LaserMicronics
MICROMACHINING SERVICES

Press Release

Reliable plastic connection for rapid wound healing

LaserMicronics safely joins the core of a medical device through high quality laser plastic welding

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The innovative micro water jet device debritom+ is a device for medical wound cleaning developed by leading medical technology engineers of CARAG AG. It is produced using state-of-the-art processes and promises particularly tissue-preserving wound cleansing and faster healing. The fact that the device can function in this optimal way is also due to laser technology.

Chronic wounds in particular can be treated with micro water jets with very little pain. A high-pressure micro water jet removes slough such as fibrin, necrosis or biofilm, removes foreign bodies from acute wounds and is ideally suited for efficient irrigation of contaminated wounds. The intended microbleeding induced through the processs stimulates wound healing is stimulated again. The treatment significantly reduces the duration of wound healing and protects the healthy tissue. In addition, the treatment is fast - a relief for patients as well as doctors and nursing staff.

In order to meet the high demands of doctors and patients, the manufacture of the debritom+ device is very demanding. The materials and workmanship must be of exceptionally high quality. For hygienic cleanliness, production is therefore carried out in a clean room, and the components are made of high-quality plastics - with high resistance to cleaning agents.

The most important functionality of the debritom+ itself, which is distributed from Switzerland by medaxis, is pressure generation. The liquid is pressurized in the device with up to 200 bar, test pressure is even up to 400 bar. Hence, a key component is the valve block where pressure is generated. In order to guarantee the stability of the connection between the two components made of POM-H, the manufacturer relies on the laser plastic welding by LaserMicronics GmbH. LaserMicronics uses this process to produce safe, hygienic and hermetically sealed connections between plastic components.

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The valve block for the wound cleaning device is a microfluidic component whose contour is traced in the welding process. The particular LPKF laser system used for this process determines the exact welding parameters based on the data and ensures precise welding seams. The resulting joints are almost as strong as the base material. The machine also enables complete process control and traceability of the results. Thus, the welding seams are precisely positioned and the results inspected.

At LaserMicronics, the joining of clean room produced components is also carried out in a class 5 clean room. Welding times of just a few seconds enable high cycle rates. The fact that the machine combines a short cycle time with high quality weld seam ensures high output and prompt availability of the welded components. This contributes to short delivery times for the debritom+.

The laser plastic welding process is also suitable for the production of housings with electronics and sensors, for cartridges or other microfluidic plastic components. Particle formation, such as that caused by minimal friction in ultrasonic welding, is avoided in laser plastic welding. In addition, the process does not require any chemical additives for joining the material. This is a particularly important point for applications both in medical technology and in the food and beverage industry; in both sectors, even the slightest contamination must be avoided at all costs.

Figure 1: The debritom+ precision device for gentle wound cleansing, especially of chronic wounds

Figure 2: One of the key components of the device: The valve block consists of a laser-transparent and a laser-absorbing plastic element - firmly welded and tested for pressures up to 400 bar.

Figure 3: An LPKF laser machine, comparable to this LPKF PowerWeld 6600 model, welds the valve block components together.

About LaserMicronics

LaserMicronics GmbH specializes in micromachining and material processing with laser systems. Engineers and physicists work on the development of customer-specific solutions backed up by comprehensive machinery. The range of services includes feasibility studies, process optimization and the job-shop production of prototypes or series.