



EFD[®]
INDUCTION

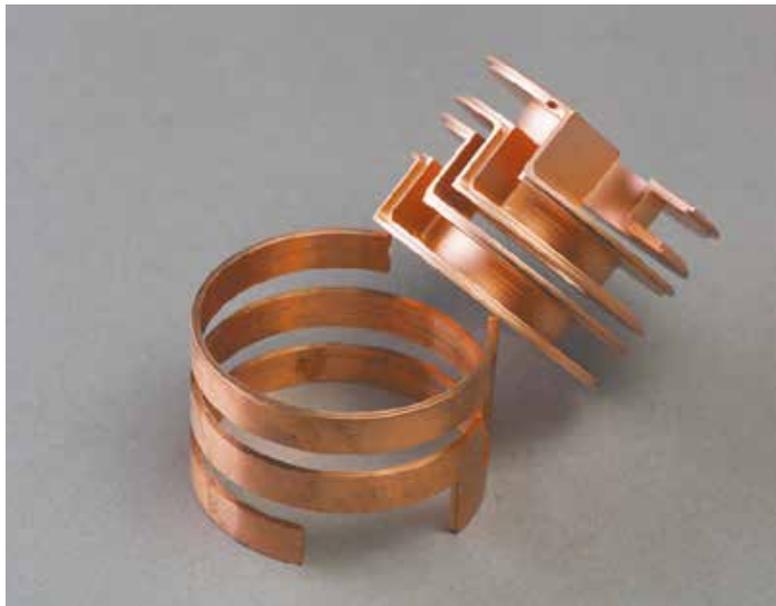
Induction coils

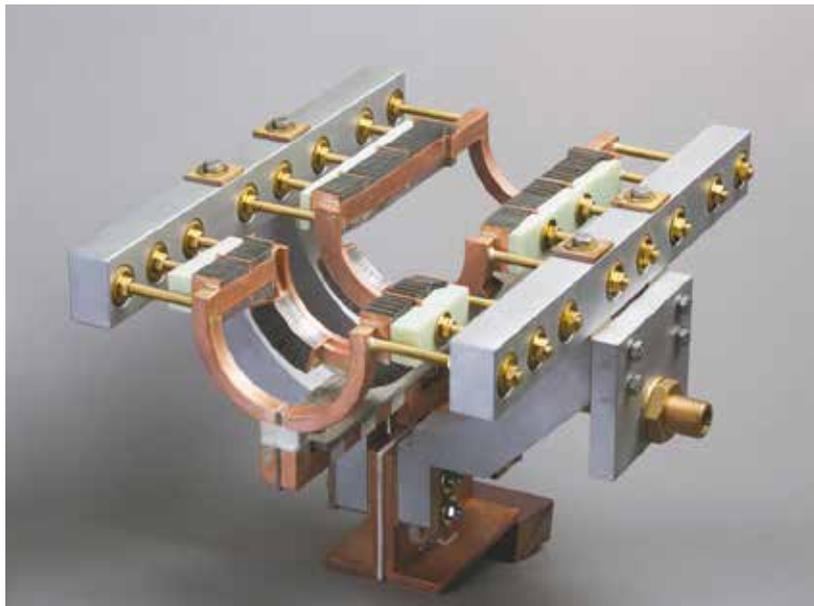
How to turn them into powerful business tools

Coils customized for your business

Single-turn, flexible, multi-turn cylindrical, left-turn, right-turn, rod-shaped, hair-pin, parallel, ear-shaped, new, reconditioned, tiny, big, unbelievably enormous. At EFD Induction we design and make practically every type of coil imaginable.

But making coils is only part of the story. We can support you and your business with worldwide coil refurbishment and logistics services. Contact us today to learn more. We have coil-related testimonials and case stories from customers around the globe—and we'd love to share them with you.







The world's best induction coil company?

To get the most out of EFD Induction equipment you should use EFD Induction coils. But even if you use non-EFD Induction power sources, we can still provide you with new, more efficient coils. Alternatively, we can re-condition your existing coils to increase their working life and productivity.

Coil services

Our logistical and tracking support will help ensure you always have enough coils to hand. We also make sure that coils are replaced before they pose a threat to uptime and productivity.

Worldwide network of labs and coilshops

Designing and testing coils is often the process with the longest lead time when devising an induction heating solution. That's because the design must first be rigorously

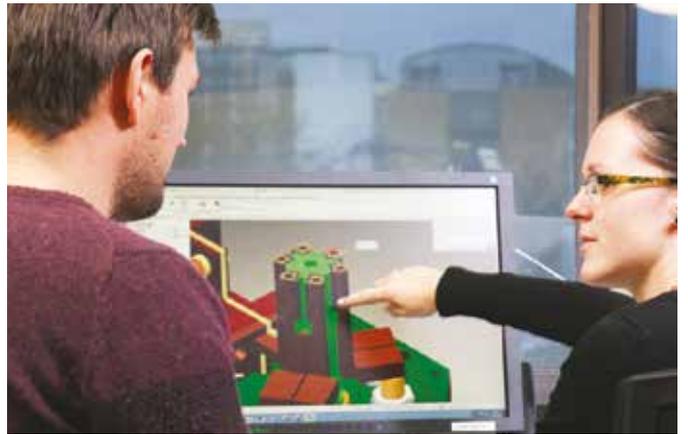
tested to see if it works as expected in harsh working environments. However, such testing requires specialist equipment—the kind you find in our worldwide network of labs and coil workshops.

Skilled specialists on call

EFD Induction coil engineers are specialists at building, testing and reconditioning coils for many of the world's leading manufacturing companies.



With EFD Induction you benefit from specialist engineers and specialist equipment... in a worldwide network of manufacturing facilities and coil workshops.



Every EFD Induction coil is a customized business tool—precision crafted to deliver maximum uptime and heating results.

Reduced costs

EFD Induction coil services lower your costs through:

- Maximum uptime. Maximum coil lifetimes saves you money by reducing the number of coil changes and minimizing production disturbances caused by aging coils.
- Consistent quality. Our coil services help to ensure you consistently achieve desired quality levels. You get things right the first time. Scrap is minimized. Yield is maximized. Reworking is reduced.
- Professional planning. Reduce associated costs for coil logistics, storage, upgrades, etc.
- Computer simulation. We use advanced digital simulation techniques to specify the best possible induction solution for your needs. It also shows how various solutions affect your materials, work processes, etc.
- Lower energy consumption. Our coils help you optimize your induction equipment to run it in an efficient way. This can help you save energy.

Advanced tools for maximum coil lifetime

Coils from EFD Induction are state-of-the-art components. We typically use the following tools and processes to ensure their longevity and performance:

- 3D design programs.
- Advanced simulation tools and software.
- Mandrels to achieve tight tolerances.
- Testing and final dimensional check on customized alignment gauges.
- Rigorous pressure and leakage testing.
- Quality Management System certified to ISO 9001.
- Use of Health, Safety and Environment Management Systems throughout the design, testing and manufacturing phases.





Three coil challenges

The induction coil, also known as an 'inductor', is essential to induction heating. Many factors contribute to a coil's effectiveness: the care taken to make it, the quality of the materials used, its shape, its maintenance, its correct matching with the power source, etc. That's why it's so important to insist on professionally made and maintained coils.

Here are just three of the many hurdles to be overcome in order to make safe and efficient coils:

Challenge one: water flow and speed

It is generally important to achieve an adequate flow of cooling water through the coil. When high power density is expected in the inductor, the coil designer must consider the flow rate and the water's velocity. This is because velocity significantly influences the heat transfer between inductor and coolant, and therefore has a major impact on the longevity of the coil.

A booster pump is sometimes needed to maintain the desired flow and velocity. Professional designers will also specify a purity level for the water in order to minimize coil corrosion.

Challenge two: impedance matching

It is necessary to achieve the correct impedance matching between the coil and the power source in order to use the latter's full power. The coil designer must also consider that coils need five to ten times as much reactive as active power.



Designing and making induction coils is technically challenging. The details of every single EFD Induction coil are entered into a constantly updated database. As a result we can quickly and smoothly replace or repair any coil, anywhere—without compromising quality or productivity.



Challenge three: magnetic flux concentrators

Concentrators focus the current in the coil area facing the workpiece. Without concentrators much of the magnetic flux may propagate around the coil. This flux could engulf adjacent conductive components. But when concentrated, the flux is restricted to precise areas of the workpiece. Concentrators are made from laminates, or from pure ferrites and ferrite- or iron-based powders. Each material has its own pros and cons:

- Laminates have the highest flux density and magnetic permeability. They are less expensive than iron and ferrite-based powders. However, laminates are stamped in a few standardized sizes and are therefore less flexible. They are also labor intensive to mount and can usually only be used up to medium frequency range (<50 kHz).

- Pure ferrites are efficient with small magnetic fields. But they suffer from low saturation flux density and heat conduction. Their brittleness makes them difficult to treat.
- Iron powders offer high flux densities and are easy to shape. But since powders have a relatively low working temperature (< 250 – 300 °C), care must be taken to prevent overheating caused by internal losses and radiation from the heated workpiece.





You're never far from EFD Induction coil expertise and support services.

From coils to complete solutions

We've been developing induction-heating solutions for more than 65 years. Today, we're one of the world's largest industrial induction equipment makers, with sales and service companies, manufacturing plants and R&D centers around the world. We are particularly strong in devising complete, customized 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 are fully up and running.

www.efd-induction.com



PUTTING THE SMARTER
HEAT TO SMARTER USE