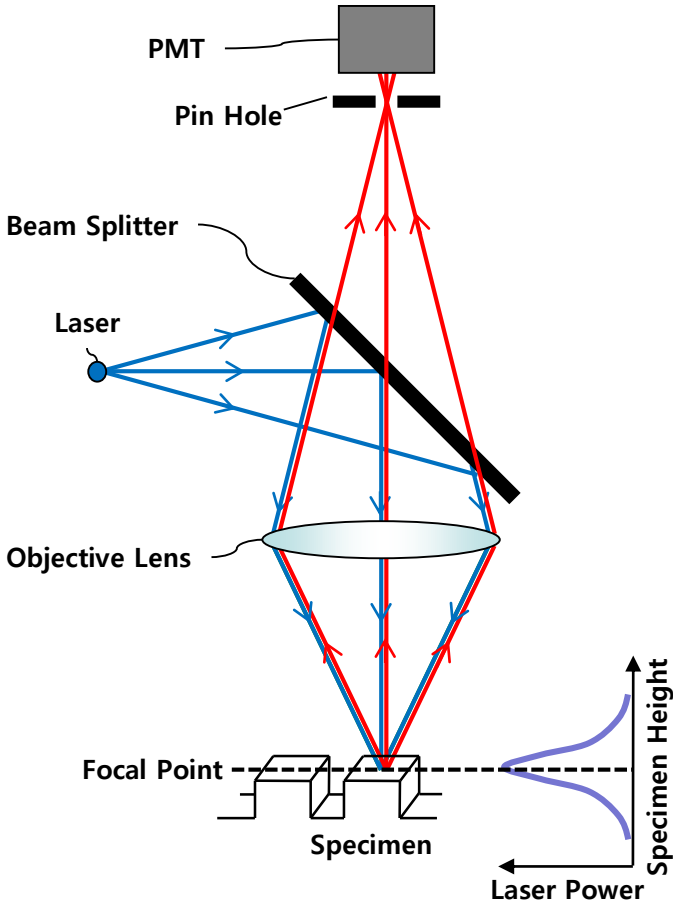
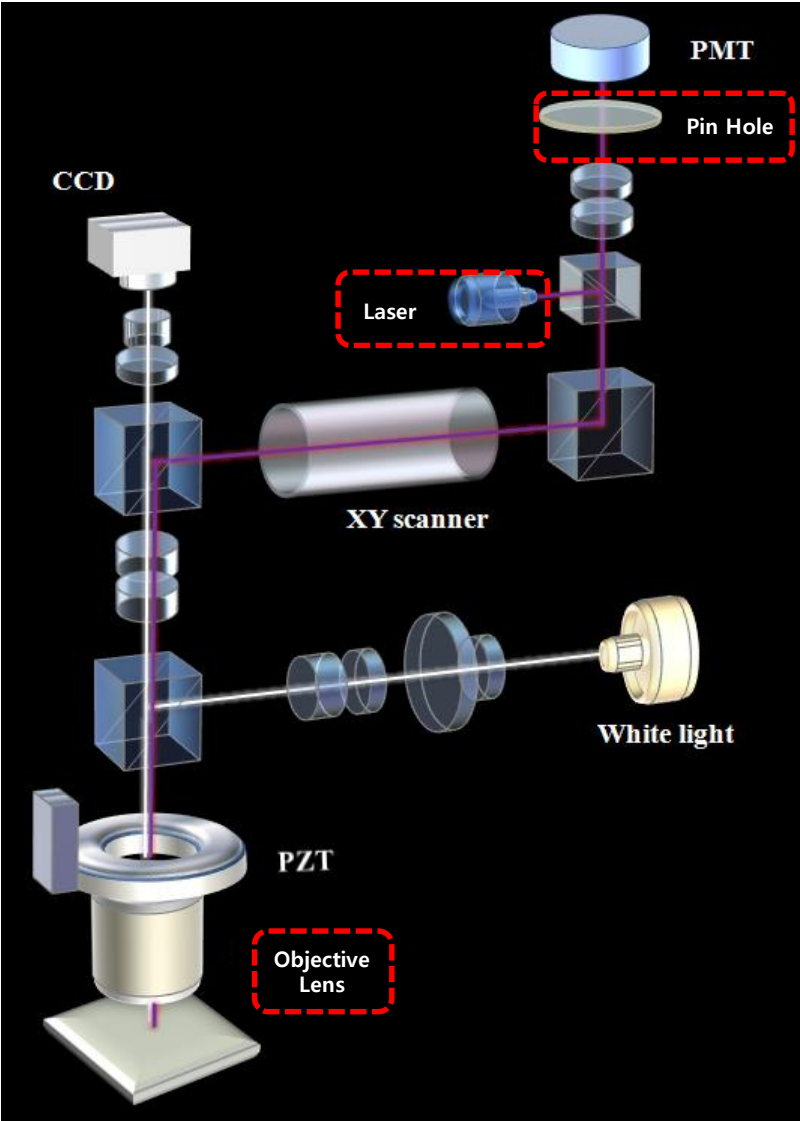


PSS inspection by NS-3000

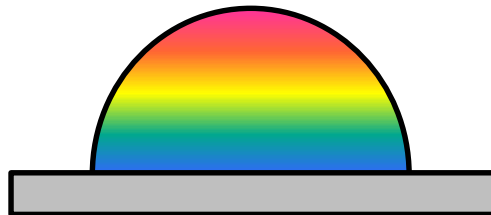
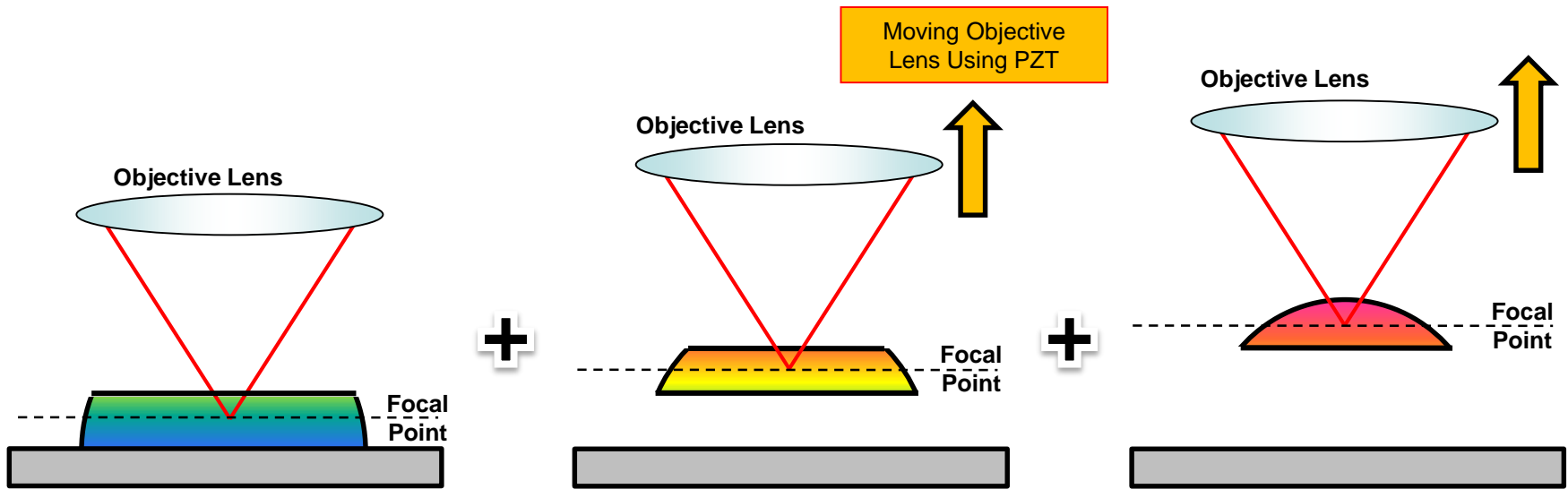


Configuration of Confocal Microscope



Laser power is being maximum when the specimen is at the focal point

Principle of 3D Measurement



Result of 3D Measurement

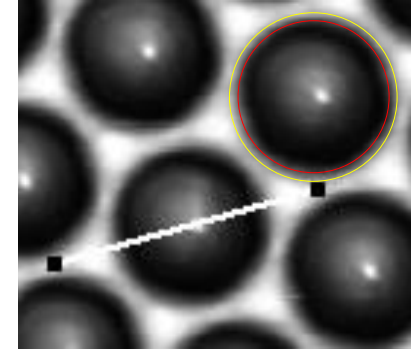
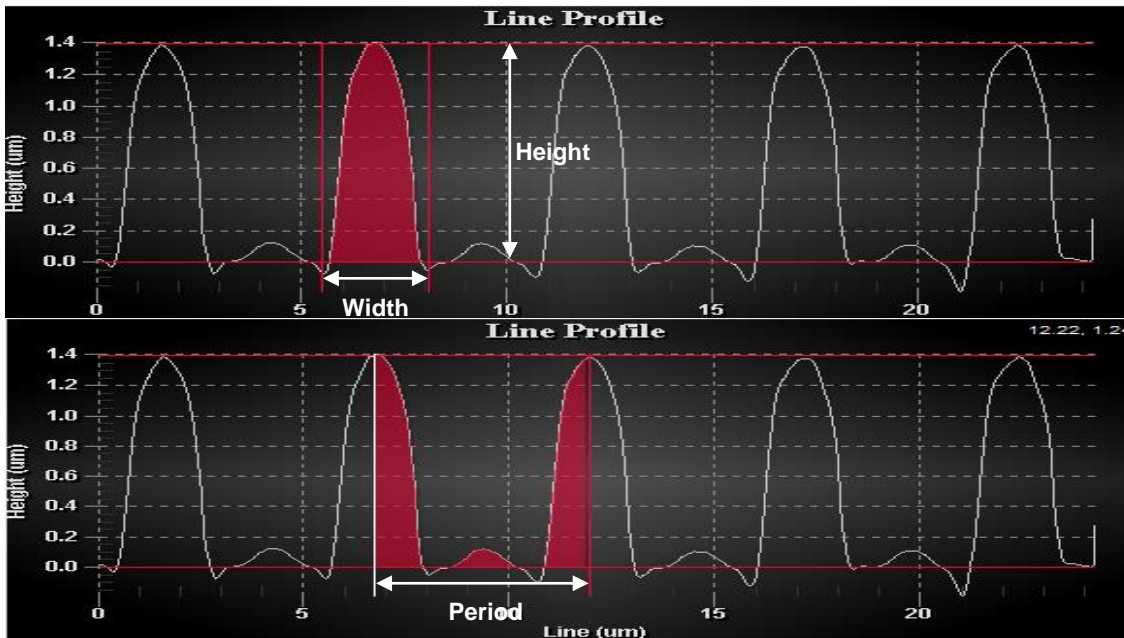
Making 3D Shape of specimen as collecting focal points by moving Objective Lens

Needs of Auto Analysis Program

◆ Traditional Measuring of Bumps



❖ Using Cursor, Measuring its Height, Width, Period



- It takes long time
- Result may be Different
- Can not Trust the result exactly

Automatic Measuring can make short-time inspection and exact result.

Auto Analysis of Sapphire Wafer Bump

◆ Analysis Window of NSView Pro

Resultant Image

Measuring Condition

Profile Direction

3D Analysis

Image Display

Current Position
X:0.146 μ m Y:24.707 μ m Z:1.308 μ m

Measurement Results

#	Rep...	Rep...	Max. H.	Max. ...	Min. H.	Min. P...	Vol.
1	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00
2	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00
3	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00
4	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00
5	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00

ROI Result

Bump Analysis Mode

TF Image Analysis Height Map Analysis Roughness

Texture Analysis Finger Line

Profile Cursor List

No.	H. dist. (um)	V. dist. (um)	Angle (°)	Area (um2)
1	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000

Line Profile Result

Line profile Display

X Profile

Depth (um)

X (um)

3.125um

Profile direction

- Horizontal
- Vertical
- Specific line

Profile Mode

- Single
- Average

Option

- Intensity

Auto Analysis of Sapphire Wafer Bump

◆ Bump Width

3D Analysis

Resultant Images
 Depth Map
 Through Focus
 Valid Data

Data Info.
ID : default
Date : 2011.1.24
Time : 20:39.26
Scan Mode :
Mag : x100
Step Size : 0.07 um
of Steps : 112
Laser Power : 100.0 %
PMT Gain : 0.27 V
Hor. Tilt : 0.0000 deg.
Ver. Tilt : 0.0000 deg.
Base Pos. : 0.00 um

1.naf

254

7

Profile direction
 Horizontal
 Vertical
 Specific line

Profile Mode
 Single
 Average

Option
 Intensity

Current Position
X:23.730μm Y:24.902μm Z:0.174μm

Measurement Results

#	Rep...	Rep...	Max. H.	Max. ...	Min. H.	Min. P...	Vol.
1	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00
2	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00
3	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00
4	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00
5	0.00	(0, 0)	0.00	(0, 0)	0.00	(0, 0)	0.00

Auto Selection

Clear Selected Clear All

Export

Bump Analysis Mode

Bump Analysis TF Image Analysis Height Map Analysis

Procedure Summary

Cursor List

No.	H. dist. (um)	V. dist. (um)	Angle (°)	Area (um2)
1	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000

Reset Cursors Reverse

Export

Measuring Diameters of every bumps in Image Display Automatically

Depth (um)

X (um)

Auto Analysis of Sapphire Wafer Bump

◆ Display Result

❖ Result shows in the Bump analysis window

❖ Auto Save as a Text file

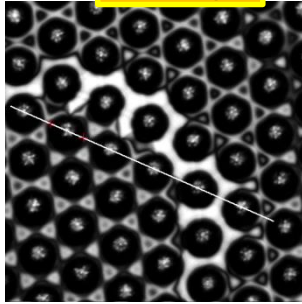
Depth	Size	Period	Interval
1 1.307	1 2.879	1 (1-2) 3.956	1 (1-2) 1.077
2 1.272	2 2.880	2 (1-6) 3.923	2 (1-6) 1.041
3 1.248	3 2.873	3 (1-7) 3.935	3 (1-7) 1.044
4 1.275	4 2.875	4 (2-3) 3.915	4 (2-3) 1.038
5 1.316	5 2.887	5 (2-7) 3.947	5 (2-7) 1.056
6 1.292	6 2.885	6 (2-8) 3.950	6 (2-8) 1.066
7 1.257	7 2.903	7 (3-4) 3.950	7 (3-4) 1.076
8 1.261	8 2.887	8 (3-8) 3.932	8 (3-8) 1.052
9 1.253	9 2.899	9 (3-9) 3.934	9 (3-9) 1.047
10 1.264	10 2.881	10 (4-9) 3.945	10 (4-9) 1.058

Depth	Width
1 1.307256	1 2.879245
2 1.272412	2 2.880128
3 1.247954	3 2.873113
4 1.275324	4 2.874897
5 1.316145	5 2.887244
6 1.292377	6 2.885128
7 1.257269	7 2.903387
8 1.261242	8 2.887236
9 1.252897	9 2.899043
10 1.264241	10 2.881250
11 1.281857	11 2.888129
12 1.294657	12 2.893052
13 1.258770	13 2.888918
14 1.279531	14 2.902282
15 1.297594	15 2.894648
16 1.280970	16 2.896541
17 1.295282	17 2.876192
18 1.285693	18 2.918012
19 1.292164	19 2.895459
20 1.286512	20 2.879677
21 1.298081	21 2.898257
22 1.267070	22 2.90278
23 1.284852	23 2.905530
24 1.277047	24 2.879485
25 1.280926	25 2.876515
26 1.268320	26 2.920854
27 1.276283	27 2.920774
28 1.284318	28 2.904541
29 1.265785	29 2.897071
30 1.291506	30 2.875550
31 1.264911	31 2.901959
32 1.262963	32 2.903591
33 1.262755	33 2.899455
34 1.287866	34 2.906848
35 1.264177	35 2.897412
36 1.272591	36 2.892283
37 1.258155	37 2.903855

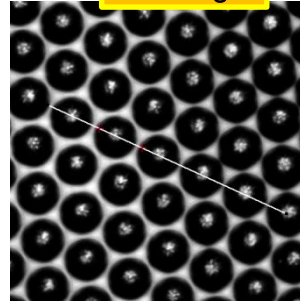
Numbering Every Bumps in FOV, Showing not only Height, Width and Period, but also Mean, Standard Deviation

Example of PSS Measurement

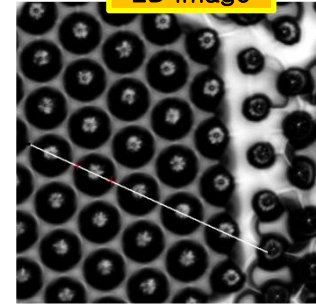
2D Image



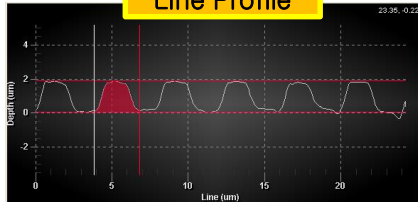
2D Image



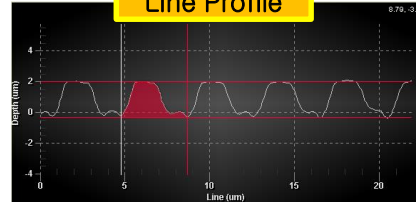
2D Image



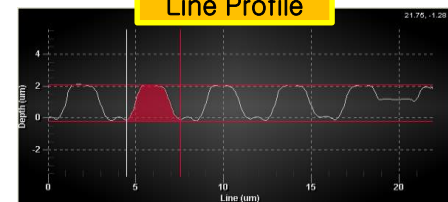
Line Profile



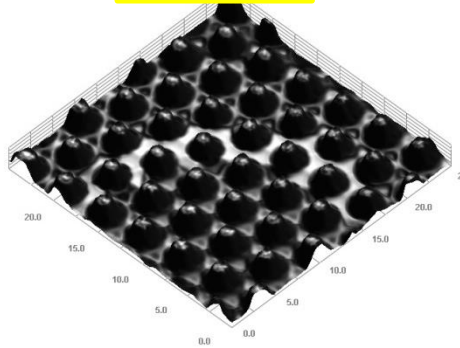
Line Profile



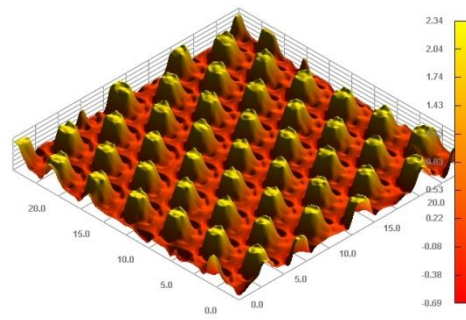
Line Profile



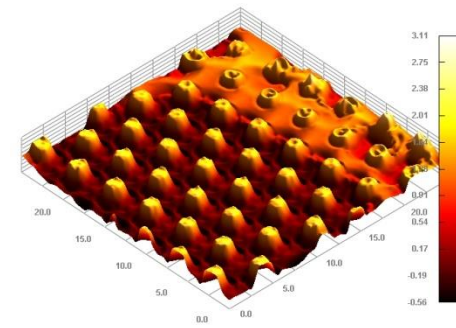
3D Image



3D Image

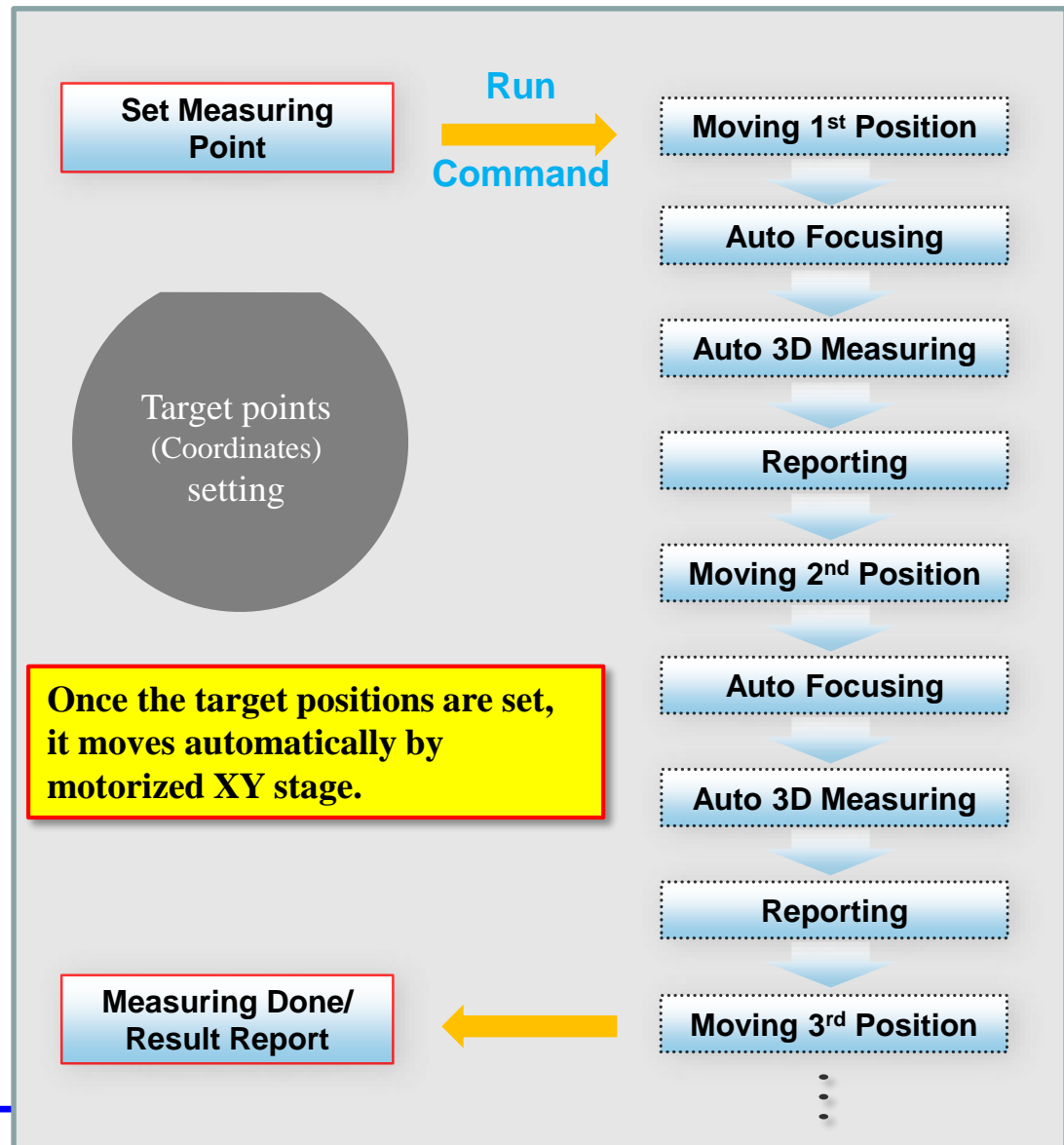


3D Image



Flow Chart of Auto Measurement

Loading Specimen



Unloading Specimen

Measuring Point Setting S/W

The screenshot shows the 'Motion Control' software interface. At the top, it displays 'Wafer Size : 2.inch' and 'Communication status : ON'. The interface is divided into several sections:

- Unit:** Radio buttons for 'Count' (selected), 'mm', and 'Half'.
- Speed:** Input fields for X, Y, and Z axes, all set to 2000 cts/sec.
- Option:** Checkboxes for 'Safe moving', 'AF after moving' (checked), and '3D measure after moving'.
- Resolution:** Input fields for X (0.010 mm/cts), Y (0.010 mm/cts), and Z (0.001 mm/cts).
- Status:** A color-coded indicator for 'Stopped' (green), 'Moving' (red), and 'Limit' (blue).
- X Motor, Y Motor, Z Motor:** Each has a position display (0 cts), directional arrows, and buttons for 'Move to Origin' and 'Set as Origin'. The Z Motor section also includes 'Set as Upper Limit', 'Set as Lower Limit', and 'Lock Limits' buttons.
- Work Space [XY]:** A circular diagram with 'TOP', 'BOTTOM', 'LEFT', and 'RIGHT' labels. A red 'X' marks the center, and a green 'X' marks a point on the top axis.
- Measure Points:** A table with columns for 'No.', 'X Axis', and 'Y Axis'. It contains 10 rows of data. A red dashed box highlights this table. Below the table are 'SET', 'CLEAR', and 'Clear all positions' buttons, along with save and load icons.
- Direct Move:** Input fields for X and Y (both 0 cts) and a 'GO' button.
- Functions:** Buttons for 'Initialize', 'Change Wafer', 'Procedure', and a stop icon.
- Save Path:** A text field containing 'C:\Documents and Settings\#NSS#바탕 화면#' and a file explorer icon.
- Wafer ID:** An empty text field.

Double Click the position where user wants in the program, Stage will move the point automatically.

User can set the positions in advance

Measurement results is saved in the file named here

Tact Time

5 Point Inspect Time : 50 Sec

Title	Tact time		
1 Point Measurement Time	4 sec	× 5 Points	20 sec
Stage Moving to Point to Point	4 sec	× 5 times	20 sec
Wafer L/Unloading	10 sec		10 sec
Tact Time / 1 Wafer			50 sec

- Data analysis and Transfer in Wafer unloading Process

Specification

Title		Specification
Tact Time		50sec/5 point (4sec/1 point)
Measuring Method		Confocal Method
Repeatability		20 nm (3 σ ,100X Objective Lens)
Lens Spec. (100X Objective Lens)	Mag.	Max 5,600 Times (24"Monitor, 5x optical zoom)
	Optical Zoom	1X ~ 5X
	F.O.V.	125 μ m X 125 μ m
	W.D.	0.3 mm
Head Unit	Confocal Scan Speed	30 frames/sec (512x512pixels)
	Vertical Scan Range	250 μ m
	Vertical Resolution	10 nm
	Scan Actuator	PZT (piezo electric actuator)
	Feed Back	Capacitive sensor feedback control
	Illumination	Laser (wavelength 405 nm)
	Controller	Maker : PI piezo controller
X, Y, Z Stage	Velocity	10 mm/s
	Resolution	(X,Y) 0.1 μ m / (Z) 0.5 μ m
	Repeatability	(X,Y) \pm 0.1 μ m / (Z) \pm 0.3 μ m
	Driving Actuator	5 phase stepping motor
	Guide	Cross-roller guide
	Controller	Nanoscope MC stepping motor

System Dimension

