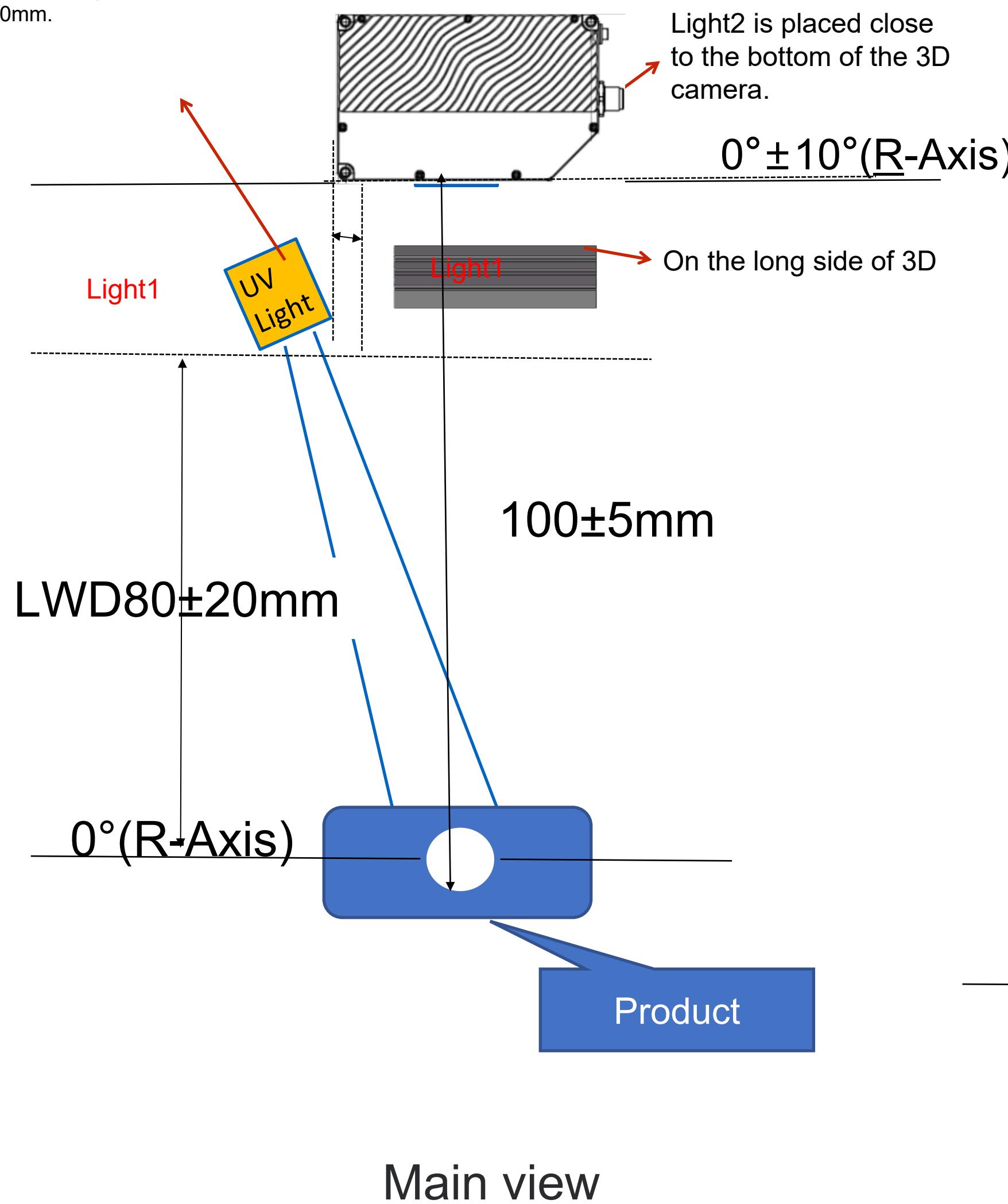


因为电池在HSG内腔位置波动，底部空间不足(Gap过小)，当前方案固定胶量点胶，导致胶水无法流入底部缝隙中，溢出至电池表面,造成产品不良

Because the battery fluctuates within the HSG cavity, there is insufficient space at the bottom (the gap is too small). The current scheme fixes the amount of adhesive and applies it with a dispensing point, so the glue cannot flow into the lower seam and instead spills onto the surface of the battery, resulting in product defects.

➤ Optical system diagram

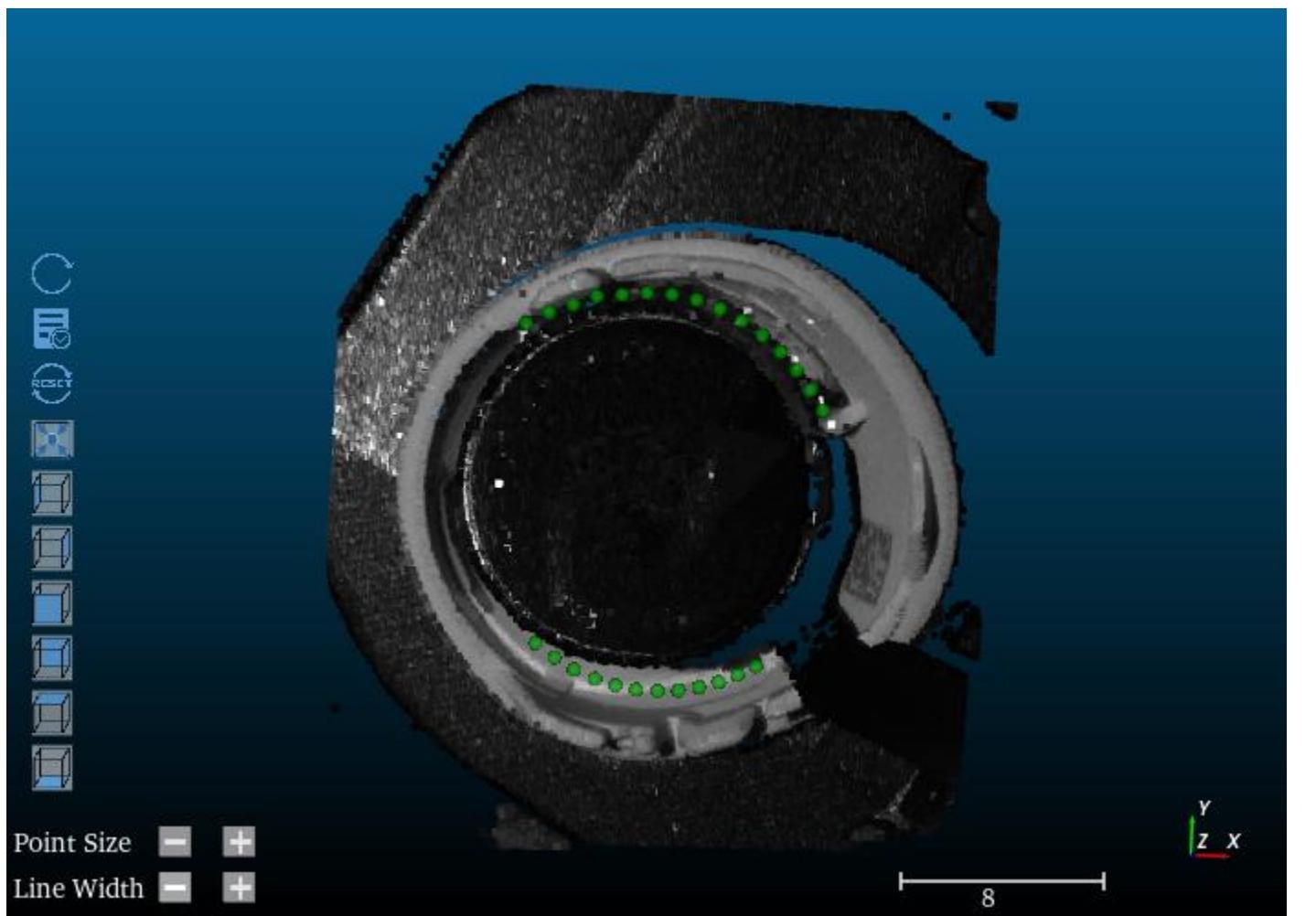
The distance from the outer edge of the 3D camera is adjustable from -10mm to +30mm.



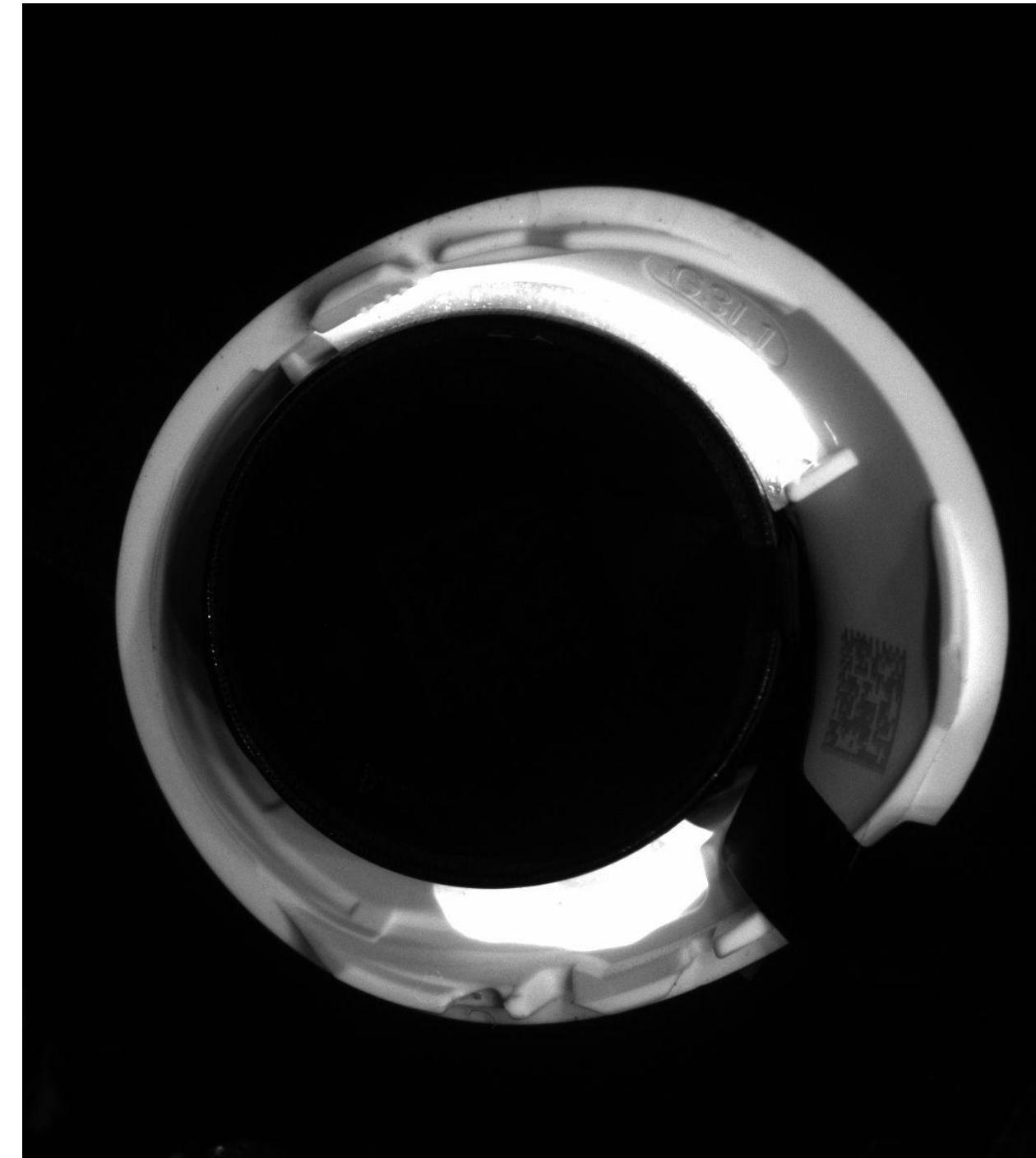
Parameter			
Pixels	FOV	Resolution	DOF
2448*2048	21*17.5mm	0.008mm/pixel	2.5mm

BOM(for Dual_station)				
Item	Type	Description	Brand	Quantity
Camera	LYL-LCubor-A363DST-KIT	3D	Luster	2
Light	RBM-HBL8629-UV365-T35	UV light	Luster	4
Light2	RBM-HBLSP3829-UV365-T35	UV light	Luster	2
License	VW-VA-SW-GLUE10	/	Luster	1

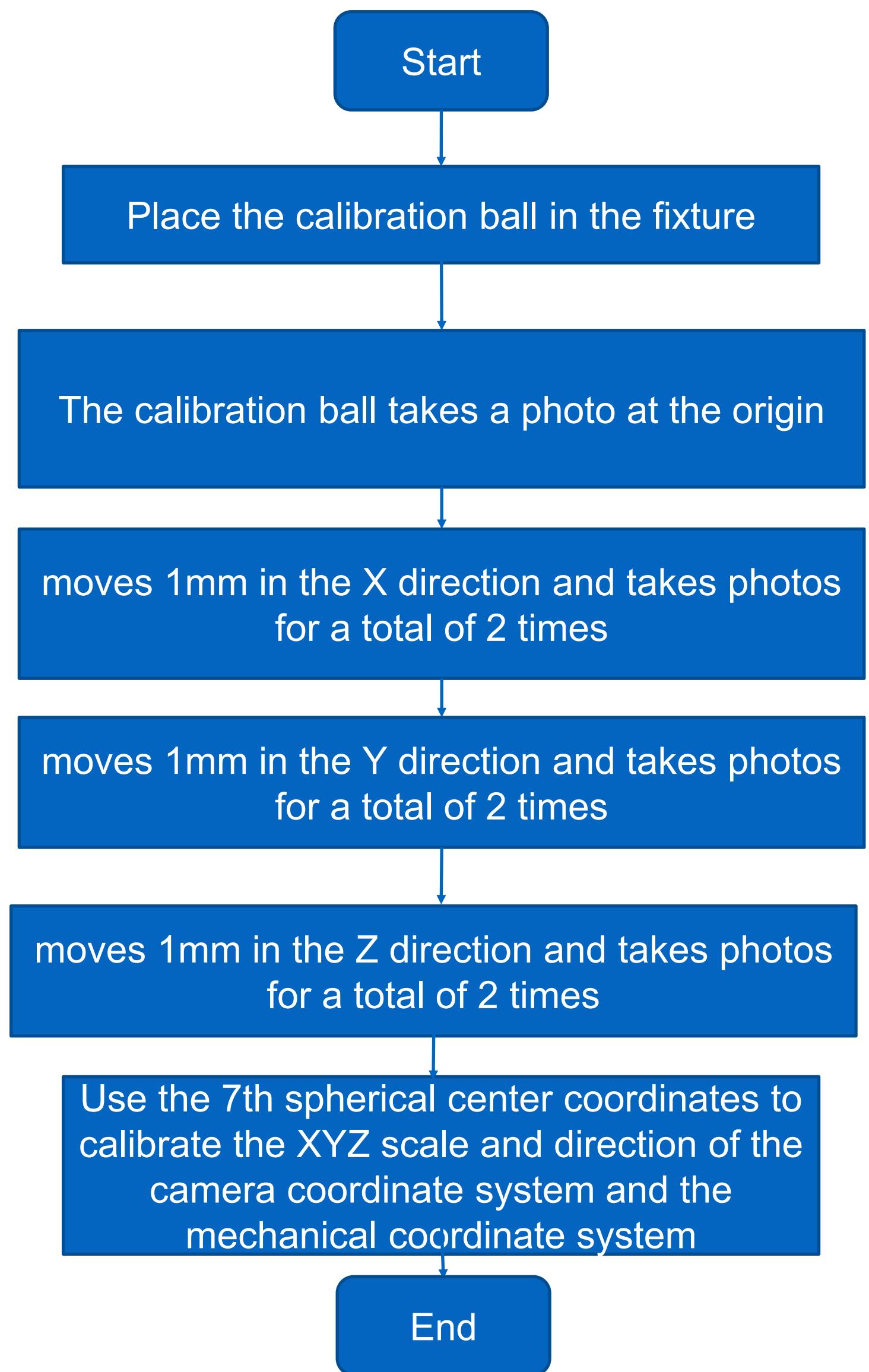
Audio | H510 – 成像效果



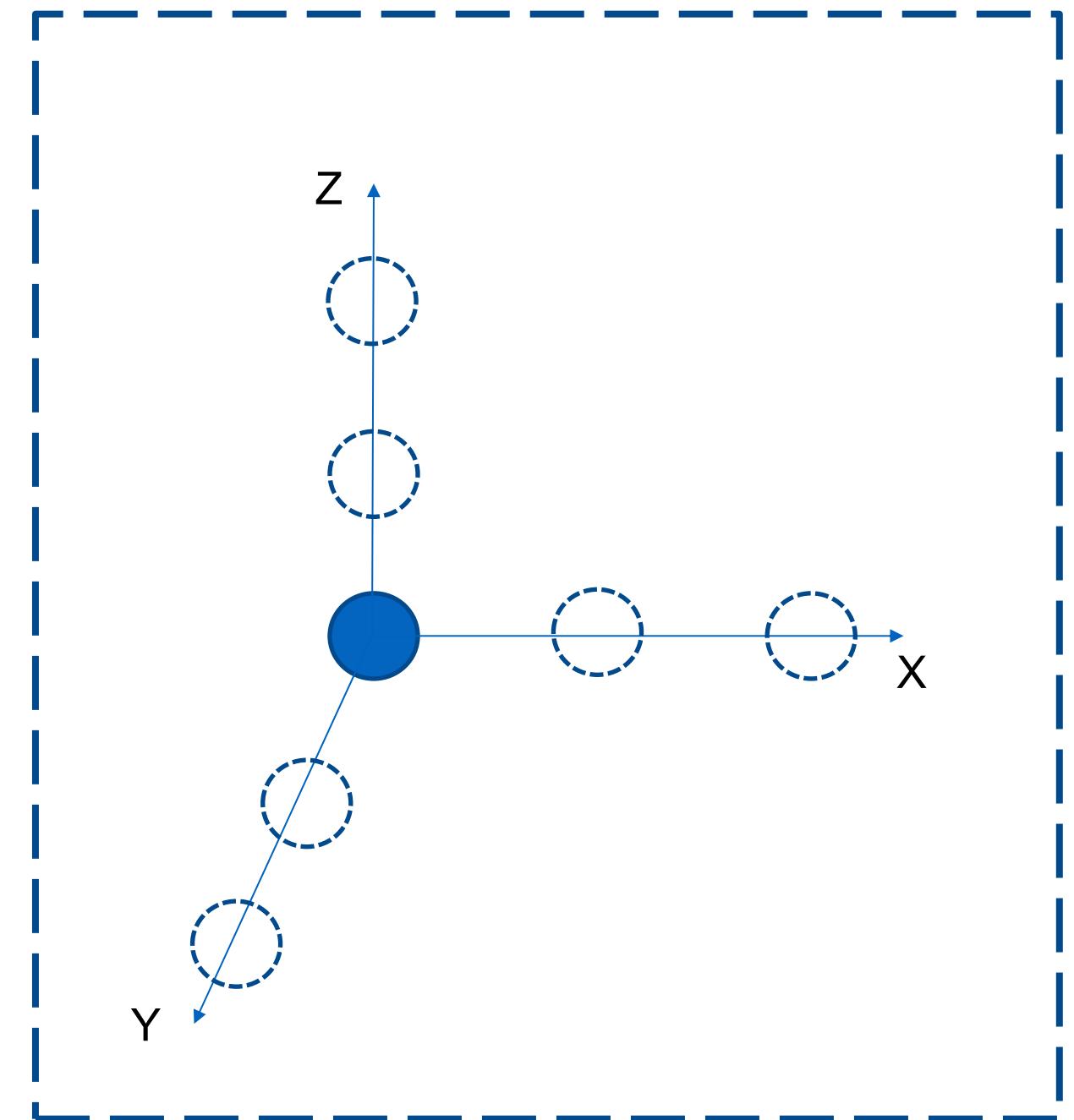
Product positioning and Gap measurement show no issues.



When re-inspecting with an external UV light, the glue path imaging effect is good.



Calibration Ball



Calibration Ball positions

Audio | Calibration Needle - 坐标系原点关联

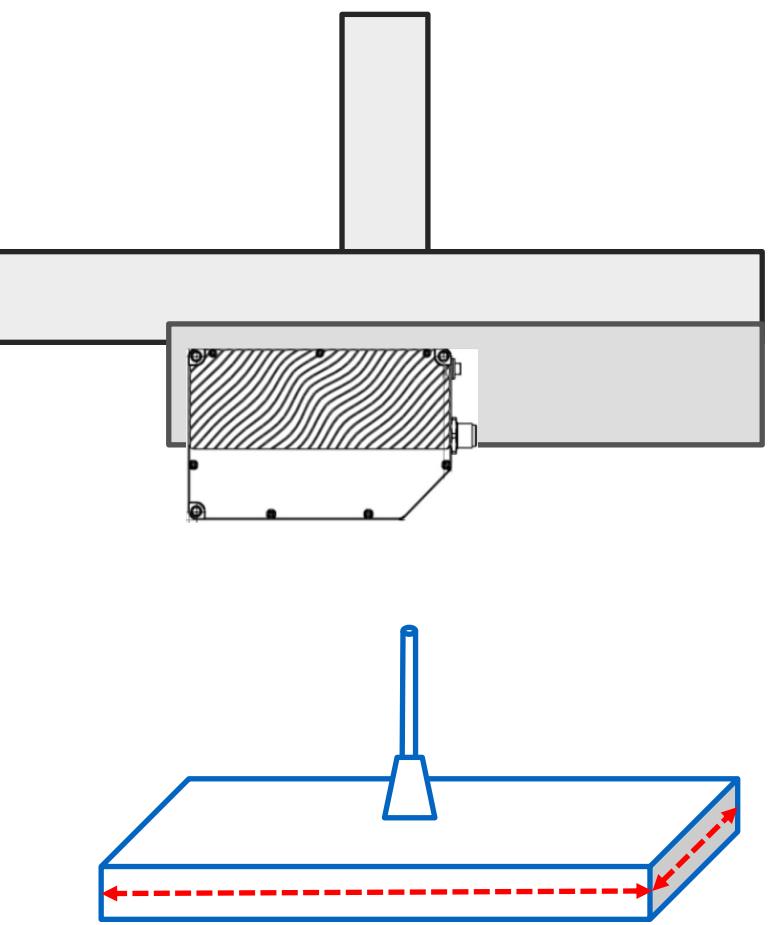
First calibration needle

Step 1: Place the calibration block at the imaging position of normal production materials, perform image acquisition, and obtain X1, Y1, Z1.

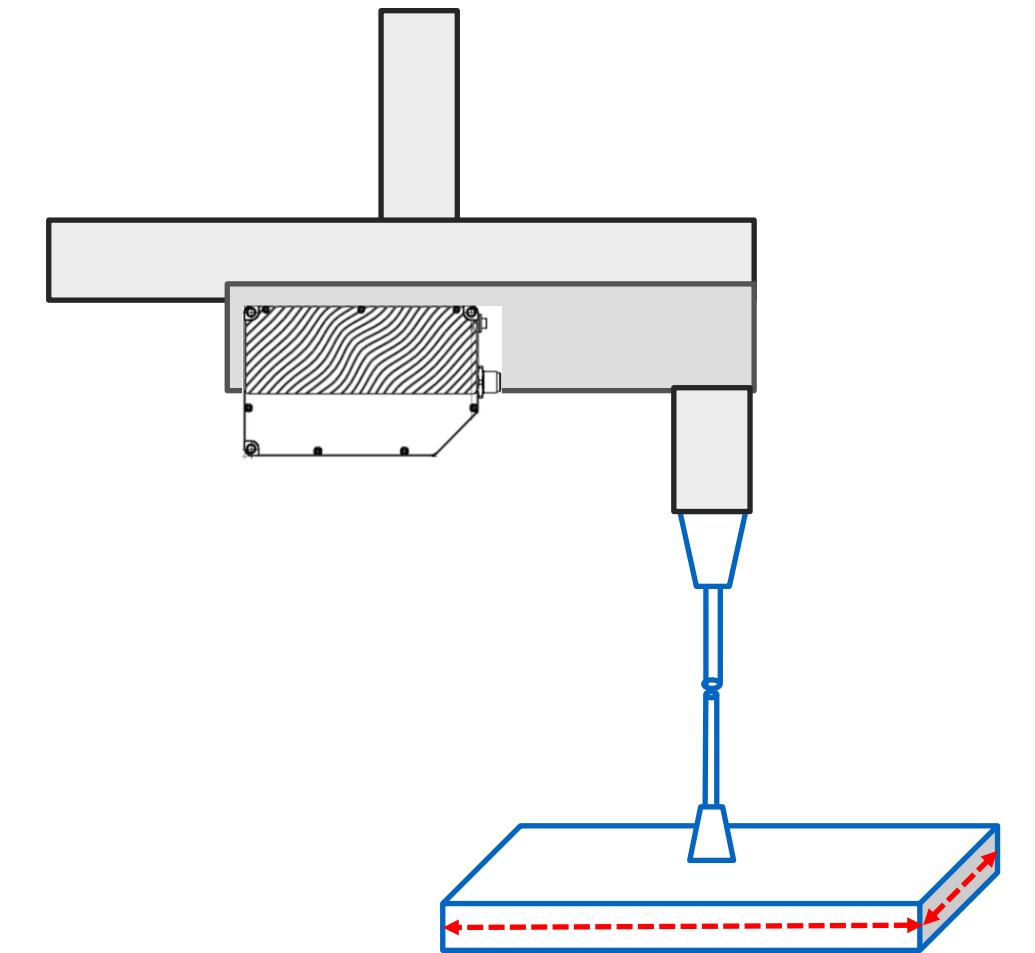
Step2: Manually align the calibration needle with the dispensing needle and record X0, Y0,Z0

Step 3: Calculate the positional deviation between X0, Y0, Z0 and X1, Y1, Z1.

Note: Normally, only one operation is required when installing equipment and wiring. If the mechanism module and camera are disassembled and the relative relationship changes, this process needs to be carried out.

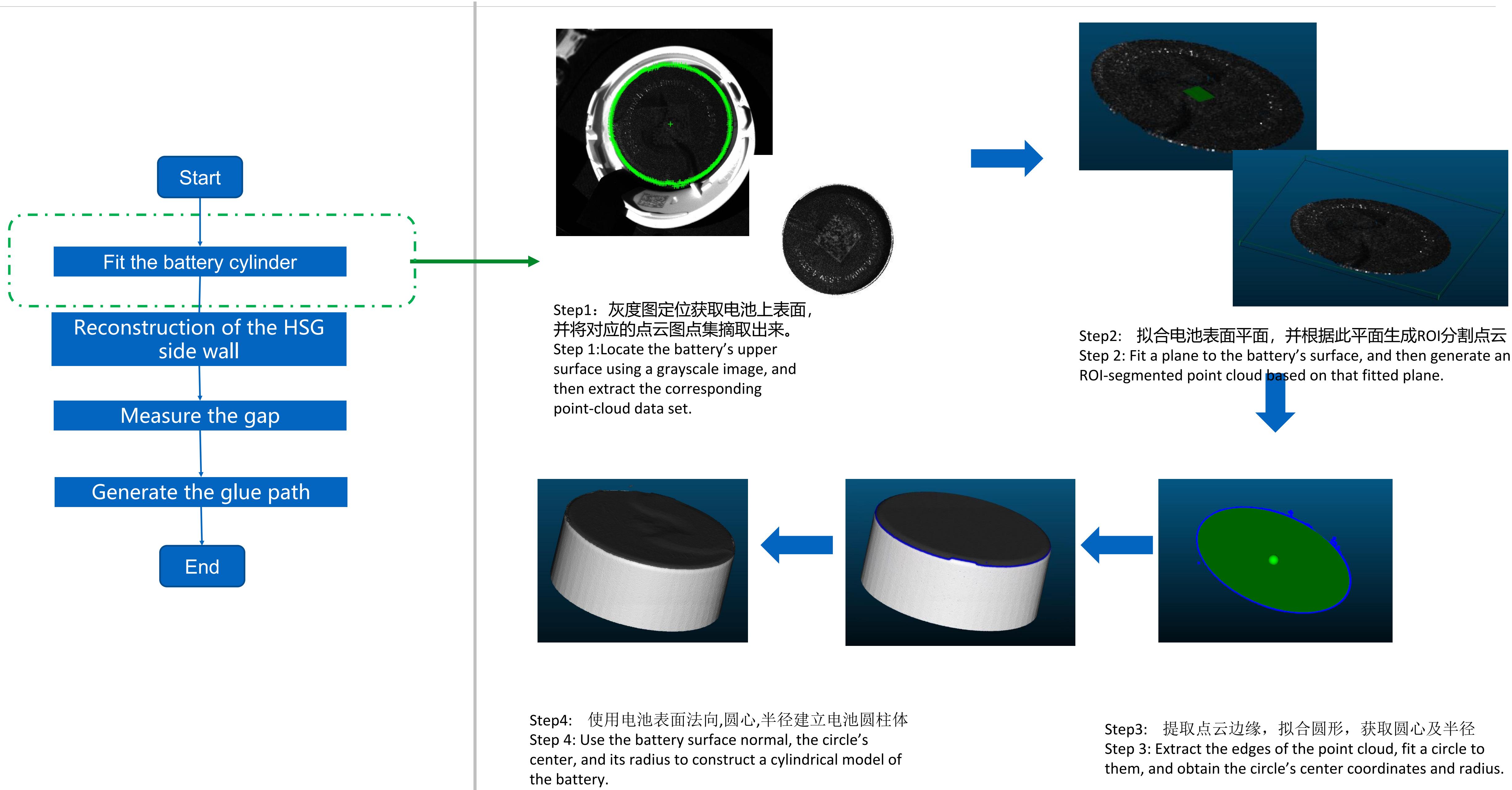


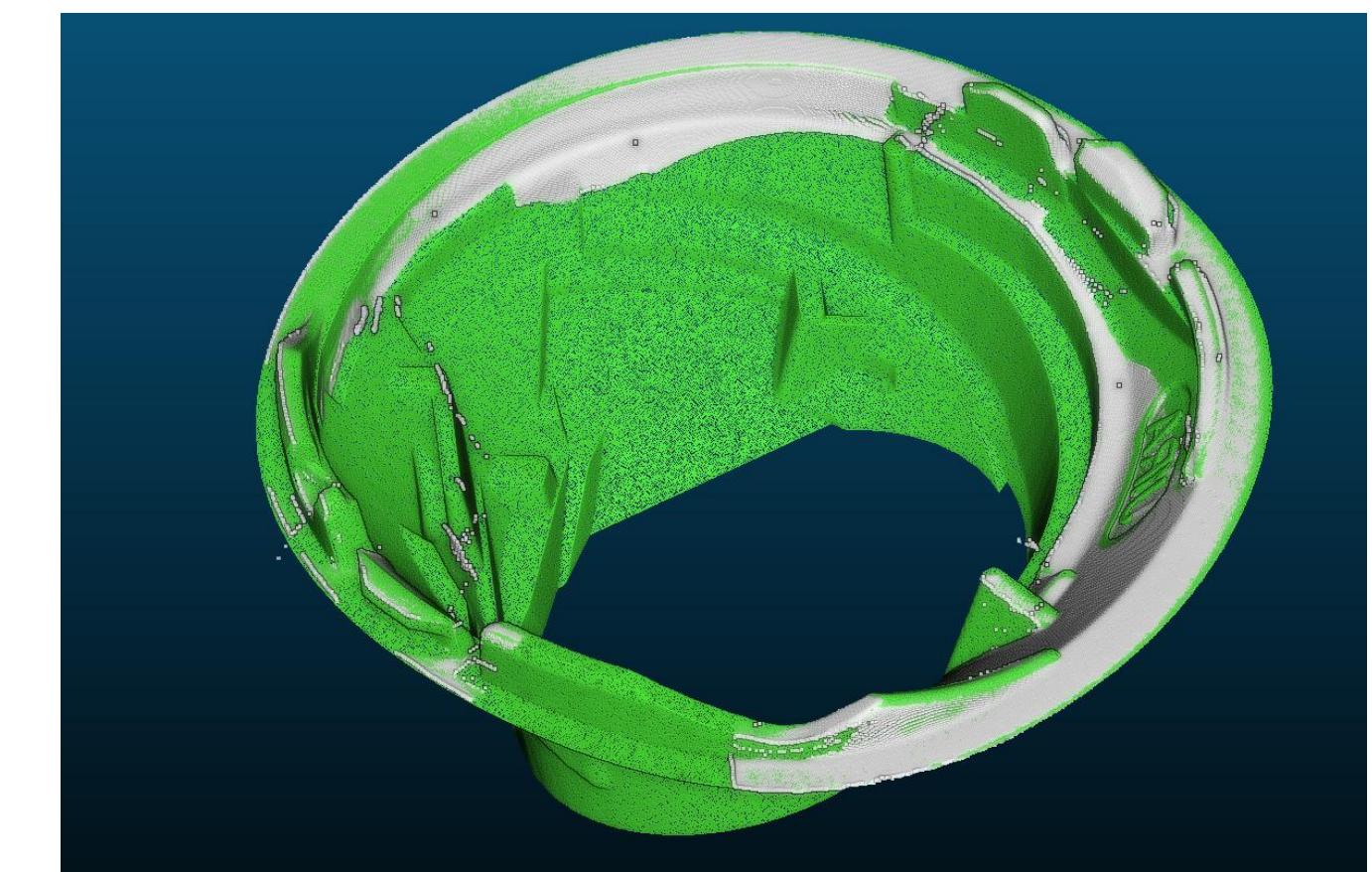
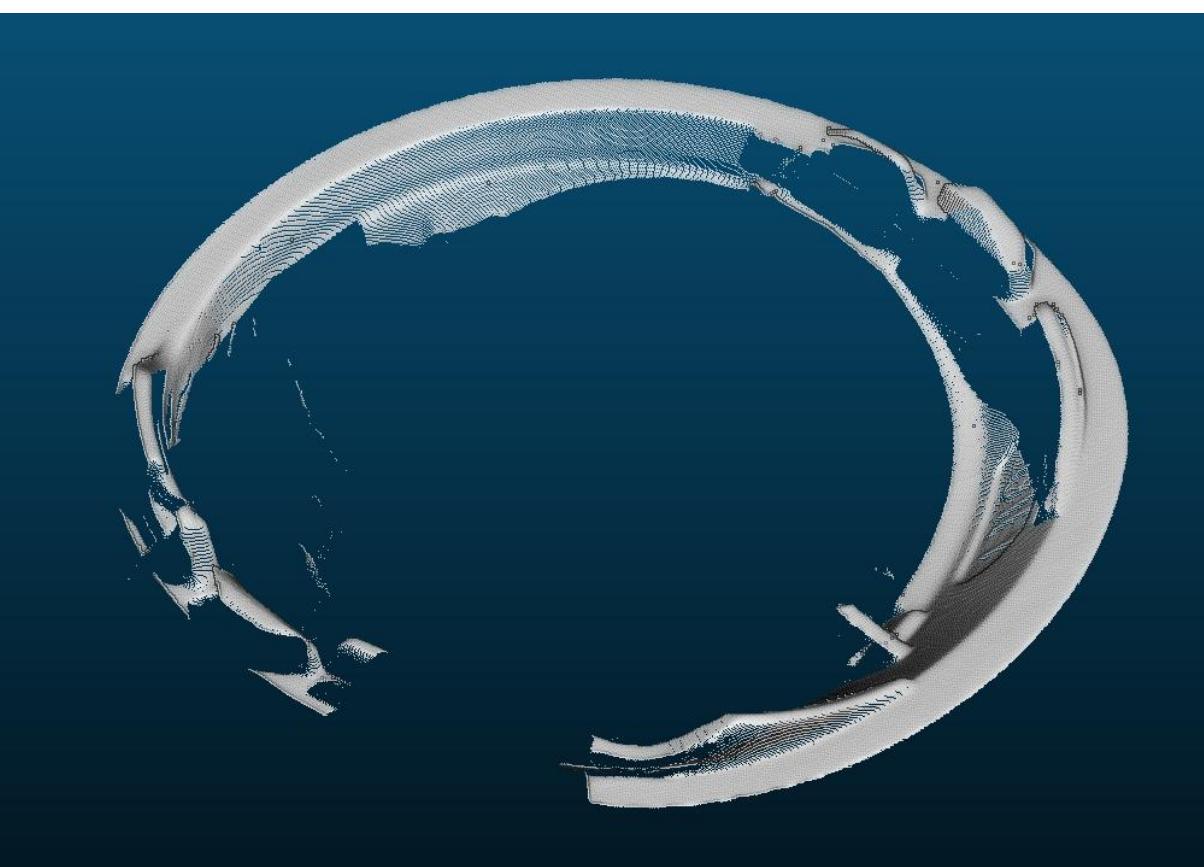
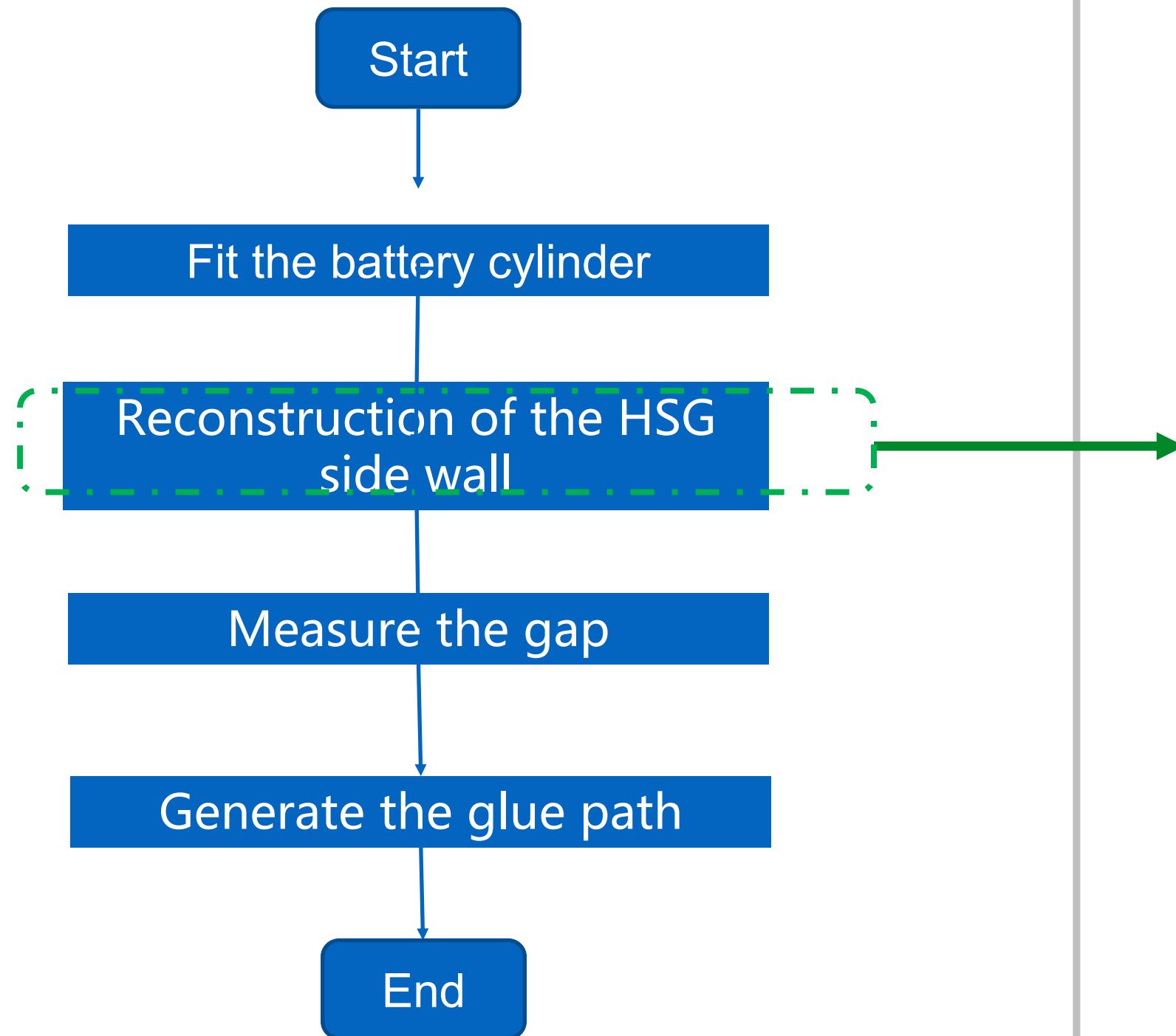
Step 1: Place the calibration block at the imaging position of normal production materials, perform image acquisition, and obtain X1, Y1, Z1.



Step2: Manually align the calibration needle with the dispensing needle and record X0, Y0,Z0

Audio | H510 Workflow – Gap Measure

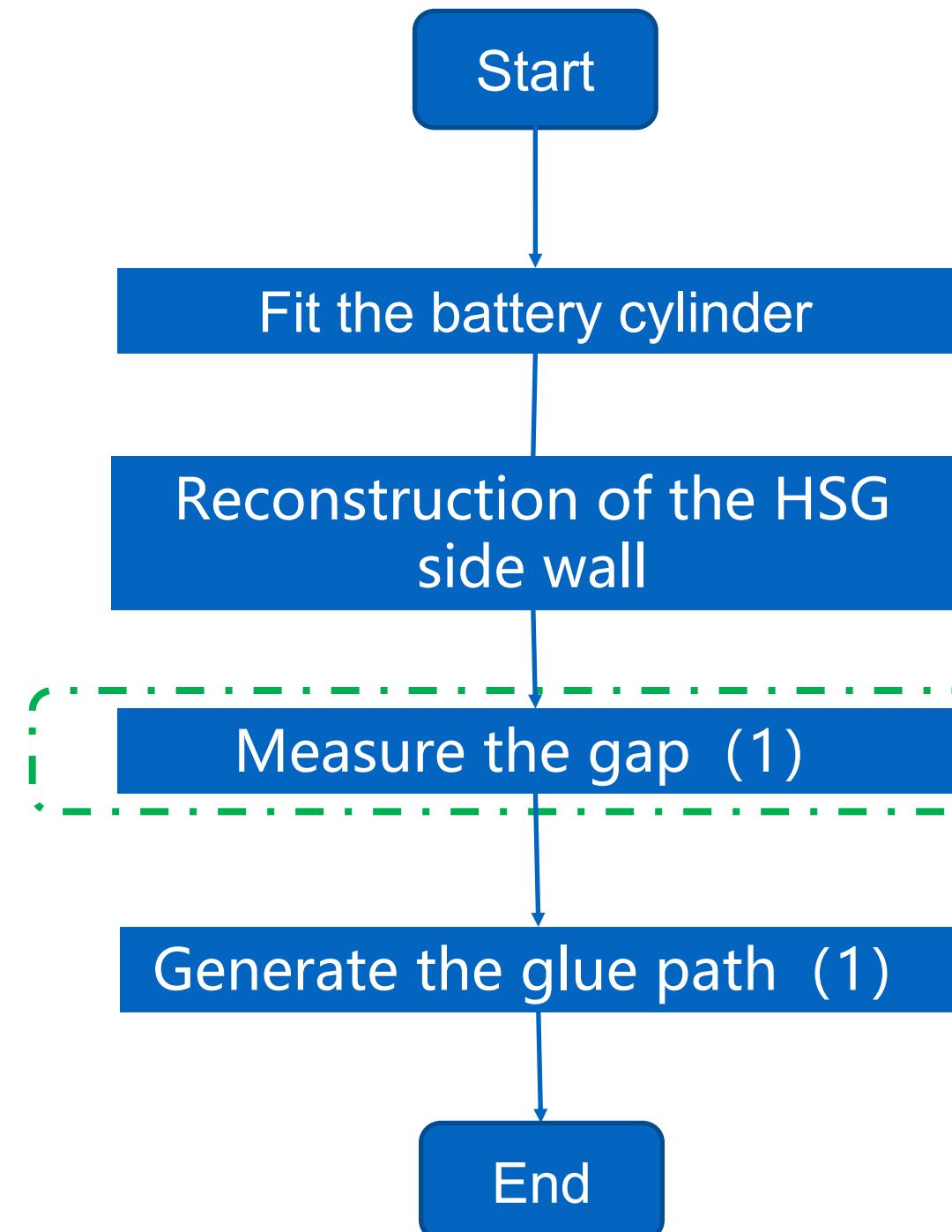




Step1: 采集实时HSG点云(因激光三角法成像原理, 电池遮挡导致HSG侧壁缺失)
Step 1: Collect real-time HSG point clouds (due to the laser triangulation imaging principle, the battery blocks part of the view, causing missing data on the HSG side wall)

Step2: 白色实时HSG点云与绿色模型模型匹配, 使用模型点云补全HSG侧壁
Match the white real-time HSG point cloud with the green model; use the model's point cloud to fill in the missing side wall of the HSG.

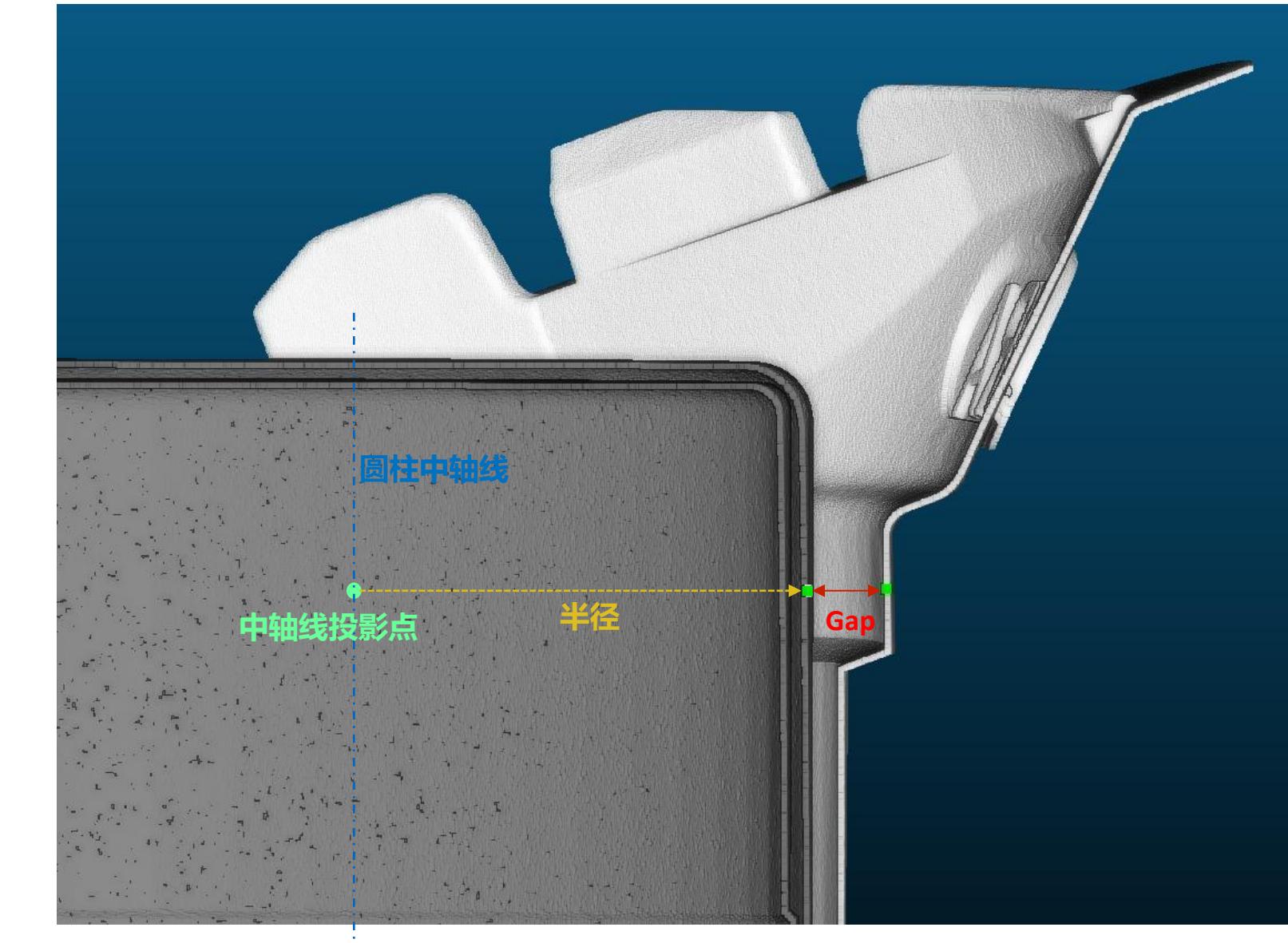
Audio | H510 Workflow – Gap Measure



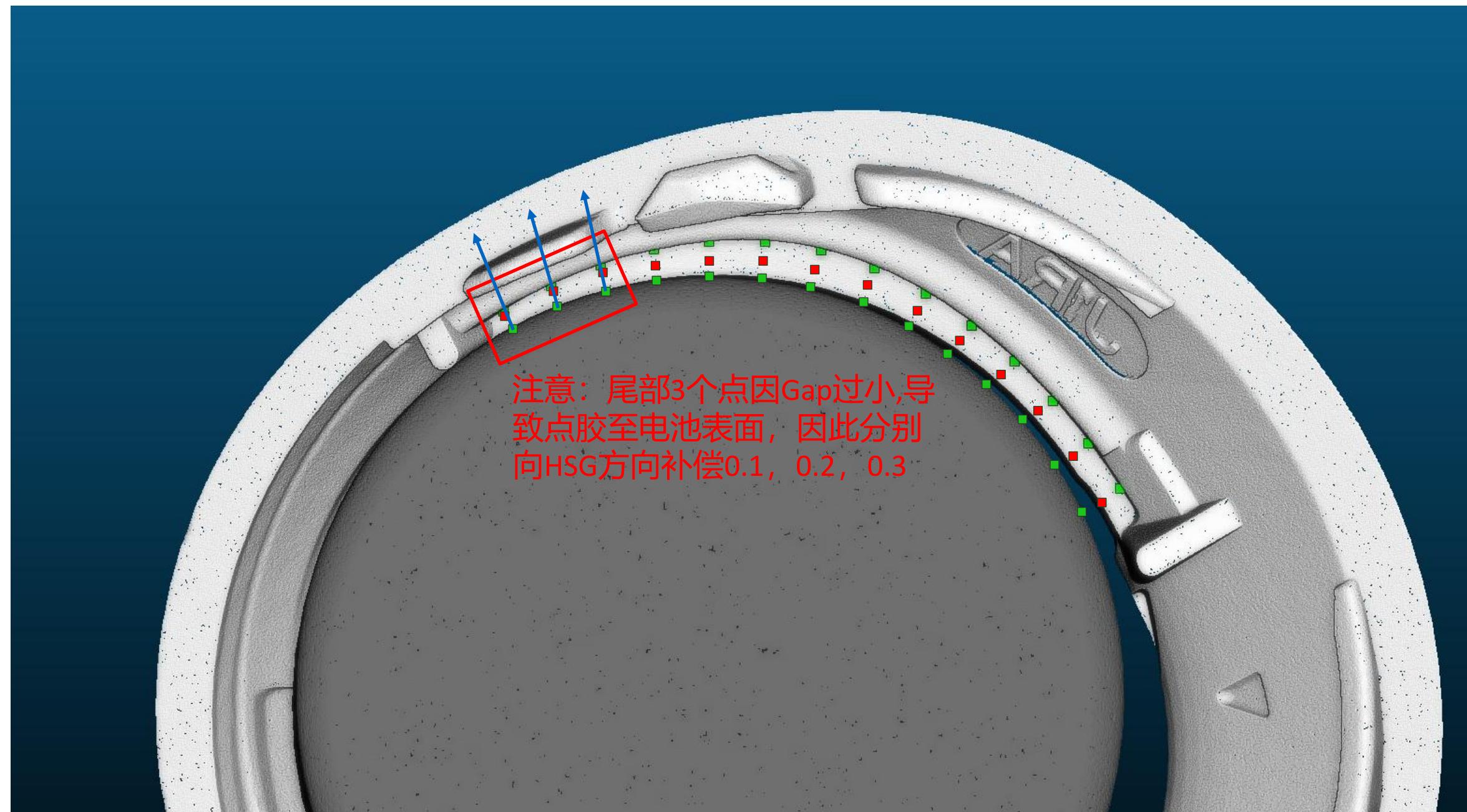
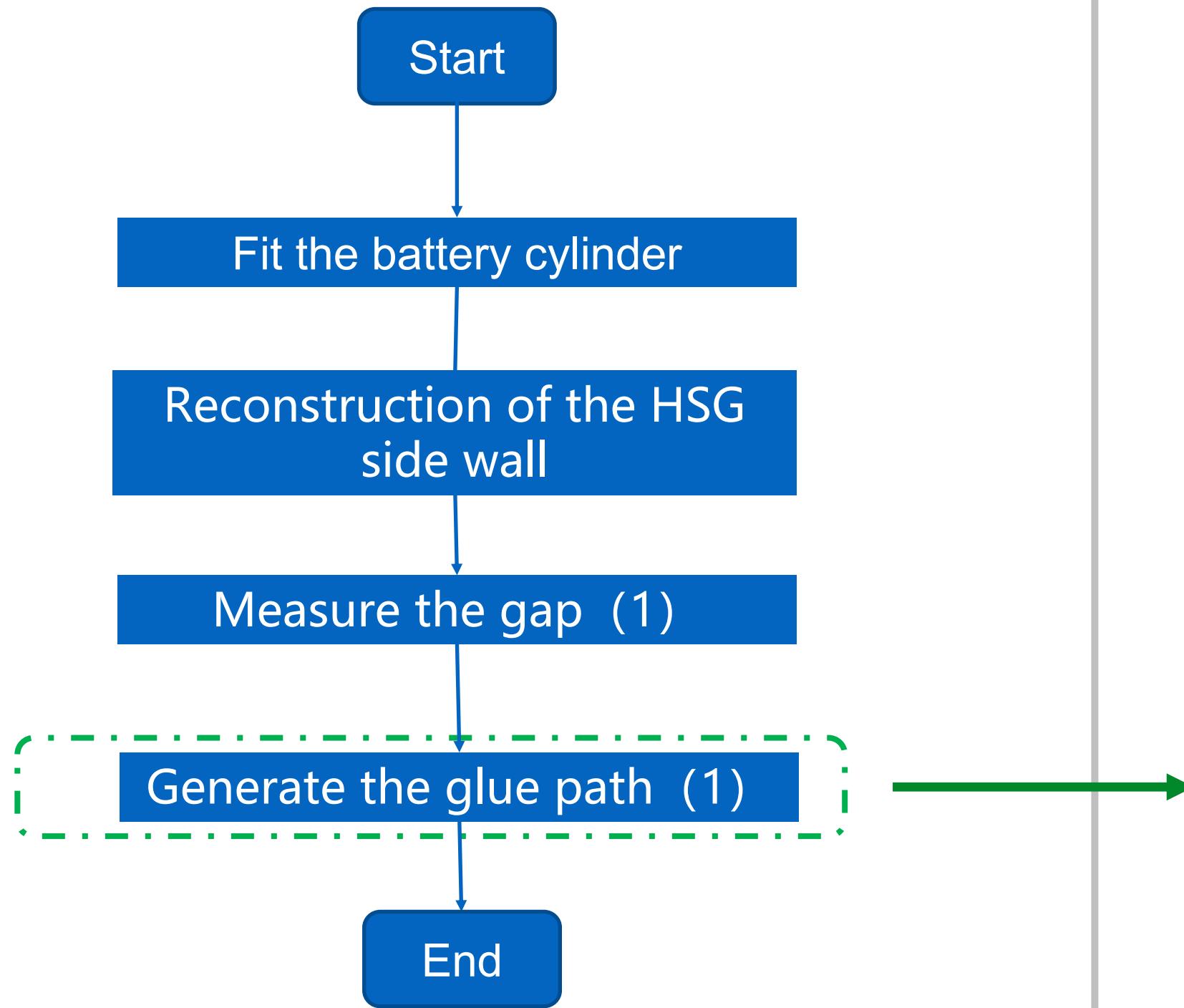
Step1: 使用HSG侧壁台阶(绿色)面拟合平面,并向上平移0.5mm为Gap测量位置
Step 1: Fit a plane to the step on the HSG side wall (green surface), then translate it upward by 0.5 mm to set the measurement position for the gap.



Step2: 使用大Rib边缘为起点, 沿着Gap测量截面间隔8° 共取15个点
Step 2: Use the edge of the large rib as a starting point and, along the Gap-measurement cross-section, sample 14 points at 7° intervals.



Step3:
①建立HSG侧壁测量点到圆柱中轴线的投影点
②投影沿着投影点和HSG测量点方向平移圆柱半径建立电池表面测量点
③计算电池表面测量点和HSG侧壁测量点距离为Gap
Step 3:
1. Establish the projection of each HSG side-wall measurement point onto the central axis of the cylinder.
2. Translate the cylinder radius along the line defined by that projection point and the original HSG measurement point to create a battery surface measurement point.
3. Compute the distance between the battery surface measurement point and the corresponding HSG side-wall measurement point; this distance is the **Gap**.



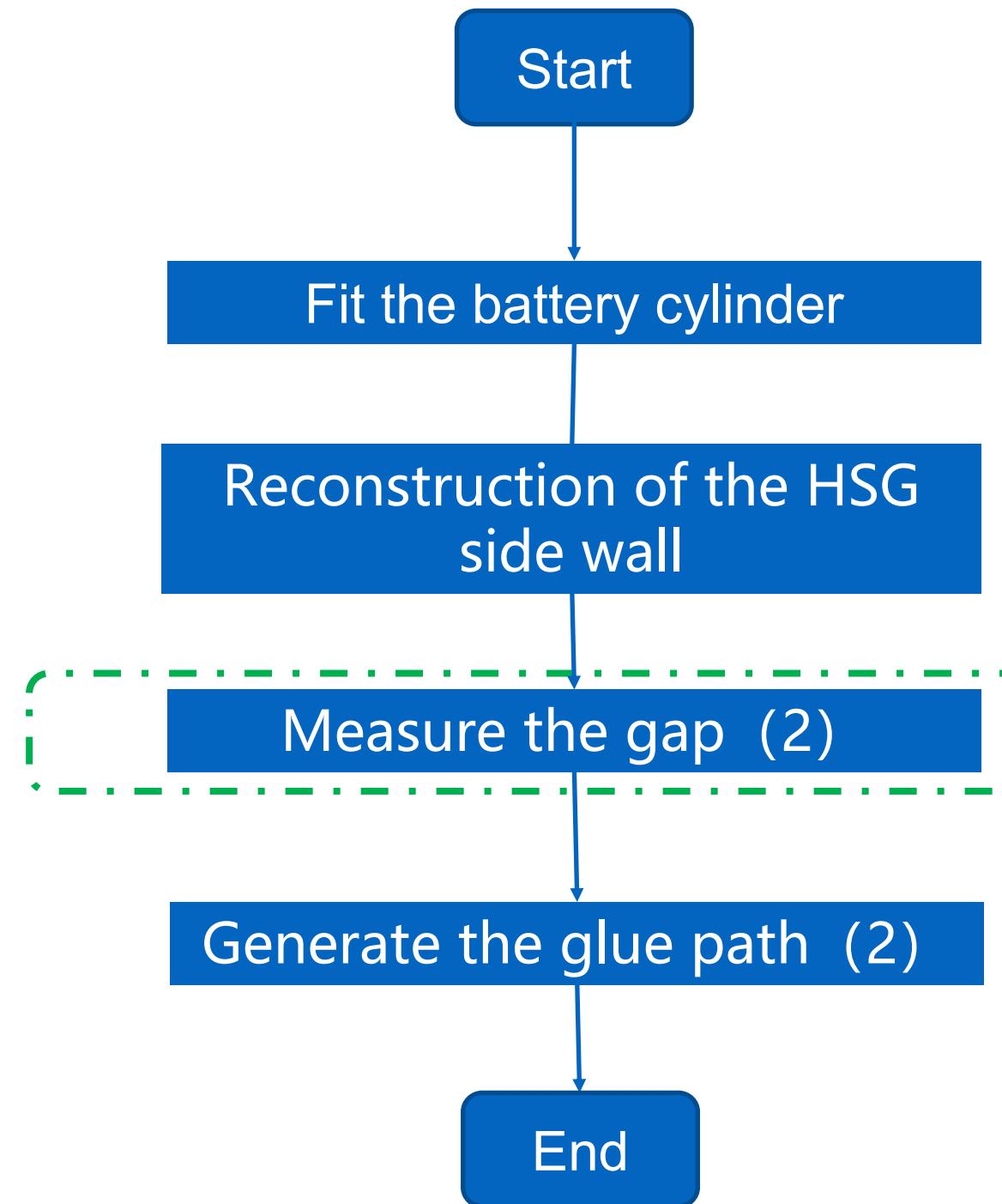
Step1:

- ① 使用Gap测量中点(HSG侧壁和电池表面)，建立点胶路径点
- ② 通过Gap测量值大小进行判断，进行点胶速度动态调整，控制胶量

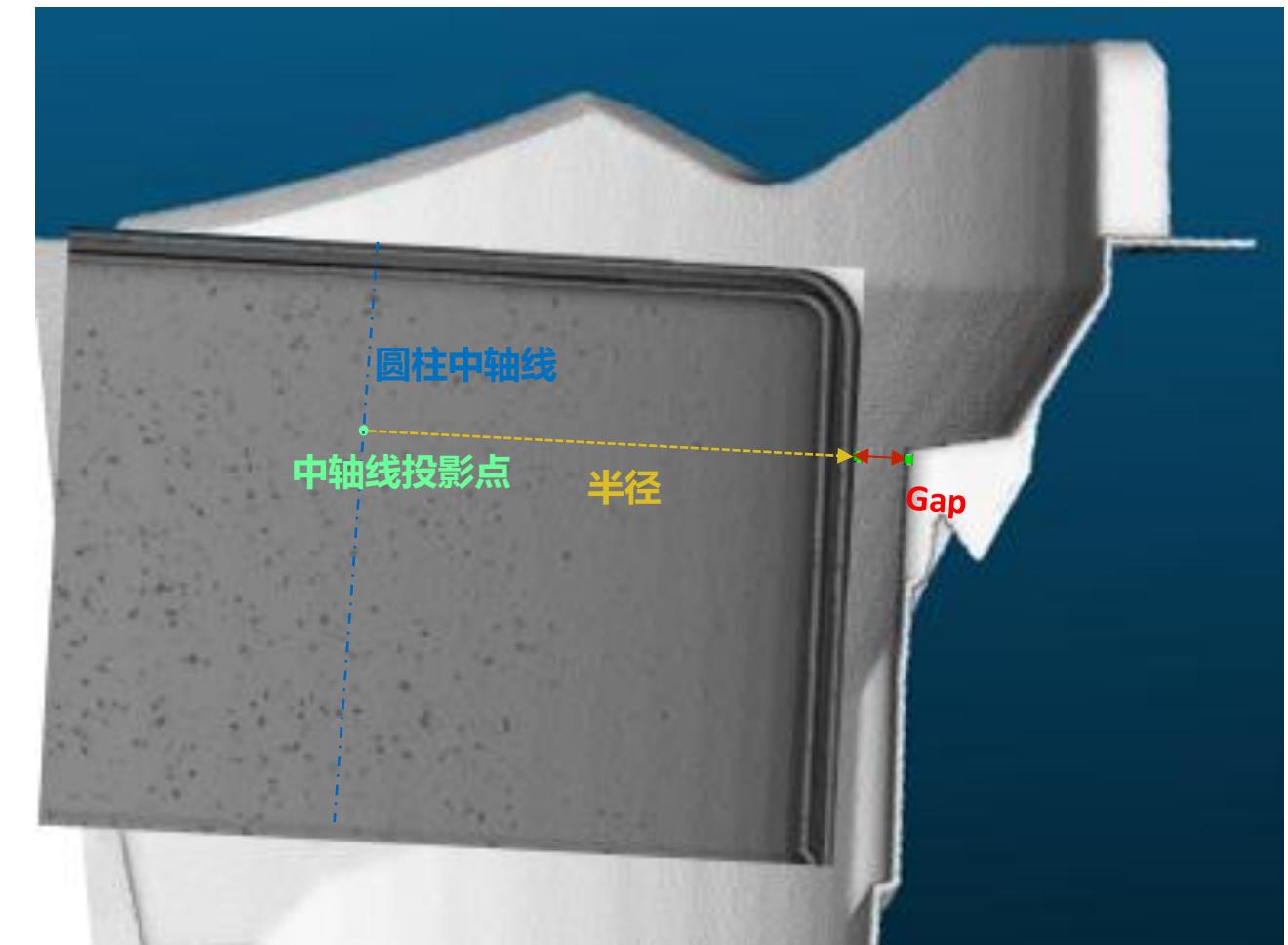
Step 1:

1. Use the midpoint of the Gap measurement (between the HSG side wall and the battery surface) to establish the dispensing-path points.
2. Dynamically adjust the dispensing speed based on the magnitude of the Gap value, thereby controlling the amount of adhesive applied.

Audio | H510 Workflow – Gap Measure



Step2: 使用Rib边缘为起点, 沿着Gap测量截面间隔 6° 共取12个点



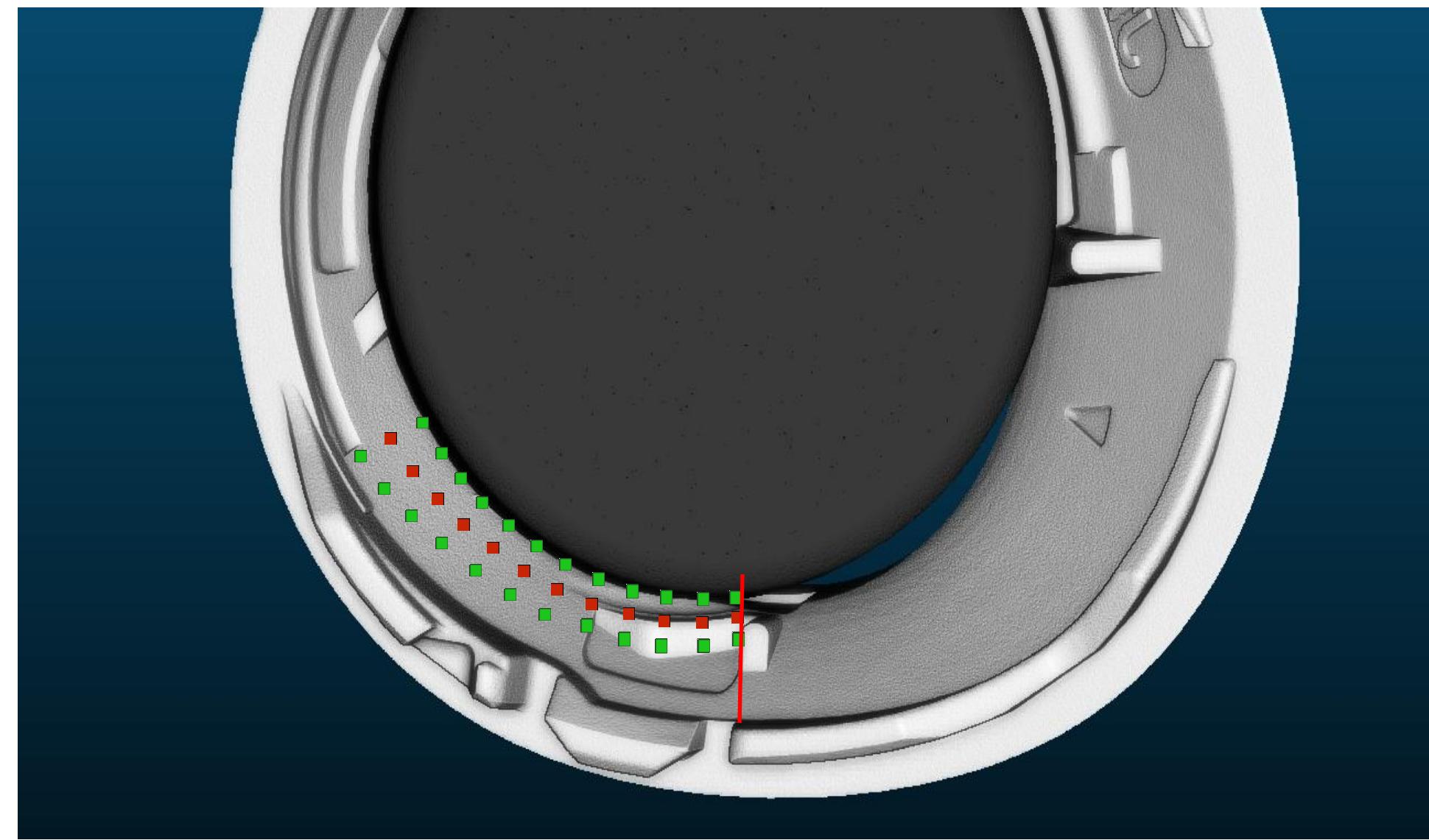
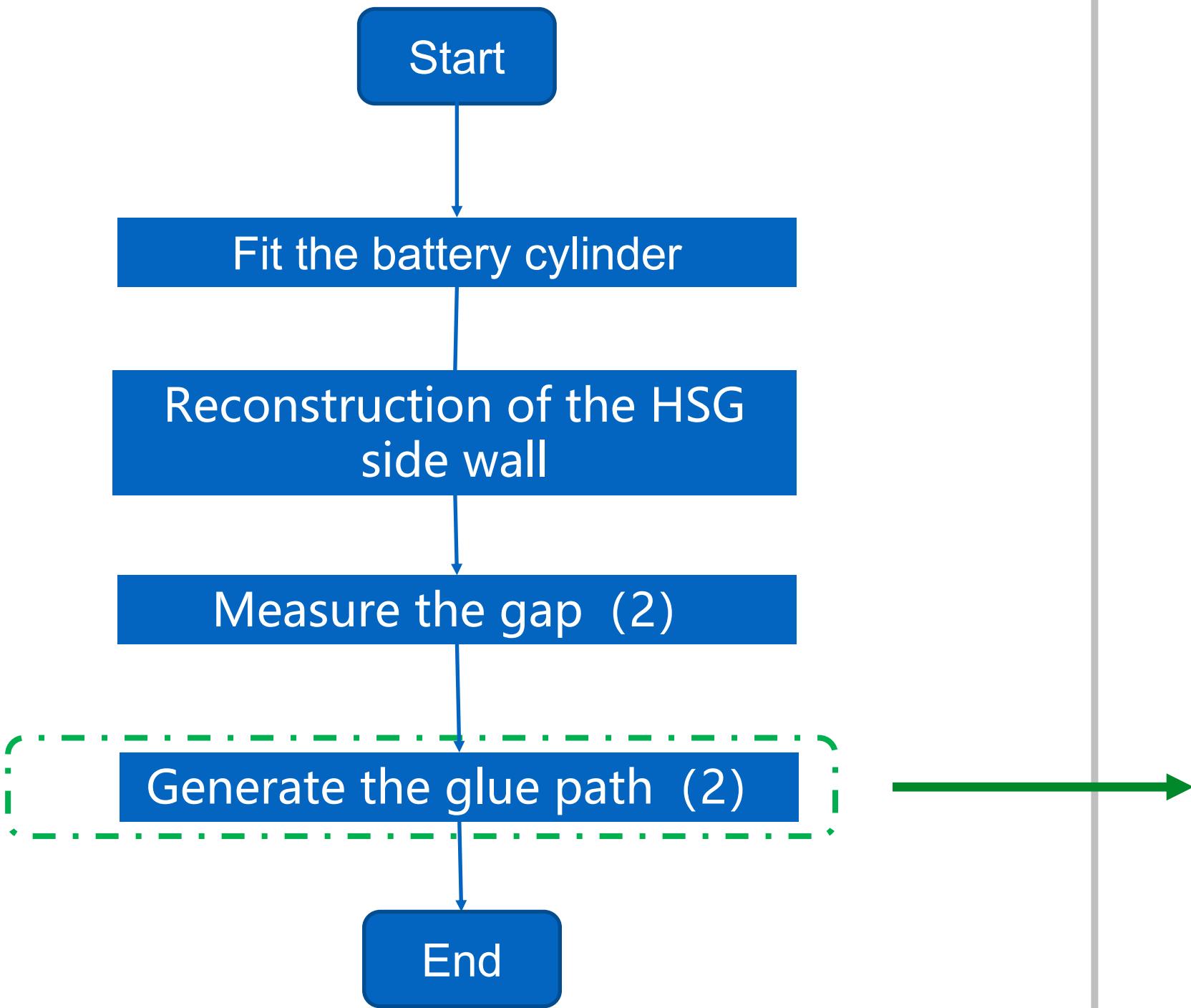
Step3:

- ①建立HSG侧壁测量点到圆柱中轴线的投影点
- ②投影沿着投影点和HSG测量点方向平移圆柱半径建立电池表面测量点

③计算电池表面测量点和HSG侧壁测量点距离为Gap

Step 3:

1. Establish the projection of each HSG side-wall measurement point onto the central axis of the cylinder.
2. Translate the cylinder radius along the line defined by that projection point and the original HSG measurement point to create a battery surface measurement point.
3. Compute the distance between the battery surface measurement point and the corresponding HSG side-wall measurement point; this distance is the **Gap**.



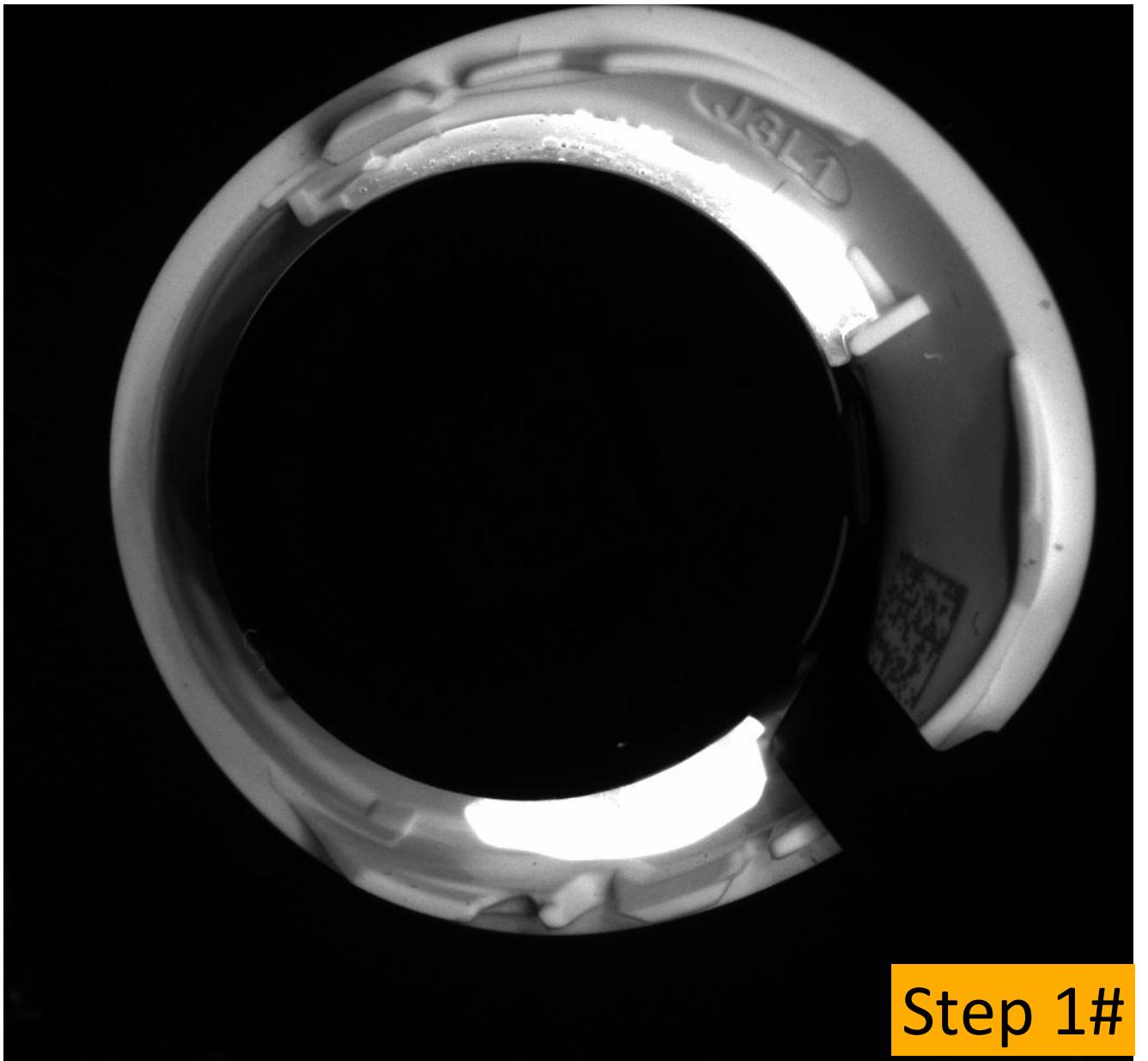
Step1:

- ① 使用Gap测量中点(HSG侧壁和电池表面), 建立点胶路径点
- ② 通过Gap测量值大小进行判断, 进行点胶速度动态调整, 控制胶量

Step 1:

1. Use the midpoint of the Gap measurement (between the HSG side wall and the battery surface) to establish the dispensing-path points.
2. Dynamically adjust the dispensing speed based on the magnitude of the Gap value, thereby controlling the amount of adhesive applied.

H510 3D rechecked logic



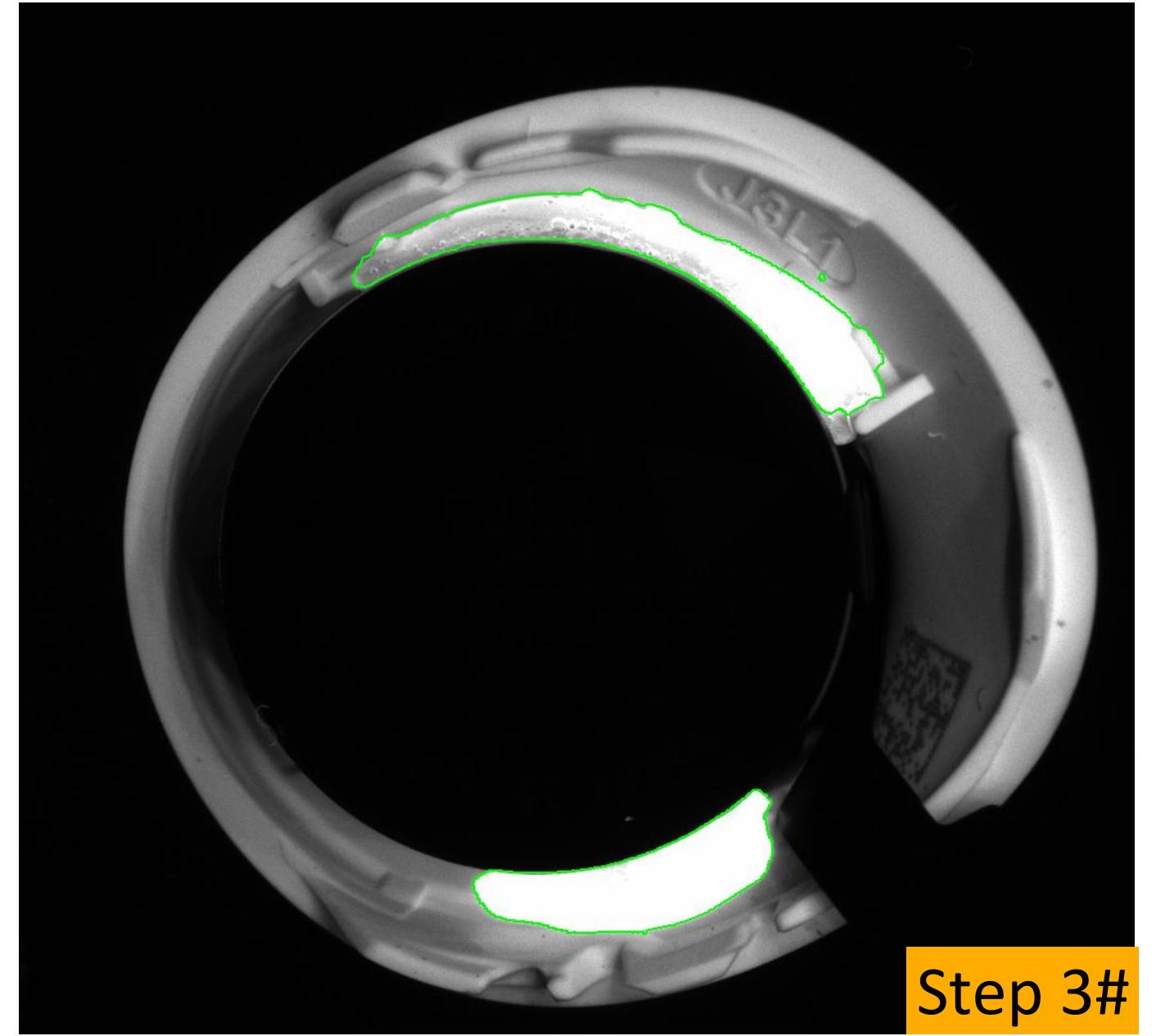
Step 1#

Source image (post-dispense)



Step 2#

extract glue color



Step 3#

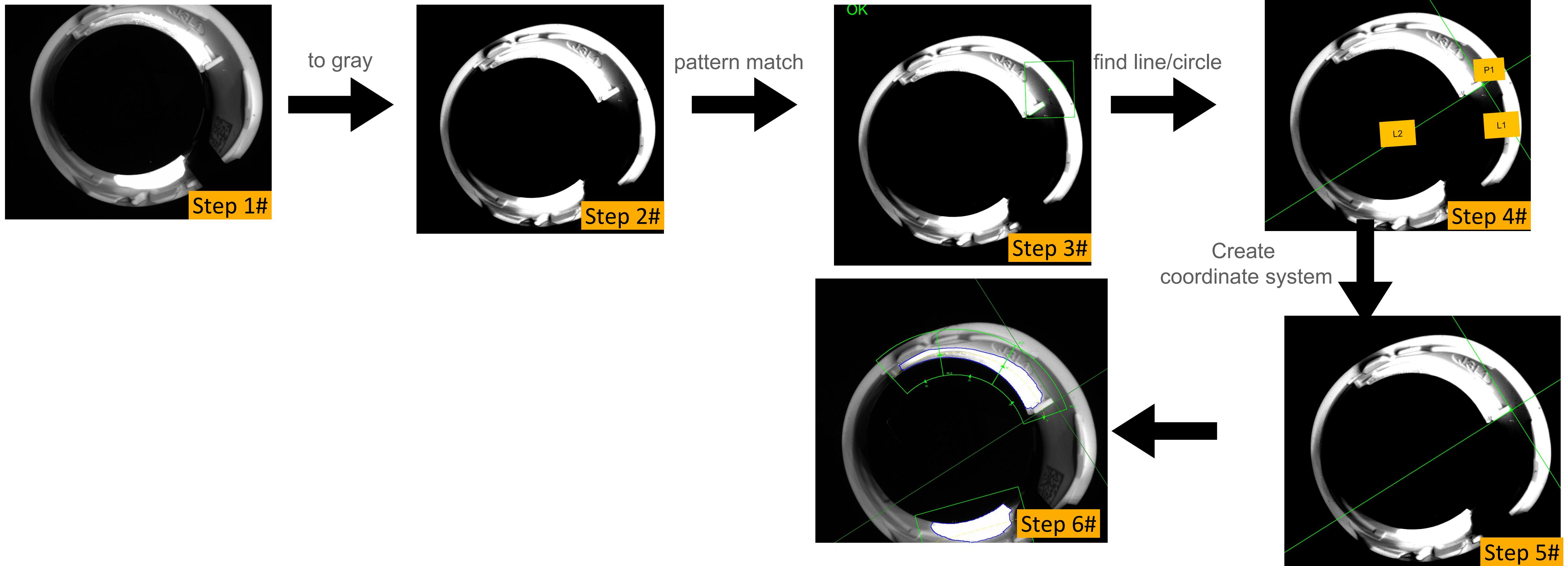
extract result

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

Step 1# Capture pose source image

Step 2# Extract the color of glue path

Step 3# Inspect the glue path



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

Step 1# Capture pos1 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 3 straight lines to obtain L1/L2 ,P1 is the intersection of L1&L2

Step 5# Establish a product coordinate system by using P1and L1.

Step 6# Place the glue inspection region according to product coordinate system

H510 | Glue path AOI introduction report - Pose

No Glue

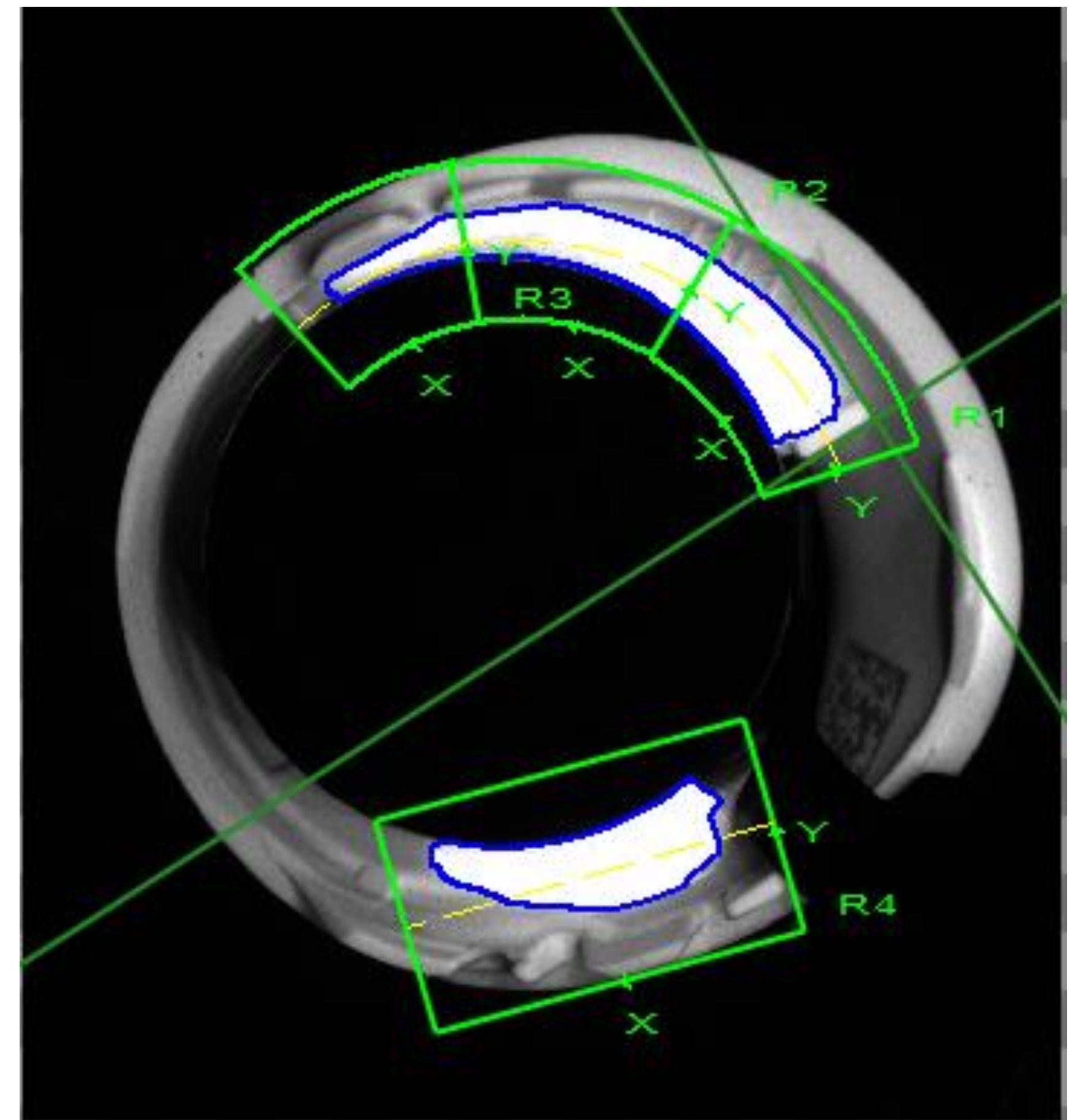
The areas of the glue $> 0\text{mm}^2$

Glue Missing

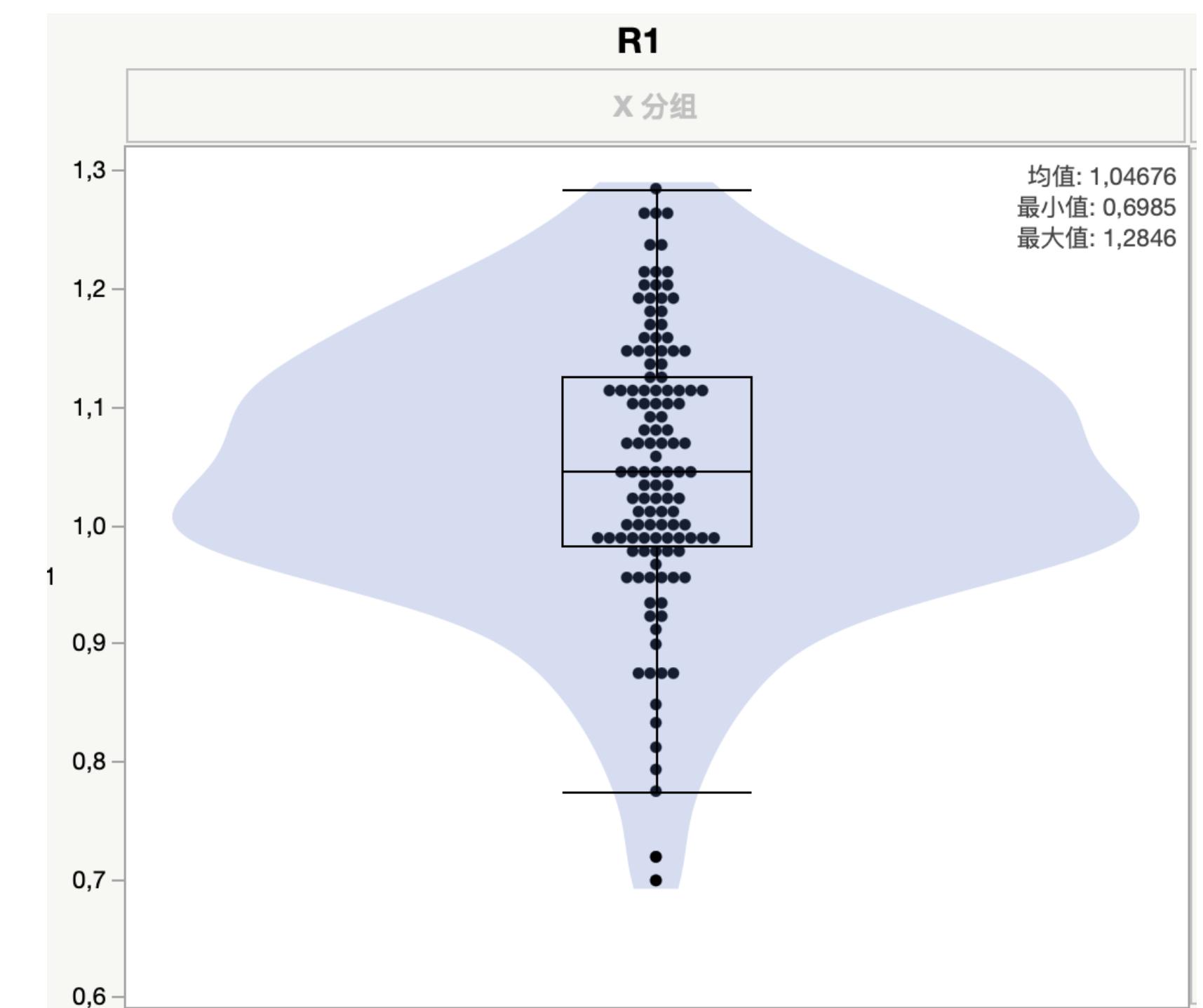
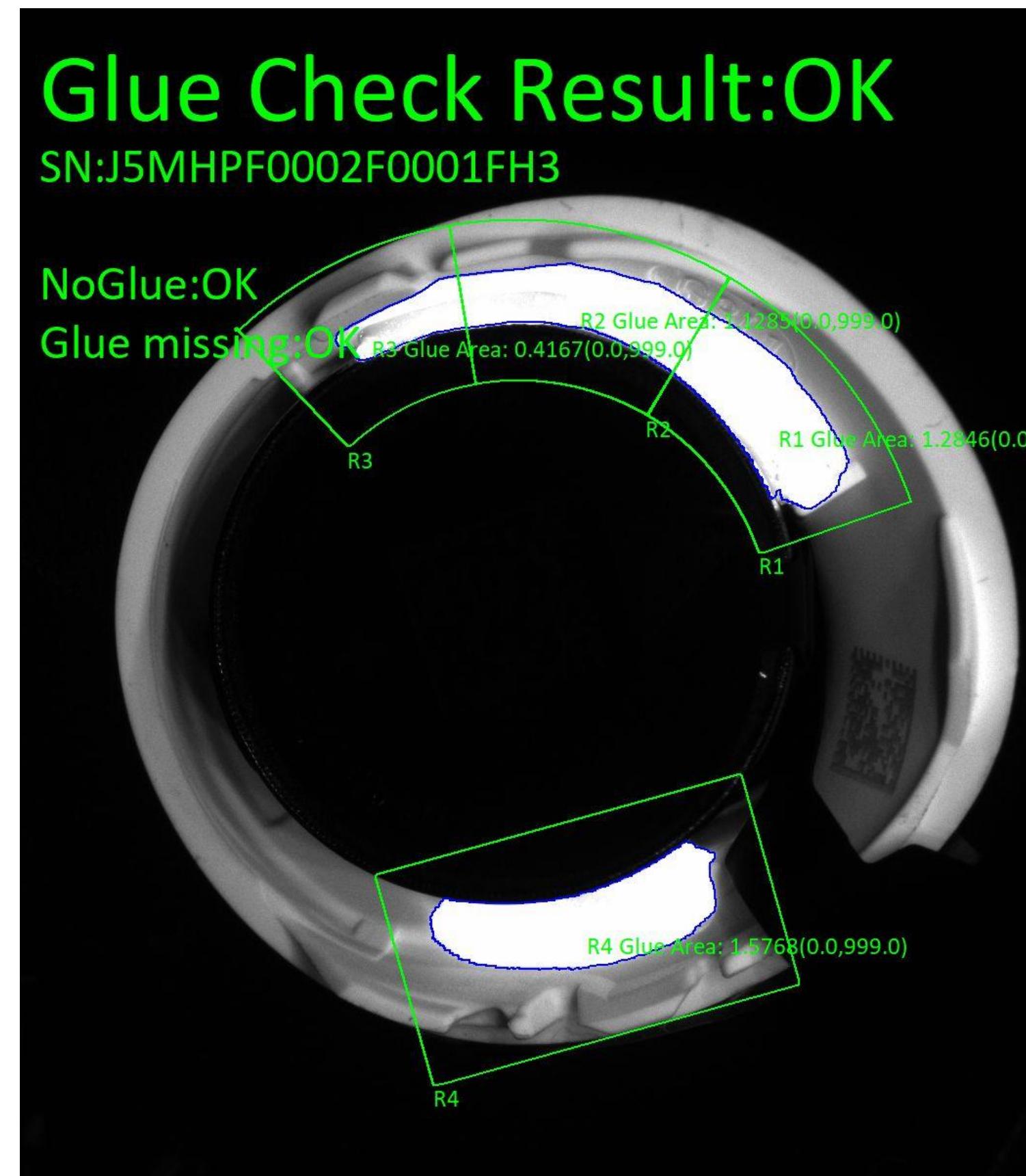
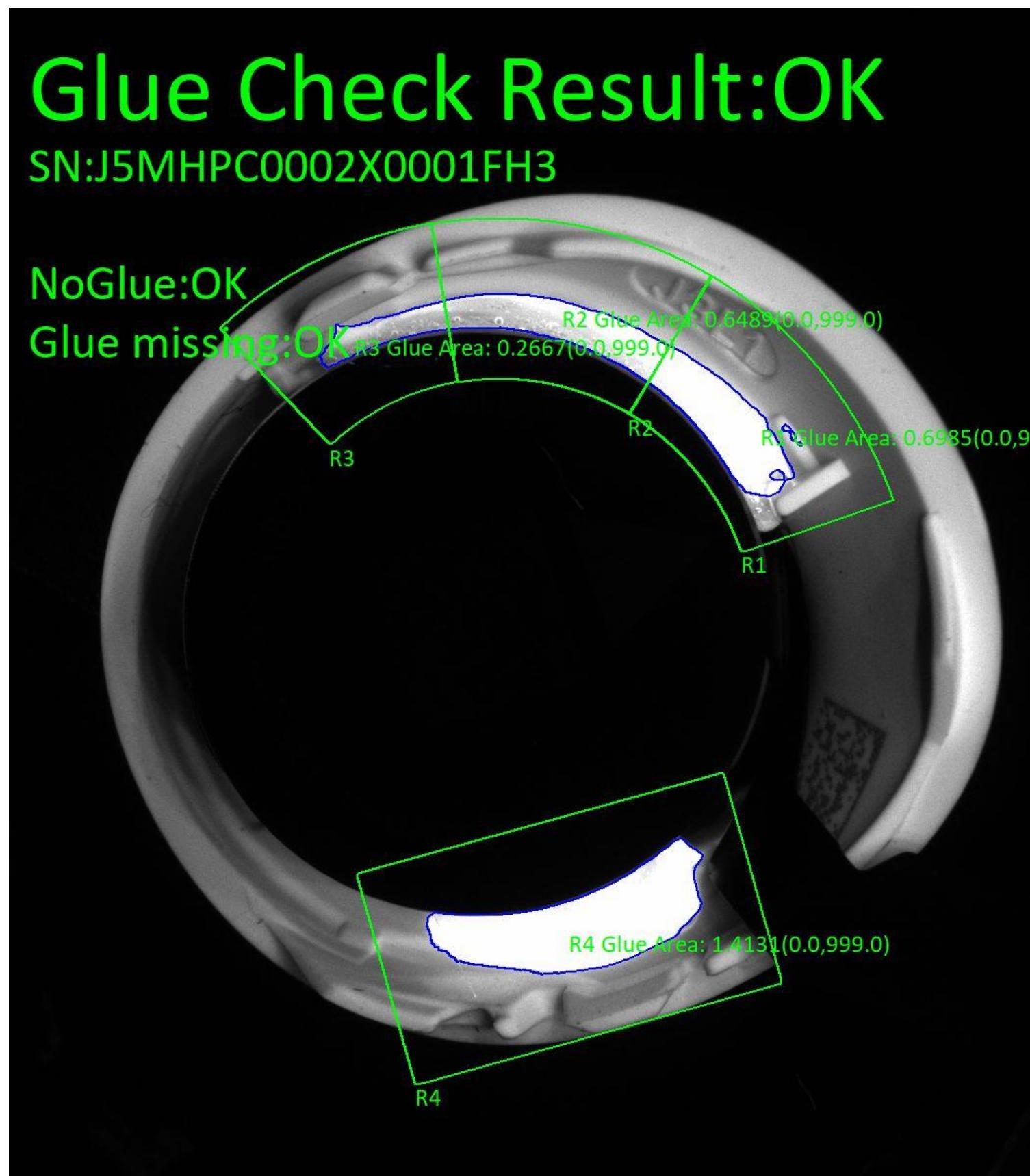
The areas of glue $\geq (\text{spec})$

Region	No Glue	Glue Missing-Area
R1	Glue area $> 0\text{mm}^2$	Glue area $> 0.49\text{mm}^2$
R2	Glue area $> 0\text{mm}^2$	Glue area $> 0.4\text{mm}^2$
R3	Glue area $> 0\text{mm}^2$	Glue area $> 0.16\text{mm}^2$
R4	Glue area $> 0\text{mm}^2$	Glue area $> 0.94\text{mm}^2$

Post-dispense image

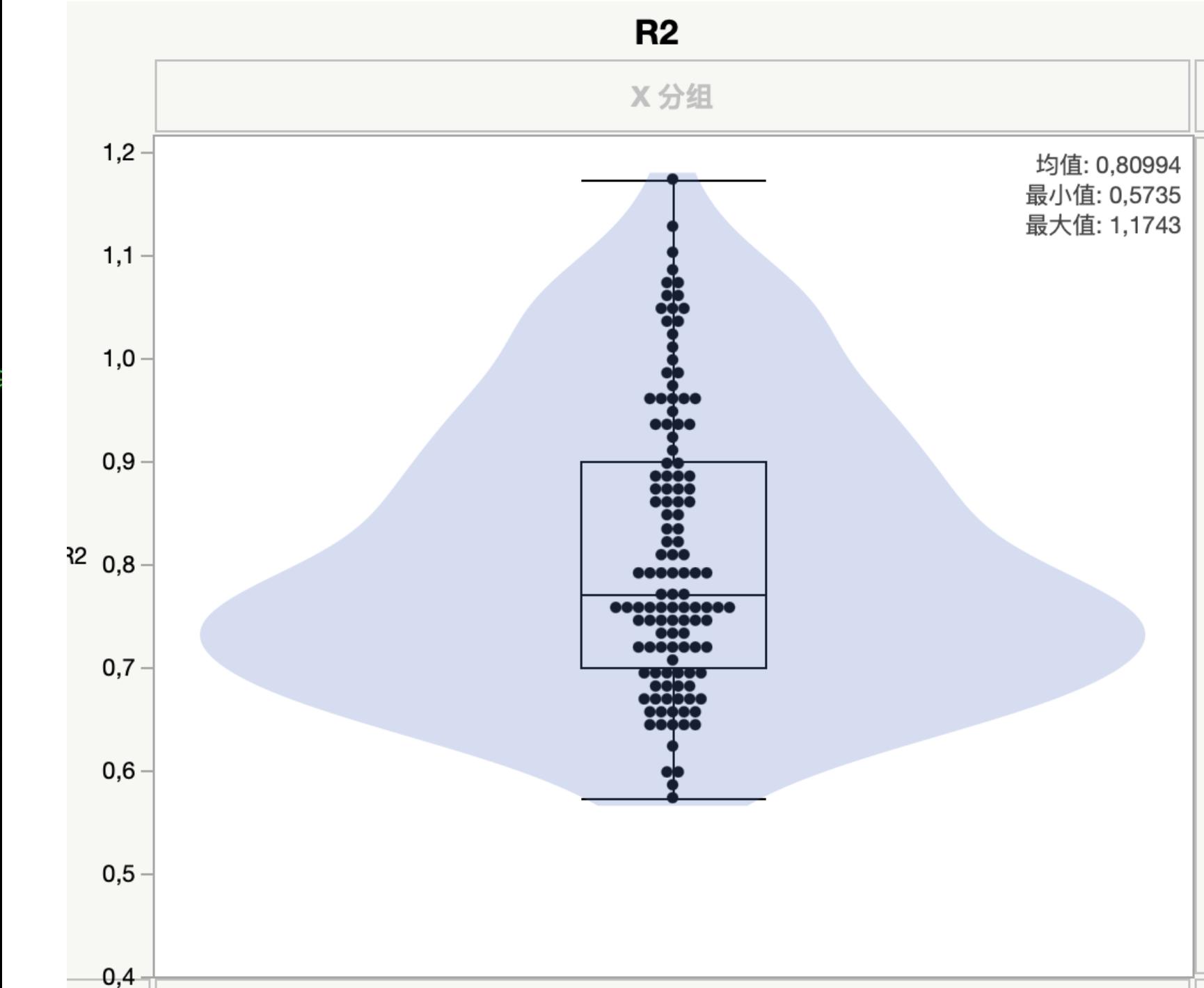
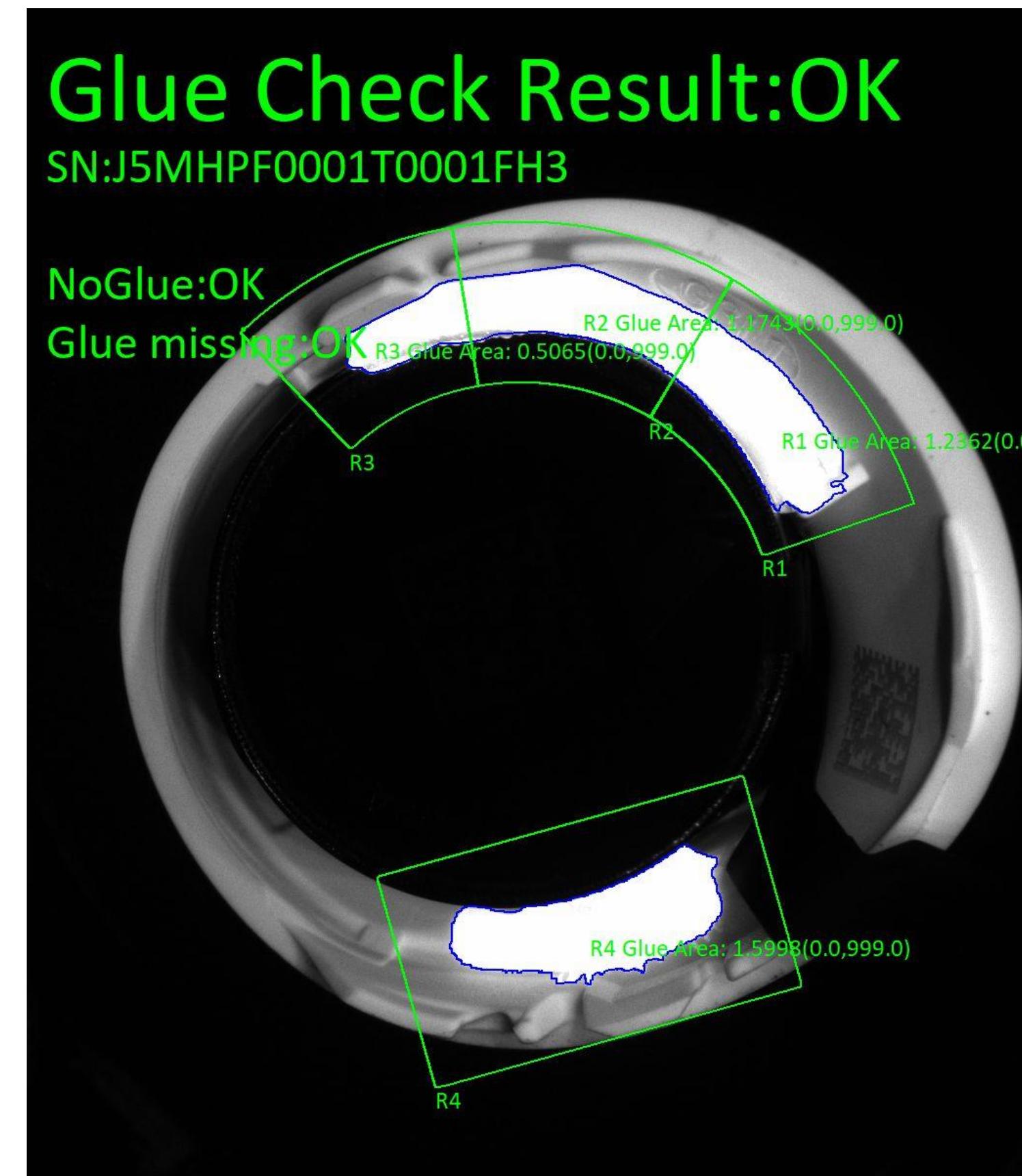
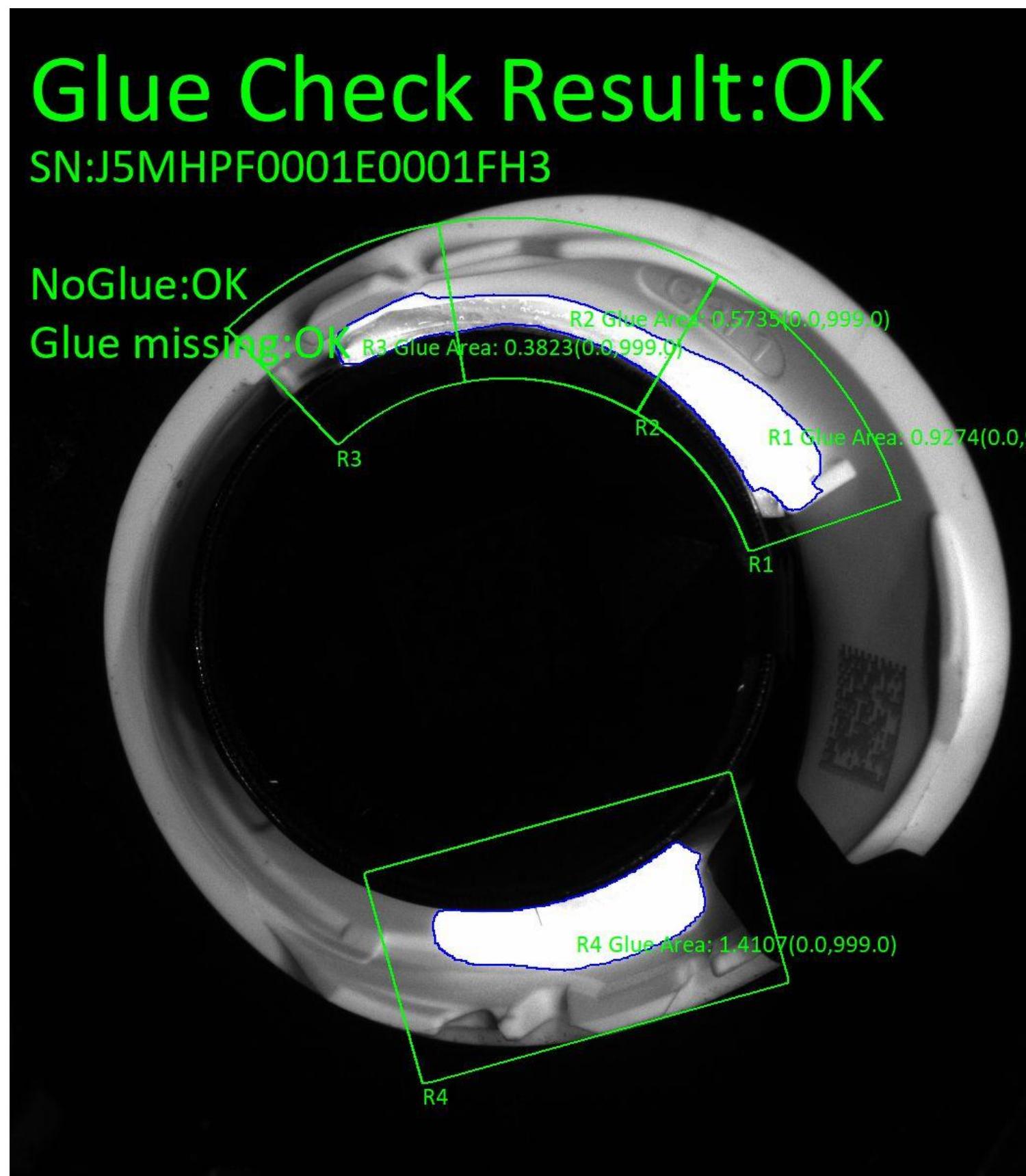


Post-dispense image



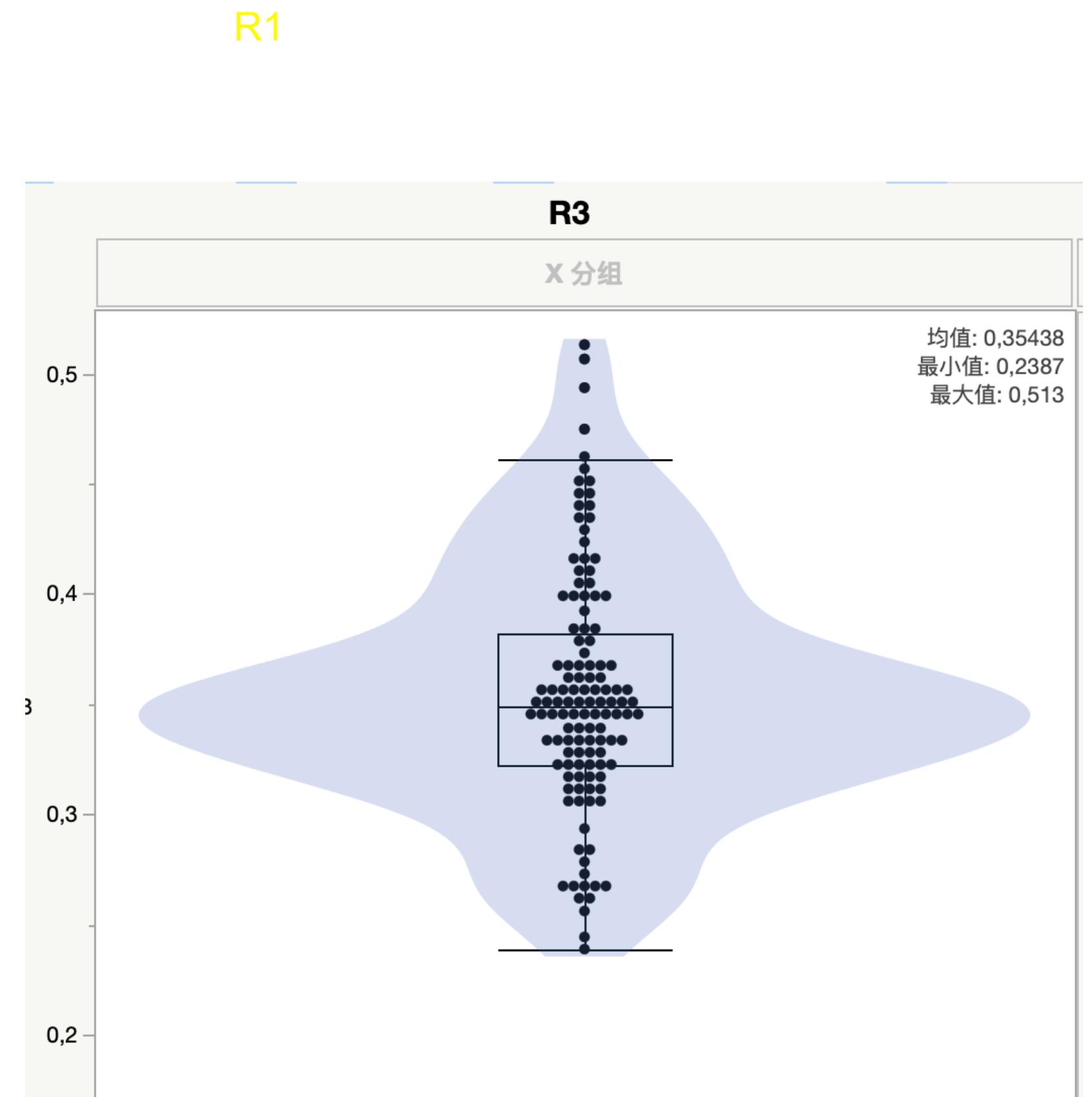
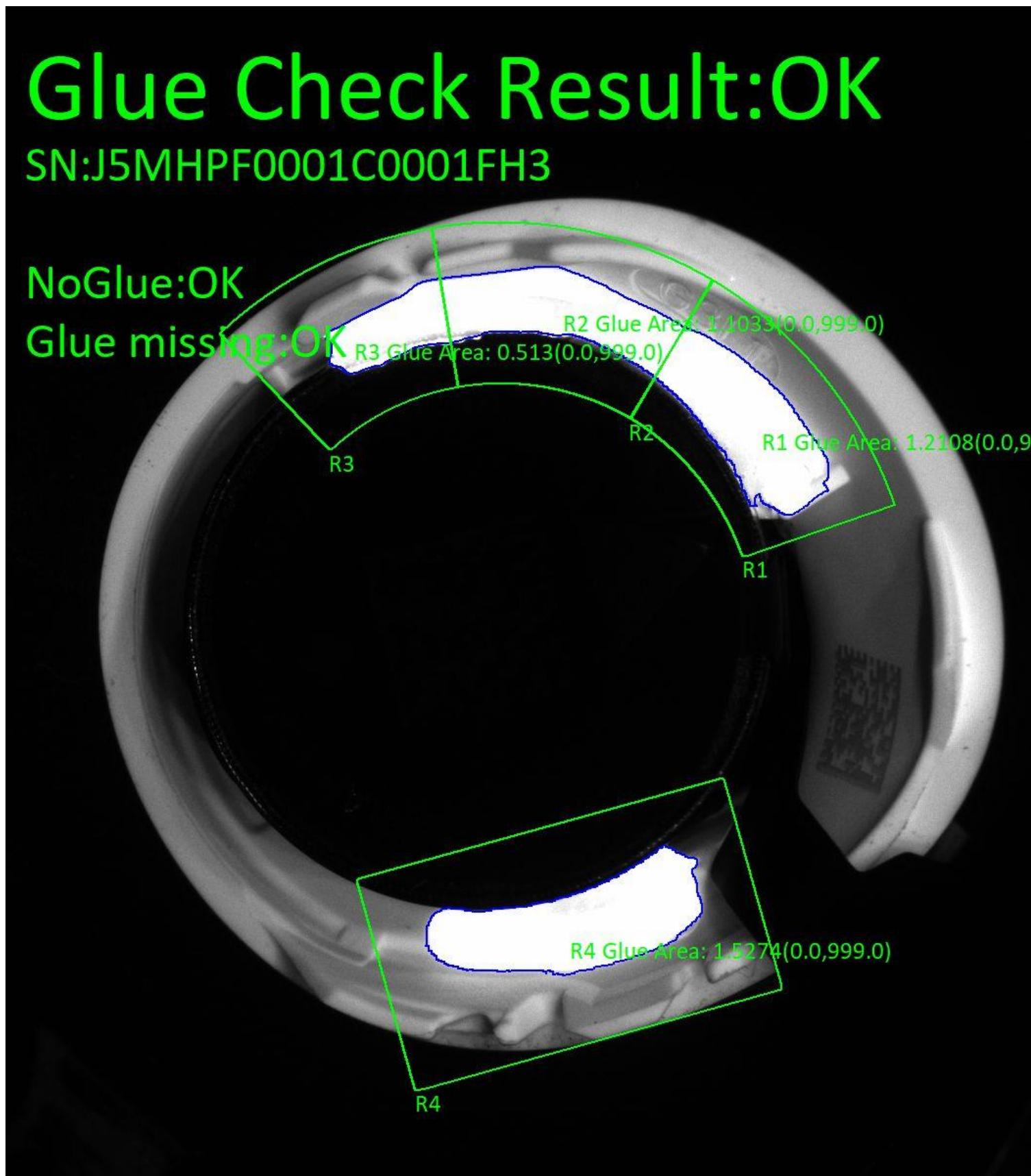
$$\text{Spec} = \text{R1min} * 70\% = 0.6985 * 70\% = 0.49$$

Post-dispense image



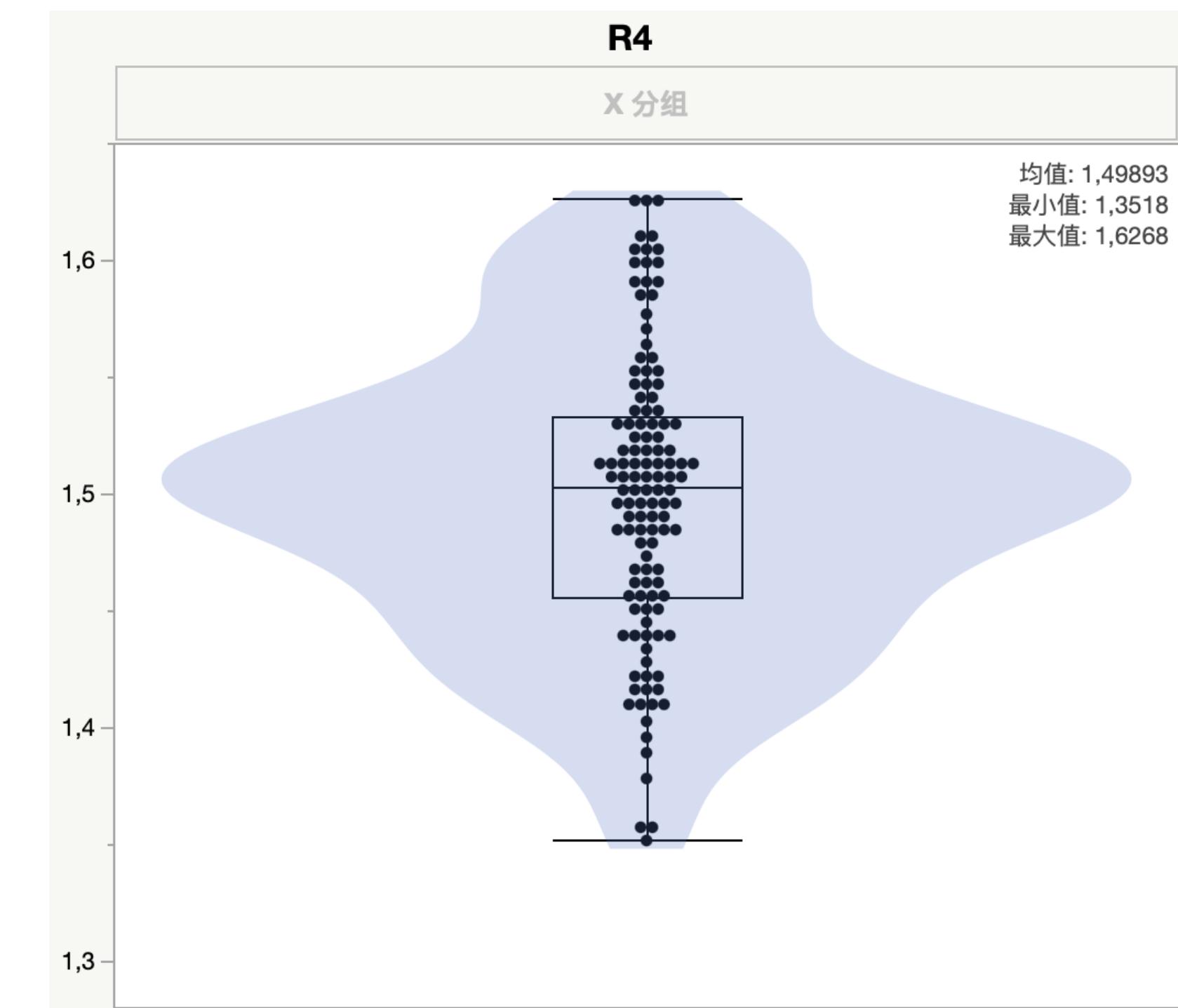
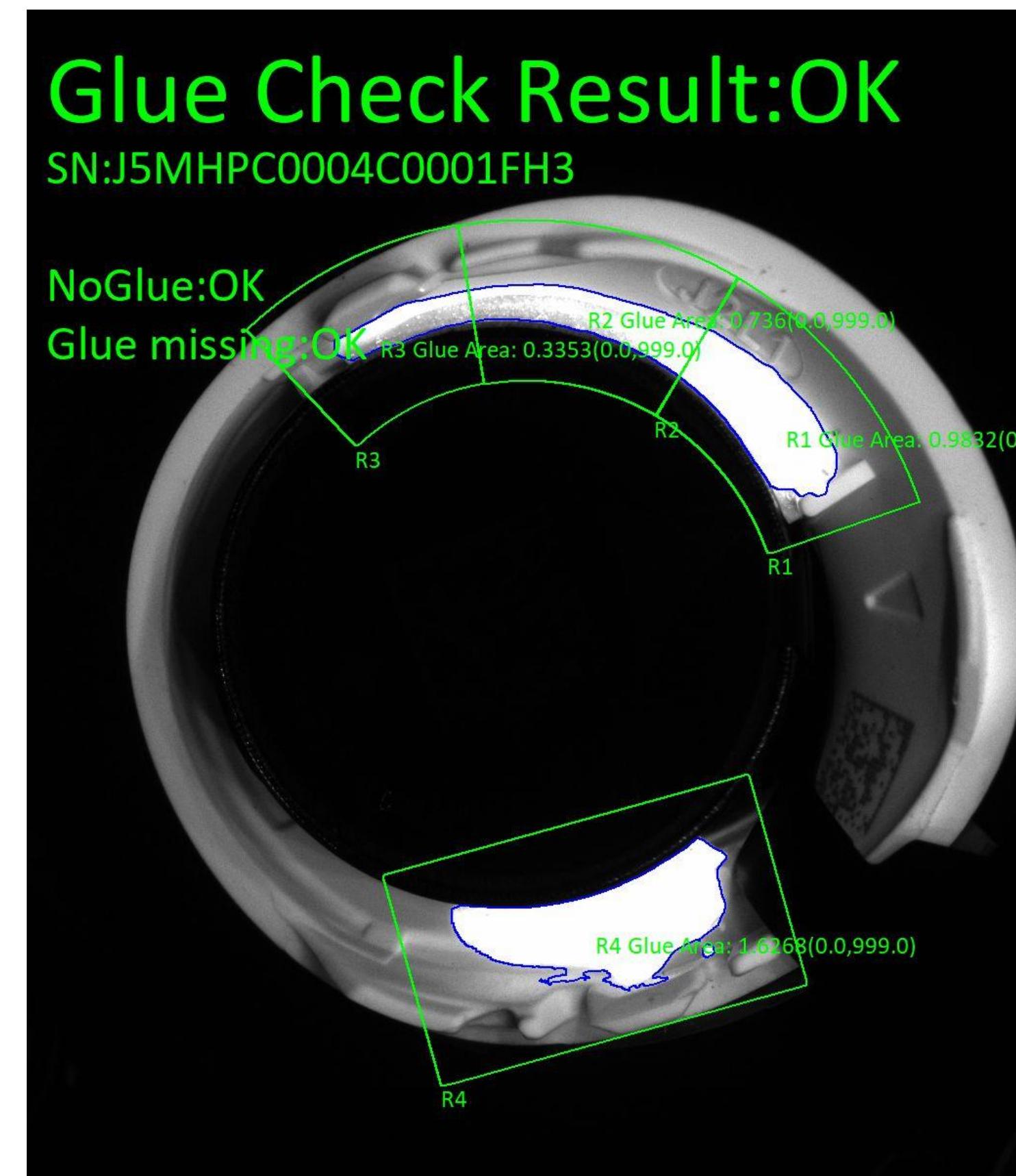
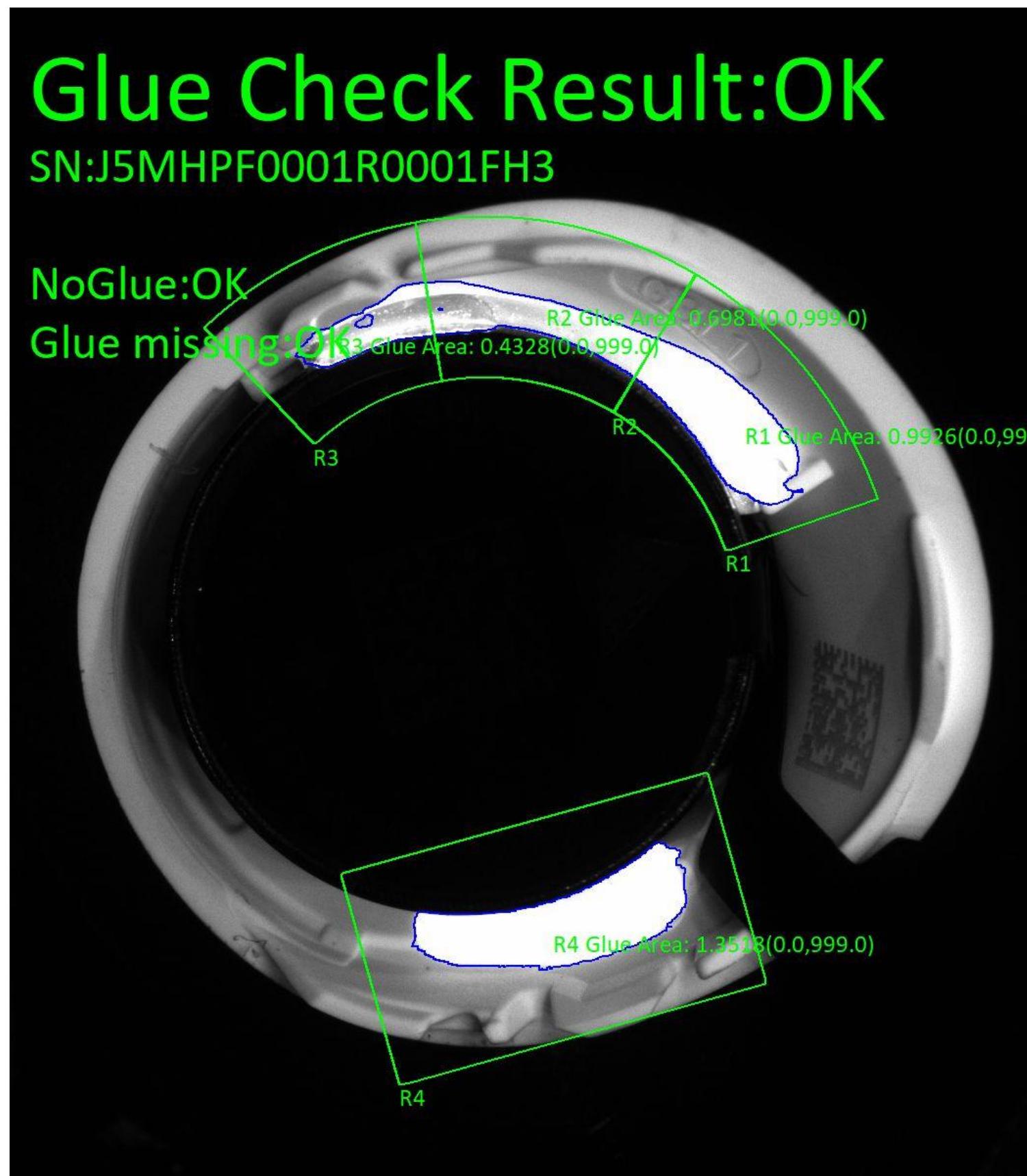
$$\text{Spec} = \text{R2min} * 70\% = 0.5736 * 70\% = 0.40$$

Post-dispense image



$$\text{Spec} = \text{R3min} * 70\% = 0.2387 * 70\% = 0.16$$

Post-dispense image



$$\text{Spec} = \text{R4min} * 70\% = 1.3518 * 70\% = 0.94$$