



Left: EFD Induction single cam hardening with special coil
BELOW: EFD Induction package hardening

New hardening techniques

Achieving shorter manufacturing lead times is one of many advantages of using EFD's induction-based hardening solutions

More and more companies are opting for induction-based hardening solutions – and there are four key reasons that make induction hardening such an attractive choice for OEMs and suppliers.

The first centers upon high throughput. Induction hardening is ideal for integrating into production lines, and once installed, engineers can exploit the equipment's high throughput, accurate controllability and reproducibility – even for work pieces with complex geometries. If components need tempering, EFD Induction offers different solutions such as induction or furnace tempering to overcome such issues.

Secondly, the technology realizes shorter lead times. For example, the in-line integration made possible by induction hardening not only boosts output – it slashes lead times. Components no longer need be sent away to hardening shops or separate hardening areas, and transportation times and costs are also reduced. As a result of this, administration is also streamlined.

Thirdly, environmentally, induction heating is a clean, flameless, no-contact technology, and since it precisely delivers



heat only when and where it is needed, induction hardening is extremely energy-efficient – particularly when compared to wasteful methods such as furnace carburizing. In addition to this, induction hardening typically uses a polymer emulsion and thus eliminates the use of environmentally unfriendly oil baths. These features are not only good news for the environment, but they also contribute to a safer, healthier and more productive workplace.

Finally, induction-based hardening solutions give engineers complete control. This means each and every work piece is hardened to very precise specifications

so nothing is left to chance. With EFD Induction's PLC/CNC control systems, engineers can determine the heating pattern, heating time, throughput speed and quenching processes for each hardened component. Parameters for each part can be supervised and stored on the work server via a network connection.

There are several benefits to in-line integration. For example, production throughput is maximized and each camshaft is individually hardened with known and controllable process parameters. Full supervision and control of the hardening process is made possible and there is no need to transport the camshafts off-site, saving on logistics and administration costs.

Closely spaced lobes that need to harden are often a challenging aspect for engineers. When the distance between the lobes is less than 7mm, heat transfer can easily preheat the next cam to be hardened, or temper an adjacent cam that has already been treated. The company has 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, and this means that the heating process can be adjusted to suit each lobe.

EFD Induction is a leading induction hardening company, and its induction camshaft hardening solutions are used by many of the leading names in the truck, bus, excavator and earth-moving equipment industries. EFD offers 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, and these include automatic loading/unloading, protective atmosphere capability, double station/centers and various process-monitoring solutions.