



# Electron beam welding

*Electron beam during welding*

## Technology

A focused electron beam melts the material at the joining point of the workpiece by converting the kinetic energy of the electrons into heat. The local overheating of the melt pool due to the high power density of the electron beam creates a vapor capillary and thus the possibility of melting the joint very locally down to great depths.

With gap-free positioning of the joint, welds with very high aspect ratios are possible without filler material.

A proportion of electrons that are scattered back from the workpiece surface can also be used for precise monitoring and adjustment of the joint.

A low heat input compared to the weld seam dimension enables low-distortion welds for highly stressed and sensitive components.

## Applications

- Automotive industry
  - Transmission and drive components
- Machine and plant construction
  - Hydraulic cylinders, piping elements, shaft-wheel connections
- Power engineering
  - Copper expansion strips
- Vacuum technology
  - Beam channels
- Sensor technology
  - Pressure / ultrasonic sensors
- Medical technology
  - Implants, fine welding on sensor housings made of titanium or medical stainless steel

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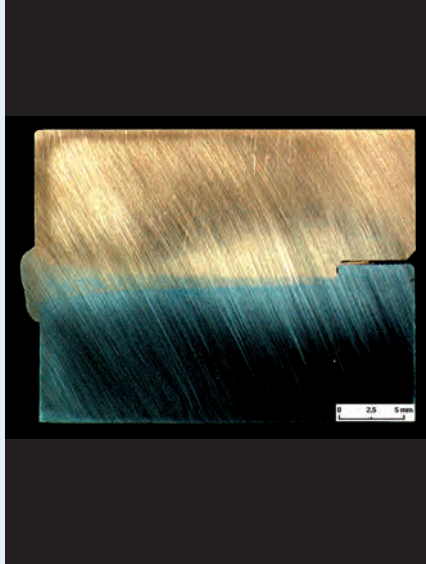
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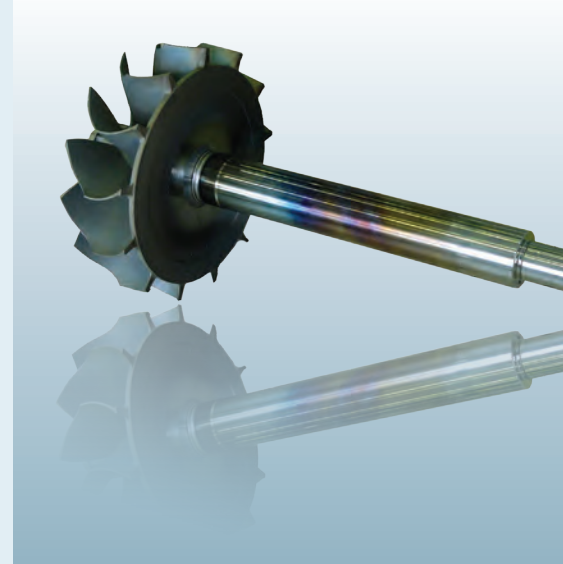
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Pressure sensors



Bronze/steel mixed joint



Exhaust gas turboshaft

## Advantages

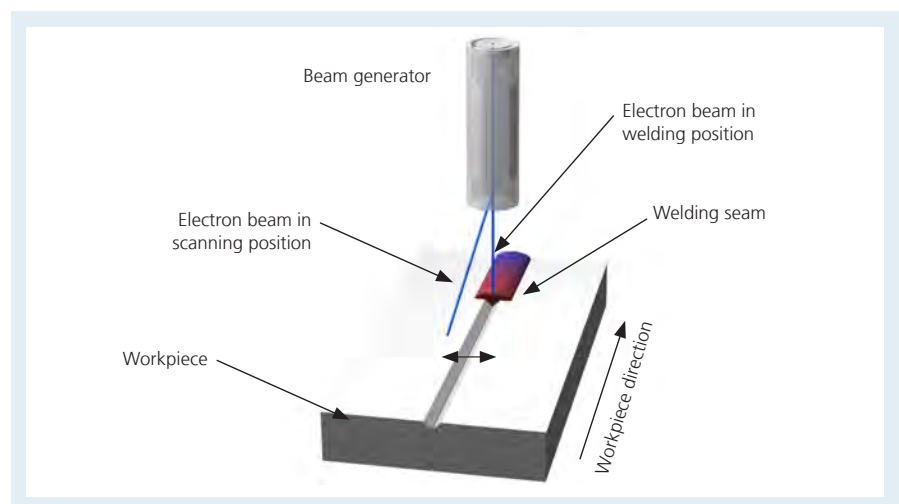
- Low energy input due to deep welding effect
- Narrow weld seams (depth-to-width ratio up to 20:1)
- High reproducibility thanks to CNC-controlled process management
- No filler material required
- Automatic seam tracking
- No oxidation due to vacuum process
- Vacuum and liquid-tight seams
- Welding of a wide range of materials (in addition to all conventionally weldable materials, including hardenable steels, aluminum, copper, titanium, tungsten, platinum – also as mixed joints)

## Our offer

- Expert advice on welding suitability and joint design
- Feasibility studies
- Development of innovative, unconventional solutions
- Technology development for customer parts
- Pilot production and introduction into production
- Machining of special customer parts
- Single part production
- Precision welding for applications e. g. in medical technology or sensor production
- Ultrasonic testing
- Production of ground sections to document the seam design

## Technical specifications

Beam generator	10 kW/60 kV
NC axes	2 orthogonal linear axes, 1 rotary axis
Feed rate	≤ 6 m/min
Welding depth	0.1 ... 25.0 mm
Beam diameter	0.1 ... 0.5 mm
Part dimensions	max. 1000 mm × 500 mm × 450 mm
Additional equipment	wire feeder for welding multi-axis devices for axial and radial seams



Automatic seam tracking by scanning with the electron beam