



**EFD**<sup>®</sup>  
INDUCTION

# HardLine<sup>®</sup> vertical heat treatment machines

An introduction to the VS / VM / VL / VXL systems

# How HardLine saves you money



EFD Induction's HardLine vertical heat treatment machines are proven business tools. They improve competitiveness by lowering costs, while at the same time ensuring outstanding process quality. In fact, this combination of cost and quality advantages has made the HardLine range of vertical machines one of the most widely used in the world. The main benefits delivered by HardLine vertical systems are:

## **Reduced capital costs**

As each HardLine vertical hardening system handles a wide spectrum of workpieces, you need fewer dedicated machines.

## **Reduced operating costs**

Advanced CNC systems, state-of-the-art inductors and reliable power sources all help ensure maximum uptime and minimal waste.

## **Streamlined production**

Fast, automated induction hardening is ideal for in-line integration.

## **High throughput**

Programmable heating and quenching cycles, automatic loading systems, various indexing table choices and dual spindle options guarantee high throughput.

## **Improved operator productivity**

Smart ergonomic design and an easy-to-use operator interface minimize human errors and boost operator productivity.

## **Customized solutions**

HardLine vertical systems are modular; subsystems can be added to meet your specific requirements. You avoid paying for redundant features.



*HardLine systems are widely used for hardening automotive components. Top, a camshaft being heated and quenched in a HardLine machine. Bottom, a HardLine machine being tested at an EFD Induction facility.*

# Options and controls for maximum productivity

Each HardLine vertical heat treatment machine can be fitted with a range of optional subsystems. These options let you easily adapt the machine to match specific parts and process requirements. Some of the options available are:

- Automated loading/unloading solutions increase throughput and make it possible to integrate the hardening machine into a production line.
- An indexing table with a programmable CNC-axis gives unlimited position control. Static, rotating, single- and double-station tables are available.
- A HF/MF chuck connection allows quick changeovers from high to medium frequencies. It also enables the use of both frequencies for parts with high and medium frequency heating zones in one set-up.
- Double tailstocks and centers let the machine harden two parts simultaneously.
- With a curved-disc hardening device, a normal inductor can scan and harden curved components.

All HardLine vertical heat treatment machines feature an advanced CNC solution based on the world's most trusted platforms. The specific type of CNC used depends on machine and processing requirements. The CNC control unit is mounted on the machine body, while the system interface is field-located close to the operator. A key feature of the CNC solutions is the inclusion of absolute encoders. These eliminate time-consuming system referencing otherwise needed on start-up.

HardLine vertical heat treatment machines can be fitted with various monitoring solutions. You can, for instance, choose the RTM100 system. An advanced real-time monitoring system, the RTM100 monitors several parameters in multiple machines simultaneously.



## HARDLINE AT WORK

The photo on the left shows an EFD Induction automated loading system placing a camshaft into a hardening machine. Such loading/unloading solutions maximize throughput, while also helping to ensure optimum process outcomes. The photo on the right illustrates a programmable quenching cycle at work.



# Possibly the world's most successful vertical



## **HardLine VS**

Specially designed for workpieces up to 300 mm in length, the VS system is ideal for small to medium production volumes. Despite its compact size the VS is extremely versatile, and is available in numerous configurations. Each VS machine can be fitted with a turntable for fast and easy loading/unloading.



## **HardLine VM**

Our most popular vertical hardening system, the HardLine VM is capable of hardening components up to a maximum of 400 kg. A key benefit of the HardLine VM is its versatility, with a single system able to handle everything from CV joints to camshafts and axle shafts.

## **HardLine machine types**

HardLine vertical hardening systems are available in four machine types, each one designed for a range of workpiece sizes: VS, VM, VL, VXL. All the machines are powered by EFD Induction Sinac power sources, and feature CNC-based control systems. Each machine also features a closed-loop cooling system.

# al heat treatment systems



## **HardLine VL**

The VL machine is designed specifically for large and heavy components up to a maximum length of 2,000 mm and a weight of 600 kg. As with all HardLine vertical machines, the VL is compatible with CNC controls and robotic handling.



## **HardLine VXL**

HardLine VXL is a hardening machine built specifically for very heavy and/or large parts. To let the machine handle large components, the VXL features a special, reinforced spindle and a high-power output carriage. The VXL can also be fitted with a mobile spindle, making the machine ideal for hardening large gears.

## **Sinac power sources**

All HardLine vertical hardening systems are powered by EFD Induction Sinac generators, which are available in parallel- and serial compensated versions. Sinac's output power and frequencies range from 5-2,000 kW and 0.3-350 kHz. Special 'Multi Frequency Concept' Sinacs are also available. These systems use patented EFD Induction technology to simultaneously deliver two different frequencies to a coil, resulting in optimum hardening of complex geometries.

# Get more from your equipment

When you choose a solution from EFD Induction you choose security and peace-of-mind. As one of the world's largest induction heating companies we offer a full range of maintenance, logistics, training and spares services. Make the most of your heating system—with a little help from the people who built it.



*Many HardLine vertical machines are customized to work with robotic handling solutions. Above, a HardLine machine and its robotic handling system near completion at the EFD Induction factory in Freiburg, Germany.*

EFD Induction has to date installed thousands of heating solutions for a vast range of industrial applications—bringing the benefits of induction technology to many of the world's leading manufacturing and service companies. EFD Induction has manufacturing plants, workshops and service centers in the Americas, Europe and Asia.

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