

# LASER REVOLUTIONIZES INDUSTRIAL WELDING

## There is a new generation of laser welding equipment on the market specially designed for manual spot and small seam welding.

This generation is represented by the LSW 4000 manual welding unit from A-B Lasers, Inc. These welders are small, mobile, powerful and simple to operate, and are capable of welding different metals or metal combinations. This new concept in low cost welding opens up possibilities for lasers that were previously unimaginable.

These desktop lasers are generally intended for manual welding. The welding source is a pulsed solid-state laser, and the laser head and supply are integrated into the workbench. The welder requires no external cooling and no special installation.

## The Work Zone

Special attention has been focused on creating an ergonomic operator station that is not intimidating. This guarantees fast and efficient work, without fatigue, for many hours. The operator sits in front of the welder and manually loads parts to be welded into the enclosure. The operator has a clear view of the processing area through a large laser-safe window of protective glass. The final positioning of the workpiece is made with the aid of a stereo microscope. For enhanced viewing of the workpiece, a CCTV option is available. An

aiming device in the microscope (alignment crosshairs) is used to position the workpiece. After positioning, welding is initiated by depressing a footswitch. Cover gas (nitrogen or argon, selected to prevent discoloration or contamination of the weld) is used only during the actual welding process, substantially reducing operating costs.

Although the desktop welder was specifically designed for manufacturing in small batches, and for repairs, it has also been found to be economical for larger production batches through the use of suitable fixturing. Proper fixture design enables simple, fast-loading, positioning and discharging the workpieces after operation is completed.

## Advantages

When compared with conventional methods, such as soldering, resistance and plasma welding, etc. desktop laser welding offers many advantages:

- Simplification of the work process;
- Welding with high precision;
- Enhanced manufacturing quality, with fewer rejects;
- Increased throughput;
- Welding different metals or metal combinations, especially metals with high thermal conductivity and high melting point (copper, titanium, tantalum, silver, gold, platinum, etc.);
- No contact welding, causing distortion or thermal stress;
- Small heat-effect zone;
- Welding where access is difficult;
- Avoids use of solvents, etc.;
- Low maintenance, low operating costs, reduced labor costs.

Some of the present areas of application are:

- Manufacture of micro-mechanical and precision components;
- Medical assemblies;
- Dental prosthetics;
- High reliability electronic assemblies;
- Repair of components and electric circuits;
- Calibration and alignment of precision mechanisms;
- Jewelry manufacture;
- Eyeglass manufacture, repair.

## Dental Engineering Applications

In modern dental engineering, bridge blanks, metal cast clips, wire clasps and the like are welded by laser. Typically, the materials used are gold, reduced gold alloys, steel and titanium. The reasons for using laser technology in the dental lab are:



Example of the precision welding in a dental application



The LSW-4001 desktop laser welding system.

- Welding directly on the master model; embedding and transfer are no longer necessary;
- Welding in the immediate vicinity of ceramic and plastic parts is possible due to the small zone of heat effect;
- Welding of fine joins with high strength and practically no warp;
- Welding with high precision;
- Simplified handling, especially when welding in areas that are difficult to access;
- Capability of welding titanium.

Titanium is used in modern dental engineering for dentures and implants. This material is becoming more and more significant in many areas because of its biological compatibility, neutral taste, strength and low weight. Conventional methods, like micro-plasma welding, often produce unsatisfactory results. The strength of the joins is inadequate due to the hardness increment. Laser welding avoids this problem, allowing wider use of titanium in dental applications.