MED WELD GWA-2000

AUTOMATED MEDICAL GUIDE WIRE MICRO-WELDING SYSTEM

Doc ID: DS-GWA2000-V2
Class: Medical Device Manufacturing

WIRE OD RANGE	LASER PULSE DURATION	POSITIONING ACCURACY	CYCLE TIME
0.008" - 0.038"	0.1 - 10.0 ms	±2.5 µm	< 3.5 sec / joint

SYSTEM OVERVIEW

The MedWeld GWA-2000 is a fully automated, high-precision micro-welding workstation designed specifically for joining Nitinol, Stainless Steel, and Platinum/Iridium components in medical guide wire assemblies. Equipped with closed-loop optical alignment, real-time weld monitoring, and automated material handling, it guarantees consistent tensile strength and smooth ball/butt joint transitions required for critical vascular devices.

SYSTEM ARCHITECTURE & MICRO-WELD OPTICS

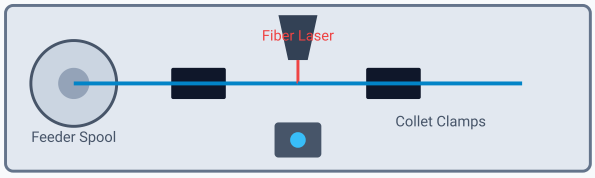


Figure 1: Automated Wire Feed, Collet Alignment & Laser Focus Layout



Figure 2: Distal Tip Ball Weld & Nitinol/SS Butt Joint Profiles

TECHNICAL SPECIFICATIONS

PARAMETER	SPECIFICATION LIMIT	OPERATIONAL NOTES
Applicable Materials	Nitinol, SS 304V/316L, Pt/Ir, Gold	Supports dissimilar material joint combinations
Wire Diameter Compatibility	0.20 mm to 0.96 mm (0.008" - 0.038")	Custom quick-change V-groove collets available
Laser Source Option	Pulsed Fiber / QCW Fiber Laser	Wavelength 1070 nm; peak power up to 1.5 kW
Vision System & Alignment	5MP Coaxial CCD + Machine Vision	Sub-pixel edge detection & concentricity check
Shielding Gas Interface	Argon / Helium High-Purity Jet	Coaxial nozzle preventing oxidation & embrittlement
Tensile Joint Efficiency	> 85% of base wire yield strength	Validated via integrated pull-tester module
In-Line Quality Monitoring	Infrared Pyrometer & Spectrometer	Pass/Fail classification per individual weld pulse
Cleanroom Compliance	ISO Class 7 (Class 10,000) Compatible	Anodized aluminum & stainless steel enclosure

AUTOMATION & QUALITY CONTROL FEATURES

Closed-Loop Vision Alignment

High-magnification telecentric optics automatically align wire tips within 2.5 µm prior to laser firing, eliminating operator error in manual positioning.

Integrated Tensile Testing

In-line pneumatic force testing module subjects 100% of processed welds to preset proof-loads immediately following joint formation.

Zero-Flash Argon Shielding

Specialized micro-flow nozzle surrounds the joint with inert gas to completely eliminate heat tinting and retain wire flexibility.

FDA 21 CFR Part 11 Compliance

Software architecture provides full user access management, automated audit trails, and electronic batch production reporting.

PRODUCTION YIELD & CYCLE PERFORMANCE

GUIDE WIRE PROCESS TYPE	AVG. CYCLE TIME	TARGET FIRST PASS YIELD
Distal Ball Tip Formation (Nitinol / Platinum)	2.8 sec / part	≥ 99.4%
Proximal Core-to-Shaft Butt Weld (SS to Nitinol)	3.4 sec / part	≥ 98.8%
Marker Band Ring Micro-Tack Welding	1.9 sec / joint	≥ 99.6%