

Press Release October 2001

**StarWeld Manual with *dynamic beam welding* technique**

## ***Compact Laser Micro Welding Station***

**STARNBERG** - Positioning speed and accuracy are the key requirements of the laser beam for micro welding applications. E.g. in the fields of electronics, electromechanics, sensors, telecommunication or medical devices, the moving axes of positioning systems often limit the speed and the accuracy of the welding process. At the Productronica Fair in Munich, BAASEL LASERTECH, a company of the ROFIN-group, presents the new StarWeld Manual with *dynamic beam welding* technology, galvo-deflection heads and the unique *sweet spot* resonator as a starting model for small series production. Special emphasis is laid on flexibility, on welding quality, and on processing speed.

The turnkey system StarWeld Manual was designed as an ergonomic, seated workplace with emphasis on sufficient leg room and fatigue-free loading. The system is only 800 mm deep, no more than an office desk, requiring extremely little floor space. With a total height of only 1400 mm the system can be „overlooked“ comfortably. This is an advantage because it contributes to the visual transparency of the production shops. The integrated LCD monitor and the fold-up keyboard provide additional compactness. The monitor displays the programmed welding path and optionally a simultaneous picture of the work piece from a cctv camera.

With the *dynamic beam* technology (see below) and the proven LaserCAD beam control, any geometric contour can be conveniently programmed and edited. Within such a program, the laser parameters, like pulse energy, average power or focus diameter, can be adjusted dynamically. The integrated program editor with its extensive library allows greatest flexibility even for very sophisticated welding requirements like pulse shaping or ramping. Various network interfaces and teleservice are a matter of course, just as the possibility of integrating a cctv camera system or a weld check monitor.

The z-position of the laser focus can be adjusted manually or program controlled optionally. Also, a rotary chuck for cylindrical workpieces with a maximum diameter of 125 mm can be integrated.

The built-in pulsed Nd:YAG laser with its unique *sweet spot* resonator (see below) is air-cooled and provides pulse energies of 60 Joule and an average power of up to 40 W. Depending on the focusing optics and the operational mode, welding spot diameters between 0.05 and 1.0 mm can be obtained. With these values even the finest wires or thinnest foils with a thickness of below 50 µm, or copper plates of 1 mm thickness, can be welded with high quality and consistency.

The StarWeld Manual is particularly well suited for efficient small series production in the fields of electronics, telecommunication, medical devices, job shops and precision mechanics.

Carl Baasel comments on the introduction: „*The StarWeld Manual pools our entire competence coming from the fields of laser technology, systems building and digital controls. It is the ideal system for high-quality precision welding in offline-operations*“.

### ***Dynamic beam welding: flexible and dynamic with an excellent price performance***

In laser material processing either the workpiece and/or the processing optics are moved. As an alternative for smaller working fields the laser beam may be positioned with galvanometric rotating mirrors. This method allows considerably higher positioning speeds as well as higher precision at lower investment costs. Examples for the successful use of this technique are laser marking and the remote welding in the field of high power lasers.

BAASEL LASERTECH has already been using the *dynamic beam welding* technique successfully with pulsed solid-state lasers for several years. With the powerful LaserCAD editor, any geometric contour together with the corresponding laser parameters can be programmed easily and conveniently. In addition a pattern recognition system with a thru-the-lens video camera can be integrated as an option. Here the big advantage of the *dynamic beam welding* technology becomes obvious: possible tolerances of the workpieces or the fixtures can be detected and corrected in real time.

For sublimation cutting the same technology, *dynamic beam cutting* in this case, has also been employed successfully, using CO<sub>2</sub> lasers or Q-switched solid-state lasers.

### **Sweet spot resonator: precision and consistency**

Most solid-state lasers (e.g. Nd:YAG) have the thermophysically induced characteristics that the beam quality changes with laser power. This causes a changing welding depth from one pulse to the next in a welding sequence, because the focus diameter changes.

This mostly adverse effect is compensated by transmitting the beam through a fiber, however at the cost of an overall larger focus diameter. The reason is the step index fibers emit a beam with constant but reduced beam quality independent of the incoming beam quality. This results either in a larger welding spot or, alternatively, if that is compensated optically, in lower position tolerances for the workpiece in the beam direction.

To overcome this problem, BAASEL LASERTECH has developed the unique *sweet spot* resonator offering an almost constant and high beam quality with very good focusing properties. That way the *dynamic beam welding* technique can be employed with direct beam delivery without a fiber, resulting in larger working fields with a good resolution and higher speed - still ensuring consistently high welding quality.

For particularly precise weldings of very thin wires and sheet metals, with thicknesses as low as 50 µm, the focus diameter can be reduced once again - of course with lower average power. The *sweet spot resonator* has thus far proven successful in processing highly reflecting - and therefore difficult to process - materials like copper, gold and silver.



**Fig. 1**



**Fig. 2**

**Fig. 1 + 2:**

The **StarWeld Manual** is a compact and ergonomic laser micro welding station. The unique *sweet spot* resonator as well as the LaserCAD beam control allow flexible, high precision welds. The ***dynamic beam welding*** technology based on galvanometric moved rotating mirrors allows higher processing speeds and higher precision at lower investment costs.

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