

# Camshaft hardening

A guide to the benefits of induction heating



# Why choose induction for camshaft hardening?

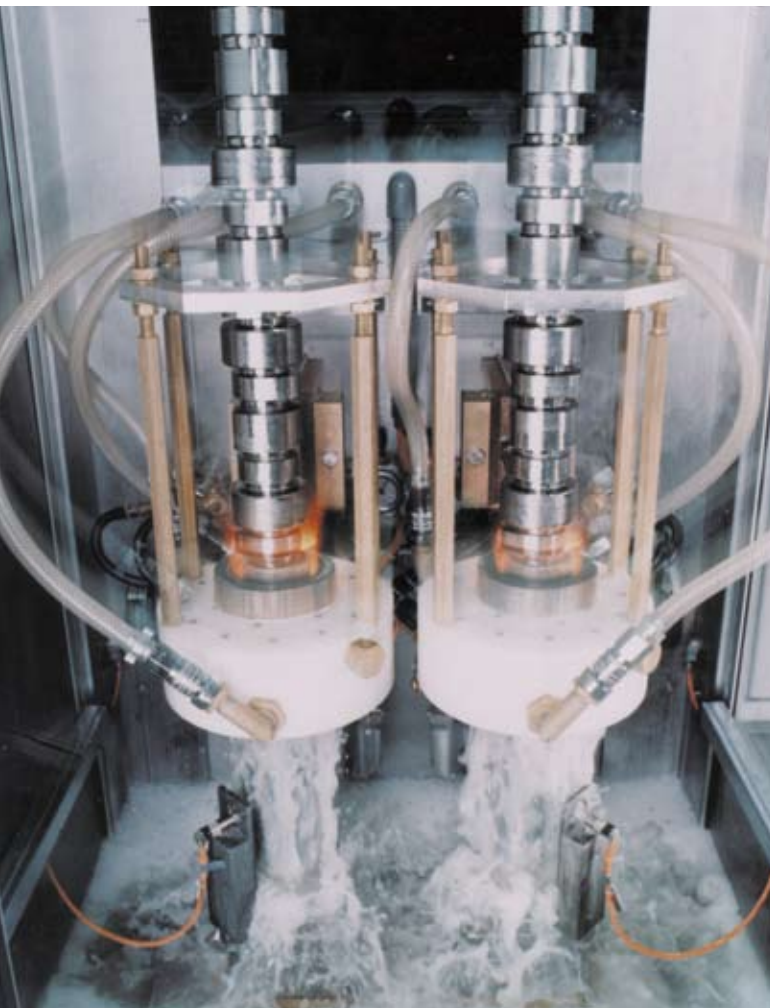
There are many reasons why induction heating is the preferred method for hardening camshafts. Chief among them, however, is the ease with which induction hardening can be integrated into existing or planned production lines.

The benefits of inline integration are obvious:

- Production throughput is maximized.
- Each camshaft is individually hardened with known and controllable process parameters.
- Full supervision and control of the hardening process.
- No need to build up production buffers, as with furnace hardening.
- No need to transport the camshafts off-site, thereby saving logistics and administration costs.

Another key reason is induction heating's energy-efficiency. Unlike furnaces, induction produces heat only when and where it is needed. Moreover, induction hardening is controllable. Temperatures, heat patterns and penetration depths can be adjusted to the requirements of individual workpieces.

Induction hardening is repeatable. Process parameters can be set in advance in order to achieve uniform and predictable results on multiple workpieces. And induction's polymer emulsion quench medium is a more environmentally friendly alternative than the oil baths used in furnace carburizing.

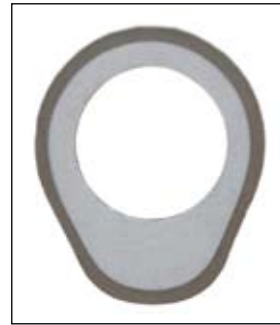


*Above, a double station EFD Induction vertical hardening machine in action. Left, simultaneous quenching with polymer emulsion of two camshaft lobes.*

# Package hardening—an EFD Induction specialty

Closely spaced lobes are a challenge to harden. When the distance between the lobes is less than 7 mm, heat transfer can easily preheat the next cam to be hardened, or temper an adjacent cam that has already been treated.

At EFD Induction we have perfected a proven 'package hardening' method that ensures successful hardening of closely spaced lobes. The method uses three different induction coils to simultaneously heat the inlet, outlet and injector lobes. Each coil is independent, with its own power supply. This means that the heating process can be adjusted to suit each lobe.



*We design, make and maintain customized induction coils for camshaft hardening. These formed coils (top right and bottom) deliver precise heat patterns and penetration depths for perfect hardening results (top left).*



*A specialized EFD Induction solution—package hardening of three lobes ensures perfect hardening outcomes for closely spaced cams. Each coil operates independently and its formed to match a specific lobe.*

# Camshaft hardening systems from EFD Induction

EFD Induction is the world's no.1 induction hardening company. Our induction camshaft hardening solutions are used by many of the leading names in the truck, bus, excavator and earth-moving equipment industries. Our systems are also widely used to harden marine camshafts.

We offer a complete range of CNC-controlled vertical hardening machines that are ideal for camshaft hardening. The systems vary from the compact VS machine for small to medium production volumes, to the VM, VL and VXL for progressively larger components and output volumes.

All EFD Induction vertical hardening machines can be fitted with numerous subsystems. These include: automatic loading/unloading, protective atmosphere capability, double station/centres, and various process monitoring solutions.

To learn more about our camshaft hardening systems—and our experience with demanding customers—just contact your nearest EFD Induction office. Full contact details can be found at: [www.efd-induction.com](http://www.efd-induction.com)



*A twin cabinet EFD Induction vertical hardening machine. The power source is an EFD Induction Sinac.*