

New 450 mm positioning system is twice as fast!

Revolutionary Twin Gantry from Schneeberger

Known for its innovative positioning and motion systems, Swiss firm Schneeberger Linear Technology developed the "Twin Gantry" 450 mm precision positioning system.

Initial tests and analyses prove that the positioning speed in precision applications such as wafer production can be doubled. The Twin Gantry has been on the market since mid-2014.

Mobile telephones, tablets, laptops and many other, routine electronic products are becoming ever more efficient and/or smaller. This is due to the semiconductor chips, miniaturisation of which seems to be endless. Inserting and testing structures (data highways) in these tiny electronic parts requires systems whose accuracy of movement has to be within micrometres and nanometres. The major chip manufacturers also expect optimum speed, as this has a direct impact on profit. In addition to the optical system, in order to best satisfy the requirements efficient positioning units are in great demand in production and test facilities. They ensure that the wafers dotted with hundreds of chips are quickly and accurately positioned.

Schneeberger AG, based in Roggwil, Switzerland, is a leading supplier of precision motion systems. The customers and end users all have very different accuracy requirements. However, it is becoming more common for positioning accuracies to range from ten to one hundred nanometers for an area of 250,000 mm² because of the recent advances in miniaturization. To illustrate: the ratio between a nanometer and a meter is roughly equivalent to the relationship of a hazelnut to the Earth.

Schneeberger positioning systems have a long history of achieving the precision required for the approach and stop motion. This is partially attributed to the use of hybrid materials that combine, for example, carbon fibers and aluminum. When the mass being moved is low, the acceleration can be faster and more accurate. High rigidity is guaranteed even with low weights. The improved dynamics enable chip manufacturing units to achieve higher throughputs, which is more economic.

Twin Gantry: less weight, more speed

In the interests of greater efficiency, Schneeberger engineers developed a new positioning system that underwent extensive testing. Their initial results promised a real quantum leap in terms of improved performance and that is, in fact, what turned out to be the case. The company assumed the Twin Gantry would double the speed of semiconductor chip testing, which ultimately provides a considerable increase in productivity.

The name Double Gantry reflects the decisive technical principle: two gantry axes are used. The X and Y axes are uncoupled. This is possible by arranging them in a cross and achieving independent movement through multiple guide rails. This innovative structure means the lower axis does not have to bear the weight of the upper axis, which massively reduces the lower axis's speed in the usual stacked configuration. In the Double Gantry, the X and Y axes each bear their own weight, as well as that of the axis of rotation, the wafer and the clamp system.

Furthermore, Schneeberger uses a high-tech composite material for the x- and y axes made of various carbon fibers and fitted with integrated attenuation layers. This is how they manage to rapidly dissipate even minor oscillations in the system during positioning and to stabilize the system as quickly as possible. The use of profiled guideways designed and manufactured in-house is also helpful. In this way, our specialists achieve optimum pulsation levels with maximum rigidity.

The Twin Gantry also features a flat rotational axis that with a 300 mm diameter, has an installation height of just 26 mm. In this way, the center of mass is also reduced, which ultimately leads to the increase in the dynamic positioning speed.



The Swiss company

Schneeberger AG brought

the Twin Gantry positioning system to market in 2014, which has virtually doubled the production speed of wafer manufacturing

and testing systems. Schneeberger manufactures all the essential parts in-house – from the cast mineral base and miniature guideways to the measuring systems.

Optimal values in terms of precision dynamics

Speed and precision are equally important for achieving a high production speed. In the final analysis it's a question of approaching clearly defined structures as quickly and accurately as possible.

Production speed suffers if a positioning system moves quickly to a defined position, but has to be adjusted there for a long time due to lack of precision. It is therefore worth approaching the predefined structures quickly and accurately.

Many different innovations enable Schneeburger to optimally achieve this with the Twin Gantry system. In figures: acceleration up to a 5 g force with positioning accuracy of 0.5 μm is achieved when installed in a semiconductor test system. If the user requires greater precision, the Twin Gantry can achieve positioning accuracies of 100-nanometers. Even then, acceleration speeds of 2 gs are still possible. What setting achieves the best productivity is impossible to say. That entirely depends on the specific application. Schneeburger is glad to provide the necessary customer support through appropriate adjustments to achieve optimum results.

Initial analyses and tests have shown the Twin Gantry provides enormous potential for productivity gains. Consequently, the company receives numerous inquiries from the semiconductor industry. The Twin Gantry's impressive production speed also attracts the attention of other companies in the microelectronics industry as well as the solar power and medical technology sectors. In all cases, Schneeburger is perfectly ready to adapt its systems to the different requirements.

Improved detail: superlight structural component

As one of the leading manufacturers of innovative positioning and movement systems, Schneeberger AG is always at pains to innovate. The company's engineers don't concentrate exclusively on complex system solutions such as the Double Gantry. The developers also place great emphasis on minor, detailed improvements. The latest example is a bionic laser welding structural component. The idea is that it should weigh less than half the weight of previous solutions, yet have the same rigidity and have the ability to be used in various positioning systems. The secret lies in the production process and the newly defined geometry that it makes possible.

This bionic laser welding structural component is supposed to weigh much less than half, but have the same rigidity.

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