Temperature monitoring

As cement plants aim for higher alternative fuel thermal substitution rates, close temperature monitoring of the process is crucial. As TPI Polene's case study shows, thermography solutions provide key support to cement operators as they optimise precalciner operation when using alternative fuels.

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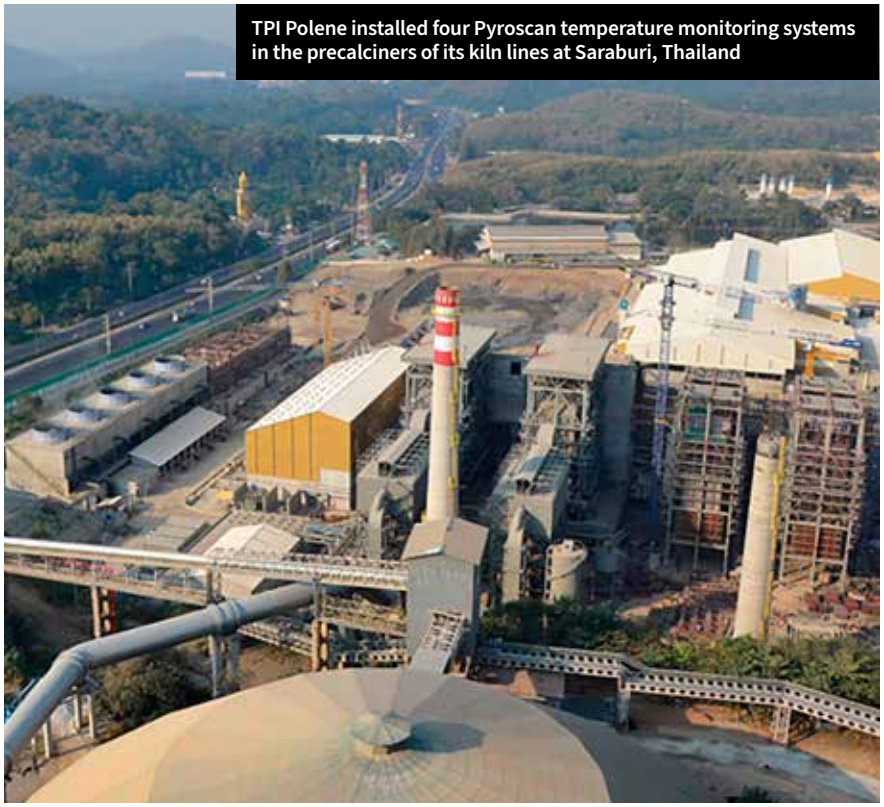
Thailand-based cement producer TPI Polene Public Ltd Co operates four cement production lines in Saraburi with a total capacity of 13.5Mta.

As a pioneer in the waste-to-energy sector and decarbonisation in Thailand, TPI Polene has equipped its cement lines with ThyssenKrupp PREPOL-SC® 'step combustion' precalciners. On the precalciner's combustion grate, waste can burn for more than 1000s at high temperatures, significantly longer than when using conventional calciner technology with a maximum residence time of seven seconds. As a result, the PREPOL-SC precalciner opens up new possibilities for the thermal utilisation of a large number of alternative fuels, even those with large particle sizes.



TPI Polene installed four Pyroscan temperature monitoring systems in the precalciners of its kiln lines at Saraburi, Thailand

Thermography as added value

In 2023 TPI Polene started to study the implementation of HGH Infrared Systems' Pyroscan on PREPOL-SC precalciners as a way to improve its pyroprocess by leveraging the added value of thermographic data.

Following several on-site trials conducted at different locations, HGH and TPI Polene agreed on the most relevant field of view and positioning of the camera. The Pyroscan installed at the top right side of the precalciner offers a bird's eye view on the full grate.

HGH and TPI Polene conducted on-site trials to determine the best location for the Pyroscan equipment

The two first systems were successfully commissioned earlier this year and are now fully operational. A further two systems are due for commissioning in the summer.

The water-cooled Pyroscan, fitted with very high temperature resistant hoses and cables, suits the harsh environment of the preheater. High-resolution visible and thermal images of the inside combustion chamber are displayed in real-time, allowing operators to evaluate the feeding and monitor temperatures closely.

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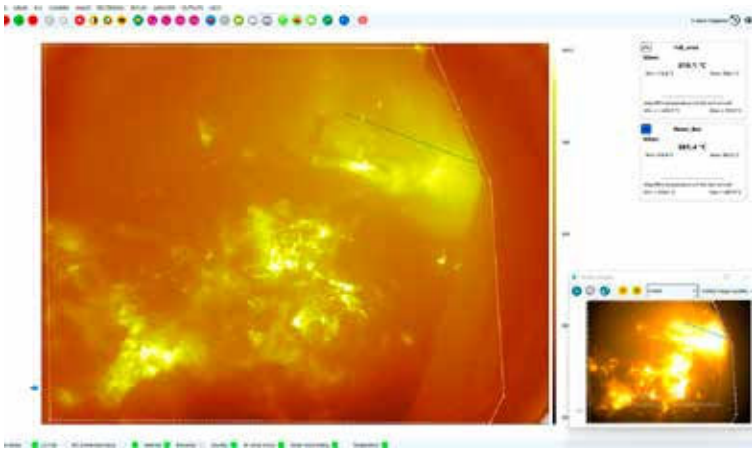
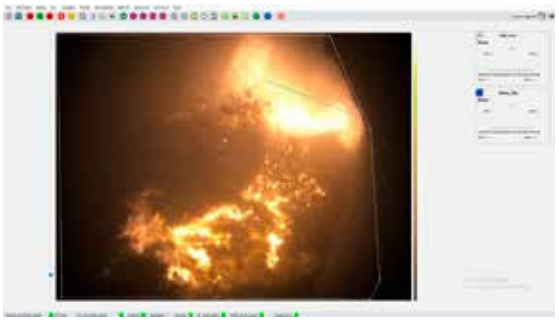


The thermal image (left) and visible image (below) of the PREPOL SC precalciner as seen through the Pyroscan equipment



efficiently and the waste feeding is optimised " said TPI Polene's cement production team.

Benefits of temperature monitoring in the precalciner

Monitoring temperatures inside a precalciner has many benefits, including:

- optimising alternative and conventional fuel usage to ensure complete combustion and minimise waste
- maintain consistent and efficient limestone calcination, which is critical for producing high-quality clinker
- prevent operational issues such as overheating or incomplete combustion that can damage equipment or increase emissions
- control the formation of emissions such as NO_x by adjusting temperature profiles.

Therefore, temperature monitoring helps maintain stable and efficient calciner performance , contributing to improved energy efficiency, lower emissions and better process reliability.

"After installation of the HGH Pyroscan, with an 'eye' inside the chamber, the PREPOL precalciner is more stable, incineration temperatures are monitored efficiently and the waste feeding is optimised."

TPI Polene production team

Further applications

Kiln temperature monitoring

In addition to temperature monitoring in the precalciner, the Pyroscan can also capture high-resolution images of the kiln's interior, providing detailed visualisation of the flame and combustion process. This capability is essential for optimising fuel consumption, ensuring complete combustion and minimising emissions.

The system delivers real-time video and thermal imaging, allowing operators to observe the flame shape and its temperature continuously. This information helps kiln operators to adjust burner settings and maintaining stable kiln operation. Pyroscan software offers an unlimited number of zones and free shape zones, as well as a live graphic display.

Temperature monitoring in the clinker cooler

Pyroscan can be implemented in the clinker cooler. Operators can easily detect snowman and red rivers formation at an early stage. The temperature values on the grates allow process engineers to adapt the speed of the grates and/or blowers to optimise productivity. Each user-defined zone can be associated to an alarm, based on minimum, maximum or average temperature ranges.

With both visible and thermal images available simultaneously, many additional details can be revealed by a single piece of equipment in both applications. The kiln camera calibration range is 800-2000˚C and for the cooler, camera calibration ranges between 700-1350˚C for the clinker cooler.

Conclusion

As the cement industry accelerates its decarbonisation efforts, the need for precise and continuous temperature monitoring becomes more critical than ever. From rotary kilns and clinker coolers to precalciners, HGH Infrared Systems' advanced thermographic tools such as Pyroscan equip operators with the real-time insights necessary to adapt to fluctuating thermal loads, optimise alternative fuel usage and ensure process stability.

The successful deployment of HGH pyrometric cameras to monitor the temperature of TPI Polene's precalciners highlights the value of integrating high-resolution thermal imaging into alternative fuel processing, especially when extremely high substitution rates are reached. By enabling better control, early detection of anomalies and improved combustion efficiency, these solutions not only support sustainable manufacturing but also enhance operational reliability and performance. ■

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