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Precision Motion Control and Metrology in Lithographic Scanners

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Lithographic steppers and scanners are highly complex machines used to manufacture integrated circuits (ICs). These devices use an optical system to form an image of a pattern on a quartz plate, called the reticle, onto a photosensitive layer on a substrate, called the wafer. The circular wafer can contain many ICs, typically 100 or more, and needs to be repositioned from exposure to exposure. Moreover, different patterns need to be put exactly on top of one another, even when the wafer has left and re-entered the machine to accommodate for intermediate process steps. To be able to pack more functionality into each IC and to increase the productivity of the machine, the required accuracy and speed for the repositioning is increasing as well.

In this presentation, the lithographic process will be explained and the motion control and metrology architecture of ASML's scanners will be detailed. It will furthermore be shown which evolutions were necessary to keep up with the ever increasing demands for shrink and increasing throughput.

Summary

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