



# Bolt expansion

A guide to the benefits of induction heating



# Induction heating for speedy bolt expansion. And speedy cost contraction.

**The use of induction heating for bolt expansion in high-pressure turbines is a powerful business tool. It's faster than resistance and flame heating. Its rapid, precise and localized heat doesn't damage bolts and threads. And with a compact, mobile EFD Induction 'Twin' Minac system, one operator does the work of two.**

Expanding bolts with induction is the proven time- and labor-saving alternative to inefficient flame and resistance heating. With induction, a specially designed coil is inserted into the bolt. Rapid, precisely controlled and localized heat is then induced directly in the bolt. The heat expands the bolt by an exact, pre-decided length, making it easy to remove the nut.

The speed and accuracy of induction heating prevents damage to the bolt threads. The heating process is so quick there simply isn't enough time for heat to travel into the thread area. And of course,

with induction there's no risk of rods melting inside the bolts—a common and time-consuming problem with alternative heating methods.

With induction, crucial process parameters such as temperatures, ramp-up and dwell times are set in advance. Operator productivity is enhanced by quick-release coils. It takes only a few seconds to attach differently sized and shaped coils to the handheld transformers. The coils can be used with angle adapters to ensure smooth and fast passage of the coil into the bolt.



*An EFD Induction Minac 25/40 Twin heating bolts on a steam turbine. This particular model features two independent handheld transformers, both powered by one compact and maneuverable converter.*

# Twice the work. Done in half the time.

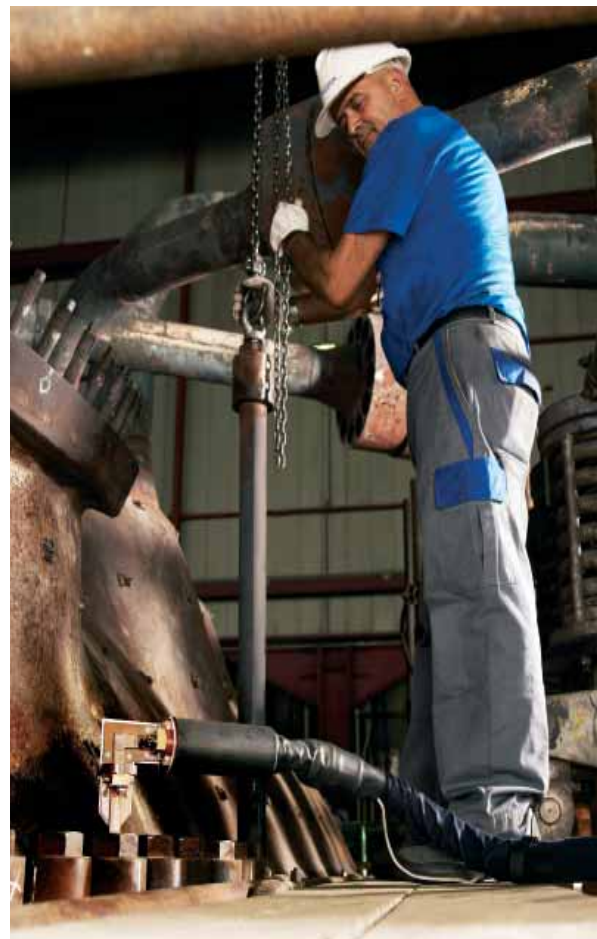
The EFD Induction bolt expansion solution is built around a small yet powerful mobile Minac converter, and specially designed inductor coils. The Minac also comes in a 'Twin' version, where one converter is connected to two independent handheld transformers. This means an operator can work on two bolts at the same time—in effect achieving the productivity of two operators. Alternatively, two operators can work simultaneously, each with their own independent transformer.

A Minac is small and light enough to be hoisted onto scaffolding or a cherry picker. And the flexible cable (up to ten meters long) makes it easy for operators to access hard-to-reach areas. But Minac's compact size and mobility isn't achieved at the expense of

power. The Minac 25/40 Twin, for example, has outer dimensions of only 345 x 708 x 453mm, yet its two handheld transformers each delivers a maximum output power of 40kW simultaneously. Minac's speed and efficiency are crucial advantages when heating bolts, as maintenance work must often be performed within tight downtime constraints.



*An operator inserts a specially designed induction coil into the bolt. The long flexible cable makes it easy to reach work areas, further reducing the time needed to remove the nuts.*



*Minac lets operators pre-select key process parameters. The operator can then perform other tasks, safe in the knowledge that the bolt is being heated to precise specifications.*

# The EFD Induction Minac. For bolt expansion and just about everything else.

Exceptionally easy to use, the Minac systems used for bolt expansion typically deliver output powers of 25-50 kW. And since integrated output matching is standard on all Minacs, you can use your system for practically any heating application: brazing, shrink fitting, hardening, curing, straightening, heat treatment, etc.

The Minac also features micro-controllers to ensure optimal heating process control. And process parameters can be fed back to a recording device so you can keep a log of work performed on each bolt.



*The end result of quick and safe induction bolt heating: an exposed turbine is ready for maintenance.*

EFD Induction is Europe's no. 1—and the world's no. 2—induction heating company. In addition to our equipment we offer a range of services to ensure you get a solution best suited to your business and technical needs. We have manufacturing plants, workshops and offices in the Americas, Europe and Asia.

**Learn more about the EFD Induction solutions that are boosting productivity for companies around the world. Visit: [www.efd-induction.com](http://www.efd-induction.com)**