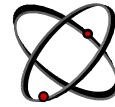


# **ELECTRON BEAM ENGINEERING INC**



*A Precision Electron Beam & Laser Welding Service*

1425 South Allec Street, Anaheim, CA 92805  
Telephone 714-491-5990 Fax 714-758-0690  
Website: [www.ebeinc.com](http://www.ebeinc.com)

## **THE BEAMER SERIES A User Friendly Electron Beam Welder Designed & Manufactured in the USA**

### **MODELS:**

**5 KW BEAMERS: 512 (12" cube) 518 (18" cube) 524 (24" cube) 536 (36"cube)**

**3KW Series BEAMERS: 12, 18 & 24,**



**The 512 Beamer Model with a 12" chamber**



The 536 Beamer Model with a 36" chamber

## **SPECIFICATION SUMMARY**

The "BEAMER" line is a completely new design of electron beam welders taking advantage of all the latest developments in the fields of electronic control systems, high voltage power supplies, vacuum technology and electron gun design. It is available in four different cubed chamber sizes; 12" (300 mm), 18" (457 mm), 24" (610 mm) and 36" (914 mm) as signified by the last two digits of the model number.

Reliability, serviceability, an unequalled specification and a close control of costs have made possible this latest development from Electron Beam Engineering (EBE) the result of 40 years of experience in the design, building and use of EB welders.

EBE has been in the unique position of having the experience of welding a very wide variety of components for our customers in the medical, aerospace, sensors, scientific instruments, oil exploration and sports product fields and welding quantities from one to hundreds of thousands.

Our Beamer line incorporates all the features expected from a modern EB welder including:

- Welding material thickness capabilities range from 0.001" (0.025mm) to 0.50" (12mm) of steel at 30 inches per minute (760 mm / minute).
- Over current safety feature to protect parts in the event of gun arcing.
- Fast automatic pump-down of the cubed chamber with the EBE "silent running" feature.
- Mimic diagram on touch screen showing machine status of vacuum system and electron beam.
- Multiple screens for servicing aids and machine history.
- Unlimited weld parameter storage with individual customer ID assignment.
- Machine is easy to use and service.
- The Beamer is versatile for manual and automatic operation.
- Touch screen and manual controls for versatility of operation.
- Switched mode high stability 60 KV 5 KW power supply.
- Instant parameter storage after weld development is completed.
- Electron gun with turbo-molecular pumping and protected optical system for ease of service and cleaning.
- Wide speed range rotator using stepper motors.
- Optional precision rotator (rotangle) with tilt mechanism for use in the chamber.
- Optional full CNC work manipulation for 2, 3, or 4 axes ('G' codes).

### **1. WORK CHAMBER**

**1.1.** The chamber has a full front opening door fitted with a large 8" diameter window for watching the weld or for checking part run out while under vacuum. Four side ports and two base ports are for mounting the rotating fixtures or tailstock.

**1.2.** The gun is mounted on the top of the chamber and is adjustable in position to make full use of the various chamber widths.

PLEASE NOTE THAT THE 3KW SERIES HAVE THESE VARIATIONS: DIFF. PUMP ON GUN. COVER GLASS FOR OPTICS. 0.3" PENETRATION. HALOGEN ILLUMINATOR.

## **2. VACUUM SYSTEM**

- 2.1.** There are two separate vacuum systems for the gun and the chamber to minimize pump-down time and maintain a higher vacuum level in the gun for improved gun performance.
- 2.2.** The chamber is pumped by a rotary/roots pump combination and an oil diffusion pump for reliability and robustness. The evacuation time is less than one minute with a clean, empty chamber. The unique EBE “silent running” feature switches off these large pumps after the initial roughing vacuum cycle. This saves power and dramatically reduces the noise level.
- 2.3.** The gun is pumped with a separate two stage rotary pump and a turbo-molecular pump to maintain cleanliness in the gun. Evacuation time after filament change is less than 5 minutes.
- 2.4.** A micro controller is interlocked to vacuum levels and senses all the valve positions and controls the evacuation and electron gun supplies automatically. On achieving correct vacuum levels the gun is energized and welding can commence, either manually or automatically.
- 2.5.** The gun vacuum is isolated from the chamber with a valve, which closes before the chamber is vented. This maintains a high vacuum in the gun for improved stability and filament life.

## **3. CONTROLS & DISPLAYS**

- 3.1.** A combination of digital, analog & touch screen controls are used to optimize the convenience for the operator, particularly during weld development when manual control of the beam is essential and yet high accuracy is maintained with digital technology when required.
- 3.2.** Some manual beam controls like, filament, focus, deflection, low and high beam current are provided to enable the operator to either customize each weld or do weld development without using a keyboard. Once finalized, these values can be stored automatically as part of a weld program.
- 3.3.** An infinite number of programs can be individually named and stored on non-volatile removable memory.
- 3.4.** The touch screen uses different pages to display vacuum status, EB weld parameters, machine history and servicing data. Each screen is interactive and has different access levels by password.

## **4. POWER SUPPLIES**

- 4.1.** The beam is generated by a dry 0-60 KV, 0-5 KW highly stabilized switched mode power supply, which is mounted in a 19” (483 mm) standard rack.
- 4.2.** Over beam current settings and a low stored energy supply set limits for the beam current to prevent any damage to parts being welded in the event of a gun malfunction such as an arc over.
- 4.3.** The dry bias & filament supplies are housed separately, also in a 19” (483 mm) rack mounting.

4.4. The remaining power supplies are high stability low voltage for the electronics and motor drivers and are part of the electronics circuit board rack.

## 5. WELDING BEAM CAPABILITIES

5.1. The wide range of welding power is achieved with a unique control system developed by EBE as a result of many years of using electron beam welders. Weld penetration depths can be held to very close tolerances. (More details on request)

5.2. The beam can be switched on and off in milliseconds or sloped in and out for smooth welding results.

5.3. The weld cycle can be set for a variety of beam tacking modes or beam pulsing for reduced heat input. The initiation of the weld or tacking can be interlocked to the angle of rotation of the part by using the EBE Digital Rotangle.

5.4. Weld times can be set from 0.1 sec to 999 seconds.

5.5. Weld penetration is adjustable from 0.001" to 0.70" in steels. Thinner materials can be welded at much higher speeds. This is made possible by the 5 KW beam power and the low ripple HV power supplies. Many other materials are welded at similar speeds. For more welding data go to [www.ebeinc.com](http://www.ebeinc.com)

## 6. THE ELECTRON GUN

6.1. Designed for performance, long life, accessibility for servicing, and with clean lines; this unique electron gun features a turbo-molecular pump, vacuum gauges, isolation valve, optical viewing system, work-piece illuminator and rapid change filament electrode.

6.2. The unique optical telescope system for viewing the work-piece and the beam position is housed outside of the vacuum environment for safety of components and to prevent metal vapor contamination. A closed circuit television (CCTV) is available as an option to the telescope

6.3. A transportable Mylar film protects the optical system windows into the gun, and is moved when contaminated with metal vapor to enable a clear view of the work-piece at all times, even during welding. This avoids the cleaning associated with other electron guns that use cover glasses and it reduces down time associated with changing cover glasses.

6.4. A high intensity LED light source is also mounted externally from the vacuum system and is protected by the Mylar film transport system.

6.5. An "anode" meter and a "drift tube" meter detect any misalignment of the beam, which is displayed on the analog meters. It is used for aligning the gun using the two push-pull hand screws on the front of the Gun.

6.6. A tool kit is provided containing: Filaments, O-rings, hand tools, and cleaning equipment for general maintenance such as filament changes and servicing the electron gun.

## 7. WORK MANIPULATION

7.1. Fitted as standard are two adjustable rotary drives for making circular welds in the horizontal and vertical axes. They are driven by precision micro stepper motors to enable welding from small diameters (typically 1/16" or 1.6 mm) up to much larger components of 10" (250 mm) diameter. (An optional angle encoder can be fitted when the start and stop of the beam must be correlated to the work piece position).

- 7.2. There are optional rotators that can be mounted inside the chamber and tilted to any angle. These are either single station “rotangles” or multiple spindle carousels for increased production rates.
- 7.3. CNC X-Y tables with low profile can be supplied with 2, 3 or 4 axes of control.
- 7.4. A pneumatic tailstock for holding parts between centers can be fitted to the side of the chamber opposite the horizontal rotator.
- 7.5. A beam circle generator for stirring the weld or making small circular welds is also available.

#### 8. SERVICES REQUIRED

- 8.1. Water: A supply of clean water to cool the diffusion pump is required at 2 gallons (9 Liters) per minute at 75° F (24° C) maximum. A chiller can be supplied as an extra item.
- 8.2. Power: Outlet ratings are 208 to 240 V (other voltages to special order) three phase at 30 amps (60 amps for 24” & 36” chamber).
- 8.3. Air: A small amount of compressed air is required to operate the valves. Pressure minimum 80 psi (5 Bar).
- 8.4. Environment: We recommend a clean environment with an ambient temperature not exceeding 80° F. (27° C)
- 8.5. Footprint: The machine measures approximately 5 ft x 7 ft (1.5 M x 2.14 M). For servicing access we recommend a floor space of at least 12 ft wide x 9 ft deep (3.7 M x 2.7 M)

#### 9. RETROFIT FOR OLD EB WELDERS

- 9.1. The electronics, electrical, pneumatic and vacuum controls have been designed as a package that can be easily retrofitted to existing EB welders as an upgrade for improved performance, greater reliability and ease of servicing.

Please contact us for more details or help with your welding requirements.

#### Contact for technical and commercial information:

**Richard Trillwood, CEO** Tel: 714-491-5990 Ext. 110  
Electron Beam Engineering, Inc.  
1425 South Allec Street  
Anaheim, CA 92805  
Email: [richard@ebeinc.com](mailto:richard@ebeinc.com)

Fax: 714-758-0690