

Vacuum brazing is better ...

Brazing made easy – with vacuum furnaces by Ipsen.

Many high-grade stainless steel, ceramic and aluminium products can only be manufactured in an economically- and environmentally sound manner using vacuum brazing. To meet these needs, Ipsen offers manual, semi- and fully-automatic single- and multi-chamber vacuum furnaces



The new Ipsen all-metal chamber for hard- and high-temperature brazing

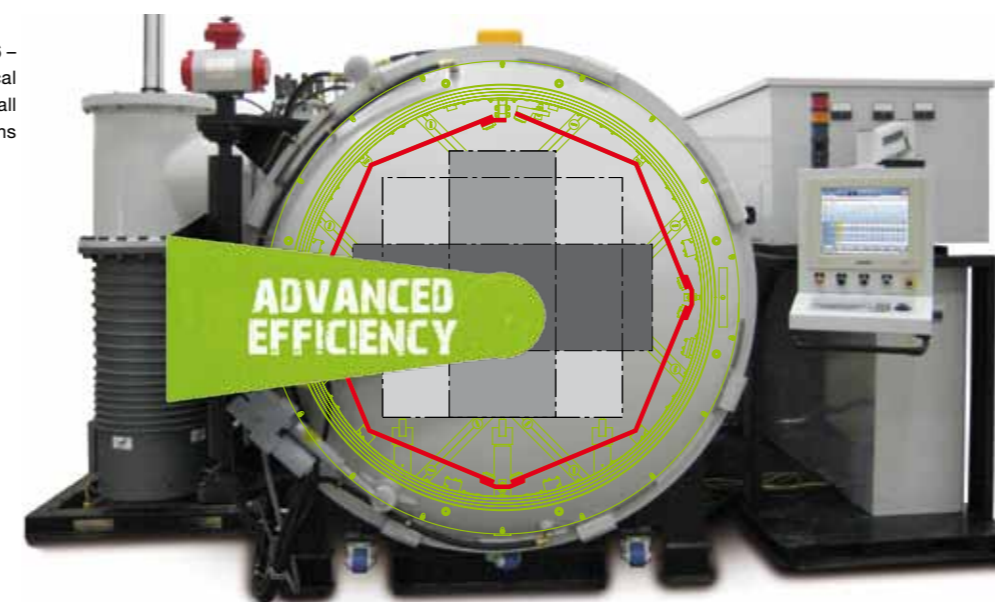
Flux-free brazing is especially environmentally friendly because no aggressive fluxing agents are applied to the components. This renders the removal of flux residues and finishing treatments unnecessary.

The brazed joints produced by this method are also superior. They are significantly more reliable and stronger because there is no chance of flux material entering the joints and reducing their mechanical strength or the corrosion resistance of the base metal.

High temperature brazing in rough-, fine- or full-vacuum is especially well-suited to thermally and mechanically highly-stressable joints. It's no wonder that vacuum brazing has become the standard for component manufacturing in safety-critical applications such as aerospace technology.

The advantages of Ipsen vacuum brazing equipment are plain to see: fully definable furnace atmosphere, fast temperature regulation, and guaranteed almost ideal temperature uniformity. Furthermore, Ipsen's vacuum brazing technology offers exemplary energy efficiency.

Titan 6 – the new, economical vacuum-furnace for all brazing applications



Hard work wins



This is what vacuum brazing is for.



Medical technology – brazed component for directing beam concentration in radiation therapy

Jet engine components and adjustment systems

They are increasingly manufactured using vacuum brazing.

Heat exchangers and heating tubes

The process of choice for the durable connection of heat exchanger components and heating tubes is high-temperature brazing, for example using stainless steel or copper filler material.

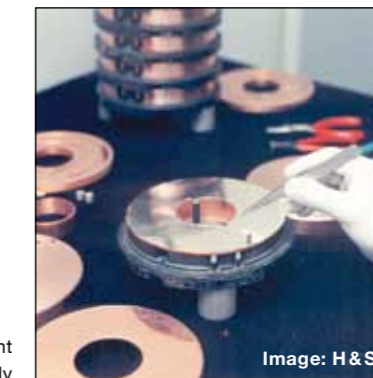
Plate heat exchanger components can be joined quickly, simply and reliably using vacuum brazing.

Implants

Vacuum brazing is more and more becoming the choice in manufacturing of stainless steel (DIN ISO 5832-1) and titanium-alloy implants.

Turbine blades

Turbine blades are subjected to huge stresses in practice. By brazing them in vacuum, especially with the perfect uniform heating, their joints are made highly reliable.

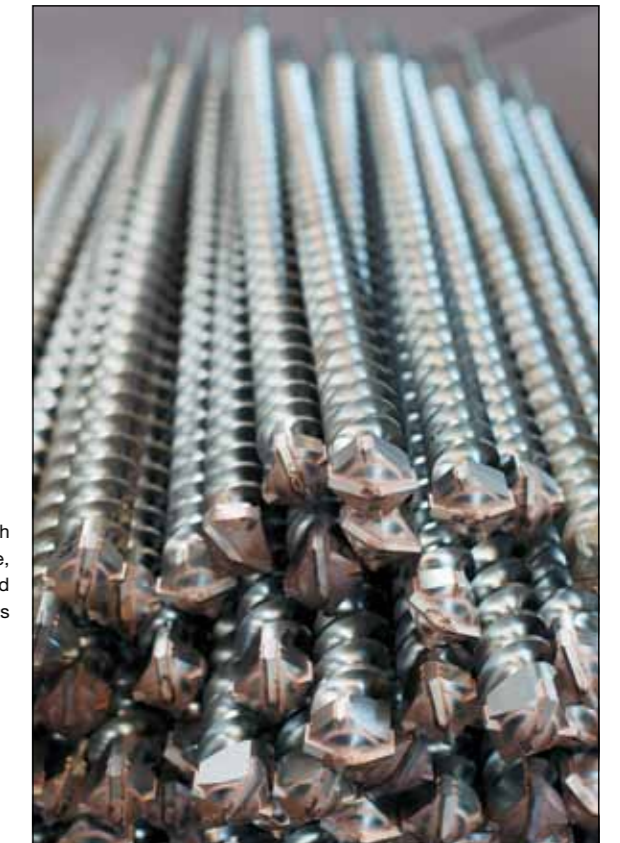


Brazing component assembly

Honeycombs and mounting components

The highly mechanically stressed joints of connectors, including honeycomb structures, nuts, screws and rivets, are brazed in vacuum furnaces.

Drill bit with hard metal cutting pate, hardened and attached in a single process



High-temperature vacuum brazing.



Vertical vacuum furnace for large components, e.g. for the aerospace industry

Vertical single-chamber brazing systems

Top- or bottom-loader for large charge dimensions

Three chamber brazing systems (i. e. for catalyzer brazing)

- Maximum component dimensions 860 × 1,820 × 760 mm (w × l × h)
- Components per charge: 200 to 3,200
- Maximum load 800 kg
- Total process time 110 minutes
- Working vacuum in pre-chamber less than 10⁻³ mbar
- Working vacuum in brazing chamber ca. 10⁻⁵ mbar
- Working temperature in brazing chamber ca. 1,200 °C
- Removal temperature from cooling chamber less than 100 °C

The process

Flux-free, high-temperature brazing under rough-, fine- or full vacuum is used for joints that are subjected to high thermal and mechanical stresses. Generally, nickel-, copper- or noble metal-based alloys with a liquidus temperature higher than 900 °C in the form of crystalline foils, thin plating, powder or pastes are used as filling material.

When vacuum brazing, harmful atmospheric oxygen is evacuated from the furnace and the brazing charge heated to the appropriate temperature. Once the filler metal has successfully liquified and flown into place, the charge is cooled in a circulating stream of nitrogen gas. This vacuum brazing process can be carried out in horizontal or vertical vacuum single-chamber furnaces, and for mass production, also in continuous multi-chamber vacuum furnaces.

Horizontal, single chamber brazing systems (fine- and full-vacuum)

- Maximum component dimensions 1,200 × 1,500 × 1,200 mm (w × l × h)
- Maximum load 2 t
- Temperature uniformity better than ±5 °C
- Working vacuum from 10⁻² to 10⁻⁶ mbar
- Graphite or metallic heating chamber
- Standard- or high-grade steel housing



Vacuum-brazed turbine blade

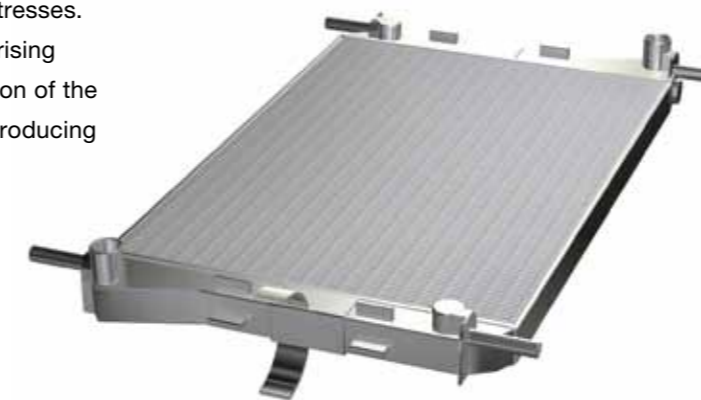
Vacuum aluminium brazing.

Three-chamber vacuum brazing furnace for industrial production



The process

For aluminium brazing, a filling metal containing magnesium is used in the form of plated sheets. During heating, and even before the filling metal starts to liquify, the aluminium oxide layer is broken up by the high vacuum and the thermal stresses. It is subsequently carried off by the vaporising magnesium. This allows optimal distribution of the filling metal across the brazing surface, producing a flawless and durable bond.



Vacuum-brazed cooler

Single chamber brazing systems

- Maximum component dimensions 1,600 × 7,800 × 2,400 mm (w × l × h)
- Maximum load 30 t
- Temperature uniformity better than ±5 °C
- Working vacuum in the range of less than 10⁻⁵ mbar

Three chamber brazing systems

- Throughput of up to 2,000 kg per hour
- Working vacuum of the brazing chamber in the range of less than 10⁻⁶ mbar
- Temperature uniformity of the brazing chamber ±3 °C
- Pre-chamber designed for cleaning of parts (thermal degreasing)

About the company.

Ipsen – we deliver performance.

Ipsen stands for cutting edge heat treatment technology and systems. Few companies in the world have had such a decisive impact on the development of heat treatment.

For over 60 years Ipsen has been finding new ways of producing steel of ever improving quality using the company's innovative, proprietary technologies, such as the AvaC® process (low-pressure carburising), the SolNit® process (solution nitriding) and the recently developed HybridCarb process (gas carburising with recycling). Ipsen's offerings combine the highest performance with outstanding reliability, which perhaps explains why our furnaces and heat treatment equipment enjoy an excellent reputation

all over the world. Our customers work in automotive, aviation and aerospace as well as tooling, machining, medical and commercial heat treating.

Despite Ipsen's many important innovations, our focus is not solely on technology: in all we do, we aim to surpass our customers' expectations. We are not only committed to developing great technology, we are also passionate about providing quick, seamless and attentive service.



If you require further information or would like to know more about our company and the products we make, please contact us. We look forward to hearing from you!

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Hard work wins 