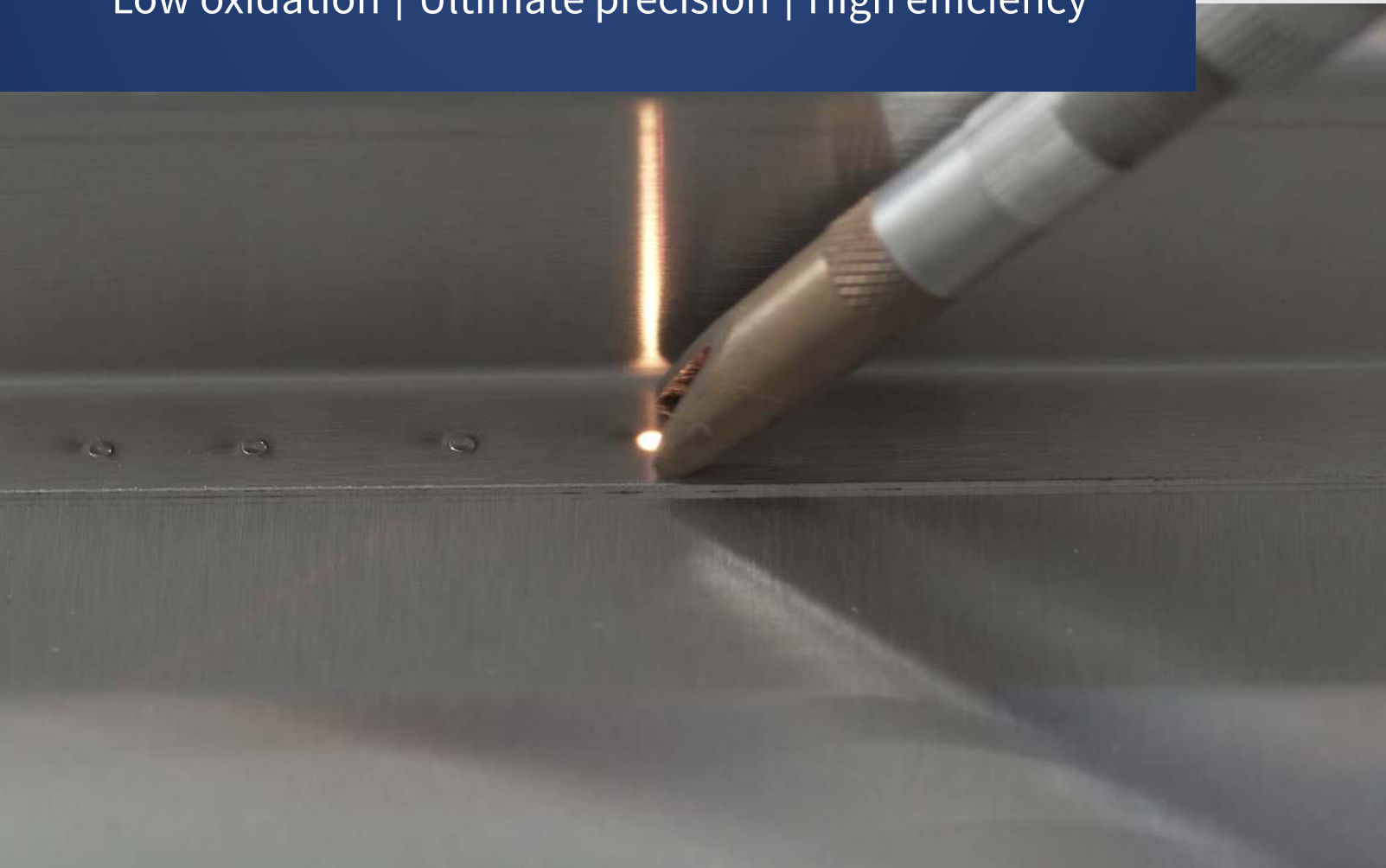


LASER WELDING SYSTEMS

Low oxidation | Ultimate precision | High efficiency



HOW LASER WELDING WORKS

How It Works

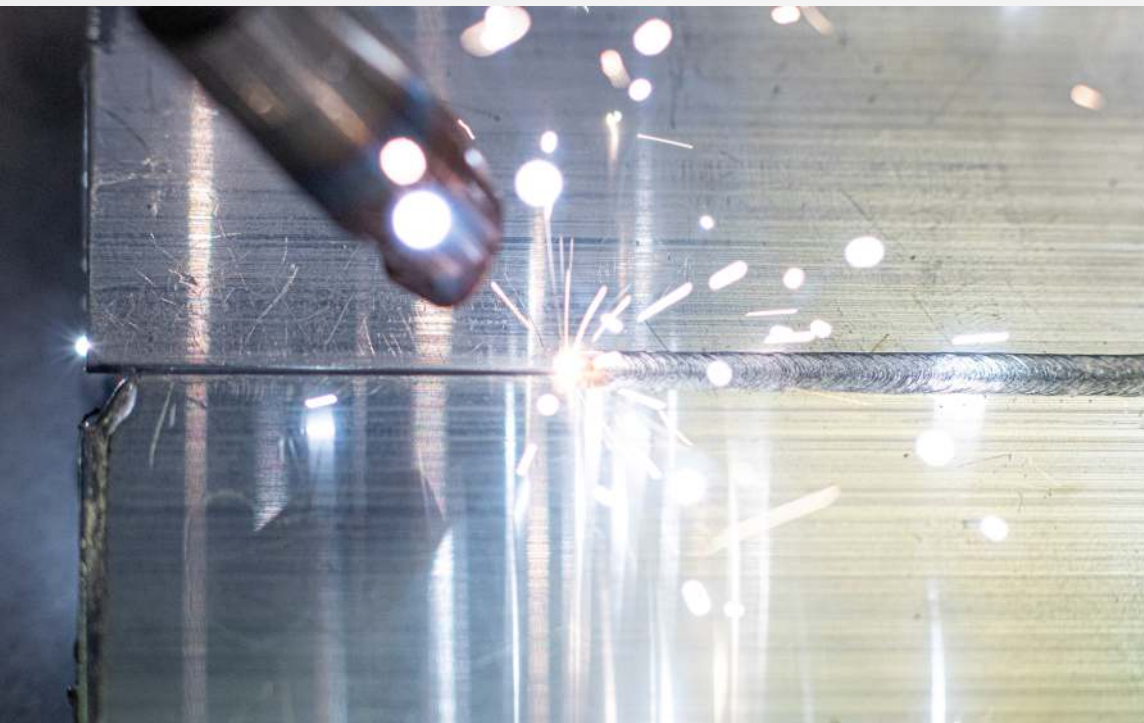
Laser beam welding is an advanced industrial process employed to seamlessly join various materials, forming robust and enduring welds. By focusing a high-intensity beam of light onto the desired welding area, this method effectively melts the materials together, creating a strong and permanent bond.

The laser welding technique ensures precise heat input to the targeted area, producing narrow full penetration welds that are aesthetic and with minimal welding oxidation. This precision helps to avoid any thermal and physical distortion to the end product, particularly advantageous when joining thin large sheets. Laser welding is the finest welding method when it comes to minimizing loss of base material properties, such as hardness and strength.

While predominantly utilized for metals, laser welding is versatile enough to process other materials like plastics and silicone. Minimal waste generation, low energy consumption, and simple maintenance make this technology user and environmentally friendly.

Speed and Versatility

Laser welding offers remarkable versatility, catering to both handheld precision applications and large-scale automated workshops. Handheld applications boast welding speeds of 1-5 m/min., while robotic laser welding can achieve speeds of up to 12 m/min. Laser welding is highly effective in processes requiring swift execution, surpassing traditional methods, as it is >5 times faster than MIG and >10 times faster than TIG.



Scan this QR and see
laser welding in action

ADVANTAGES OF LASER WELDING

Minimal Physical Distortion: Laser welding effectively avoids thermal and physical distortion, particularly beneficial when joining thin large sheets, resulting in a pristine end product without the need for additional processing.

Low Welding Oxidation: By providing precise heat input to the desired area, laser welding ensures narrow full penetration welds, resulting in aesthetically pleasing final results with minimal welding oxidation.

High Speed: Laser welding boasts remarkable efficiency, surpassing traditional methods such as MIG and TIG welding by more than 5 and 10 times, respectively.

Reliability: Our high-quality Lithuanian industrial design ensures durability and reliability.

Complex Joint Creation: Our laser technology enables the creation of intricate joints with ease, that are not achievable with traditional welding techniques.

Low Heat Application: Laser welding employs a low-heat application, minimizing damage to components or materials during the welding process.

High-Strength Welds: Laser welding produces welds that boast both consistency and high strength, ensuring the integrity of the joint. Laser welds can be monolithic without filler metal.

Excellent Mechanical Properties: Laser welding preserves the material's structural properties, ensuring that the welded components retain their original mechanical characteristics.

Ultimate Precision: Laser welding offers unparalleled accuracy, even for users without a welding background, due to the absence of laser light reflection, easy manipulation, and precise heat input to the targeted area.

Capability for Long and Wide Sheets: Our laser welding systems enable the welding of sheets with different steel grades and dimensions, facilitating versatile application across various projects.

Cost-Efficient Solution: Diodela's laser welding systems consume 40% less electricity than average MIG machines when welding materials like 3 mm stainless steel, offering significant cost savings.

Sustainability: Our laser welding systems are designed to be energy-efficient and environmentally friendly, aligning with sustainable manufacturing practices.

Smart and easy use: With an integrated touch screen interface, our laser welding systems enable users to save welding parameters for future use, ensuring consistent results and saving valuable preparation time.



DIODELA LASER WELDING SYSTEMS



Diodela laser welding systems are based on quasi-continuous wave diode and fiber laser technology developed by Lithuanian laser scientists exclusively for Diodela.

Expected laser welding systems **lifetime > 90 000 hours**.

All Diodela systems are provided with **24 months warranty and user trainings**.

All Systems Are Equipped With Accessories Necessary to Operate

With standard (8m) fiber cable, power cable (2m long – can be modified) accessory kit including (2pcs eye protection, 2pcs respirators, IR detector, lens, welding kit and etc.).

Important Notes

- I.** Power is not everything. Contact Diodela team and discuss how laser welding can serve to your applications in most efficient way;
- II.** All systems have 2-year warranty and possibility to extend warranty up to 3 years;
- III.** All systems include professional class 4 laser safety and exploitation training;
- IV.** This process can be used in both hand held precise and large-scale FWS type laser welding system automated workshops, allowing welding speed of 1-5m/min.

SPECIFICATIONS

Model	FWS-1000-AS	FWS-1500-AS	FWS-2000-AS	FWS-2500-AS	FWS-3000-AS
Laser source	Fiber laser				
Output power	1000W	1500W	2000W	2500W	3000W
Power adjustment range	10-100%				
Wavelength	1080 nm				
Output operation	Continuous / Modulated				
Modulation frequency	Up to 50 kHz				
Power stability	<3%				
Adjustable wobble (weld width)	0.1-5 mm				
Central focus distance	Standard 120 mm (150 mm optional)				
Cooling	Integrated water cooling				
Warm-up time	1 min				
Working humidity	<70% (at 40 degrees Celsius)				
Working temperature	0-40 degrees Celsius				
Laser welding gun weight	<1 kg				
Optical cable length	Standard 8 m (up to 15 m optional)				
Overall system dimensions	1200 x 600 x 1300 mm				
System weight	180 kg	185 kg	190 kg	195 kg	205 kg
Power supply	Single-phase 230 VAC	Single-phase 230 VAC	Single-phase 230 VAC	Three-phase 400 VAC	Three-phase 400 VAC
Avg. power consumption	<3.7 kW	<5.5 kW	<7.4 kW	<9.3 kW	<11.1 kW
Stainless steel weld thickness (single pass)	Up to 3 mm	Up to 4 mm	Up to 5 mm	Up to 6 mm	Up to 7 mm
Aluminium weld thickness (single pass)	Up to 2 mm	Up to 3 mm	Up to 4 mm	Up to 5 mm	Up to 6 mm

Table of specifications for Diodela laser welding systems

How to Choose a Suitable System?

The easiest way is to send us a two piece sample (~ 10x10cm preferably). We will be able to specify welding speed and effect of desired system on specific material. After testing, we will advise the most efficient system for your specific needs.

Optional

- Laser diode sources;
- Fume extraction unit;
- Automatization solutions;
- Expanded warranty;
- Lens options.

APPLICATION FIELDS

The laser welding process finds widespread use across various industries, including:

Automotive: Laser welding is employed for welding numerous automotive components such as airbag initiators, batteries, and fuel injectors, ensuring high-strength welds.

Aerospace: Laser welding plays a crucial role in aerospace applications by welding different metals with precision, avoiding material damage due to precise heat input, and achieving high-strength welds. Mostly used to weld engine components, panels and structural components.

Electronics: Laser welding is utilized in the production of electronic components for devices like LEDs and consumer electronics such as mobile phones or TVs, enabling the creation of precise and intricate joints.

Medical: Laser welding is essential for fabricating medical devices such as surgical instruments, implantable devices, and diagnostic equipment, ensuring hermetic seals, precision, and biocompatibility.

Semiconductors: Laser welding is used for joining micro-sized semiconductor components, such as integrated circuits and microchips, ensuring precision, reliability, and electrical conductivity.

Furniture Manufacturing: Laser welding facilitates precise welding of aluminum and steel components in furniture manufacturing. Its capability to store desired parameters for future use ensures consistent results and saves preparation time.



MATERIALS

A whole range of materials can be worked with in this process:

- Various plastics, including transparent plastics;
- Silicones;
- Metals (stainless-steel, copper, gold, silver and aluminium).

Wire-free Welding

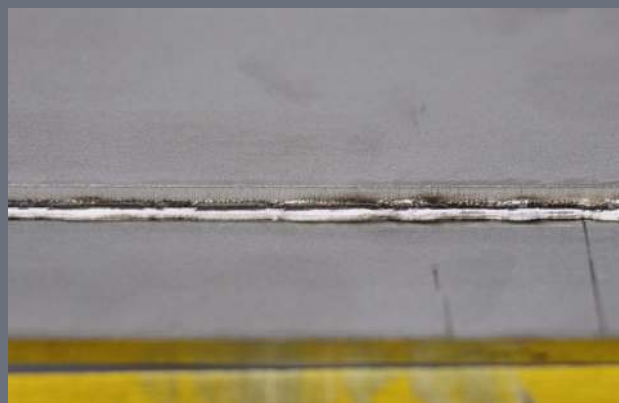
In applications where the distance between the materials to be welded is up to 100 micrometers, no additional wire or filler is required, resulting in a seamlessly monolithic welding seam. When the gap exceeds 100 micrometers between the materials, an additional wire is used.



WELDING OF LARGE
AND THIN STEEL PLATES



WELDING OF ROUND
ALUMINIUM PIECE



WELDING OF STEEL
WITHOUT FILLER METAL



FIBER LASER
WELD CUT ON ALUMINIUM

RESULTS OF DIODELA LASER WELDER



CLOSE TO ZERO PHYSICAL DISTORTION



ULTIMATE PRECISION AND
HIGH STRENGTH WELDS



CREATING COMPLICATED JOINTS



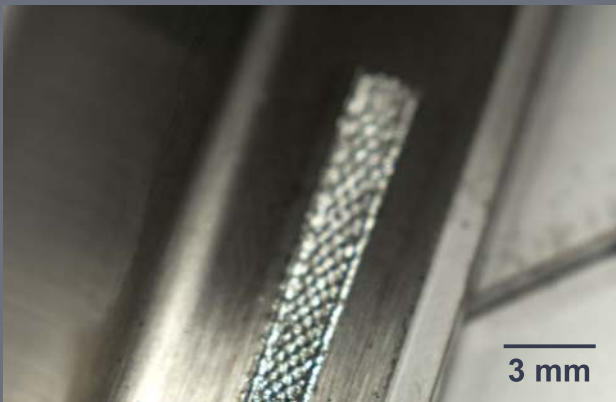
WELDING WITH FILLER METAL



AESTHETIC RESULTS
WITHOUT ADDITIONAL PROCESSING



WELDING WITHOUT FILLER METAL
FOR THIN MATERIALS



DIFFERENT SIZES AND STYLES OF WELDS FOR INDIVIDUAL USER NEEDS



STRENGTH TEST



X-RAY OF OUR LASER WELD

HANDHELD, AUTOMATION AND CUSTOM SOLUTIONS



Handheld Welding

Diodela's laser welding systems are versatile, catering to both handheld and robotic applications. Featuring a lightweight laser gun, our systems ensure comfort and ease of operation for users. Furthermore, the red laser pointer enhances precision by accurately indicating the welding spot during the process. Handheld laser welding speed is 1-5 m/min.

With laser welding, maintaining optimal welding quality becomes significantly simpler. Users can save and store parameters for various materials in the system, eliminating the need for extensive prior welding experience. Moreover, preparation for laser welding systems takes as little as one minute, optimizing efficiency without compromising on quality.

Welding Automation

Our laser welding systems seamlessly integrate with various types of robotic arms or CNC systems, facilitating automation across diverse manufacturing environments. The robotic laser welding speed is up to 12 m/min.

Customized Solutions

Through collaboration with Lithuania's Center for Physical Sciences and Technology, we offer companies various custom solutions using laser technologies.



Do you have any questions?
Scan this QR code and read our FAQ.



SUPPORT, TRAININGS AND MAINTENANCE

Support

Ensuring exceptional customer support is a cornerstone of our commitment at Diodela. Our dedicated team prioritizes smooth communication and delivers high-quality service to our valued clients. Diodela's experienced engineers are readily available to address any inquiries related to machine usage, maintenance, and more. As a producer of laser systems, we boast the capacity to swiftly execute repairs and offer customized modifications tailored to meet the specific needs of our clients.

Trainings

At Diodela, our laser systems are designed for intuitive and straightforward operation, thus training sessions typically last only 1-2 days. Depending on the preference, these trainings can be conducted either on-site at client's company premises or online.

Maintenance

Diodela laser systems require minimal maintenance, ensuring hassle-free operation for our clients. Technical maintenance of the laser welding system includes:

- The system consumes electricity and inert gas (15-20 l/min).
- Regular replenishment of distilled water in the cooling system, recommended to be replaced every 6 months.
- Weekly cleaning of lenses, employing a simple cleaning process similar to cleaning glasses.
- Replacement of lenses when they wear out, typically lasting 1-2 months on average, contingent upon proper maintenance and workload.
- Replacement of nozzles when they wear out.

With diligent maintenance practices, Diodela's laser welding systems are expected to operate reliably for approximately 10 years (90 000 hours), delivering sustained performance and value to our customers.



USER SAFETY

Diodela's FWS laser welding machines are classified as a high-power laser system of the 4th category. The system can radiate up to 8kW of momentary power in the IR field (808-1080nm) wavelength range. Laser radiation is not in the range of light visible to the human eye, it can damage the retina irreversibly, thus, safety glasses and face shield must be worn during the entire laser system operation period.

All personnel working near the laser welding area must wear laser safety eyewear and protective clothing. Safety glasses and face shield must be selected according to the length of the laser wave by Diodela. Depending on the material to be welded, it is recommended to wear respirators or use dust suction and filtering systems.



Comprehensive user manuals with detailed instructions are provided during laser machine user training sessions to equip operators with the necessary knowledge and protocols for safe operation. Diodela's laser systems are CE certified.





ABOUT DIODELA

Experts in Industrial Laser Manufacturing

Diodela is a European photonics solutions manufacturer for industry, specializing in developing and producing advanced industrial laser systems for welding and cleaning. With a dedicated team of professionals and extensive expertise in photonics, we excel in crafting innovative and precise laser systems that cater to the diverse needs of industrial clients.

Established by Laser Scientists

Diodela was established in Vilnius, Lithuania by professional laser scientists. The company operates within a city renowned for its rich history in photonics, serving as a hub for numerous esteemed companies within the field.

With full control over our production processes, Diodela ensures the highest quality standards, competitive pricing, swift production turnaround, and dedicated customer support. Our commitment to excellence and continuous improvement has earned us a reputation as a trusted partner in the industry. Diodela lasers are exported to over 20 countries in Europe, North America, and Asia.

Our Partners:





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LASER WELDING SYSTEMS

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