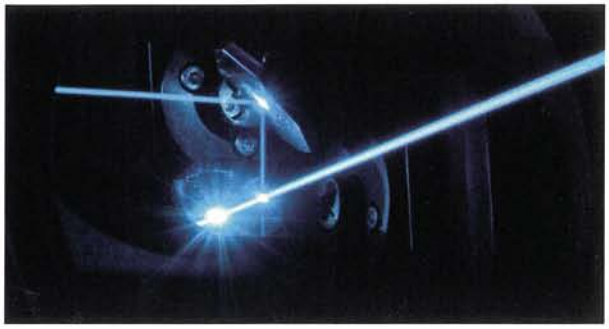
Laser micromachining has for the last few years been widely used in the industry. Among others the electronics industry has, with its ever lasting need for denser circuit board structures, adopted the technique to achieve high density interconnects as well as in laser marking.



Outstanding laser micromaching technology uses PSD

The most flexible micromachining systems use the so called direct writing technique. Here the laser beam is guided to the position of machining and hence, the heart of such a system is the laser deflection unit. With high speed and excellent accuracy it must, with great repeatability, guide the laser beam to exactly the right position at exactly the right time.

A laser deflection system is principally made out of a motor block with two scanners, angle mounted, each equipped with a mirror on their rotary axis. The laser beam is reflected by the first mirror towards the second mirror and then towards the XY-plane. By regulating the angle of both mirrors, any x and y position in the XY-plane of the working field can be reached. A closed loop regulation assures the accuracy of the system.

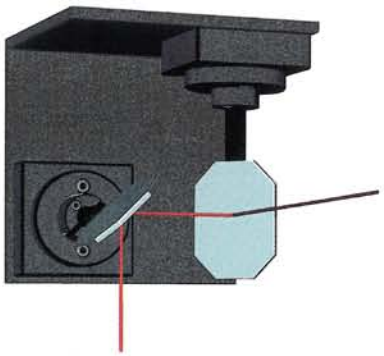


Figure 1. Principle of direct writing using rotating mirrors.

Since 1988 the Belgium company Newson Engineering NV has been working in the field of signal measurement and control engineering. Their experience found its way into a choice of high quality, leading edge products and in 2001 they patented the rhothor™ concept, setting revolutionary new standards in laser deflection.

Figure 2. Newson Engineerings scanner unit rhothor™.

In the rhothor™ scanner the mirror position measurement is done with a PSD. The SiTek PSD was chosen due to its good position resolution, excellent linearity and short response time. A LED or a laser is used as a light source. The light finds its way onto the PSD through a small hole in the rotor. When the rotor is turned, the projected light spot moves on the active surface of the PSD. This approach constitutes a flexible position measurement system. It is flexible because the angular range and resolution can be set by choosing the right PSD-size and location.

If a larger angular measurement range is required, one can use a PSD with a larger active length or place the PSD closer to the rotating axis. The angular measurement resolution can be increased by simply using a smaller PSD or enlarging the distance between the PSD and the rotating axis. The concept also enables a resolution improvement without reducing the angular range of the scanner if multiple PSDs and LEDs are used.

The PSD based solution is not only flexible but enables the fact that laser machines equipped with a rhothor™ laser deflection system raises both its speed and its accuracy. In fact, rhothor™ beam deflection systems are more than two times faster than the common moving magnet beam deflection systems and consume less than a third of their power.

So next time you take a look at a circuit board and realize that the microvias actually are thinner than a human hair, give SiTek a thought. Possibly the manufacturing has been guided by a PSD from SiTek.

For more information about rhothor™ visit www.rhothor.com

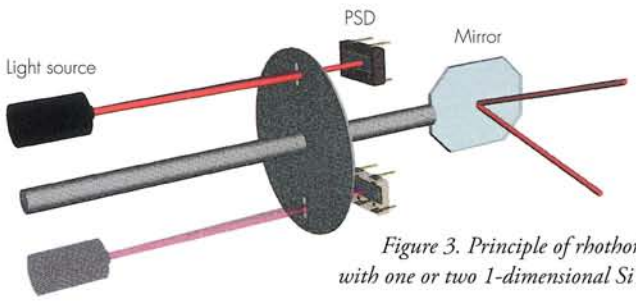


Figure 3. Principle of rhothor™ scanner with one or two 1-dimensional SiTek PSDs.