

KILNLOQ® HW LASER GAS ANALYSIS SYSTEM

# Prevent acid damage in high sulphur processes



# Eliminating acid damage with the KilnLoq® HW Laser System

High sulphur content in raw materials and fuels can leave cement plants facing the burden of expensive repairs and long downtimes for their acid-damaged gas analyser systems. Reliable and effective operation can be ensured with a hot/wet analysis solution able to cope with the challenging environment of the gas conditioning system.

## The acid challenge – and a new solution

Acid damage in the gas conditioning system can cause serious problems for the analyser measurement chamber. Not only are plants faced with significant repair costs, there is the risks posed by analyser downtime. How can a plant continue to undertake the essential measurements necessary for process optimisation and emissions reduction while the analyser is out of operation?

We have developed a solution to this problem. The KilnLoq HW Laser System is a state-of-the-art hot/wet analyser based on laser technology that works in combination with FLSmidth's KilnLoq kiln inlet probe system. As a hot/wet system, the temperature of all parts is kept above the acid dew point, so acid damage is avoided. No expensive maintenance. No equipment downtime.

### Key benefits

■ Low maintenance and low lifetime costs

■ No wear parts

■ Measures up to 12 gases simultaneously

■ Accurate and sensitive gas measurements

■ Low, long term drift minimising calibration intervals

■ Continuous insights to achieve optimum kiln operation

# Environmental benefits should not mean process challenges

Using alternative fuels can leave cement plants dealing with challenging side effects. Gas analysis solutions must take this into account to ensure continuous, reliable operation, whichever fuels you are using.



## The dark side of going green

Many cement plants are opting to minimise their environmental footprint by increasing the use of alternative fuels, such as tyres and plastic. But what is good for the planet can be tough on the process.

These fuels tend to have higher sulphur content, which can play havoc with your gas analysis system. And it is not just fuels: raw

materials with high sulphur content can also create a problem. Acid damage persists even when using ultra-low temperature coolers, which dramatically lower the gas-phase H<sub>2</sub>O concentrations in the conventional dry/cold gas analysis system. Cement plants dealing with high sulphur content require a better solution.

## Dealing with acid damage

During combustion, sulphur turns into  $\text{SO}_2$  and  $\text{SO}_3$ . When  $\text{SO}_3$  reacts with  $\text{H}_2\text{O}$  in the gas phase at temperatures below the acid dew point, the result is highly corrosive sulphuric acid, which poses a danger to your instruments.

When damage occurs, the gas analyser has to be removed for repairs, usually being returned to the manufacturer, which is both

costly and time-consuming. In the meantime, the plant is left without a gas analysis system, effectively running the kiln blind.

A hot/wet gas analysis system can cope with high sulphur levels, making it the ideal solution for plants already dealing with this problem, or in cases where alternative fuels are likely to be introduced in the future.

## Full gas analysis, without the downtime

The KilnLoq HW Laser System measures different gases, such as  $\text{CO}$ ,  $\text{NO}$ ,  $\text{SO}_2$ ,  $\text{CO}_2$  and  $\text{O}_2$ , at the kiln inlet. As with other gas analysis solutions, this insight enables kiln operators to optimise kiln operation in terms of fuel consumption and clinker quality. What makes this solution stand out, however, is the fact that all parts are heated to  $180^\circ\text{C}$  to avoid condensation and the associated acid formation. So as well as helping plants with high sulphur levels, the

KilnLoq HW Laser System is also an ideal solution for:

- Plants wishing to measure water-soluble components such as  $\text{HCl}$  and  $\text{H}_2\text{O}$ ;
- Plants experiencing high  $\text{SO}_3$  values that wish to measure  $\text{SO}_2$ ; and
- Plants that do not want to use  $\text{H}_2\text{O}_2$  dosing due to safety and maintenance issues.

## Cost benefits of the KilnLoq HW Laser System

### Hot/wet technology compared to cold/dry

- Less consumption of wear/spare parts
  - Expected saving over 5 years: EUR 8,000
- Savings on maintenance hours.
  - Reduced from 2 hours/week to 2 hours/month
  - Expected saving over 5 years: 400 hours
- Savings on man-hours for calibration due to less drift on analyser
  - Reduced from once per week to once per year
  - Expected saving over 5 years: 250 man-hours
- Savings on repairs due to acid problems
  - Expected savings on repairs over 5 years: EUR 35,000.



# Pioneering technology

The KilnLoq HW Laser System is the only system of its kind on the market, meeting industry challenges head on and providing plant operators with a solution they can rely on.

## The hot/wet solution

A hot/wet analysis system maintains a temperature above the sulphuric acid dew point so that the gas being measured is both hot – approximately 180°C – and wet. Conventional gas analysis methods use a cold/dry system in which the gas being sampled is passed through a cooler and analysed in dry conditions at temperatures around 5°C – a danger zone for acid formation.

Hot/wet analysis is already widely used today, especially for Continuous Emission Monitoring System (CEMS) applications, mainly in the form of multicomponent FTIR analysers. However, these systems are commonly limited to lower measuring ranges than those required in process measurement, they tend to be complicated, and they are high maintenance. Of course, these systems are not using laser technology.

## Proven laser technology

Our KilnLoq HW Laser System utilises robust, low-maintenance Rosemount CT5100 laser technology, which has been around for over 20 years. During that time, this technology has successfully proven to offer reliability, a long lifetime and instant response time.

The low-maintenance Rosemount laser-based CT5100 hot/wet analyser system benefits from a simple design and a high degree of flexibility. Its modular layout enables laser modules to be easily replaced on site, ensuring minimum downtime, while the ability to fit six laser modules in total makes it possible to measure up to 12 parameters simultaneously.

## Hot/wet laser technology: A unique combination

The KilnLoq HW Laser System is:

- The only laser-based hot/wet analyser solution on the market;
- The simplest hot/wet analyser solution with the least maintenance requirements; and
- The most accurate hot/wet gas analysis solution available.

## Continuous gas analysis for a competitive edge

Kiln inlet gas analysis systems deliver essential data.

Cement plants need reliable online analysis of the process gases at the kiln inlet if they are to compete in a tough market. Using the data to optimise your safety, operating costs, production and emissions enables you to compete with the best in the cement industry.

When a gas analyser goes down, the kiln is at risk of consuming too much energy, polluting the environment and, at worst, unscheduled stoppages, causing production losses and unnecessary wear on expensive equipment.



# Proven results

Pilot testing has shown the KilnLoq HW Laser System dramatically reduces maintenance time and provides continuous measurement. Stellar gas analyser performance. No acid contamination.

## Pilot plant: Significant reduction in maintenance hours

The hot/wet kiln inlet system has been tested in a cement plant burning a high volume of alternative fuels and using raw materials with high sulphur content. The plant had been running a cold/dry gas conditioning system and was spending up to 10 hours per week on maintenance. Analysers required frequent repairs due to acid damage.

Since the installation of the KilnLoq HW Laser System in 2017, the system has shown reliable and accurate measurement for the parameters NO, O<sub>2</sub>, CO as well as peak values for the SO<sub>2</sub> component. Maintenance hours have been reduced to only a weekly inspection. The runtime has exceeded 98%, and there is no sign of acid contamination in the CT5100 system.



# Combining two reliable solutions

The KilnLoq HW Laser System is a combination of two proven technologies: FLSmidth's patented KilnLoq probe and the Rosemount hot/wet laser. Together, they are a match made in low-maintenance, high performance heaven.

## FLSmidth's KilnLoq probe

The KilnLoq probe was introduced to the market in 2003 and has proven to be the optimum solution on the market for kiln inlet gas analysis with more than 300 references worldwide.

It is a One Pipe system that samples gas in a straight pipe. There are no bends, obstacles or deposits to get in the way of your sample. The process gas enters the filter housing through the centre of the pipe, where it passes through a coaxial filter for collection and analysis.

The filter itself is built into a section of the One Pipe sample line.

The entire sampling system is heated to 180°C to avoid condensation. Unique benefits of the KilnLoq One Pipe system include:

- Jets of compressed air blast all the dust and residue out of the sample path in one go
- The probe stays clean for longer because there are no bends or filters in the sample path to trap dust
- A new cleaning process makes sure the probe's tip stays free from blockage during cleaning
- No need to dismantle any machinery for cleaning or maintenance
- Maintenance and cleaning takes less than 3 minutes – up to 50 times faster than anything else on the market
- In seconds, you can view the entire length of the probe's sample path – and carry out the industry's fastest visual inspection
- Adaptable cleaning sequence setup to process conditions.

## Rosemount's CT5100 Quantum Cascade Laser (QCL) – Patented Chirp Technique

Using Rosemount's QCL/TDL technology with patented laser chirp technique expands gas analysis to both the near and mid-infrared range to enhance process insight, improve overall gas analysis sensitivity and selectivity, remove cross interference, and reduce response time.

When power is applied, the QCL heats up and as the temperature rises, laser wavelengths begin to increase. The QCL then sweeps the wavelength frequencies to detect each component of interest before cooling the device to its original temperature. This patented laser chirp process occurs in under one microsecond, enabling thousands of spectra to be recorded each second.

This technique provides significant benefits

- Accurate and fast
- Robust and reliable
- Compact
- Cost-effective
- Multiple measurements along same optical path

## Together, they are unstoppable – and so are you

No more unplanned maintenance outages. No more acid formation. No more stress. You can simply get on with running your plant.

No expensive maintenance



Minimal equipment downtime

The KilnLoq probe was introduced to the market in 2003  
**Over 300 references worldwide**



“Achieve unmatched gas analysis performance and realise cost savings with the most advanced technology in the industry”

**Convenient online**  
**web shop** for  
spare parts



[shop.flsmidth.com](http://shop.flsmidth.com)

# Airloq<sup>®</sup> gas analysis and emissions reporting solutions

Let our experience and advanced technology deliver worry-free monitoring and reporting. Our advanced gas analysis equipment, reporting and service packages provide peace of mind.

#### Industries served

Our portfolio of gas analysis and reporting solutions are available for six key industries:

- Cement
- Lime
- Waste
- Power
- Steel
- Nickel

#### GAS ANALYSIS SYSTEMS

- Probe systems (KilnLoq<sup>®</sup>)
- Gas conditioning (GASloq<sup>™</sup>) - both cold/dry and hot/wet solutions
- Analysers
  - Oxygen
  - CO, CO<sub>2</sub>, NO, SO<sub>2</sub>
  - NH<sub>3</sub>, HCl, HF and H<sub>2</sub>O
  - Total hydro carbons (THC or TOC)
  - Dust and flow
  - Mercury
- Site housing (GASloq CUBE Analyser Room)

#### ENVIRONMENTAL REPORTING SYSTEM

- Web-based and stand-alone environmental reporting (ReportLoq<sup>™</sup>)

#### LIFE CYCLE SERVICES

- Service agreement (PlantLine<sup>™</sup>)
  - Advanced troubleshooting
  - Preventative maintenance visits
  - Performance monitoring and remote optimisation
  - Engineering service
  - Managed antivirus
  - Software license upgrade subscription
  - Local language assistance
- Remote technologies (LiveConnect<sup>™</sup> and MyPlant app)
- Training courses
- Spare and wear part supply
- Installation and commissioning
- Preventative maintenance
- Repair and calibration
- Upgrades and retrofits
- Online web shop for spare parts: [shop.flsmidth.com](http://shop.flsmidth.com)

## Your global partner

For more than 135 years FLSmidth has sold equipment, plants and services to the cement and mining industries.

Today we sell productivity.

Through advanced technology and unique process knowledge, our 12,000 employees across more than 50 countries provide sustainable productivity enhancement to our customers.

We seek to increase our customers' output and decrease their total cost of ownership.



■ Supercentre    □ Project and technology centre    ■ Production    ■ Sales and services

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