OPC Accuracy Enabled by Fast eBeam System, Accurate Contour Metrology and Deep Learning

Jun Lang, Director Product Management, ASML

The shrinking EPE (Edge Placement Error) budget places more stringent requirement on OPC model accuracy, which is increasingly limited by metrology errors. In the current practice of metrology data collection and data processing to model calibration flow, CD-SEM throughput becomes a bottleneck that limits the amount of metrology measurements available for OPC model calibration, impacting pattern coverage and model accuracy especially for 2D pattern prediction.

To address the trade-off in metrology sampling and model accuracy constrained by the cycle time requirement, a novel high speed e-beam metrology system is used in conjuncture with a new computational software solution to take full advantage of the large volume data and significantly reduce both systematic and random metrology errors. This novel e-beam metrology system is based on a high data rate, large probe current, and ultra-low noise electron optics design. At the same level of metrology precision, this high speed e-beam metrology system could significantly shorten data collection time and reduce electron dosage. The new computational software enables users to generate large quantity of highly accurate EP (Edge Placement) gauges and significantly improve design pattern coverage. Deep learning models trained with such large volume of EP gauges significantly improve OPC accuracy.