X3000 3D Videoscope
Technical note

Mitcorp

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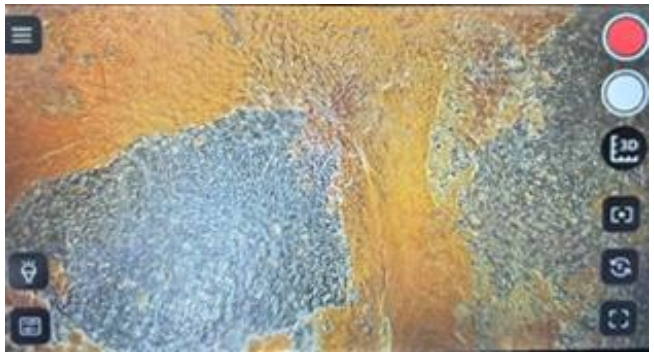
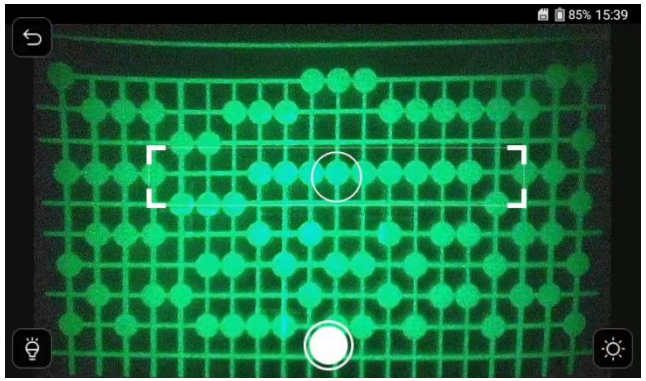
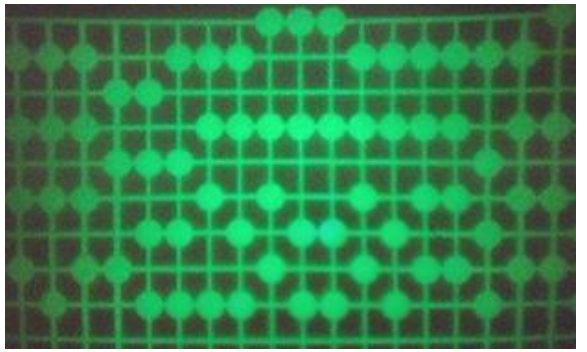
Probe Specification

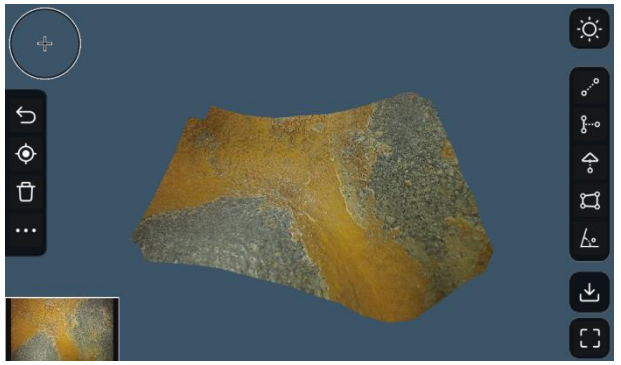
Item		Front View	Side View
Optical Spec.	*DOF*	10 mm - ∞	
	FOV	95˚	
	Resolution	2560 x 1440	
	Light Source Intensity, lux @ 50mm	3000 Max.	1200
	Light Source Type	Optical fiber LED	LED
Measurement Spec.	*Effective Range, mm*	10 ~ 25	
	Effective Area, mm^2	130 ~830	
	Measurement Error	5%	
	Measurement Function	Point to Point、Point to Line、Point to Plane、Area、Angle	

3D reconstruction process



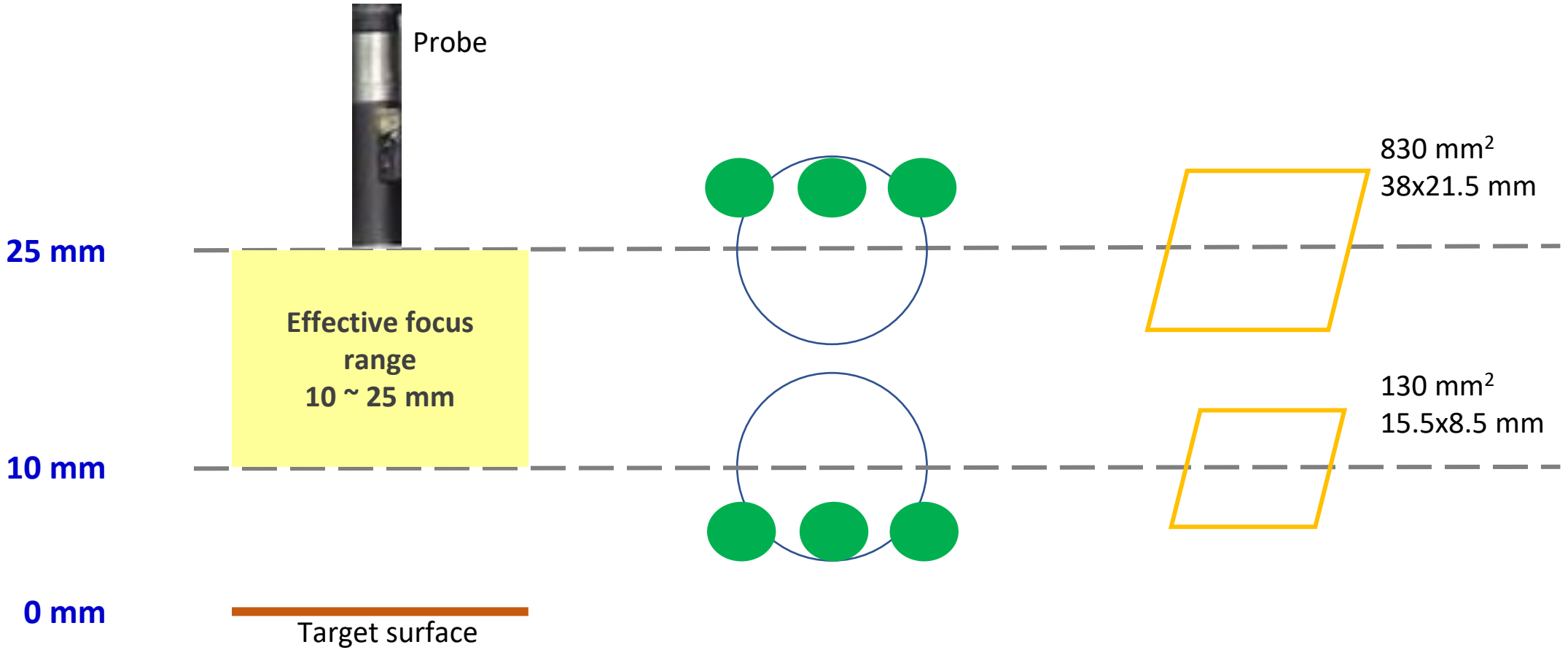






Live view → 3D focus → Pattern and Picture taken → 3D reconstruction

Effective Range and Area



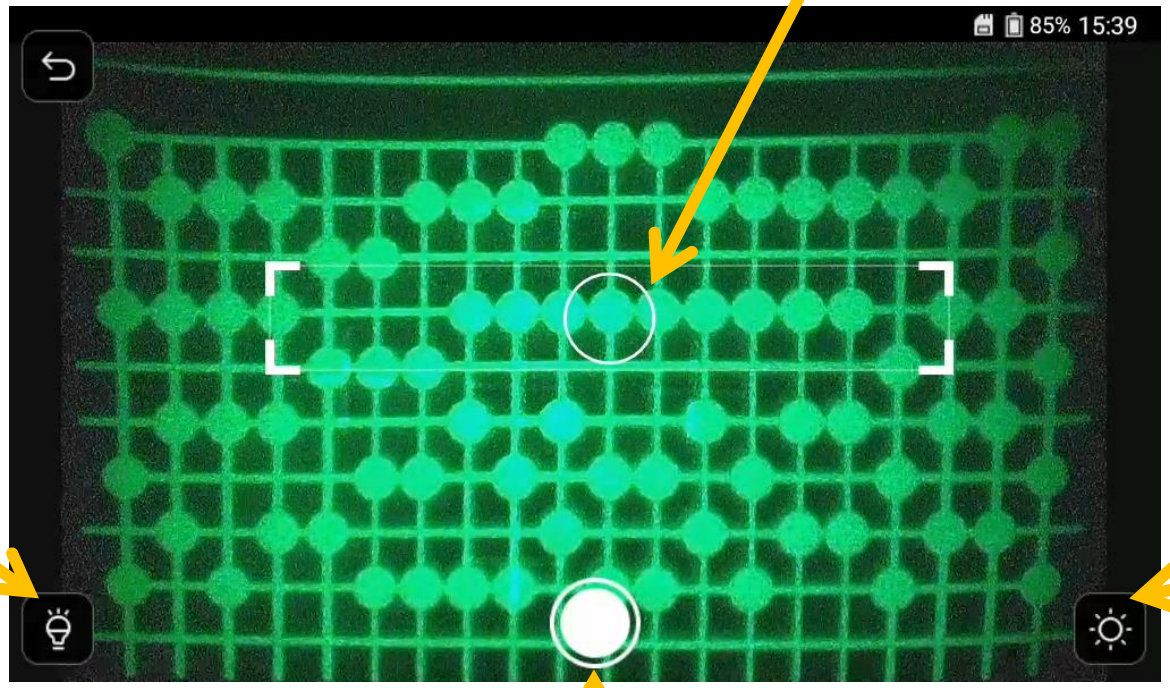
Relative position between tip and target surface

green dot position in focus mode

Effective areas

3D Focus Mode

Focus window :
Move the probe forward and backward to position the green dot within the white circle.



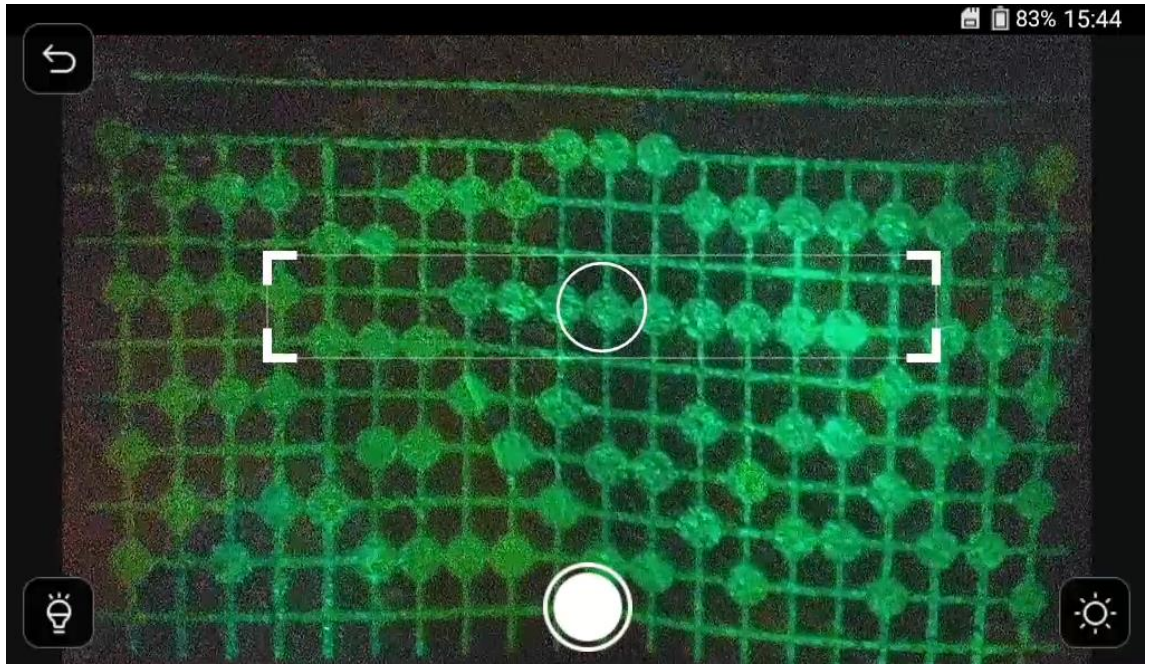
"AE" adjustment :
If there is overexposure, the "AE" should be lowered, but ensure that other green dots remain clearly identifiable.

"AE" stands for auto-exposure

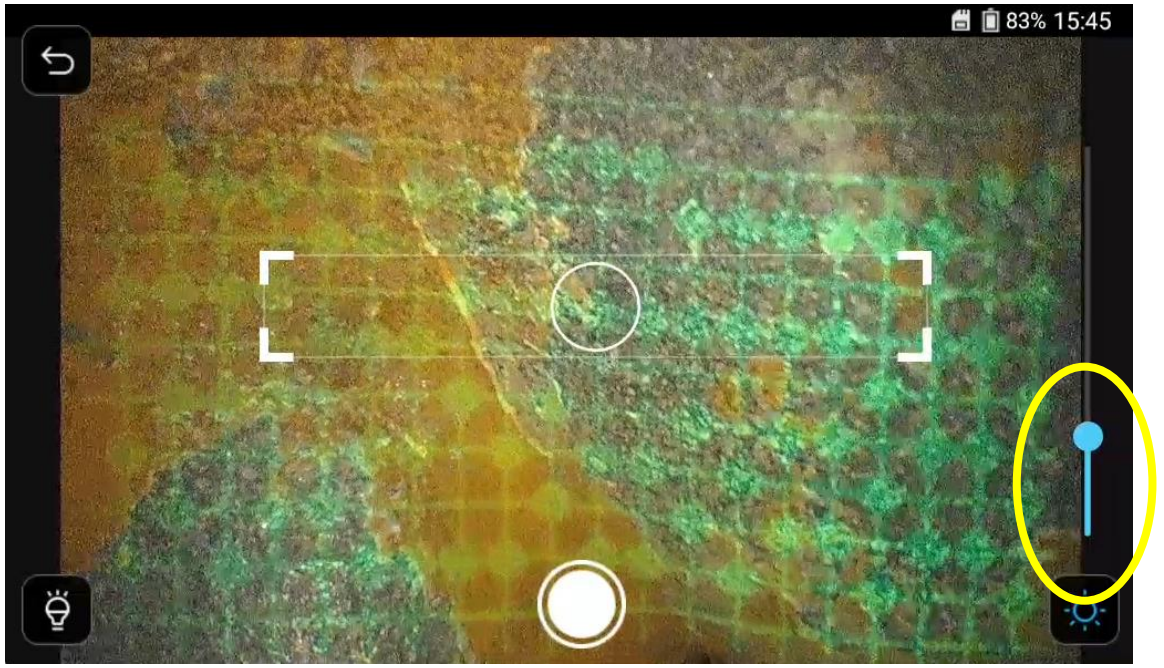
Auxiliary white light :
Illuminate target area

3D capture button

Auxiliary white light



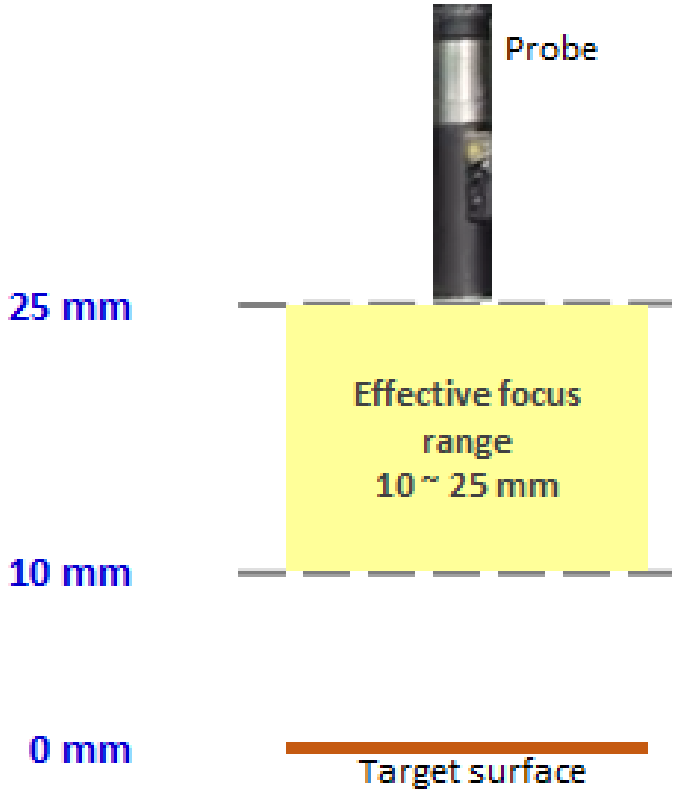
Without auxiliary light



With auxiliary light

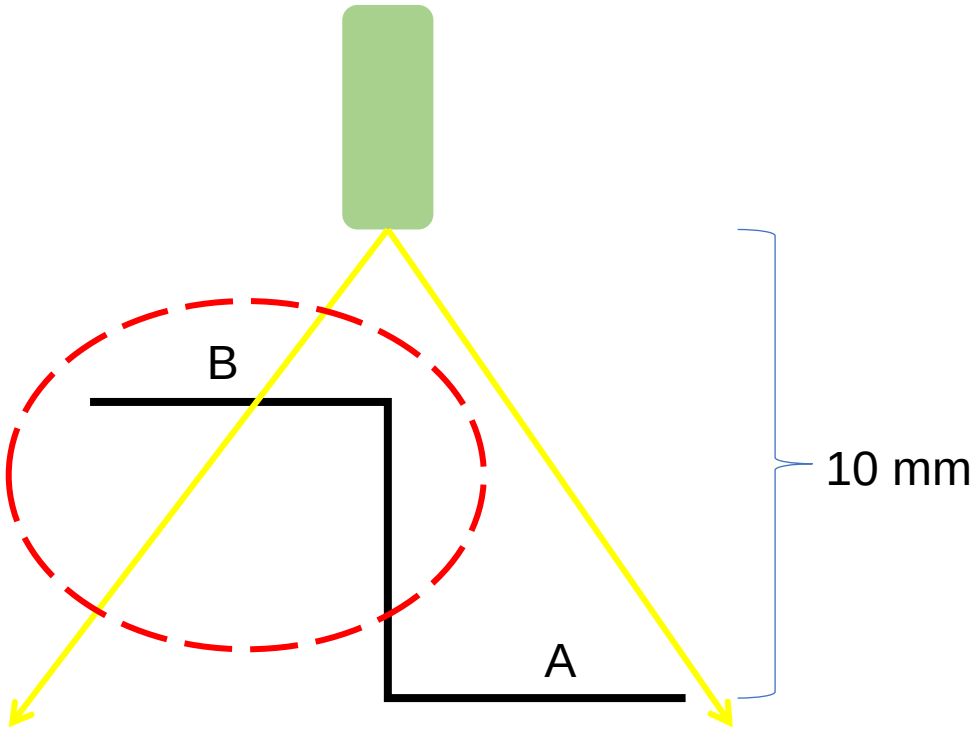
Effective range

The effective range is 10-25 mm. Exceeding this range may result in image distortion or reconstruction failure.

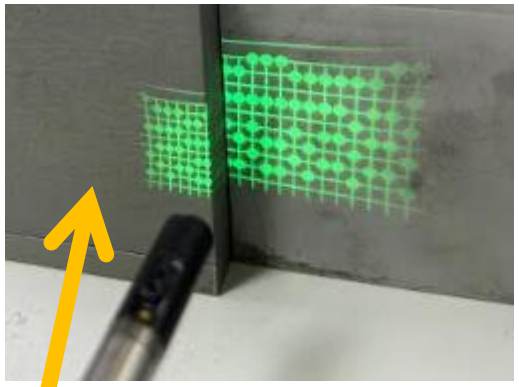


Ineffective range: closer than 10mm

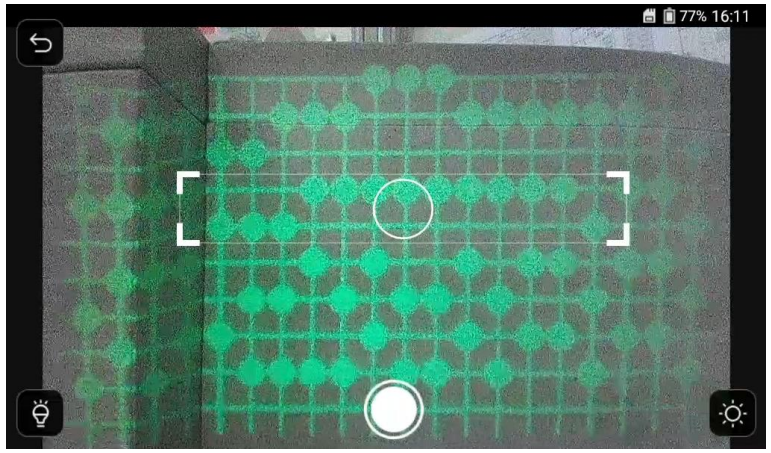
As shown below, since surface B is closer than 10mm, the red circle area is likely to experience distortion or failure.

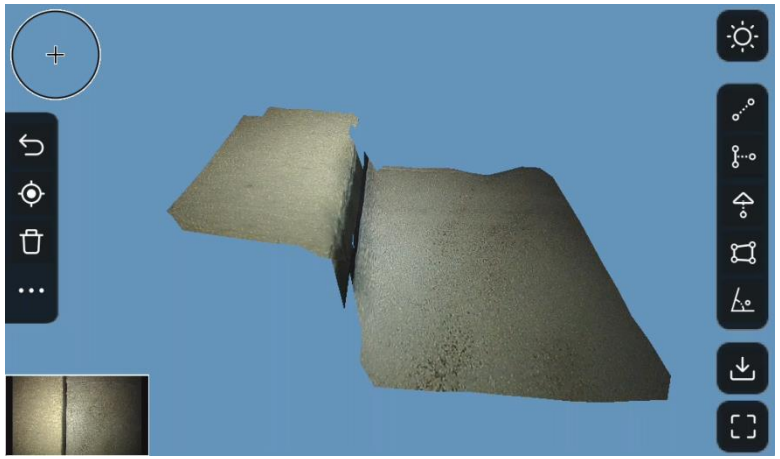


Ineffective range: closer than 10mm

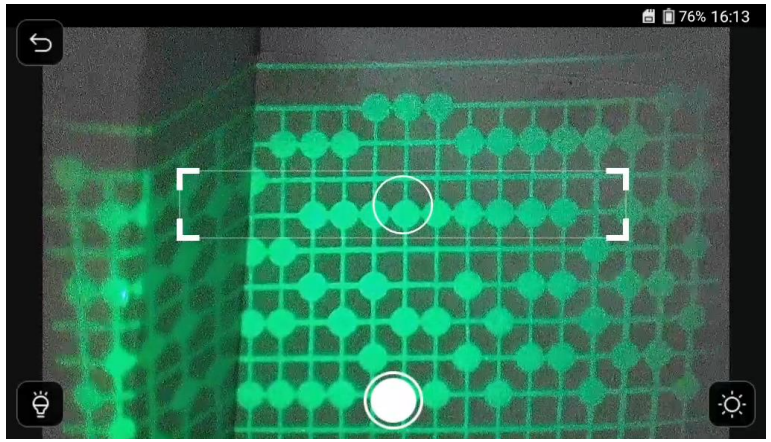


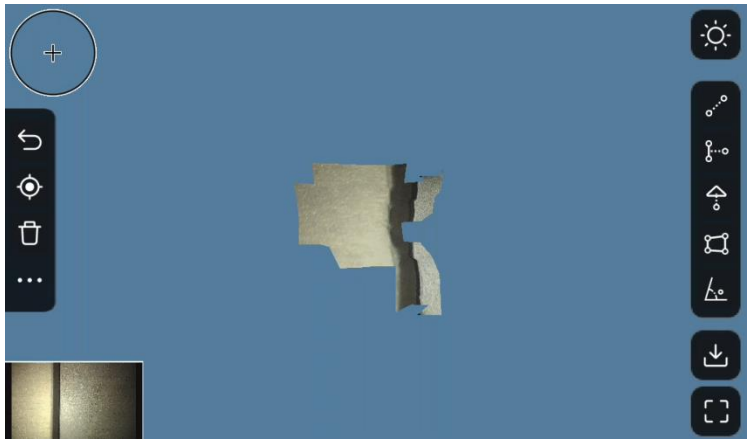
This area is close to tip





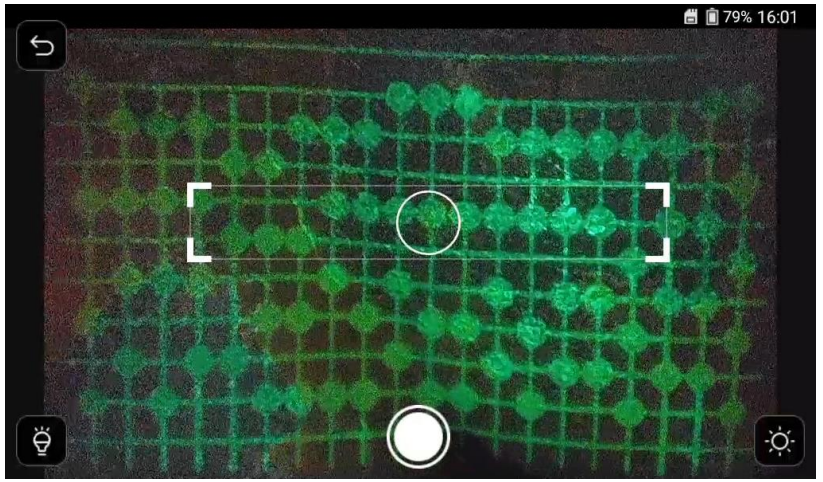
3D surface is complete

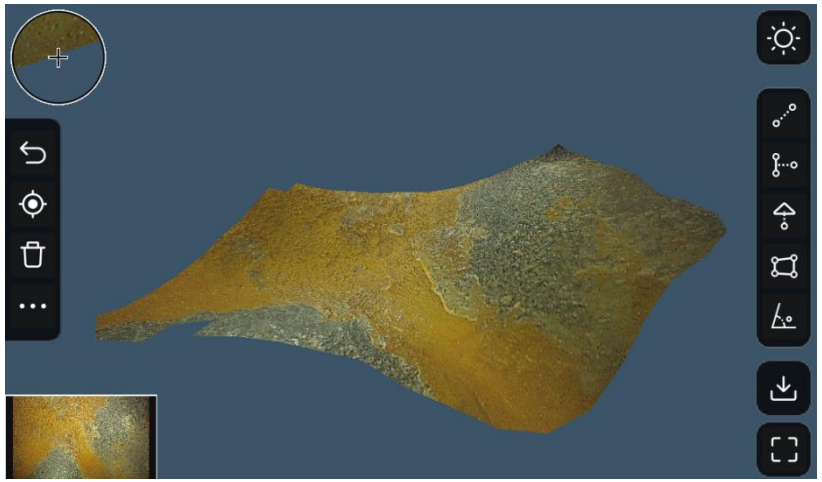




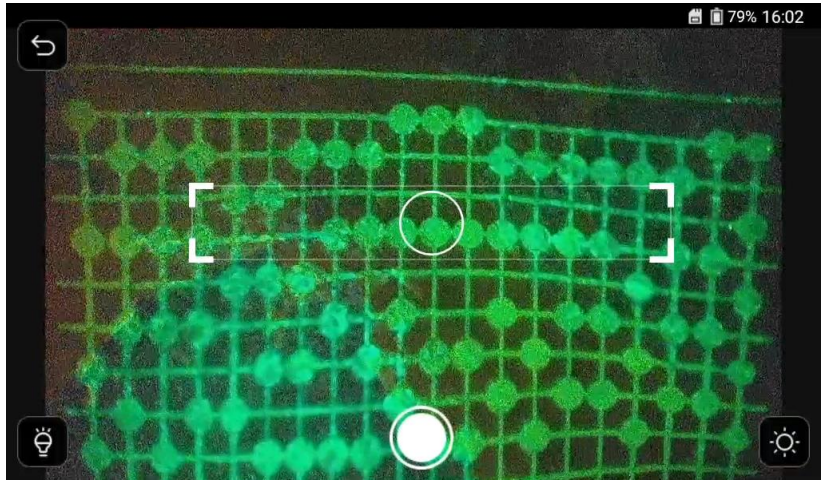
3D surface is incomplete, some surface is missed.

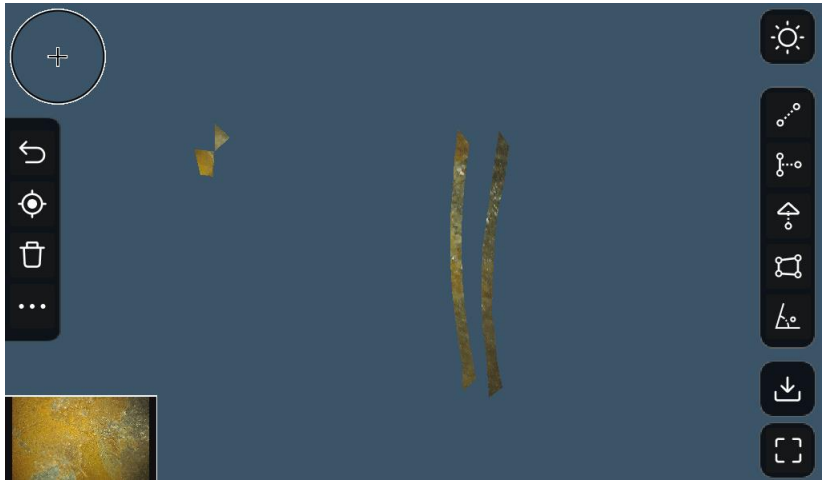
Ineffective range: closer than 10mm





3D surface is complete

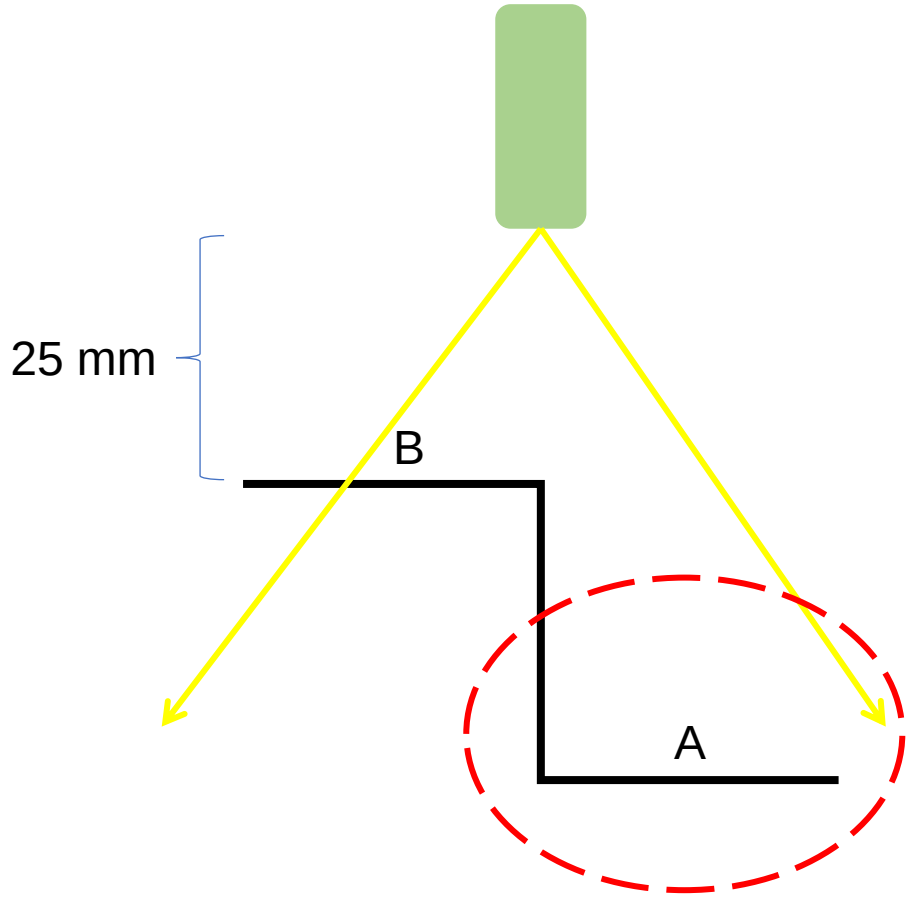




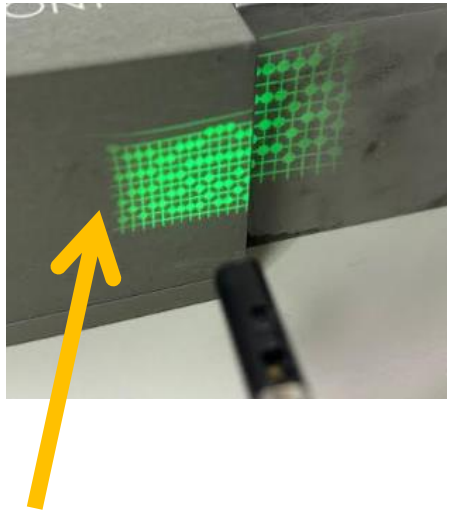
Most surfaces are missed

Ineffective range: farther than 25mm

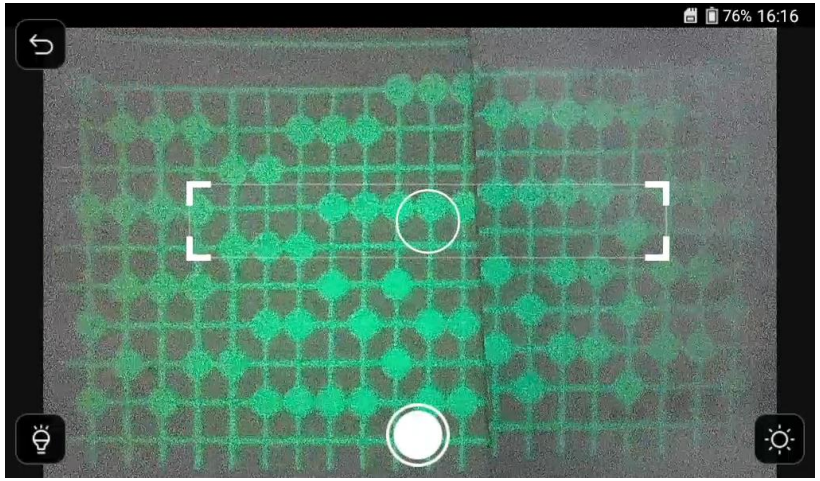
As shown below, since surface A is farther than 25mm, the red circle area is likely to experience distortion or failure.

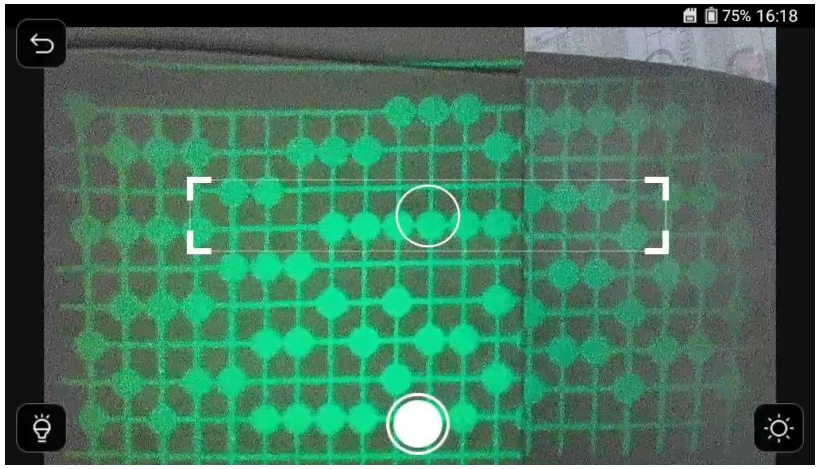


Ineffective range: farther than 25mm

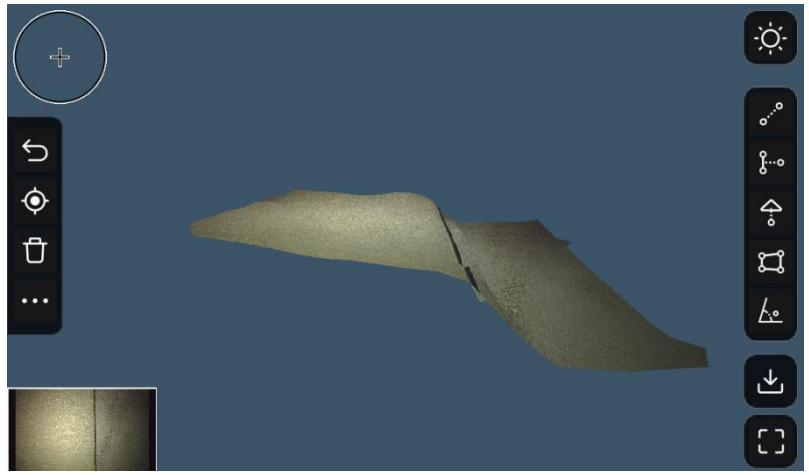


Focus on this surface





Right surface is missed due to over 25mm

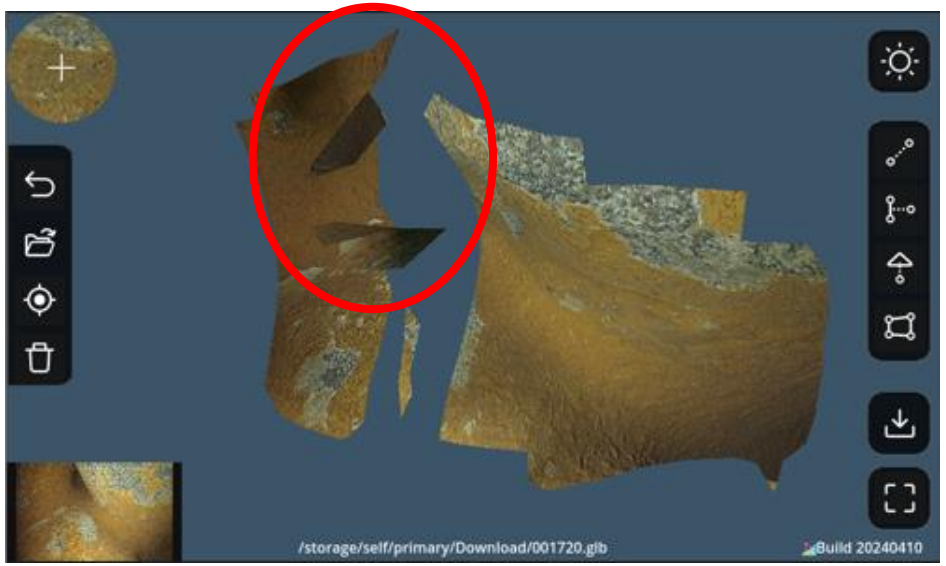


3D surface is complete

Ineffective range: farther than 25mm

When the target surface is more than 25mm away, there may be incomplete surfaces or calculation errors.

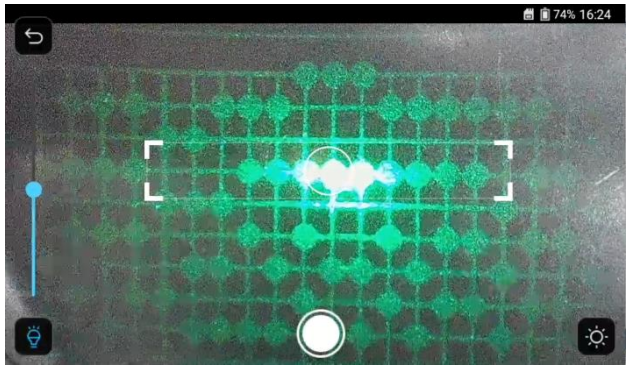
As shown in the image below, part of the depth exceeds the effective range. The 3D reconstruction image are thus incomplete

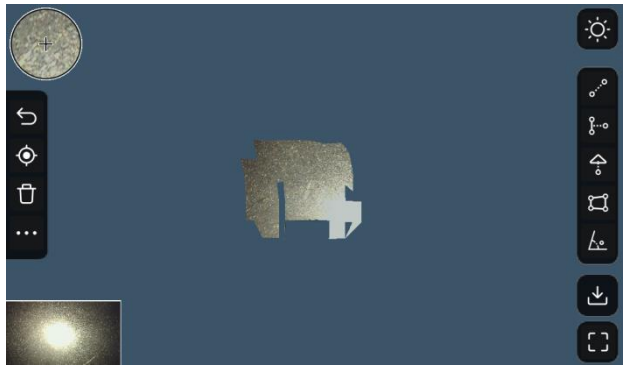


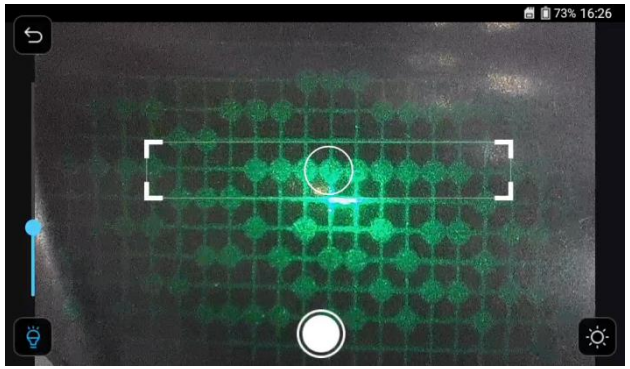
High reflection surface

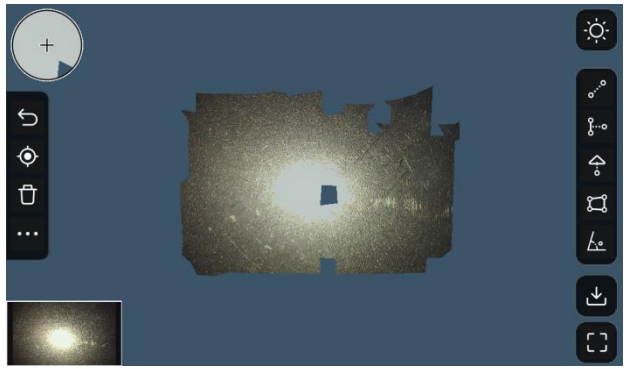
For high reflection target surface, AE adjustment is needed to get better result. Due to the bright area is worse for 3D calculation. The 3D reconstruction result could be effected. You can have **lower** AE setting to solve this issue

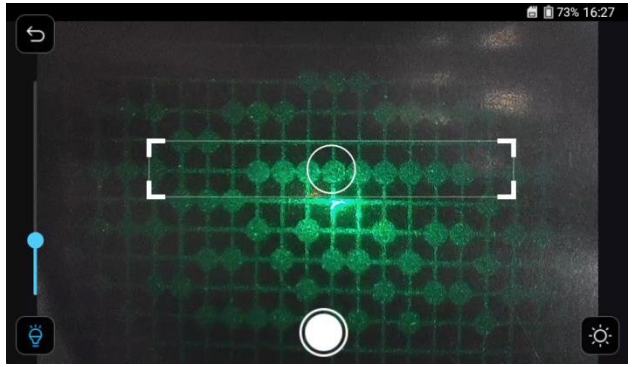
Below blade is an example

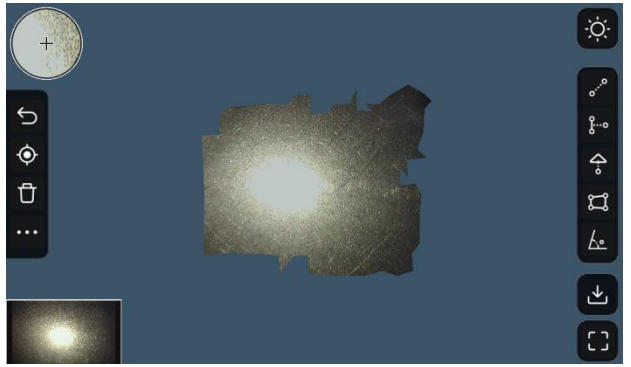








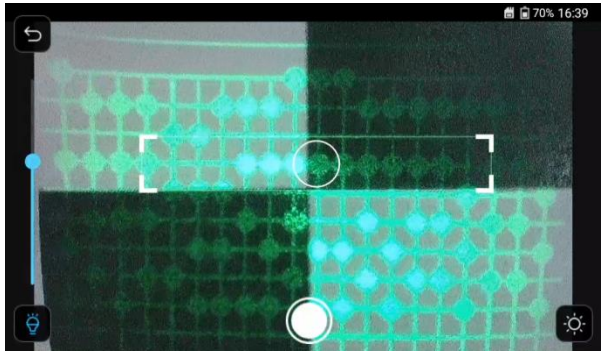


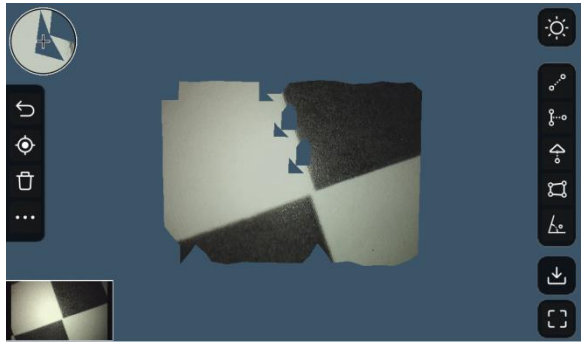


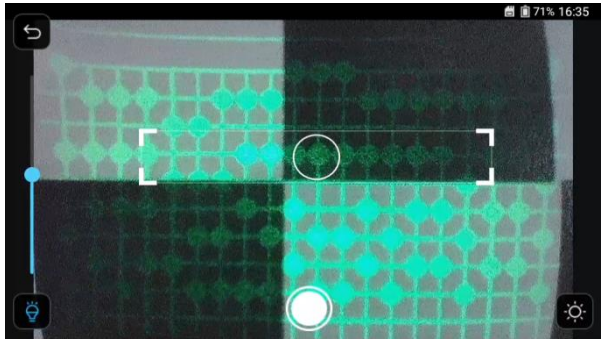
High contrast surface

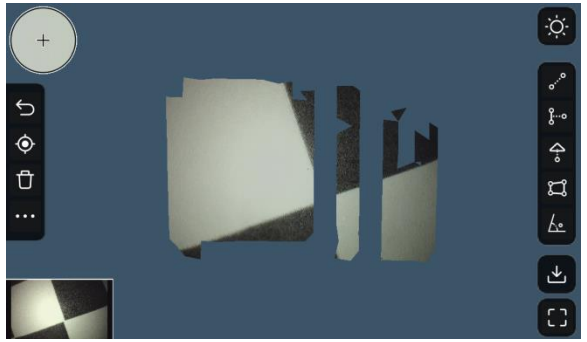
For high contrast target surface, AE adjustment is needed to get better result. Due to the dark area is worse for light reflection. The dark area could be missed after 3D reconstruction. You can have **higher** AE setting to solve this issue

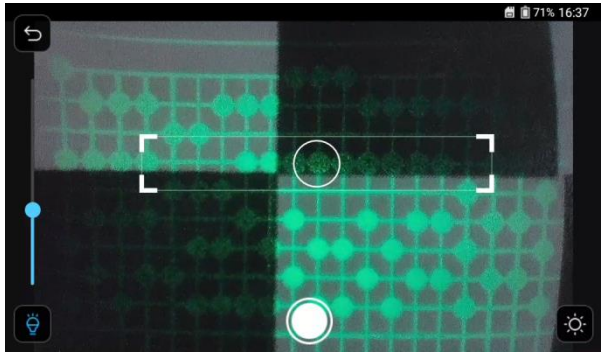
Below checkboard is an example

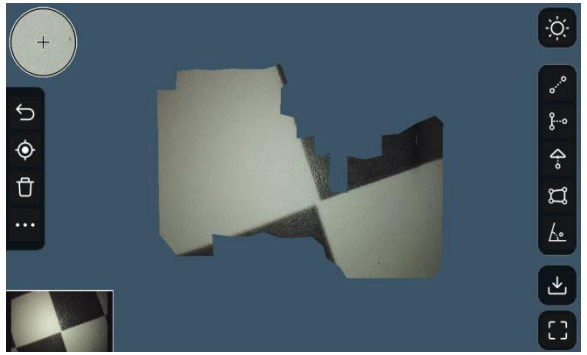






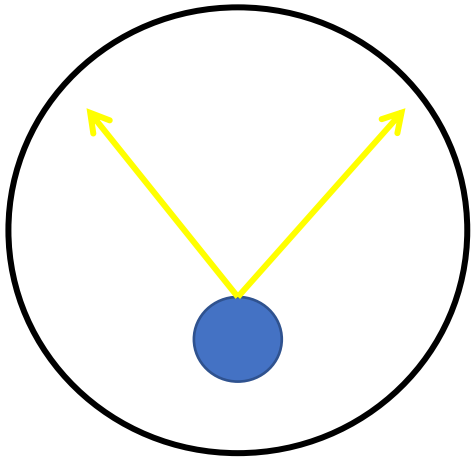


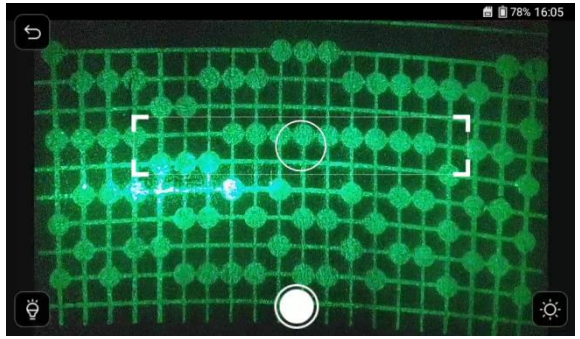




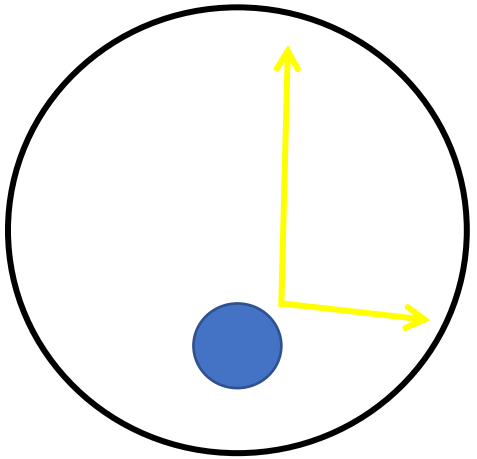
Pipe side view

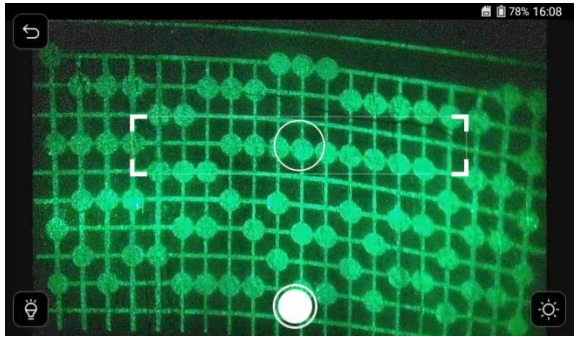
For pipe inspection, please following below instructions to get best results.
1. The green dot is within the focus window. For pipe, the green dot is better to locate at upper side
2. The camera should be oriented toward the center of the pipe. If it is tilted toward one side, the failed rate is higher. As shown in the right picture, tilting toward one side causes the green light pattern to distort, resulting in a higher failed rate.





V

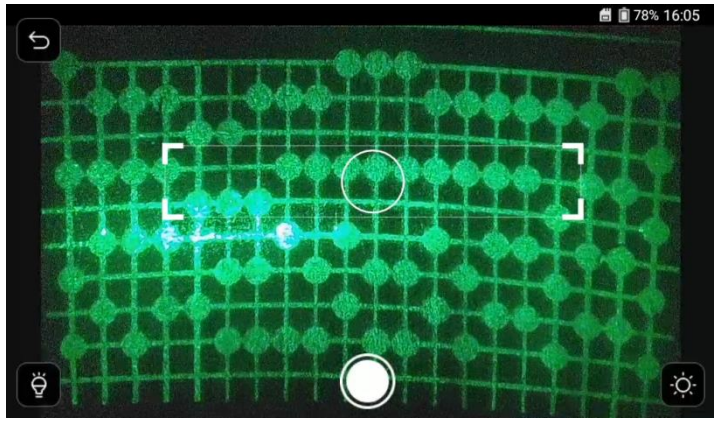


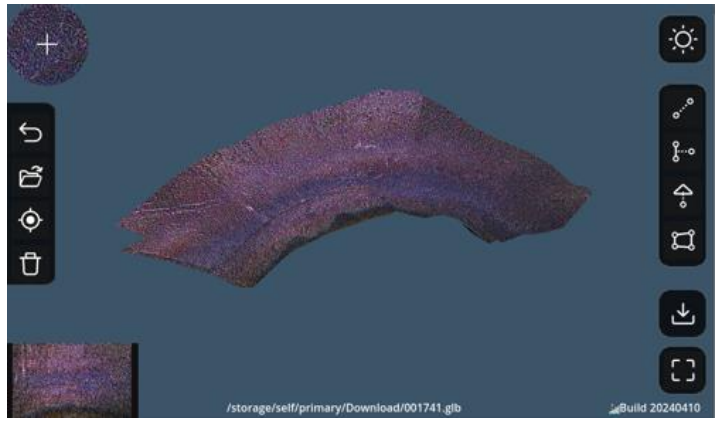


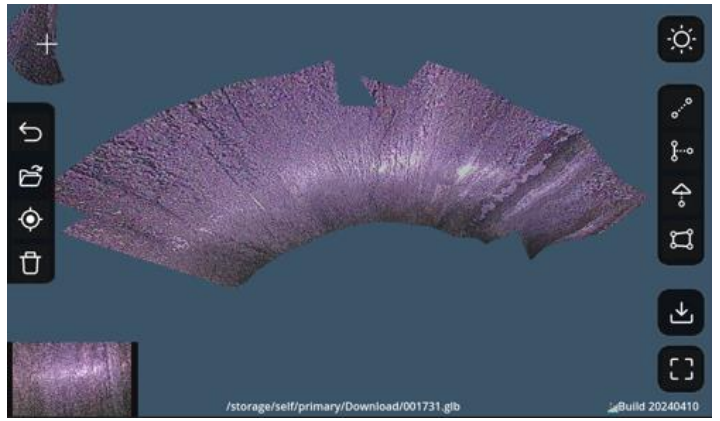
X

Pipe side view

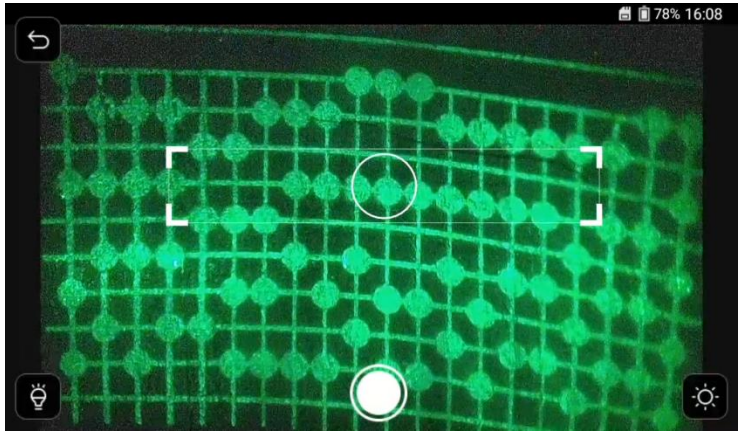
The camera is oriented toward the center of pipe, the inner wall is reconstructed completely.

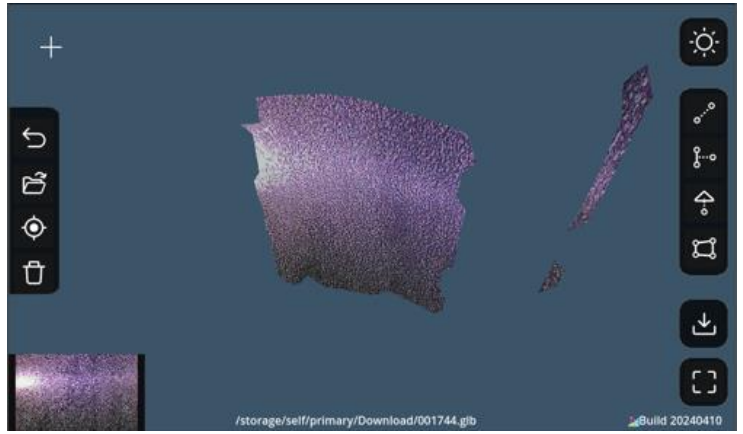






The camera is tilted toward one side, only partial surface is reconstructed





Centering device

For best result of measurement for pipe inspection, please using proper centering device to get the inner wall in focus range. For large size tube, you can use probe articulation to position camera as demand.

905-000401

905-000402

905-000403

Item	SKU part no.	Outer diameter	Inner diameter	Material	Weight
1	905-000401	18 mm / 0.71"	6mm	SUS304	22g
2	905-000402	38 mm / 1.5"	6mm	POM	23g
3	905-000403	65 mm / 2.68"	6mm	POM	34g

Key Points Summary

Successful 3D reconstruction depends on two factors:

- **Effective range >>** Make good use of the focus window.
- **Green light pattern clarity >>** Adjust the "AE" to get best result.

THANK YOU

Mitcorp
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