

Foot pod by Garmin

Step sensor with laser technology

A majority of people keep fit with sport these days. The most popular types of sport all over the world are walking and running. Many sportsmen carry out these activities as amateurs, and some have ambitions to reach a higher level. Others have even made their passion into their occupation. In all cases you will need a lot of training to reach your ambitious targets. Garmin helps you to stay at this level, or even to improve it. Garmin is the global market leader in the field of mobile navigation and GPS satellite communication. With its almost 9,000 employees worldwide and locations in the USA, Taiwan and Europe, Garmin is one of the most experienced manufacturers in the field of mobile navigation systems.

Garmin measuring system for optimising your training

In order to support sportsmen in their training, Garmin has introduced a new range of highly sensitive measuring units: A step sensor, mounted in the instep of your running shoe,

based on MEMS (Micro Electro Mechanical System) measures the speed and route and sends this information to your Garmin wristwatch via GPS. The information gathered can later be analysed on your computer and thus you can optimise your training.



Foot pod by Garmin.

Safety and reproducibility required

Since most running is done outdoors, the sensor must be protected from the effects of the weather. The sensitive electronics system can otherwise suffer damage. Results will be distorted. The sensor must therefore be absolutely airtight and watertight. Previous models were unable to guarantee weather tightness and were therefore only suitable for use indoors. The major challenge when realising an outdoor unit was the airtight connection of the plastic components. Existing connection technologies were not able to meet these requirements. The high levels of technical performance required, in particular in day-to-day use, were so far unable to guarantee reproducibility.

Request: New connection technologies

Garmin's search for alternative connection technologies led them to GeniRay – a Taiwanese company, a distributor for Leister lasersystems – the competent partner. For many years Leister has specialised in the development and production of systems and components for laser welding of plastic materials, and suggested this technology to Garmin as a solution. Garmin not only has high demands of quality and productivity, but also has flexibility in production. The welding system is intended to be used in various different production facilities and on several different products. It must therefore be space-saving, mobile and be arranged as a manual operation workplace. The experts at Leister and GeniRay support Garmin with the introduction of laser welding technology into the company. The discussions included material combinations as well as questions of design.

Tests passed with flying colours

Leister provided Garmin with a laser welding system for test purposes. This loan equipment allowed Garmin adequate time to qualify the process. In the tests, the advantages of laser welding assisted Garmin in producing an increased throughput with simultaneous minimalisation of scrap and therefore increasing productivity. In addition, the reduced energy and maintenance costs ensure the profitability of laser technology. Both the decisive leak proof test and the drop test were passed with excellent outcomes. The welding results achieved were in excess of Garmin's expectations. For this reason, Garmin decided to use laser welding of the plastic parts with Leister Process Technologies as technology provider. This meant that the component was ready for mass production.

Flexibility and short changeover times

In order to meet the strict demands, Garmin used a laser system from the NOVOLAS Basic AT range by Leister, combined with a movement system, and installed in a mobile cell. This arrangement allows Garmin to use the laser welding system not only for its outdoor range, but also for its navigation products. Product change is simple, replacement of the component and loading the weld contour with the process parameters take only a short time. This increases the availability of the plant many times over. The earlier adhesive principle required extended application and hardening times, thus creating longer cycle times. The hardening times are completely eliminated with laser welding. This means that the transfer times between the working steps are extremely short. In addition, the joining time was reduced by almost 50 % by the use of laser welding. The higher investment costs of the laser system, as compared with using adhesives, were amortised within a short period of time.



Novolas Workstation by Leister.

From the indoor to the outdoor step sensor

The use of MEMS and GPS technologies make the Garmin sensors ideal for individual training. The 3D precision sensor measures the acceleration of the movement and thus calculates the running speed with 99 percent accuracy. Thanks to the laser welding technology by Leister, Garmin was able to introduce a new generation of outdoor step sensors. They are effective and reliable training partners and motivate users to improve their performance.

Short profile Leister Lasersystems

Leister develops and manufactures laser systems for precision welding of plastics and for soldering of electronic components. Some of the main fields of application are automotive components, medical technology, sensor and microsystem technology (fluidics, microchips and biochips) and electronics.

Leister offers customer oriented standalone solutions and flexible systems for integration as contour welding, simultaneous welding, mask welding, quasi-simultaneous welding and GLOBO welding.

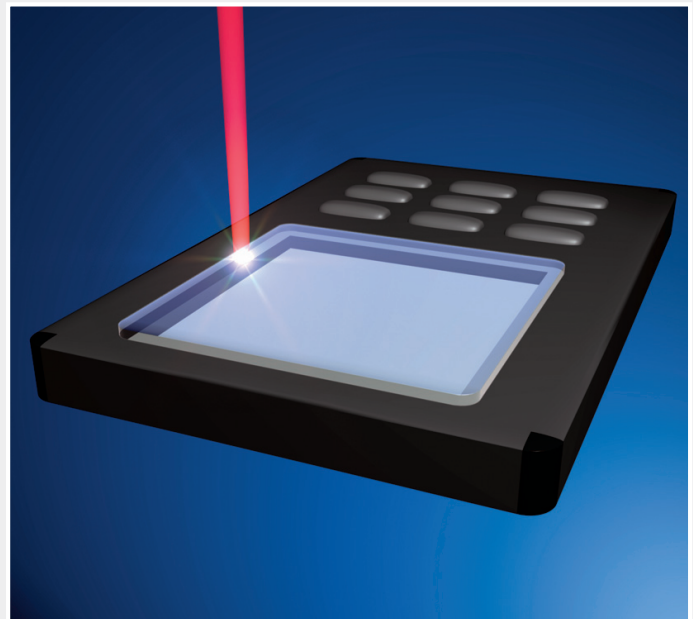
Leister Process Technologies, CH-6056 Kaegiswil, Switzerland, www.leister.com/lasersystems

Contour welding

In contour welding, a laser spot is guided sequentially along a predetermined welding pattern, melting it locally. The welding volume remains comparatively small as a result of the geometric conditions, and extrusion of the melt is avoided. Relative motion, is achieved by moving the component, the laser, or a combination of both.

Characteristics and application:

- Laser beam focused to a spot
- High flexibility
- Arbitrary 2D joining line
- Ideal for frequent changes of component



For producing the Garmin foot pods, contour welding concept is in use.

Foot pod manufacturer:	Garmin / Taiwan / www.garmin.com
Distributor of the laser system:	GeniRay Technology Corp. / Taiwan / www.geniray.com
Lasersystem manufacturer:	Leister Process Technologies / Switzerland / www.leister.com/lasersystems
Authors:	Dipl. Ing. Carsten Wenzlau, Product Manager Lasersystems, Leister Process Technologies Dipl. Ing. Oliver Hinz, Business Develop Manager, Leister Process Technologies
Photos:	Leister Process Technologies / Switzerland / www.leister.com/lasersystems

