

Case Study

Series:
Custom Linear Modules



Industry:
Semiconductor

Multi-Axis Motion for
Lithography Masking

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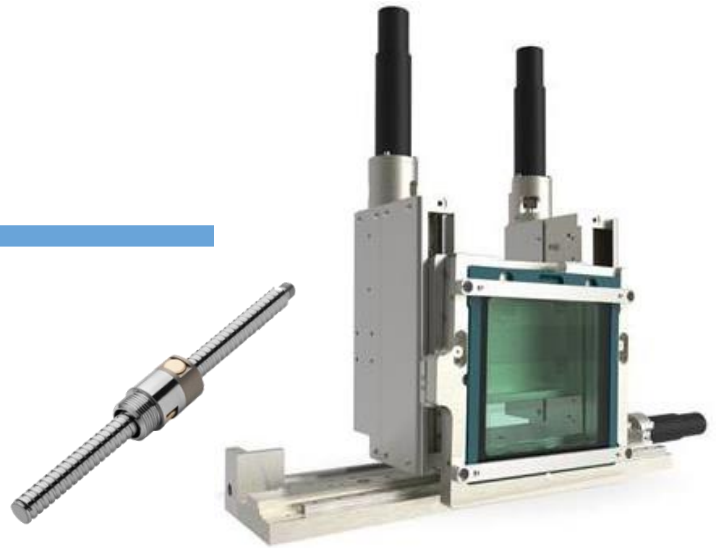
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Multi-Axis Motion for Lithography Masking

Challenge:

A leading supplier of laser processing equipment to the semiconductor industry wanted a next-generation masking system for extreme-UV lithography. The customer approached Steinmeyer with a demanding set of requirements. The motion system needed flexibility to provide fine adjustment during processing and coarse movement into a service position outside the optical path. Travel of 160mm was required in the horizontal axis and 50mm in the vertical axis, with speeds up to 50mm/sec and repeatability of better than 2 microns. The mask also needed to tilt as much as 1.5° around the optical axis. Finally, the dry nitrogen atmosphere and strict boundaries on contamination levels made the choice of materials and lubricants challenging.



Steinmeyer designed an innovative multi-drive configuration. It features stainless steel, 12 x 5 preloaded ball screws. Two vertical drives enable both translation and tilt. A stage supporting both vertical drives moves the mask horizontally. The mask frame with the associated pivot points are magnetically preloaded, which enables easy service plus backlash-free tilt. Further, the motor encoder assembly is easily detachable for quick servicing.

Special design elements regarding coatings and ball screw lubricants were also incorporated to address demands unique to this application. An eUV absorbent coating was applied on all internal surfaces to minimize signal scattering. Also, a highly-specialized lubricant was selected. This PFPE-oil is chemically stable under eUV exposure while exhibiting extremely low outgassing. It is also thermally stable, nonflammable, and insoluble in water, acids, bases, and most organic solvents.

Results:

The customer completed full acceptance testing of the system. They are thrilled by the combination of coarse and fine movement in one mechanism. Plus, the system greatly speeds their process of mask testing.



Steinmeyer Miniature Ball Screws

- German Quality
- Diameters Down to 3 mm
- Pitch Down to 0.5 mm



About Steinmeyer

Designed and manufactured in Germany, our products are used globally in precision positioning for medical devices, lab instruments, optics and other mechatronic applications. Steinmeyer engineers will work closely with you to customize our offering to deliver a solution that meets your technical requirements and budget.

Engineers are available to answer questions or to discuss your application. Contact us today:

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