

New analysis tools and processes for mask repair verification and defect disposition based on AIMS™ images

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Using aerial image metrology to qualify repairs of defects on photomasks is an industry standard. Aerial image metrology provides reasonable matching of lithographic imaging performance without the need for wafer prints. Utilization of this capability by photomask manufacturers has risen due to the increased complexity of layouts incorporating RET and phase shift technologies. Tighter specifications by end-users have pushed aerial image metrology activities to now include CD performance results in addition to the traditional intensity performance results.

Discussed is the software implemented semi-automated analysis of aerial images for repair verification activities. Newly designed user interfaces and algorithms could guide users through predefined analysis routines as to minimize errors. There are two main routines discussed, one allowing multiple reference sites along with a test/defect site within a single image of repeating features. The second routine compares a test/defect measurement image with a reference measurement image. Three evaluation methods possible with the compared images are discussed in the context of providing thorough analysis capability.

This paper highlights new functionality desirable for aerial image analysis as well as describes possible ways of its realization. Using structured analysis processes and innovative analysis tools could lead to a highly efficient and more reliable result reporting of repair verification analysis.

Keywords: photomask, repair, AIMS, CD control, aerial image