Selete Mask Handling Program

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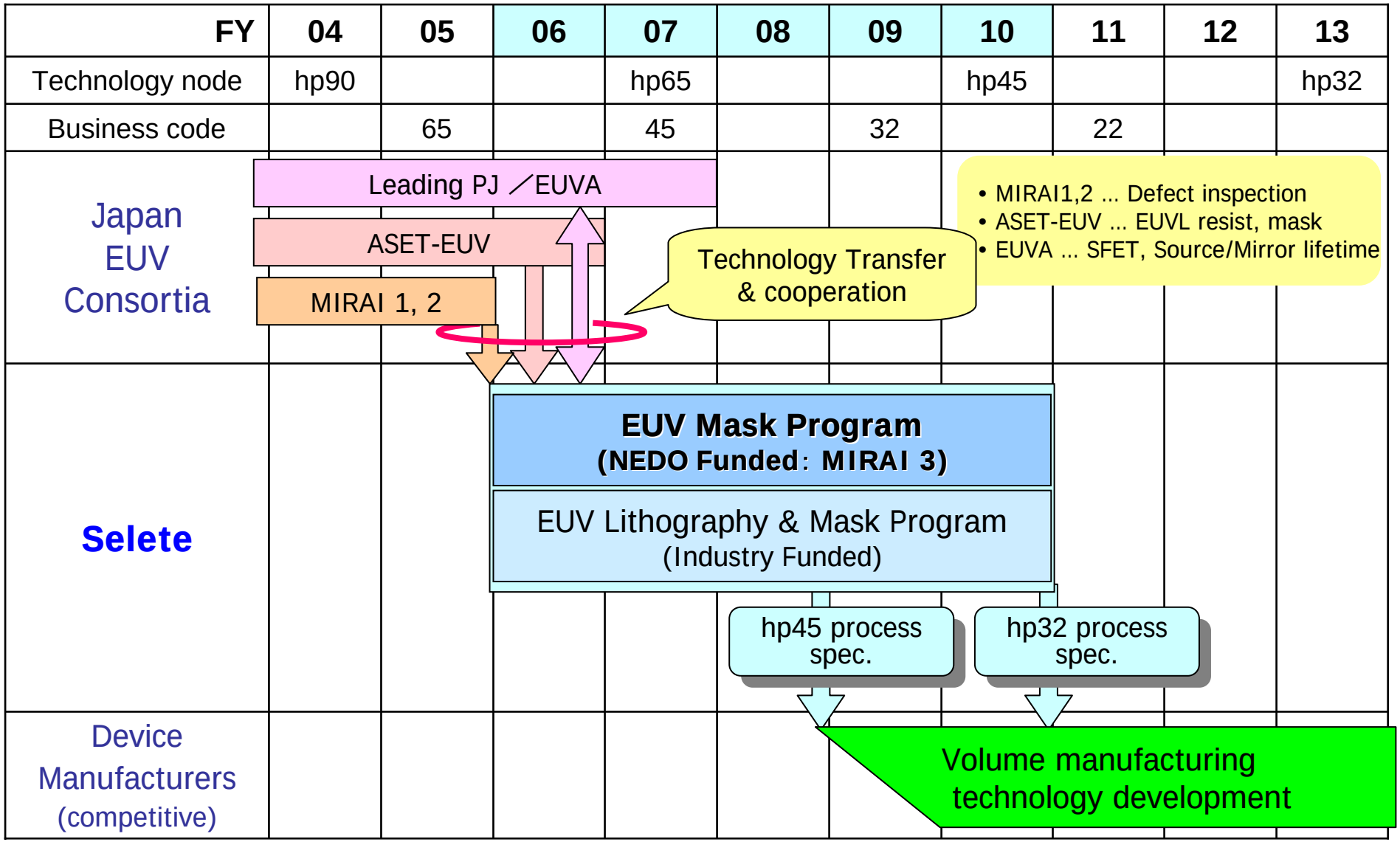
EUV Mask Program and Japanese EUVL Development Scheme

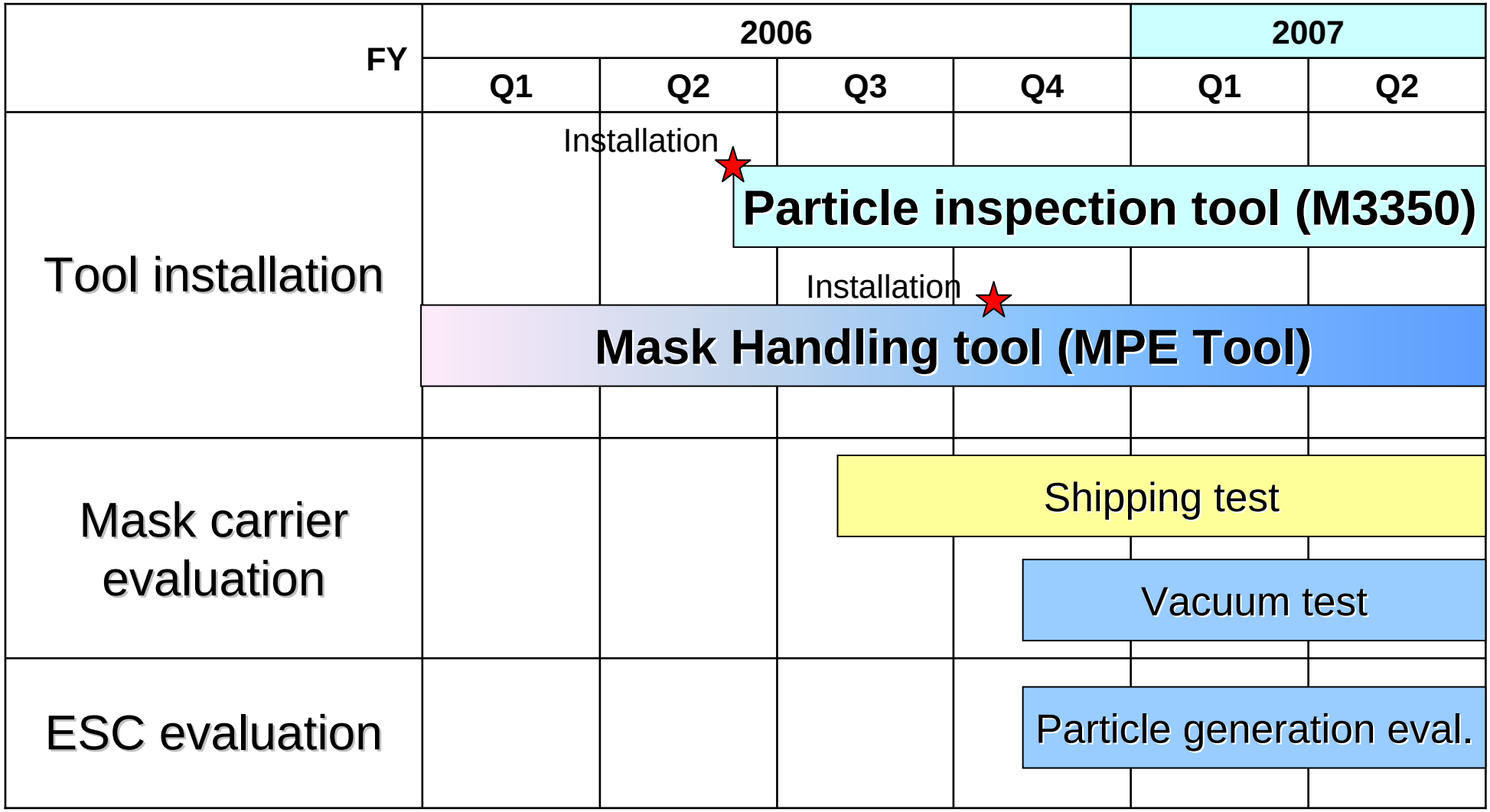
FY	04	05	06	07	08	09	10	11	12	13
Technology node	hp90			hp65			hp45			hp32
Business code		65		45		32		22		



Selete EUVL Mask Program

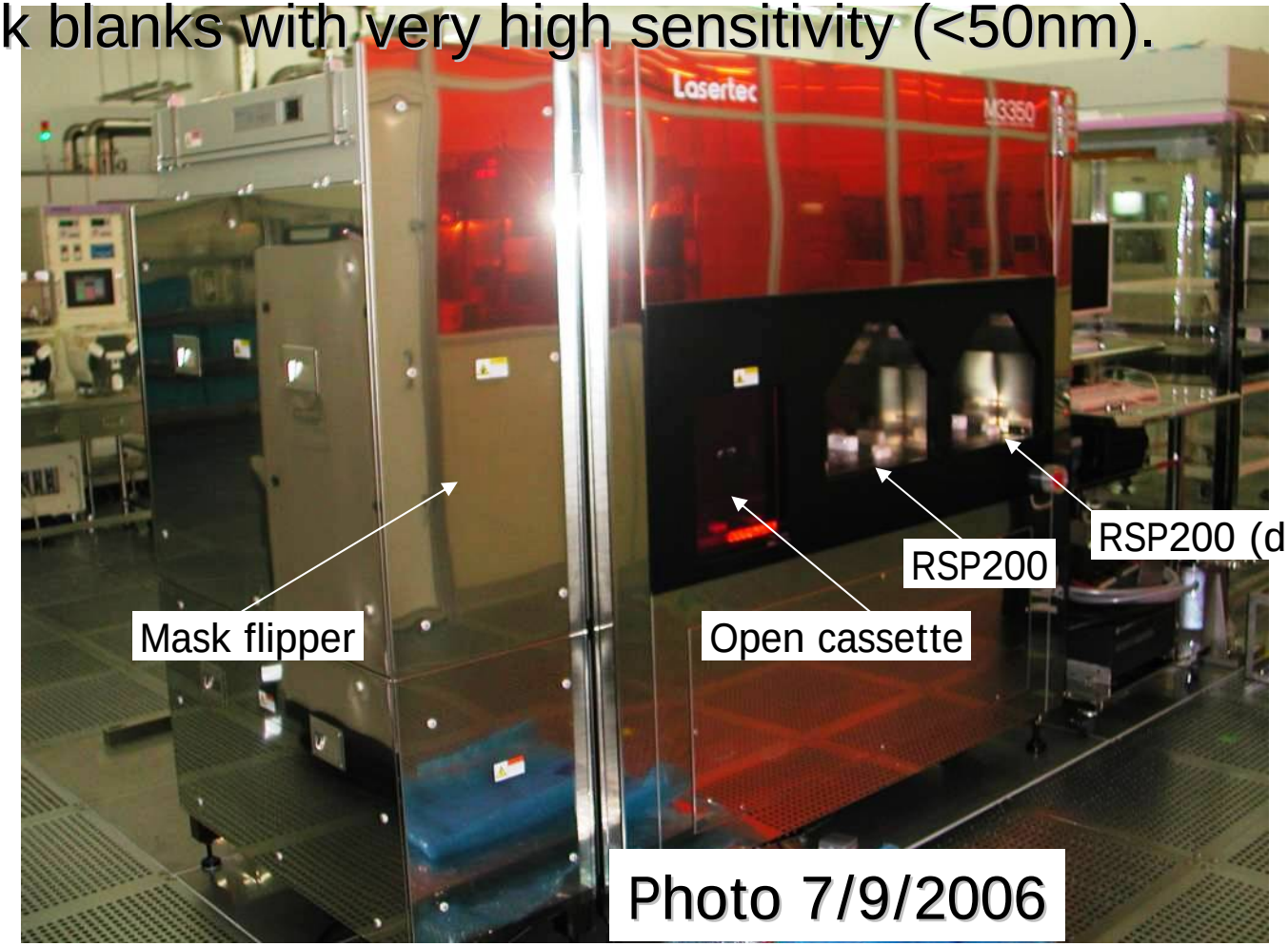
- **High quality mask and blank development**
  - At wavelength mask and blank inspection
  - Specifications for mask structure, materials and defectivity
  - Mask contamination control
- **Mask infrastructure construction**
  - Mask pattern defect inspection
  - Mask pattern defect repair
- **Mask handling technology**
  - Particle contamination-free mask handling without pellicle
  - Inspection and cleaning in wafer fab

Short term Schedule of Mask Handling Program



Maskblanks Inspection System

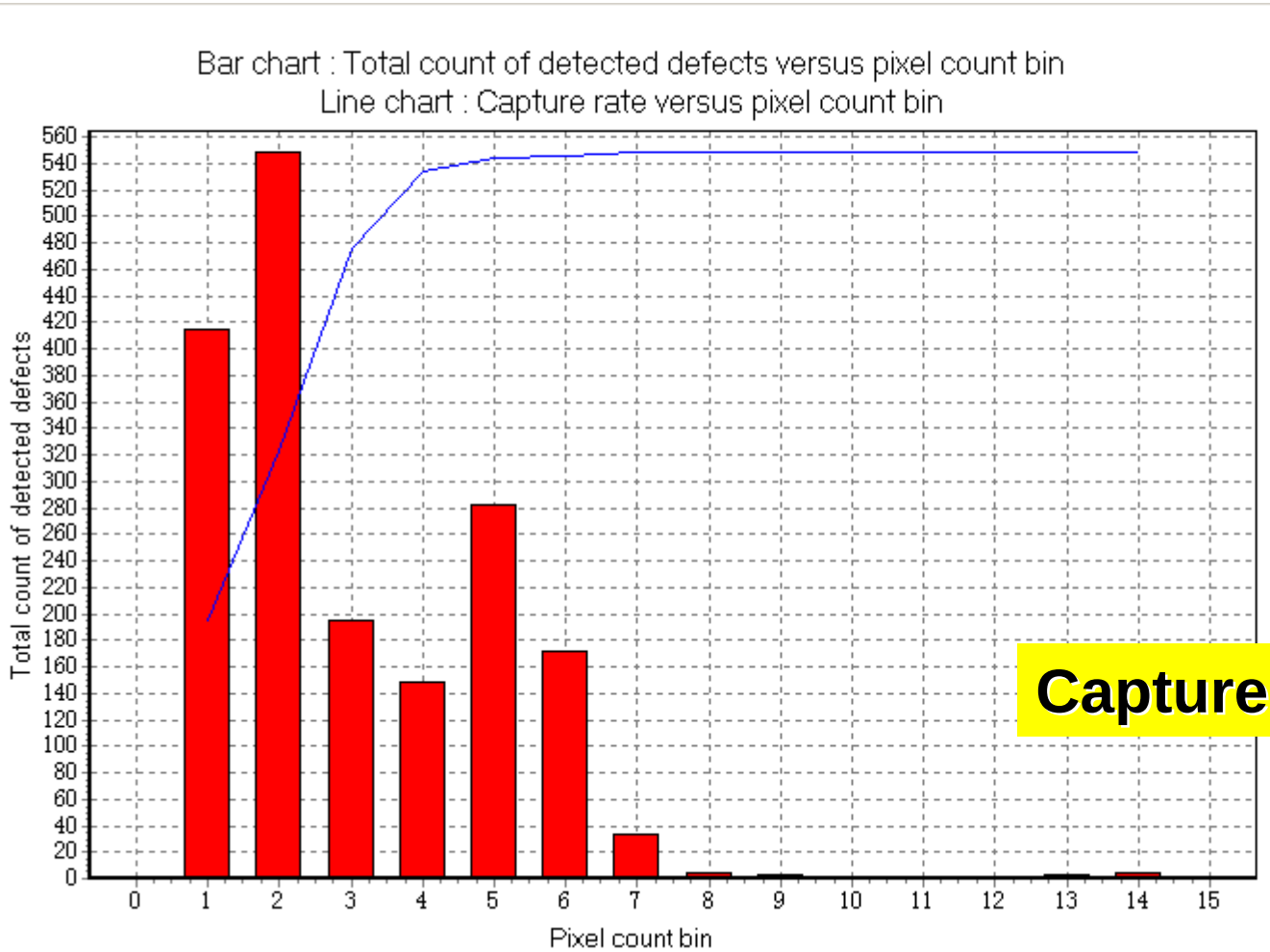
- Selete has introduced Lasertec M3350, a particle inspection tool for mask blanks with very high sensitivity (<50nm).



M3350 Specifications/Performances

Substrate Size	6025
Defect Detection Sensitivity	50nm (PSL) with >98%, 46nm (PSL) with >90%
Inspection Time	<21'30" (146 x 146 mm^2)
Light Source	1W, Argon ion laser (488nm)
Ports	Open cassette RSP200 Modified RSP200 (dual pod)
Blanks flipper	Flip Rotate (0, 90, 180, 270 deg)

M3350 Initial data ~ Sensitivity@50nm PSL

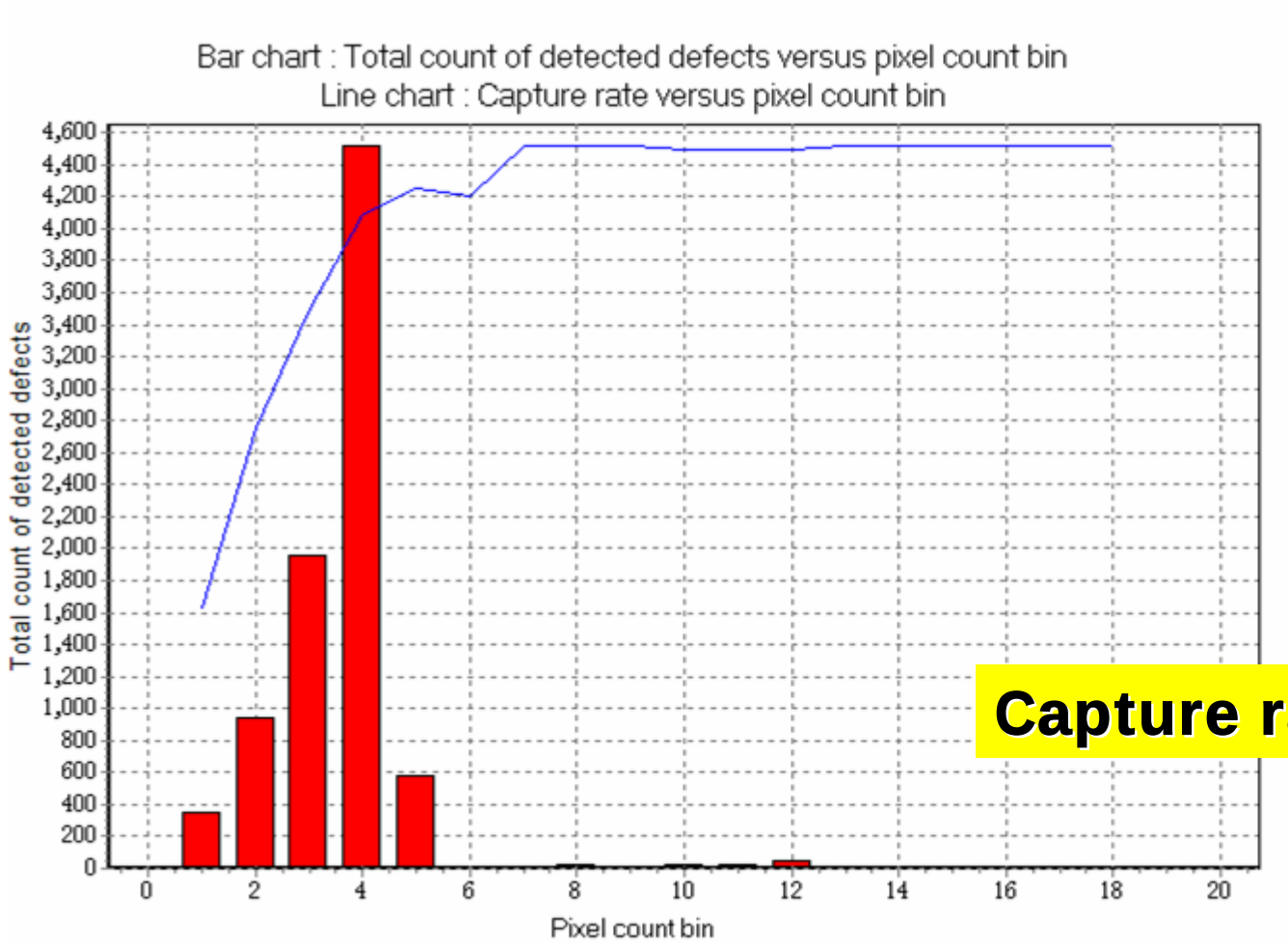


Pixel count bin	Total count of detected defects	Capture rate	Average count of detected defects
1.00,	415,	0.355,	147.5
2.00,	548,	0.589,	322.7
3.00,	195,	0.868,	169.3
4.00,	149,	0.974,	145.2
5.00,	282,	0.994,	280.3
6.00,	171,	0.995,	170.1
7.00,	34,	1.000,	34.0
8.00,	5,	1.000,	5.0
9.00,	3,	1.000,	3.0
10.00,	2,	1.000,	2.0
11.00,	2,	1.000,	2.0
12.00,	1,	1.000,	1.0
13.00,	3,	1.000,	3.0
14.00,	5,	1.000,	5.0
16.00,	4,	-----,	-----
Total,	1819,	,	1290.1

Capture rate = 99.4%

PSL on quartz blank

M3350 Initial data ~ Sensitivity@46nm PSL



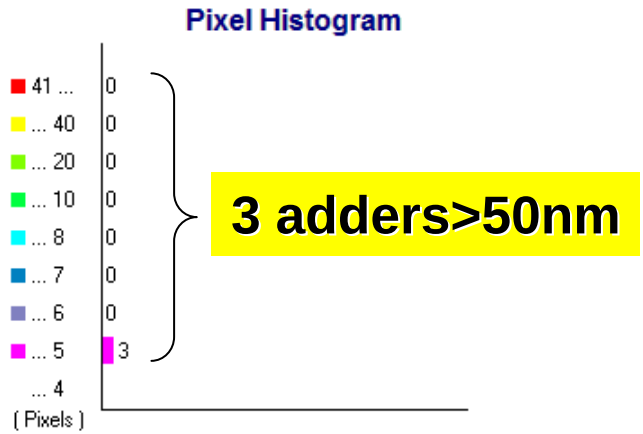
Pixel count bin	Total count of detected defects	Capture rate	Average count of detected defects
1.00,	351,	0.362,	127.2
2.00,	941,	0.609,	573.1
3.00,	1960,	0.771,	1510.9
4.00,	4516,	0.905,	4087.9
5.00,	576,	0.941,	542.0
6.00,	13,	0.931,	12.1
7.00,	18,	1.000,	18.0
8.00,	22,	1.000,	22.0
9.00,	6,	1.000,	6.0
10.00,	28,	0.996,	27.9
11.00,	26,	0.996,	25.9
12.00,	46,	0.996,	45.8
13.00,	11,	1.000,	11.0
14.00,	3,	1.000,	3.0
15.00,	3,	1.000,	3.0
16.00,	3,	1.000,	3.0
17.00,	1,	1.000,	1.0
18.00,	1,	1.000,	1.0
21.00,	5,	-----,	-----
Total,	8530,	,	7020.8

Capture rate = 90.5%

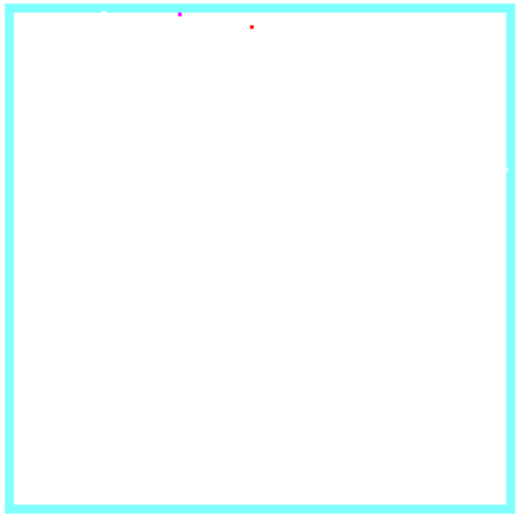
PSL on quartz blank

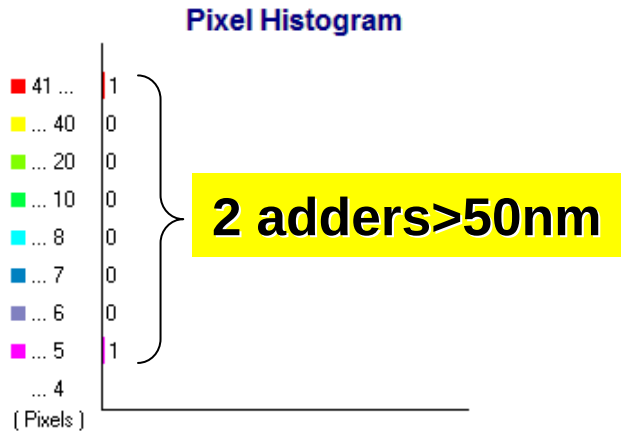
M3350 Tool Cleanliness ~ Particle adders by handling

50 times (open cassette ⇔ stage)



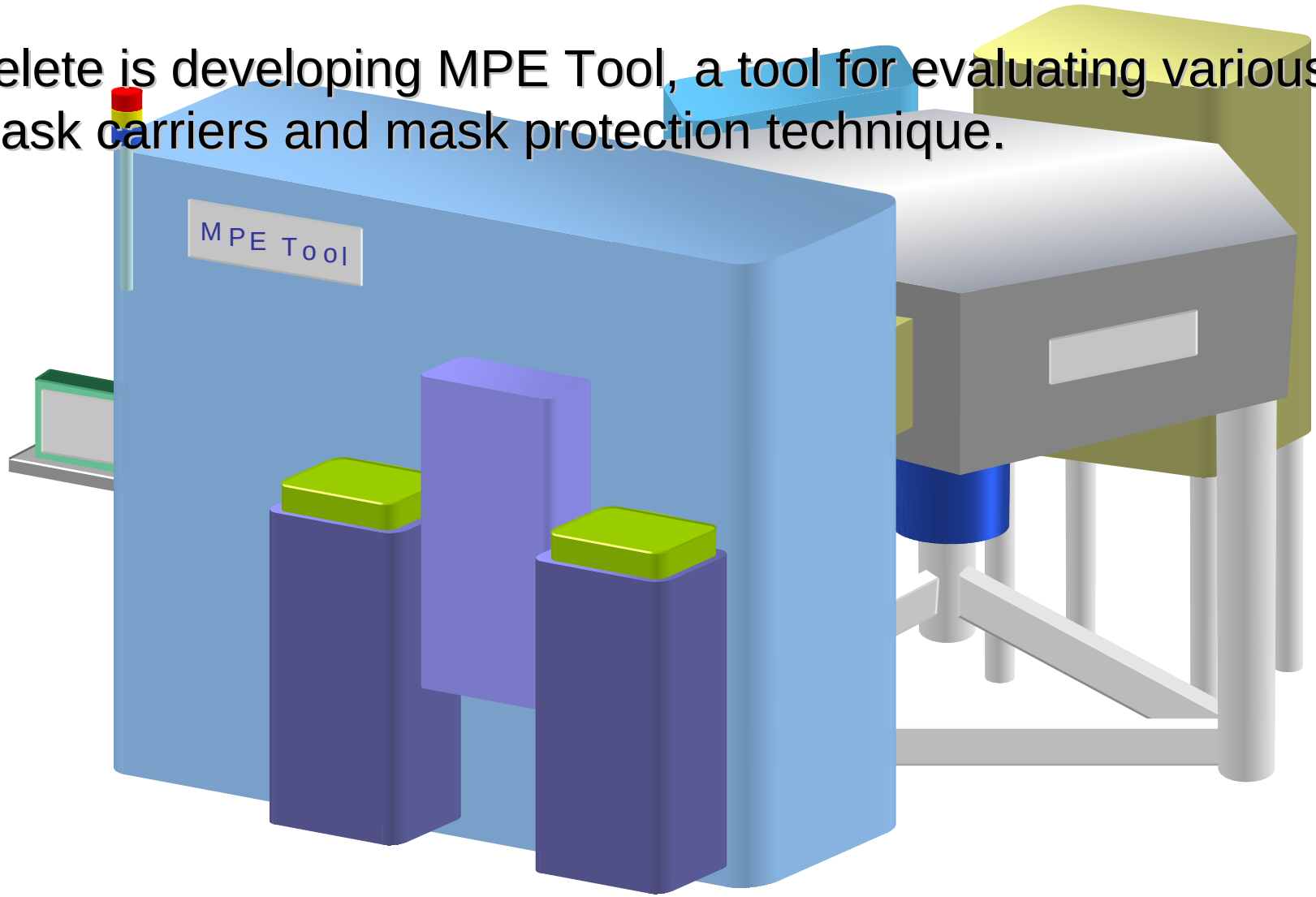
50 times (open cassette ⇔ flipper ⇔ stage)



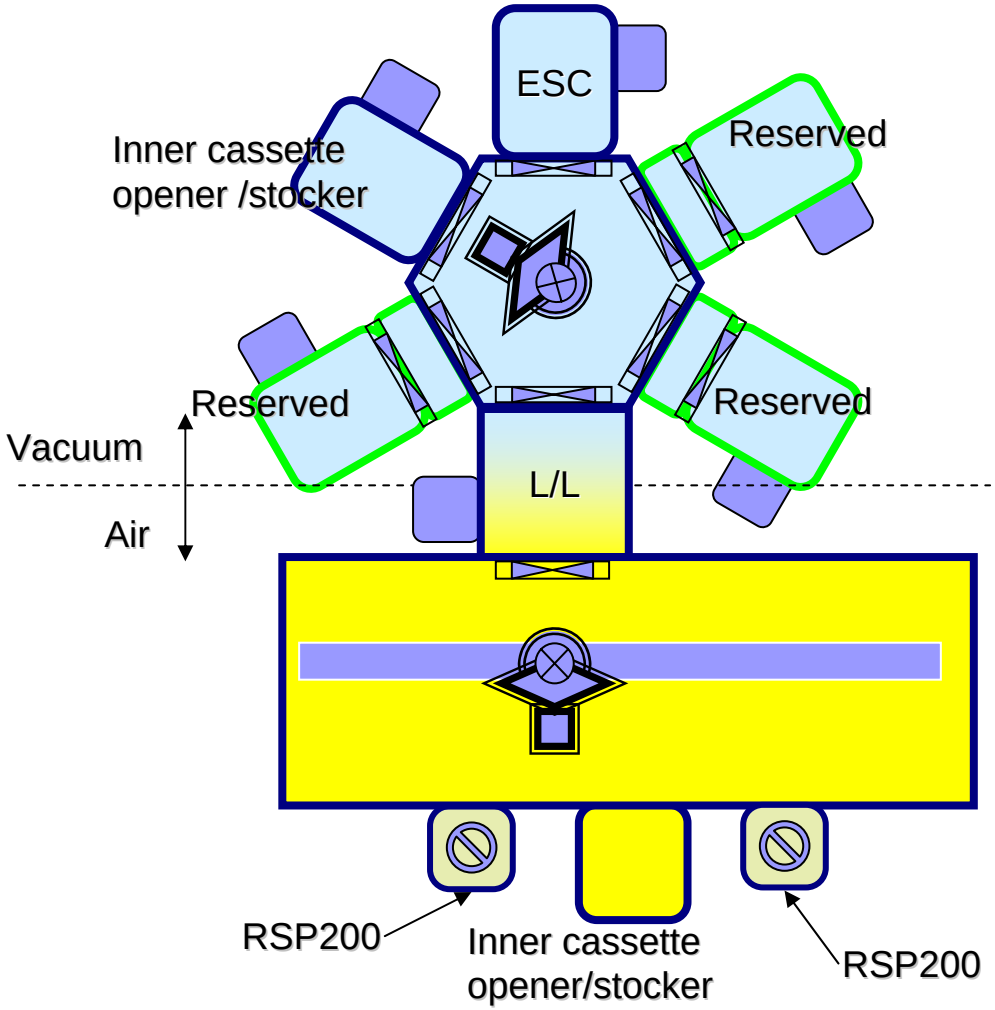


Mask Protection Engineering Tool (MPE Tool)

- Selete is developing MPE Tool, a tool for evaluating various mask carriers and mask protection technique.



MPE Tool Outline



standard optional

Standard subsystems

- Load port for RSP200
- Robot in the air
- Inner pod opener/stocker in the air
- Loadlock
- Robot in vacuum
- Inner pod opener/stocker in vacuum
- Electro static chuck (ESC)

Optional potential subsystems

- Load port for vacuum carrier
- Particle inspector in vacuum
- Stage and stage protection test bed (scan stage and phoresises)

MPE Tool Specifications

Components	• Carrier ports (RSP200 x 2) • Robot in the air • Inner pod opener/stocker in vacuum • Loadlock • Robot in vacuum • Inner pod opener/stocker in vacuum • Electrostatic chuck (ESC) • Extension ports x 3
Functions	• Handle mask between carrier and ESC. • Handle mask with inner pod between carrier and ESC. (CNE pod and Nikon EUV1 pod) • Shuffle mask between RSP200 and inner pod in modified RSP200.

Summary

- Selete started a new EUV program in April, 2006. Development of EUV mask handling technology is one of the key areas of the program.
- We plan to evaluate EUV mask carriers using Lasertec M3350 and MPE Tool.
- M3350 has been installed on the end of August, and MPE Tool will be installed in next January.

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