From high-tech

All MEPP (All Mechatronical Engineering Projects & Prototyping) in Eindhoven is a start-up (of November 2007) with a long history in precision engineering. When the established system supplier KMWE Precision Systems & Precision Components, also in Eindhoven, started focusing more and more on series production rather than on special engineering projects, five of its experienced engineers decided to start their own enterprise. All MEPP is an independent engineering agency that designs and constructs high-tech equipment, special machines and tooling according to the client's specifications. Now, eighteen months later, the track record is already impressive.

Of course the Eindhoven region, heart of the Dutch high-tech manufacturing industry, is a main target for All MEPP, but the engineering agency is expanding its activities throughout the Netherlands and has started exploring the Belgian and German market. All MEPP decided to stay away from the highly volatile semicon market, and to focus on stable (medical) and promising growth (solar and wind energy) markets. In the meantime, it has taken a more general approach to the machine construction market. In the automotive industry, for example, opportunities for product innovation and process automation have been identified. According to All MEPP, the key issue in automotive mechatronics is to establish progress in car systems, such as the drive train, motor management and environment control.

Engineering

All MEPP offers engineering services, from concept design to testing of first products. Its competences include mechanical and electrical engineering, software, value engineering, prototyping, assembly, feasibility analysis and project management. A fine example of value engineering (cost reduction) by All MEPP concerns FEI's tabletop electron microscope Phenom. At the moment, All MEPP employs fourteen people, and the ambition is to grow to a staff of 25. In the early days, engineers were posted at customers, but last year the company's philosophy was changed, and now all engineers but one work in-house on challenging projects.

Handling

Customers are high-tech companies in various markets, and projects thus far include the redesign of the control system of a diamond processing machine, a robot handler including fracture inspection for solar cells, a bending tool sensor, a transport case for silicon wafers, and the engineering and commissioning of a laser welding production line. A common denominator in several projects is handling (accurate transportation and positioning) in processes, both in air and in vacuum, concerning (fragile) objects such as chips, solar cells, DVDs, LED displays and liquid samples. Following work on the automation of solar

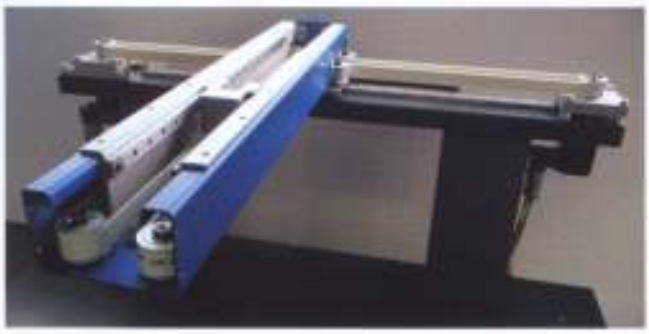
handling to pneumatic precision

cell handling, a system for measuring wafer thickness was developed; see the box.

An example of All MEPP engineering: handling system for solar cells.

High-tech and low-cost

Another example is the design of a standard, low-cost XYZ system, with a measuring range of up to 1,200 mm in all three dimensions. The system can achieve high-speed movements with high accuracy. The unique design feature of this system is the placement of the motors on the base frame, hereby strongly reducing the mass of the system. The project illustrates one of All MEPP's characteristics, the combination of high-tech and low-cost in engineering.



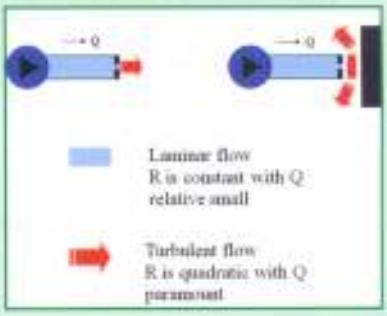
All MEPP's design of a low-cost XYZ system features a measuring range of up to 1,200 mm in all three dimensions.

Pneumatic metrology

In the course of a project on handling fragile solar cell wafers, the need for contactless measurement of their thickness came up. An accuracy of 5 µm was requested. All MEPP elaborated a pneumatic metrology that under laboratory conditions has achieved an accuracy of 0.1 µm.

Nozzles connected to air tubes are placed above and below the wafer, allowing at both sides for a small gap between nozzle and wafer surface. This gap represents a pneumatic impedance to an air flow escaping through the nozzle. At the nozzle, the air flow (laminar within the tube) will become turbulent, which makes the impedance quadratically dependent on the flow. As the pneumatic impedance also depends on the gap size, this allows – after calibration – for determination of gap size. To that end, a control loop is implemented that keeps the flow constant, hence 'measures' a variation in impedance that reflects the variation in gap size. These variations in gap size, when combining the signals from above and below the wafer, offer a measure of thickness (variations).

This principle of measurement may find other applications, for example in checking the print quality of printing machines.



The underlying physics of All MEPP's pneumatic metrology.

Set-up for thickness measurement using the pneumatic metrology.

Information

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