Induction Brazing

The more productive joining process

EFD INDUCTION

Why brazing is better.

For many, brazing is a materials-joining technology. However, when done correctly, brazing is also a powerful business tool—one that reduces costs, boosts throughput, and improves product quality. Here are some of the main benefits of brazing:

Cost-effective

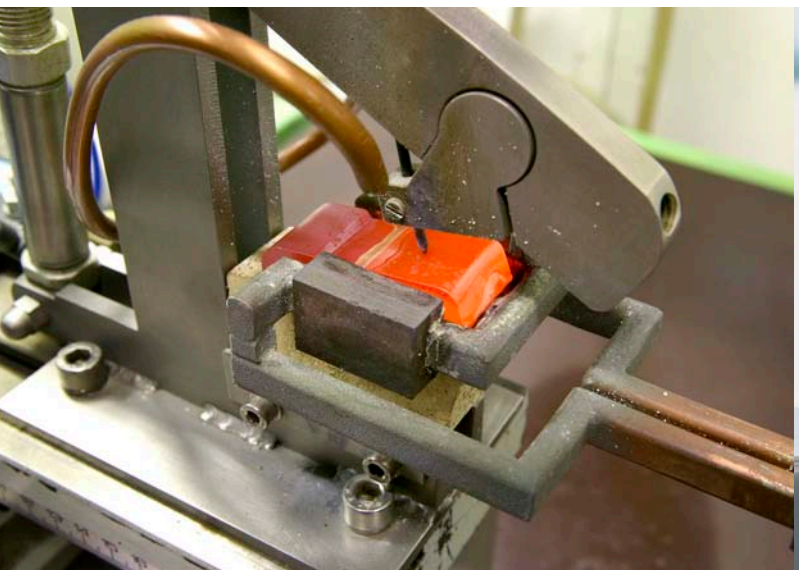
Brazing is quick, accurate and controllable. It minimizes scrap. It is precise and repeatable, making it perfect for automated production methods. Also, brazing facilitates the speedy production of parts from standard components, which is more cost-effective than making single units from scratch. Moreover, the relatively low temperatures involved in brazing (450°C–900°C) keep down energy costs.

Flexible

Brazing is amazingly versatile. It can join a wide range of metals. It can even join ferrous to non-ferrous. And since brazing does not melt the base metals, it is ideal for joining metals with different melting temperatures.

Neat and strong

Brazed joints, like welded joints, are very strong. They are shock- and vibration-resistant, leakproof and electrically conductive. The typical brazed joint is as strong, if not stronger, than the base metals it joins. But unlike welding, brazing preserves the metals' integrity by not melting them.



Small footprints, ease of integration and electronic control make brazing ideal for automated production lines.

Looking good. With induction brazing the filler material that binds the base metals is drawn through the joint by capillary action, resulting in a neat, barely visible bead. This accounts for the widespread use of brazing in the plumbing and household fixtures industries, where the attractive appearance of the finished product is critical.

There are many ways to braze. So why choose induction?

Induction heating technology is steadily displacing open flames and ovens as the preferred heat source in brazing. Seven key reasons explain this growing popularity:

1. Speedier solution

Induction heating transfers more energy per square millimeter than an open flame. Put simply, induction can braze more parts per hour than alternative processes.

2. Quicker throughput

Induction is ideal for in-line integration. Batches of parts no longer have to be taken aside or sent out for brazing. Electronic controls and customized coils let us integrate the brazing process into seamless production processes.

3. Consistent performance

Induction heating is controllable and repeatable. Enter your desired process parameters into the induction equipment, and it will repeat heating cycles with only negligible deviations.

Brazed joints are strong and leak-proof, good news for automakers who must meet ever-tougher safety and environmental standards.

4. Unique controllability

Induction lets operators view the brazing process, something that is difficult with flames. This and precise heating minimize the risk of overheating, which causes weak joints.

5. More productive environment

Open flames create uncomfortable working environments. Operator morale and productivity suffer as a result. Induction is silent. And there is virtually no increase in ambient temperature.

6. Put your space to work

EFD Induction brazing equipment has a small footprint. Induction stations slot easily into production cells and existing layouts. And our compact, mobile systems let you work on hard-to-access parts.

7. No-contact process

Induction produces heat within the base metals—and nowhere else. It's a no-contact process; the base metals never come into contact with flames. This protects the base metals from warping, which in turn increases yield and product quality.

Brazing basics.

Brazing uses heat and filler metal to join metals. Once melted, the filler flows between close-fitting base metals (the pieces being joined) by capillary action. The molten filler interacts with a thin layer of the base metal to form a strong, leak-proof joint. Different heat sources can be used for brazing: induction and resistance heaters, ovens, furnaces, torches, etc. There are three common brazing methods: capillary, notch and moulding. Induction brazing is concerned solely with the first of these.

Having the correct gap between the base metals is crucial. A too-large gap can minimize the capillary force and lead to weak joints and porosity. Thermal expansion means gaps have to be calculated for metals at brazing, not room, temperatures. Optimum spacing is typically 0.05 mm–0.1 mm.

What we can braze:

If you want to join any of these materials, then chances are we at EFD Induction can devise a brazing solution tailored to your exact needs.

Before you braze

Brazing is hassle-free. But some questions should be investigated — and answered — in order to assure successful, cost-effective joining. For instance: How suitable are the base metals for brazing; what's the best coil design for specific time and quality demands; should the brazing be manual or automatic? At EFD Induction we answer these and other key points before suggesting a brazing solution.

Focus on flux

Base metals must usually be coated with a solvent known as flux before they are brazed. Flux cleans the base metals, prevents new oxidation, and wets the brazing area prior to brazing. It is crucial to apply sufficient flux; too little and the flux may become saturated with oxides and lose its ability to protect the base metals.

Flux is not always needed. Phosphorous-bearing filler can be used to braze copper alloys, brass and bronze. Flux-free brazing is also possible with active atmospheres and vacuums, but the brazing must then be performed in a controlled atmosphere chamber.

Flux must normally be removed from the part once the metal filler has solidified. Different removal methods are used, the most common being water quenching, pickling and wire brushing.

Brazing at work.

Aviation brazing

Fan blades and blades for casings, various parts for fuel systems, numerous components in hydraulic systems.

Automotive Brazing

Aluminum parts for AC systems. Evaporator and condenser connections (tube-to-tube, tube-to-block, tube-to-tank). Steel and copper components such as brake linings and fuel injection pipes. Short-circuit rings for electric motors.

Electrotechnical brazing

Bars, strands, rings and wires in motors, generators and transformers. One-shot or segment brazing of short-circuit rings.

Houseware brazing

Compressor parts, heating elements for dishwashers, washing machines (tube-to-tube, tube-to-block and tube-to-valve connections), faucet brazing (tube to socket, thread insert).

Tooling brazing

Drill bits, saw blades, lathes and plane tools, agricultural equipment, tools and implements for mining and related industries.

Complete brazing solutions.

We've been developing induction-heating solutions for more than 50 years. Today, we're Europe's largest industrial induction equipment maker, with sales and service companies, manufacturing plants and R&D centers around the world. Our strength is complete, tailored systems. We usually start in the lab, with materials analysis and computerized simulation of various solutions. We also look at coil design, and determine which fillers, fluxes or atmospheres are best suited to your tasks. And of course, we don't consider our job done until your systems—and your operators—are up and running 100%.

Stationary in-line solutions

Designing a new production line and want to integrate induction brazing? Or retrofitting equipment into an existing layout? Whatever your needs, we can devise a solution tailored to your specific conditions. And by solution we mean a comprehensive answer that also takes your logistics, operator skills, environmental concerns, materials handling requirements, energy consumption and ROI demands into account.

Mobile and flexible solutions

We pioneered efficient mobile induction heating. And our Minac systems continue to set the standard for mobile solutions. Compact, easy-to-use and featuring the latest in electronic controls, our mobile solutions let you bring the benefits of induction heating to the most hard-to-access components and workshop locations. We even provide mobile solutions compact enough to be transported by a family car.