SOFTTOOL ENGINEERING

Certificate
DC-3
STPS



TRAINING PROGRAM · WELDING · SPECIALIZATION PROGRAM

Laser Welding Application Engineer

Technical consultant specialist in fiber laser welding

Physics, hardware, AWS standards and consulting: know when laser is the right solution and prove it with data.

7	125	40 h	DC-3
modules	topics	duration	STPS certified

WELDING · SPECIALIZATION PROGRAM

Recommend laser only when it adds value, and prove it with numbers



OBJECTIVE

Train fiber laser welding application engineers who master the physics, hardware and parameters of the process; know all welding processes to know when to recommend laser; diagnose, propose solutions with ROI, close the sale and provide after-sales support.

Practical approach with laser machine labs, real customer cases and a final panel evaluation.

ON COMPLETION, PARTICIPANTS WILL BE ABLE TO

- Technical: explain fiber laser physics, machine architecture and control variables.
- Technical: differentiate keyhole and conduction, use wobble and perform level 1 maintenance.
- Context: compare laser against MIG, TIG, stick and spot welding, and know their limitations.
- Standards: AWS A2.4 symbols, AWS C7.4 procedures, WPS, PQR and Class 4 laser safety.
- Diagnosis and sales: find the root cause, propose options with ROI and close technically.
- Support: install and configure, train operators and ensure after-sales success.

Course data sheet

DURATION
40 h

INTENDED FOR
Application, welding process and technical sales engineers

FORMAT
On site, at your plant and with your machinery

APPROACH
Applied theory and machine practice

PARTICIPANTS
Maximum 5 per group

REQUIREMENTS
Manufacturing experience and basic operating knowledge of welding

EVALUATION
Theoretical and practical, with results for each participant

CERTIFICATE
DC-3 “Welding process training” (STPS) and Application Engineer certificate

EQUIPMENT
Operational fiber laser machine

SYLLABUS

Course content

7 modules and 125 topics. The order and depth of each module are adjusted to the machinery and the group's level.

01 Overview of welding processes

02 Laser physics and hardware

03 Metallurgy and preparation

04 Laser welding methodology

05 AWS standards

06 Verification, validation and safety

07 Consulting and sales

01 Overview of welding processes

1.1 Process overview

MIG / MAG · TIG · Stick (SMAW) · Projection (spot) welding · Fiber laser welding · Comparison matrix: speed, quality, cost and complexity

1.2 When to use each process

MIG: high volume, relaxed tolerances · TIG: precision and finish · Stick: versatility and low cost · Spot: steels, high speed · Laser: speed, quality and low distortion

02 Laser physics and hardware

2.1 Fiber laser physics

Beam generation · 1064 nm wavelength · Energy density · Interaction with matter · Keyhole and conduction modes

2.2 Machine architecture

Resonator · Delivery fiber · Head: lenses, mirrors and focus · Chiller · Control panel · Gas systems

2.3 Heads and patterns

Simple coaxial head · Head with optical wobble: zigzag, circular, triangular, hexagonal · Multi-spot head · Single and dual wire feeder · Impact of configuration on ROI

2.4 Precision optics

Focusing lenses · Dichroic mirror · Collimation · Protective windows · Beam alignment

2.5 Level 1 maintenance

Optics cleaning · Fault diagnosis · Beam alignment · Consumable replacement · Maintenance log

03 Metallurgy and preparation

3.1 Joining concepts

Fusion and solidification · Keyhole vs. conduction · Heat-affected zone · Microstructure

3.2 Material compatibility

Carbon and stainless steels · Aluminum · Copper · Titanium · Non-metallic materials

3.3 Pre-weld preparation

Physical cleaning · Laser cleaning (ablation) · Alignment and tolerances · Shielding gases

3.4 Post-weld

Spatter cleaning · Finishing with laser cleaning · Visual inspection · Measurement

04 Laser welding methodology

4.1 Welding regimes

Keyhole · Conduction · Transition between regimes

4.2 Penetration by power and material

Carbon steels · Stainless · Aluminum · Titanium · Copper: when not to use laser

4.3 Control variables

Power · Speed · Frequency: pulsed vs. continuous · Shielding gas · Wire diameter · Head distance

4.4 Optimization and wobble

Pattern types · When to use it and when not to · Impact on speed, width and distortion

4.5 Aesthetic analysis

Bead morphology · Differences from TIG and MIG · Acceptability by application

05 AWS standards

5.1 AWS A2.4: symbols

Basic symbols · Symbols applied to laser · Drawing reading · Critical tolerances

5.2 AWS C7.4: laser procedures

Structure and requirements · Differences from arc welding · Process variables · Required documentation

5.3 WPS and PQR

WPS: the master document · Parameters to specify · PQR: validation · Tensile and bend tests

5.4 Joint and fixture design

Assembly tolerances · Maximum gaps · Positioning fixtures · Automation

06 Verification, validation and safety

6.1 Visual inspection

AWS acceptance criteria · Porosity, lack of fusion and cracks · Morphology and finish

6.2 Non-destructive testing

Visual inspection (VT) · Penetrant testing (PT) · Macrography · Charpy impact

6.3 Destructive testing

Tensile · Bend · Fractography

6.4 Class 4 laser safety

ANSI Z136.1 · Risk calculation (MPE) · OD7+ eye protection · Protective clothing · Controlled area and interlocks · Fume management · Emergency protocol

07 Consulting and sales

7.1 Assessment

Active listening · 10 diagnostic questions · Data collection · Ishikawa and 5 whys · DFM: is it feasible with laser?

7.2 Proposal

Situation analysis · Options: laser, MIG, TIG or other · ROI: scrap, speed, distortion and capacity · Technical specification · Implementation plan

7.3 Presentation and closing

Data-driven technical communication · Objection handling · Alternatives if laser is not feasible · Next steps

7.4 After-sales support

Installation and validation · Operator training · Troubleshooting · Optimization and follow-up

METHODOLOGY

A specialization program, not a classroom course

01
80% practice
Learning based on real cases and machine labs.

02
Real cases
Customer situations to diagnose and solve.

03
Group work
Peer collaboration and feedback.

04
Mentoring
Instructor available throughout the program.

05
Panel evaluation
Proposal and capstone project with a real case.

Final evaluation

1. Technical test: parameters, diagnosis and safety (30%)
2. Diagnostic test: 5 real cases (30%)
3. Complete proposal with ROI (20%)
4. Panel presentation (15%)
5. Capstone project with a real case (5%)

Passing criteria

- Attendance above 90%
- Correct diagnosis above 85%
- Technically feasible proposals
- Approved capstone project

Includes

- 40 hours of specialized training
- DC-3 certificate and program certificate



INSTRUCTORS

People who started on the shop floor

More than 20 years in sheet metal fabrication: cutting, punching, bending and welding at manufacturing companies. The Soft Tool Engineering team also authored technical books on cost engineering and flat pattern development that are used as support material.

Schedule

Monday to Friday, 8:00 to 12:00 and 13:00 to 17:00. Mornings for theory and cases; afternoons for labs.

SOFTTOOL ENGINEERING

TRAINING PROGRAM

Bring this course to your plant

Send us your machinery, the materials you process and the number of participants. We'll propose the program, duration and dates.

EMAIL

info@softooling.com

WEBSITE

softooling.com

OTHER COURSES

Sheet and tube laser cutting · Complete laser cutting process · Complete CNC punching process · CNC sheet metal bending processes · CNC Bending Application Engineer · Sheet metal flat pattern calculation · Blueprint reading · Expert programmer for cutting processes · Sheet metal process expert · Sheet metal cost engineering · Welding training · Fiber laser welding

Content can be adjusted to the machinery and the group's level. Images for reference only.