

Laser Welding with Leister Prevents Drowning



BlueFox ST1 – The alarm on this safety bracelet protects against drowning.

When people drown, it's usually a completely silent process. In a critical situation like this, every second counts. The BlueFox ST1 system is an innovative safety bracelet which helps parents and lifeguards to quickly identify when someone may be drowning.

The innovative system includes a microcomputer which analyzes the measurement sensors in order to measure water pressure and detect depth. The computer software is used to program the system to the required water depth and time. If either the depth or the time is exceeded, a capsule is released from the bracelet and a balloon is inflated.

The balloon, which is fitted with a speaker, floats to the surface of the water and sounds an alarm. To ensure that the BlueFox ST1 would be able to meet watertightness requirements up to a depth of 10 m, it was necessary to identify a suitable process for connecting the two housing halves and the polycarbonate strap.



BlueFox ST1 safety bracelet for more protection in the water

Electronic Components and Welding Processes

BlueFox initially attempted to weld the components using ultrasonic technology. This was unsuccessful because it destroyed the electronics in the housing halves. Deep Blue AG then tried out laser welding as an alternative. This is a contactless method that allows components to be tightly welded together with precision – and without damaging the electronics.

A Welding Challenge

As is the case with all welding procedures, design rules must be followed for the laser welding of plastics. In addition, the component must pass a final quality inspection. In this application, the quality inspection is based on a welding path. By meeting the required criteria in terms of quality and flexibility, quasi-simultaneous welding proved to be the ideal solution.

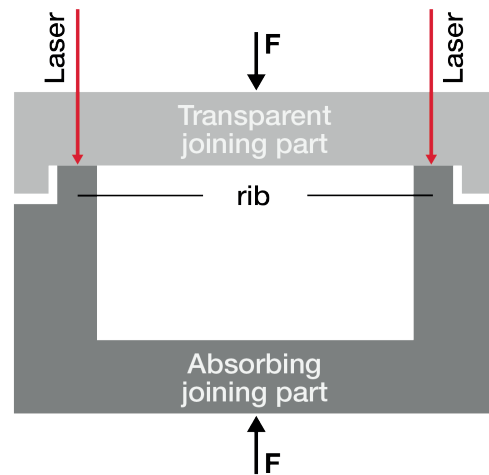
The functional principle of quasi-simultaneous welding is based on two scanner mirrors which deflect the laser beam and guide it along the welding contour at high speed.

The beam moves over the contour several times and the joining seam is plasticized practically simultaneously. When joining pressure is applied, molded part tolerances are compensated. The welding path is measured by the path measurement sensors on the clamping device.

In order to use quasi-simultaneous welding in this application, the geometry of the components had to be modified.

To prevent burning in the welding seam, the energy directors had to be changed to ribs.

This is because the ribs provide the flat welding contour required and also supply the necessary melt to produce a welding path. See figure below:



The targeted melting process ensures that the BlueFox ST1 is watertight.

The next step involved adapting the color of the components for laser transmission welding. The laser-transparent joint partner was colored with a pigment that is transparent to laser radiation.

This means that a plastic which is transparent to the laser does not necessarily need to be transparent to the eye. In this way, even components in different colors can be laser-welded together and customers' individual color requirements can be met.

This example is yet another demonstration of how important it is to get the design of components right, even at the development stage.

Leister offers support when it comes to selecting the joining process as well as designing the joint partners. This helps to reduce risks and enables prompt qualification of the process.

The consultations with Leister convinced Deep Blue AG that Leister and its quasi- simultaneous welding process were the right choice. This is because quasi-simultaneous welding offers a high level of flexibility where the components' geometry is concerned and facilitates melting due to the simultaneous plasticizing of the seam.

In addition, the procedure offers short process times and is therefore the ideal basis for the planned production rate of around 50,000 BlueFox ST1 per year.

A Solution from Leister – The NOVOLAS WS-AT System

Leister's many years of experience with different plastic materials, product design, locating fixtures, and laser welding concepts have once again helped to pinpoint exactly the right process for the job.

The laser welding method was brought to production maturity in a mere four months. To ensure that the laser is also entirely safe, the turnkey NOVOLAS WS-AT system was selected. Using AT scanner optics in conjunction with path measurement sensors fitted to the clamping device, the NOVOLAS WS-AT operates exactly as is needed to suit the requirements of the BlueFox ST1.



Leister scanner optics

The Leister human-machine interface (HMI) features a user-level controller and also makes it possible to evaluate quality at the same time. The values measured by the path measurement sensors are recorded and checked by means of an envelope curve which defines the upper and lower limits. This ensures an automated 100% inspection of the components.

Its easy operation and outstanding cost-effectiveness combined with high flexibility convinced Deep Blue AG to purchase the NOVOLAS WS-AT. Furthermore, the short process times make it possible to surpass the previous production goal of 50,000 BlueFox ST1 per year.

The NOVOLAS WS-AT is without doubt a solid investment for the future, as its high flexibility makes it ideal for welding all kinds of components.

Service With a Personal Touch

With the BlueFox ST1 developers located only a short distance away from Leister's head office, it was possible for them to benefit from consultations at short notice – on optimizing the component geometry, coloring, and the subsequent application tests.

This kept the development time short and made it possible to launch the product quickly.

The process that produced the perfect welding results was established after just two meetings at Leister.

Deep Blue AG

Headquartered in Hallwil, Switzerland, Deep Blue AG is defined by innovation and many years of experience in underwater technology.

The element of water has been the focus of the company's founder for the past 30 years or so. This has produced outcomes including the invention of the world-famous Aladin dive computer in the 80s.

Deep Blue AG's vast experience in underwater ultrasonic technology prompted the company to develop the BlueFox ST1, a safety bracelet for monitoring swimmers.

For decades, Deep Blue AG has invested all its energy into developing safety systems while remaining true to its Swiss roots.

A Feeling of Safety

The BlueFox ST1 safety bracelet helps you to feel safer in the water and has the added bonus of not restricting you with buoys, belts, or other equipment.

Additionally, the BlueFox ST1 is not just for athletes – it is designed for people of any age group, ranging from toddlers right up to the elderly. And of course, it is also ideal for those who are carrying out activities on the water, but don't want to end up actually in the water.

For more information on the BlueFox ST1:

www.bluefox-swiss.com

For more information on swimming pool safety systems:

www.bluefox-poolsafety.com

Material

> Polycarbonate

Leister Products

NOVOLAS WS-AT

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NOVOLAS WS-AT