Understanding the Extensive Benefits of Purchasing Total Linear Positioning Systems

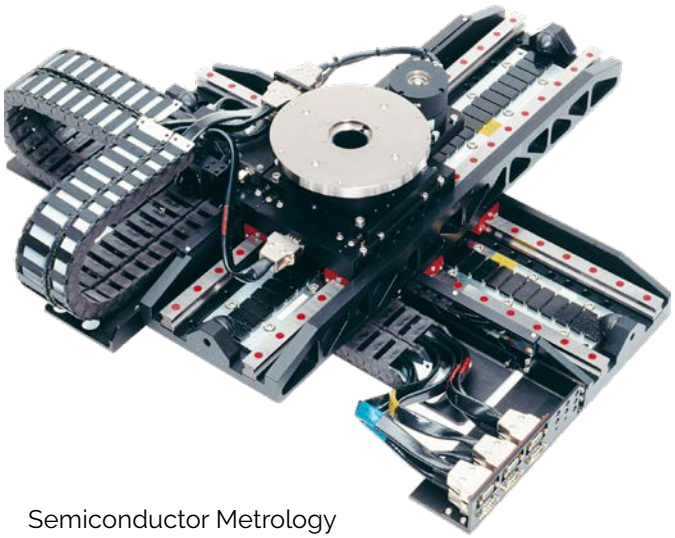
INTRODUCTION

The remarkable growth of the semiconductor, 3D printing, and bioscience/medical systems industries over the last 10 years has placed new demands on machine builders. Customer needs have called for production equipment with ever greater precision and throughput. In mature industries such as automotive and aerospace, machine users also have implored OEMs to provide higher product quality, accuracy, and productivity. These expectations are driving original equipment manufacturers (OEM) to develop machining centers and systems that can process components with much greater precision at significantly higher speed and output.

As machine builders strove to meet these needs, many began outsourcing their linear motion engineering. The goal was to free up OEM engineering resources from the confines of non-core component development to focus on proprietary technologies that generated unique competitive advantage.

To fulfill these needs, linear motion suppliers such as SCHNEEBERGER are building motion solutions that simply plug into the OEM's equipment – enabling considerable savings of engineering time and cost. In this brief, we will explore the key issues OEM engineers and purchasers should know in specifying and procuring linear motion systems. We also will review an OEM case study that illustrates the benefits of applying a total linear positioning system.

Mineral Cast LCD panel metrology



Semiconductor Metrology
(and also Atmospheric)

What is a linear positioning system?

A linear positioning system consists of a group of components that work together to create the most cost-effective system for machine movement. At a minimum, the solution consists of a base or base plate, rails, and saddle. The system can be designed to operate on a single or multi-axis.

Depending on the OEM's specifications, additional components can be added to the positioning system to increase functionality.

These include the following:

- Ball screws
- Drive mechanism (motor)
- Measuring system (magnetic or optical)
- Belt
- Electronics
- Controller
- Cable tracks and connectors
- Frame (may include vibration isolation or damping)

Virtually all motion systems are customized assemblies that are designed by the supplier to meet the OEM's requirements. (However, some vendors will build to the OEM's design in a contract manufacturing mode.) This means the motion supplier will expend engineering time for the initial design, upgrades, and cost-saving enhancements. Make sure these costs are discussed when evaluating supplier proposals.

Linear Positioning Systems: Advantages and Benefits

A linear positioning system provides the OEM with a long list of advantages and benefits.

- ✓ Allowing the motion supplier to perform system engineering and assembly enables the OEM to repurpose its engineering and manufacturing resources. They now are free to focus on designing and producing proprietary technologies that drive unique competitive advantage.
- ✓ Instead of purchasing multiple motion components, the OEM benefits from one-stop shopping. This means one purchase order, one company contact, reduced administrative effort, and single point of accountability that ensures product performance and resolves technical issues. Having one motion system part number also relieves the OEM from stocking and managing inventories of up to 20 individual components.
- ✓ The motion products are designed to reliably work together. Product returns will be minimized. OEMs should experience at least a 97% motion system quality rating.
- ✓ The OEM can purchase a motion system with only the desired functionality. There is no need to eliminate unwanted features and components, such as sensors or drives, associated with buying off-the-shelf components.
- ✓ OEMs will receive better technical support, problem solving and mistake avoidance from their motion supplier. A best-practice vendor will assign a technical advisor to each OEM customer to ensure their linear motion solutions are cost effectively designed and manufactured.
- ✓ The OEM can plan for future product generations by designing in expansion or technology upgrade capability in the first model.

Overall, applying a linear positioning system to the OEM product will accelerate design and manufacturing speed, reduce OEM assembly time and labor, plus achieve a lower total cost of ownership.

Compact Linear Positioning System Solves Microelectronics Equipment Company's Actuator Problems

A capital equipment maker serving the microelectronics industry started the development of a new liquid dispensing machine. The system's purpose was to apply thin coatings to printed circuit boards. A key machine component was a single-axis actuator that operated the valves controlling the flow of the coating fluid. The actuator had to be very small (76 mm X 62 mm X 25 mm), have the stiffness necessary to withstand a harsh environment, and meet the machine's accuracy requirements.

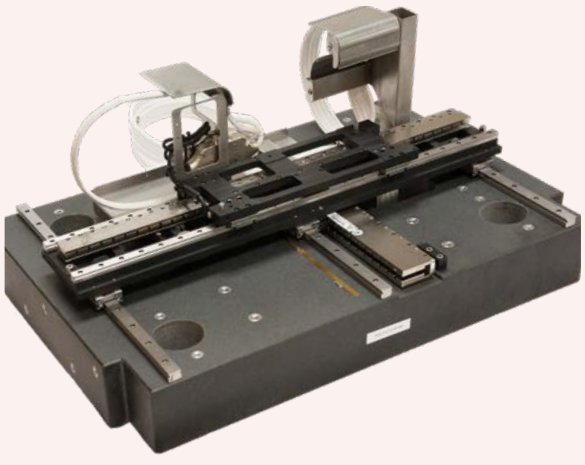
After unsuccessfully searching for a compact, off-the-shelf actuator, the OEM tested custom-built prototypes from several linear motion suppliers. But, their designs failed to meet the customer's specifications. The company then assigned the actuator design to its own engineering team.

As part of this effort, the OEM approached SCHNEEBERGER to purchase MINIRAIL miniature guideways and ball screws for the project. SCHNEEBERGER suggested the customer allow them to propose an entire actuator system that would meet the specifications, retain the OEM's original machine design, and achieve the cost target.

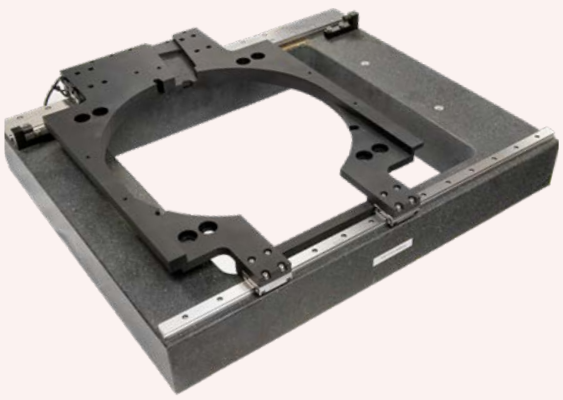
SCHNEEBERGER and the customer worked together to identify design constraints and review the critical requirements. Then, SCHNEEBERGER engineers used their expertise to design the custom actuator and build prototypes for the PCB coating machine. The linear positioning system consisted of two, double-carriage Minirails, a ball screw, Miniscale measurement device, custom-made electronics package, ribbon cabling, connectors, plus a stainless-steel base and cover.

Following product testing, the OEM confirmed that SCHNEEBERGER had the only design that fit into the machine's compact space, provided the necessary stiffness, and met the budgeted price point.

SCHNEEBERGER also fulfilled the OEM's aggressive lead time requirements. The actuator design was approved within 45 days, and production models were shipped to the OEM within 16 weeks. The customer has been applying the SCHNEEBERGER actuator in its coating equipment for over 4 years and has experienced a 3% failure rate. In addition, the OEM reports high satisfaction with SCHNEEBERGER'S engineering and customer service teams for their flexibility and responsiveness.



Semiconductor Metrology (Atmospheric, not vacuum)



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- MONORAIL AND AMS APPLICATION CATALOG
- SCHNEEBERGER BALL SCREWS SBS
- POSITIONING SYSTEMS
- SLIDES

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