AccuTRIM

Advanced multi step low swelling profile EBR System

Application – 45nm node Photomask Accurate Edge Bead Removal (EBR) System

In Brief: Acutrim is a new EBR (edge bead removal) system specifically designed to reduce swelling associated with post coat edge bead processing. Resist swelling can result in significant defects after the resist stripping. These defects manifest as resist residue on the edge of mask because of the significant thickness differential between the edge bead and the field resist thickness. A new design in EBR systems is utilized. A localized exhaust port is placed in close proximity to mask edge and surface evacuating solvent and resist byproducts during EBR processing. This results in significant reductions in swell height and width at the edge of the mask.

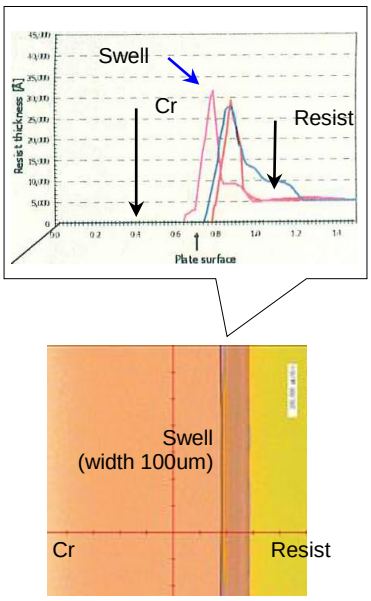


Fig 1. Existing EBR Process

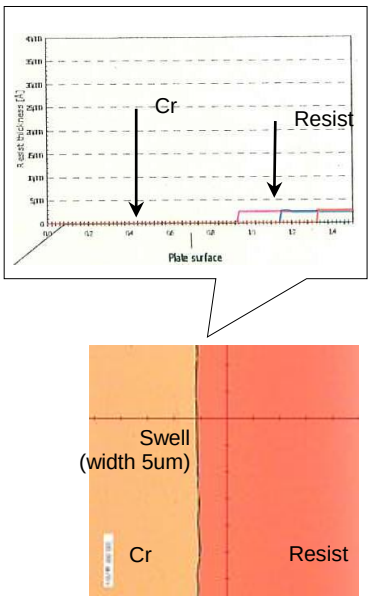


Fig.2 Accutrim Process

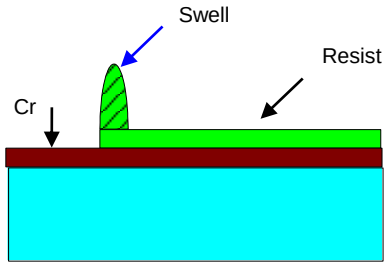


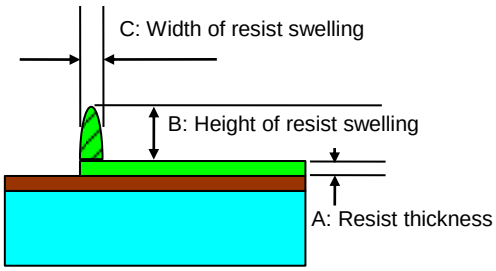
Fig 3 Cross Section EBR Process

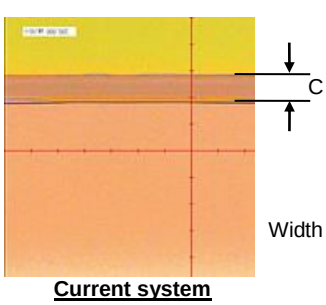
Features and Benefits

Feature	***Benefit***
Suction nozzle	• Precise removal of solvent and resist resulting in no swelling
Solvent nozzle	• Precise solvent dispense clean delineation
EBR width	• EBR width is defined as suction nozzle position from mask edge • Precision programmable positioning of suction nozzle 1.0~2.0mm from the masks edge
Solvent nozzle linear drive	• Programmable nozzle scan speed and cycle

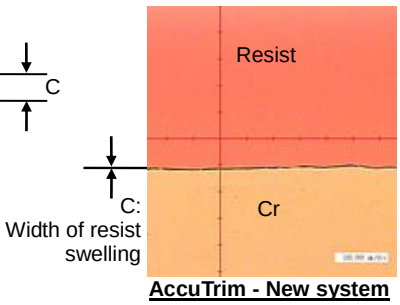
PROCESS

EBR performance comparison between AccuTrim and current system





Current system



AccuTrim - New system

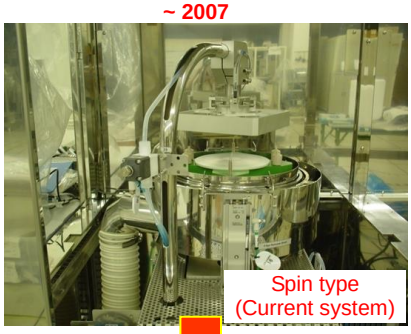
Microscope and Needle Type profiler (KLA P-11)

	A	B	C
Current	299.8 nm	3 um or more	100 um
AccuTrim	300.2 nm	41.1 nm	5 um

New EBR Advantage

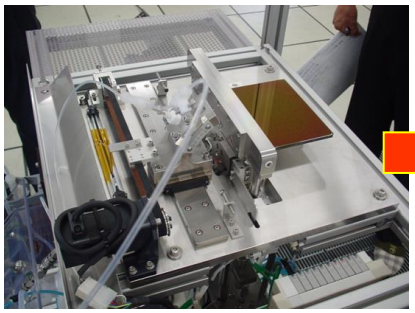
	Current	New – AccuTrim
EBR width from edge	Width is depending on mask size tolerance Ex.) Mask-A: 1.6mm Mask-B: 1.2mm	Advantage point; Reference point is mask edge, so, nozzle position is no difference between every mask
Resist swelling after EBR	Large resist swelling (~10 times thicker than resist thickness)	Advantage point; Very little resist swelling (about 10% of resist thickness)
EBR Mechanism	**Spin system and top shield cover with solvent nozzle integrated;** Top shield cover makes EBR shape, and solvent is dried by spinning	**Suction slit nozzle and independent solvent nozzle;** Solvent nozzle scans linearly along slit nozzle, and solvent is sucked into slit nozzle vacuum
Throughput	4 minutes/plate	4 minutes/plate (by triple type of solvent nozzle)

~ 2007



Spin type
(Current system)

2008 ~

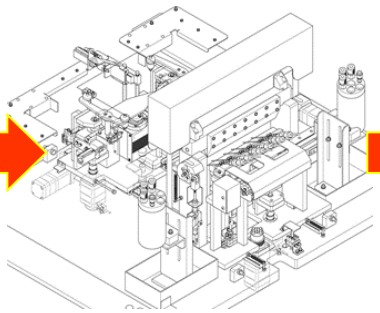


Linear type
(AccuTrim-C – early stage)

Single slit nozzle & Single type of solvent nozzle

25 minutes/plate

2011 ~

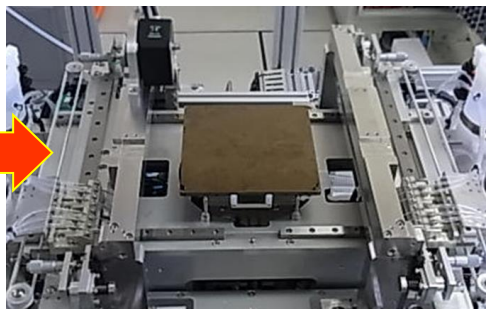


Linear type
(AccuTrim)

Single slit nozzle & Triple type of solvent nozzle

8 minutes/plate

2012 ~



Linear type
(AccuTrim-D – high throughput)

Double system of slit nozzle & Triple type of solvent nozzle

4 minutes/plate

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