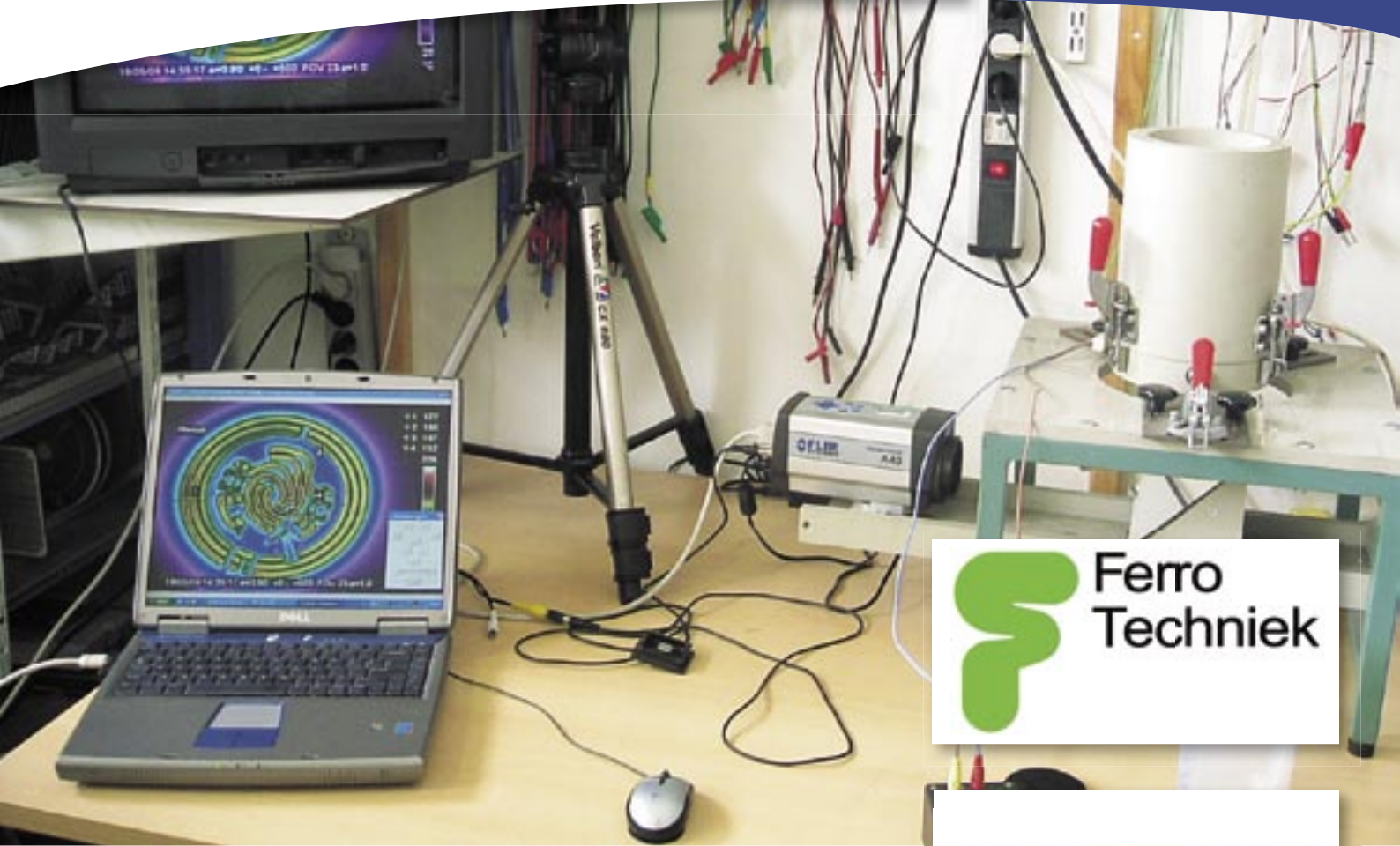


# FLIR

## APPLICATION STORY



## Ferro Techniek BV develops heating elements thanks to FLIR Systems ThermoVision A40-M

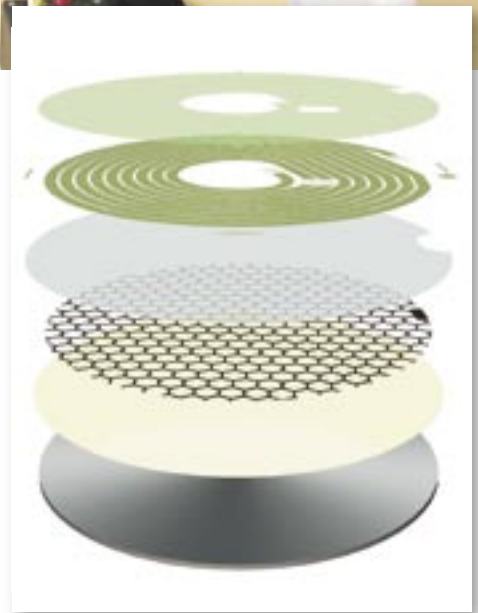
Enameling of art objects has been applied in many ancient civilizations. In the 19<sup>th</sup> century, the ground and finishing enamel process became applicable for industrial applications. Enameled metal is resistant against corrosion, high temperature, acid and alkali.

The company Ferro Techniek BV, based in Gaanderen, the Netherlands, specializes in vitreous enameling of pieces and components. Once only focused on pan supports and burner caps for kitchen stoves, which it still produces for kitchen appliances brands, the company has evolved into further innovative industrial enamel applications. Ferro Techniek now also produces enameled heat exchanger plates which desulphurize emissions of coal-fired power plants. These enameled plates

considerably extend the power plant heat exchanger's lifecycle as they are less prone to corrosion. And they contribute to reducing emissions: a distinct product advantage against a background of a stringent global environmental legislation.

The other backbone of the company is a new, more refined, yet highly successful application: Ferro Techniek develops and manufactures heater elements for small, high-powered applications: water boilers, coffee machines and other household appliances which need fast and high temperature response.

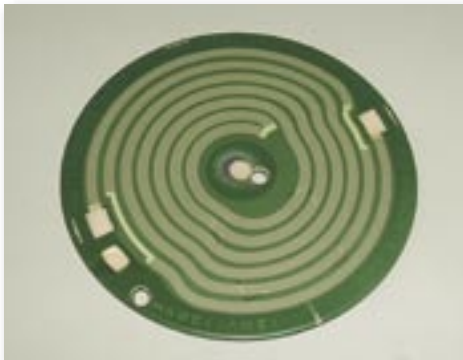
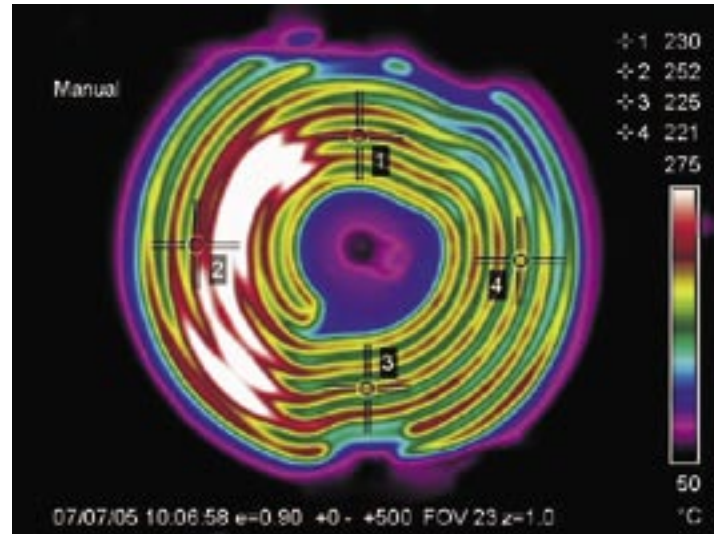
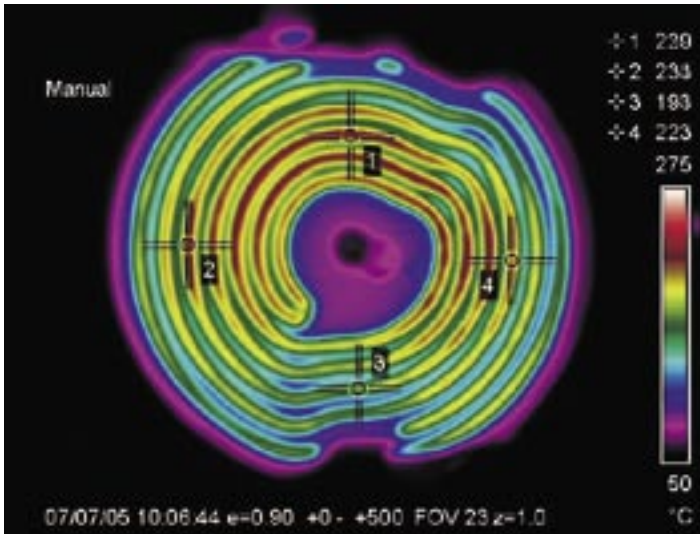
Ferro Techniek produces the heating plate and provides a stainless steel surface with a glass-ceramic coating and a PEMS (Porcelain Enameled Metal Substrate) "thick film element"



*Picture shows all layers covering the enamel plate to enable uniform heating process over the entire area*

# FLIR





Enameled plate with thick film element. IR images show uniform heating left and hot spot (potentially overheated area).

on the contact side of the heater. This thick film element consists of a thin electric-conductive layer printed with screen printing on the enameled side of the heater element. The technology contributes to equal spread of heat and generates quick response, which makes it an ideal application for domestic appliances, medical instruments, and automotive electronics. Covered by a specific, in-house developed sensor layer, E-FAST (Electronic Full Area Sensor Technology), it enables instant overheat protection over the entire heater area, while avoiding loss of thermal contact, delamination and thermal drift. "Bimetal switches, thermal fuses, and other temperature protective devices are limited in their performance", says Gerd Kloppers, Development Manager Thick-film Heating Elements, "they provide only local protection and a delayed response".

Overheating can cause irreversible failure of the element. Moreover, overheating protection becomes a distinct product feature (and soon a regular feature) of heaters for household applications.

#### FERRO TECHNIK'S THERMOVISION A40-M FIREWIRE

The development of these products would have been unthinkable without an infrared camera. The Ferro Technik developers intensively use the ThermoVision A40-M to fine-tune the designs of the thick film elements. The thick film designs have to cover the entire heating area. "But it's important," adds Gerd Kloppers, "that they display the same quality features at all turns and edges of the design".



An application of Ferro Technik's heating elements

The camera's 340x240 resolution provides the required high-quality thermal images. Its FireWire connection assists in perfectly visualizing the elaborate testing of the heating elements. To handle the high temperatures of more than 500 °C produced by its heater elements, the ThermoVision A40 at the Ferro Technik lab has been calibrated to a temperature range up to + 1,500 °C.

The serial production of the thick film elements is done at subsidiary company Ferro Electronics in Budapest, Hungary. The patterns are screen-printed on the enameled plates. The plates are subsequently tested at random by a veteran AGEMA 470 infrared camera linked to a monitor. Then, they are put together with the sensor and other elements into a one-piece heating component, ready to be assembled into a household appliance.

Ferro Technik has developed its core enameling expertise into manufacturing entire sophisticated heating components. Infrared technology has been instrumental in turning this conversion into a success. "The ThermoVision A40 camera has allowed us to realize these comprehensive product developments" says Gerd Kloppers. The results are at hand: the heaters are successfully used by leading household appliances brands.

Thanks to Martin Bouman, Area Sales Manager Benelux for providing contacts



Ferro Technik's latest product development is a flow through heater for instant beverage water heating and delivery at point-of-use (e.g. modern coffee vending machines).

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