

# ELECTRON BEAM WELDING SERVICES

*Duraflex, Inc. offers high tech Electron Beam Welding & Processing Services in addition to our highly competitive & innovative standard welding & joining processes!*

Based on Duraflex, Inc.'s recent merger/acquisition of Gardner Bellows, our team of **Electron Beam (EB) Welding** engineers & operators has the highest level of experience in the space & launch industry with welding bellows & related hardware dating back to 1975.

## Introduction

Combined with our **AS9100D | ISO 9001:2015** certifications, extensive metallurgical analysis & decades of high tech engineering experience, **Duraflex, Inc.** has more to offer in **EB Welding & Processing Services** than any other supplier!

**Duraflex, Inc.'s EB Welding services are approached carefully, every time!**

Utilizing innovative & historical welding, metallurgy, testing, quality control, engineering & processing services, **Duraflex, Inc.** can review a design before the project gets started to ensure every product will be successful by the time it progresses to the electron beam welding stage. When necessary, **Duraflex, Inc.** continuously advises & modifies customer designs before implementation to ensure the design & production processes do not negatively impact welding.

**Duraflex, Inc.'s EB Welding services are performed in a vacuumed environment & encapsulating chamber.**

The process entails a vacuum chamber, pumping system, manipulator, electron gun & a high voltage power supply. The product is placed in the vacuum chamber & the electron gun creates an electron beam (kinetic energy) that is directed onto the product.

**Duraflex, Inc. is your Single Source Solution™ when it comes to EB Welding & Processing Services!**

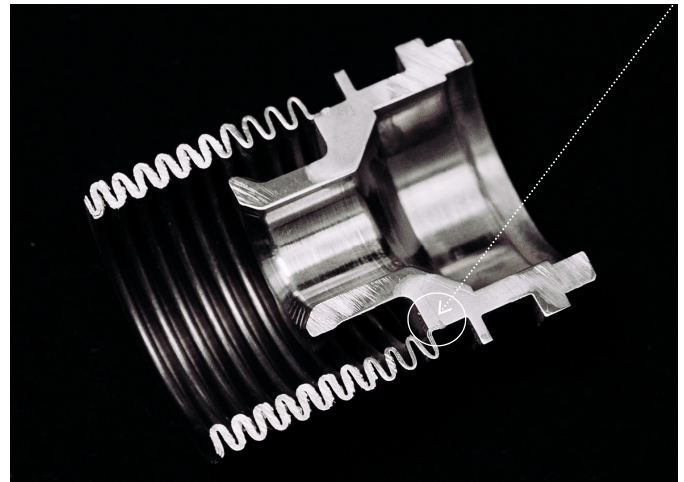
With over 40 years of experience, **Duraflex, Inc.** can help find solutions or advise on any weld or joint design. We offer a wide array of additional Pre & Post Processing Services. Every exciting challenge has presented the opportunity for us to develop new skills that can be incorporated in any project.

## Benefits

**Deep Weld Penetration** **EB Welding** offers the deepest weld penetration with a typical depth to width ratio of 40: 1 (40" deep weld to 1" wide).

**Ultra Clean Environment** **EB Welding** offers the cleanest environment for previously cleaned parts & actually enhances the overall surface quality post-welding.

**Nonconductive Material Welds** **EB Welding** has the ability to weld nonconductive materials together making the process applicable to a wide variety of industries.



## DURAFLEX, INC. ADVANTAGES

AS9100D |  
ISO 9001:2015

- Standard Products In-stock
- AS9100D | ISO 9001:2015
- Custom Orders Available
- Cost Competitive...always!
- No Minimums

- Professional Appearance
- Short Lead Times
- Engineered Drawings
- American Made
- American Materials



# ELECTRON BEAM WELDING CAPABILITIES

## EB Welding Machine Models

### Hamilton Standard W2

1) 6 kW, S/N 323	<u>Chamber Dimensions</u>	Lengths modifiable to requirements.
2) 7.5 kW, S/N 187	35"L x 22" W x 29H"	

## Additional Precision Welding | Joining Processes

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Brazing</li> <li>• Circumferential Resistance Welding</li> <li>• Laser Welding (Tube &amp; Assemblies)</li> <li>• MiG Welding (Limited to Accessories)</li> <li>• Plasma Assembly Welding</li> </ul> | <ul style="list-style-type: none"> <li>• Soldering</li> <li>• Spot Welding</li> <li>• TiG Autogenous Custom Assembly Welding</li> <li>• TiG Multiple Axis CNC Welding</li> <li>• TiG Robotic Autogenous Fusion Welding</li> </ul> |
|---|---|

## EB Welding Quality Control

- AS9100D | ISO 9001:2015
- Multiple FEA & 3D Modeling Platforms
- Approved Processes by ALL Prominent Rocket Engine Manufacturers
- Metallurgical Laboratory
- Weld Laboratory
- In-house Testing:
  - Corrosion
  - Cycle
  - Deflection
  - Flow
  - Hardness
  - Leak: Helium, Hydro, Pressure Decay
  - Minitab Production Statistical Control
  - Pressure, Proof & Burst
  - Spring Rate
  - Vibration

## EB Welding Advantages

- High Energy Single Pass Welds (no rewelding/rework required)
- Material Combinations & Varying Thickness Ratios (easily joined)
- Weld Thicknesses range: .0010" thick to 6"
- Computer Controlled (high production statistical consistency)
- Eliminates Weld-Induced Distortion
- Automated & Repeatable (no filler metal ever used)
- Highest Precision & Accuracy of any weld process
- Highest Rate of Processed Parts (per cycle)
- Highest Rate of Heat Affected Zones (HAZ) (maintains optimum strength of base materials)
- Titanium to Stainless Welding (with copper transition layers)
- Clean Welds with No Oxidation
- Deep Penetration Welds (high depth-to-width ratio (lowest heat HAZ)
- Weld Repairs (due to previously rejected, poor design or processes)
  - Redundant weld for safety/reusability on preexisting designs
  - To unreachable or invisible areas to other welding processes
  - Minimal Fixturing
  - Eliminates: heat sinks, chill blocks, inner/outer gas protection

## EB Welding Industries | Markets

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Aerospace</li> <li>• Aviation</li> <li>• Cryogenic</li> <li>• Electronics</li> <li>• Emerging Technologies</li> <li>• Energy</li> <li>• Medical</li> </ul> | <ul style="list-style-type: none"> <li>• Military   Defense</li> <li>• Research   Development</li> <li>• Rocket Engine Components</li> <li>• Semiconductor</li> <li>• Solar   Power Distribution</li> <li>• Space Exploration</li> <li>• UHV (Ultra High Vacuum)</li> </ul> |
|---|---|



**EB Welding** equipment is a very costly investment leaving a large footprint. These huge machines require steady maintenance, consistent calibration, high voltage demands & experienced highly skilled welding engineers/technicians to operate them. Because electron beam welds are the most precise, clean, strong welds (with an accurately repeatable process across many applications & materials), electron beam welding is the ultimate joining technology available today.

CONTACT US: 877.462.1007 | WWW.DURAFLEXINC.COM

765 INDUSTRIAL DRIVE, CARY, IL 60013 ■ info@duraflexinc.com ■ www.duraflexinc.com ■ PH 877.462.1007 ■ 24/7 847.337.9459