



ACHIEVING SUB-MICRON ACCURACY AND REPEATABILITY

Achieving Sub-Micron Accuracy and Repeatability in Semiconductor Metrology Tools

In the semiconductor industry, metrology and inspection processes are essential for identifying wafer and chip defects. As device geometries continue to shrink, achieving nanoposition accuracy and repeatability becomes increasingly critical.

CHALLENGE

A leading semiconductor tool OEM faced significant difficulties in achieving sub-micron level accuracy and repeatability for their inspection processes. The challenge was to position components with nanoprecision consistently, which is crucial for inspecting the increasingly tiny and dense features of modern microchips.

SOLUTION

Parker Hannifin collaborated with the OEM to develop a solution tailored to their specific needs. The approach involved designing a linear motor positioning system capable of delivering the required sub-micron accuracy. Parker's engineering team worked closely with the customer's engineers to analyze the natural frequencies of the entire system, including the payload and actuators. By understanding the payload dynamics and the specific motion requirements, Parker was able to design a highly rigid system that minimized settling times and maximized step and scan speeds between measurement points.

CUSTOMER VALUE

The implementation of Parker's linear motor positioning systems resulted in significant improvements for the semiconductor tool OEM:

- **Sub-Micron Accuracy:** The new system provided the nanoprecision necessary for inspecting the smallest features of modern microchips.
- **High Rigidity:** The highly rigid design minimized settling times, enhancing the overall efficiency of the inspection process.
- **Increased Speed:** The system allowed for faster step and scan speeds between measurement points, optimizing the inspection workflow.

This collaboration not only enhanced the performance of their metrology tools but also ensured that they could meet the stringent demands of modern semiconductor manufacturing.



Parker Hannifin Corporation
6035 Parkland Blvd.
Cleveland, Ohio 44124
1-800-272-7537

www.parker.com

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