

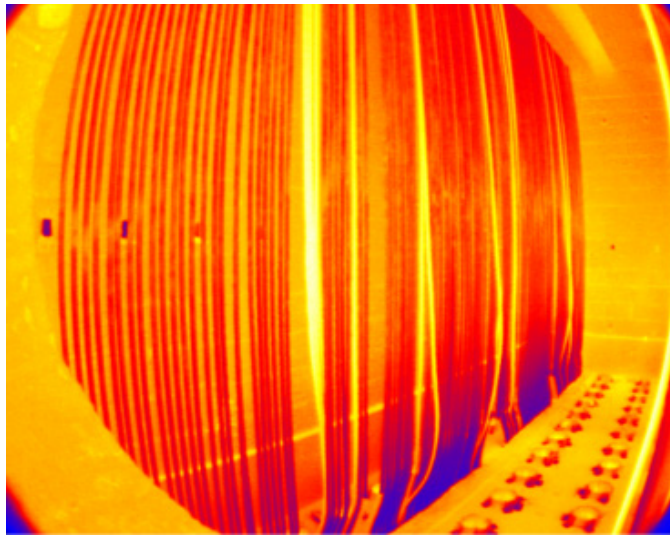
CASE STUDY

AMETEK LAND SELECTED BY LARGE ETHYLENE PRODUCER TO INSTALL HIGH DEFINITION THERMAL IMAGERS ON STEAM CRACKERS

INTRODUCTION

The NIR-B-2K, AMETEK Land's high-definition thermal imaging system, has been selected by one of the world's largest ethylene producers for installation on multiple liquid-feed cracker furnaces. After extensive technical consultation to determine the optimum location for each camera, the end-user proceeded based on a simple, proven value proposition: high-definition imaging of the most critical areas of the furnace, combined with automated tube metal temperature measurement allows for small increases in the furnaces run-length, reductions in decoking times, and improvements in firing efficiency.





ABOUT THE CUSTOMER

The client is a large ethylene producer operating a facility in the United States. The site operates around the clock, and combines processing equipment, control rooms, storage tanks, environmental protection equipment, office buildings, shops, and warehouses for a complex run by highly skilled, well-trained, and experienced employees. Located near major product pipelines and dock facilities, it manufactures a range of base chemicals or raw material chemicals, supplying them to other chemical companies that then turn them into thousands of consumer products.

THE CHALLENGE

Ethylene is a key building block for a wide range of everyday items, from the production of plastics to polyesters. It is produced by cracking hydrocarbon feedstocks at high temperature with steam.

Typical examples of hydrocarbon feeds are ethane, propane, butanes, naphthas, and kerosenes. In this case, the ethylene producer was looking to optimize their kerosene cracking furnaces.

In the convection section of a cracking furnace, heat is recovered from the hot flue gases leaving the radiant section where the actual steam cracking takes place. The recovered heat is used for high-pressure steam generation, and for preheating the feedstock and process steam. The preheated steam and feedstock are then mixed and pushed through the radiant section tubes where the cracking reaction happens and ethylene is formed.

The furnace must be kept at a high temperature for the cracking to take place. Overheating is inefficient as it wastes fuel, increases carbon deposits, and can reduce tube life.

Damage to equipment can cost millions of dollars in rebuild costs, while the financial impact of lost production can also be significant.

However, cracking is ineffective if the temperature is too low, so real-time thermal analysis is important for process control, to maintain optimal temperature, and to monitor the condition of the cracker furnace. This requires accurate, non-contact solutions that are capable of tolerating high temperatures.

The ethylene producer was using handheld single-point thermometers on every shift to measure tube wall temperatures (TWTs) within the furnace. They wanted to find a solution that allowed them to improve their control of furnace uniformity, enabling them to run longer and reduce localised coking build-up.

THE SOLUTION

To address the challenges in this application, AMETEK Land supplied thermal imaging cameras for four kerosene crackers at the customer plant.

The non-contact measurements made by these cameras provide a non-destructive technique that doesn't interfere with the process, and a direct measurement that can be achieved within milliseconds.

The NIR-B 2K was selected for this application. This is a high-resolution short-wavelength radiometric infrared borescope imaging camera, designed for a wide range of continuous process monitoring and control applications.

With an outstanding resolution of up to 3 million pixels, the NIR-B 2K can provide better definition at a distance, measuring temperatures in the range of 600 to 1800 °C (1112 to 3272 °F).

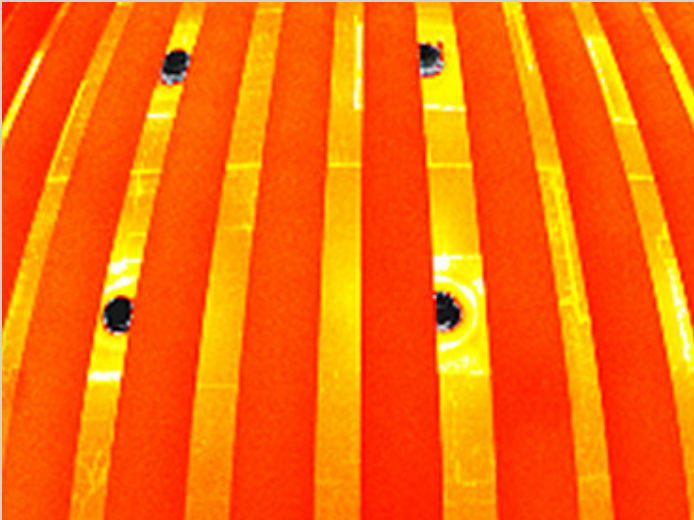
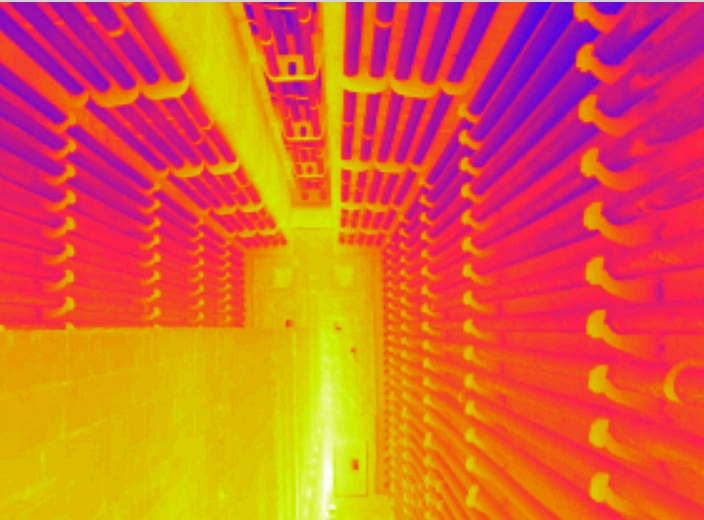
The thermal image is unaffected by the furnace's hot atmosphere/gases, when the furnace is fired using natural gas or hydrogen,

enabling operators to measure from any of 2,904,768 pixels, and optimise furnace temperature to save energy, increase efficiency, and reduce emissions.

With 24/7 coverage via Gigabit Ethernet connection, automated alarm outputs instantly alert the user to any problems or structural issues, ensuring furnace efficiency and complete operational control. In addition, thermal anomalies are easy to detect, through continuous monitoring of all positions from the safety of the control room.

The cameras require only a narrow opening to accommodate a wide field-of-view angle lens tip, with a choice of optics (FOVs) are available, providing an extensive measurement area throughout for wide furnace coverage.

Seven air-cooled NIR-B 2K imagers, each with a power supply unit and clamp collar assemblies, have been installed at each of the four cracker furnaces, providing accurate temperature measurements and continuous monitoring of furnace condition.



Example applications - industrial furnaces

EXPECTED RESULTS

The ongoing project aims to improve and optimise the performance of the furnaces. It also provides the furnace operator with better control of the decoking schedule.

Accurate, real-time temperature measurements will extend tube and catalyst life and allow automated or remote operator-controlled temperature monitoring for early warning of rising temperature.

The real-time measurements will also enable balancing of the furnace during general operation, and at critical startup and shutdown stages. It provides data trending across weeks or months of operation, delivering a greater understanding of the furnace under different conditions.

The NIR-B 2K solution also increases safety, removing the requirement for an operator to make regular handheld cyclops temperature measurements in potentially hazardous environments.

By installing the solution in four of the 12 ethylene crackers used at the site, the customer will be able to compare the results obtained and see the full impact of the new solution.

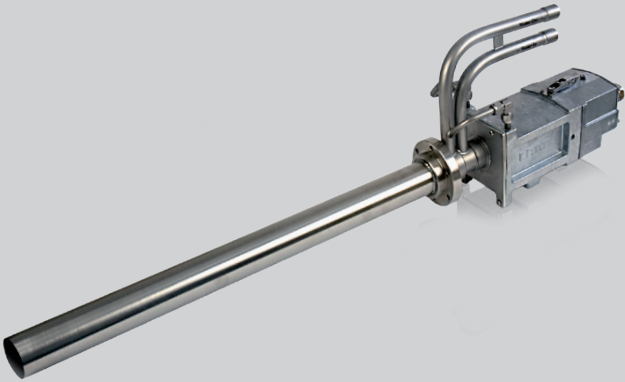
In addition, the customer intends to use a virtual furnace system that relies on a predictive model to give temperatures of the coils where the cameras cannot see. This can be validated and adjusted by the live thermal imaging data supplied by the NIR-B 2Ks.

A spokesman for the customer said:

“The AMETEK Land team put a lot of time and effort into this project, showing a very high level of understanding of both the technology and the solution. Their in-depth engineering expertise set them apart from competitors.”

NIR-B 2K

High-resolution short-wavelength radiometric infrared borescope imaging cameras designed for a wide range of continuous process monitoring and control applications.



TEMPERATURE RANGE
600 - 1800 °C / 1112 - 3272 °F

BENEFITS

- Continuous furnace monitoring
- Extreme wide-angle view
- Highly accurate temperature readings
- Advanced spectral filtering

APPLICATIONS

- Cement – Burning Zone
- Cement – Kiln Shell
- Hot Rolling – Reheat Furnace
- Forging – Rotary
- Heat Treatment – Annealing
- HPI - Hydrocarbon Processing

INDUSTRIES

- Minerals
- Steel
- Industrial Processing
- Ethylene Cracker – Steam Cracking Furnace





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PERFORMANCE SERVICES

AMETEK Land's AMECare Performance Services ensure peak performance and maximum return on investment over the life of your equipment.

We will deliver this by:

- Proactively maintaining your equipment to maximise availability.
- Optimising solutions to meet your unique applications.
- Enhancing user skills by providing access to product and application experts.

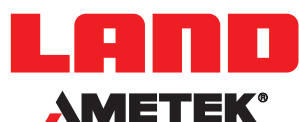
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SEE OUR RELATED LITERATURE FOR THE NIR-B 2K



DISCOVER HOW OUR BROAD RANGE OF NON-CONTACT TEMPERATURE MEASUREMENT AND COMBUSTION & EMISSIONS PRODUCTS OFFER A SOLUTION FOR YOUR PROCESS

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