PENTOL

Power plant optimisation made in Germany

PENTOMAG®

Additive for Combustion Optimisation

Eliminate Corrosion

Reduce Fuel Consumption

THINK DIFFERENTLY.

Eric Blauenstein (President/Founder), Olivier Blauenstein (CEO)

Pentol offers a unique way to improve the **eco-efficiency** of power plants

Instead of upgrading with expensive cleaning equipment, Pentol chemicals solve emission problems at the source.

Power plant operators receive technological turnkey solutions to improve performance significantly.

Beside an attractive return of investment, this is an active contribution to the long-term preservation of our environment.

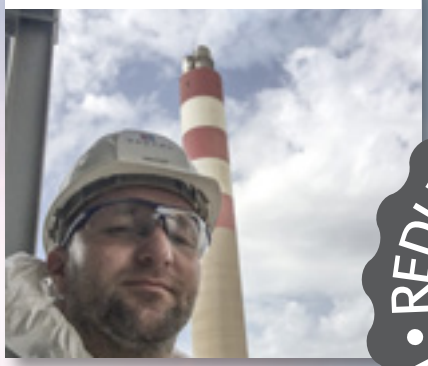
The PentoMag® product line of Pentol is one of the few technologies on the market that truly approach the eco-efficiency of a power plant.

PentoMag® reduces emission of SO_3 and its blueish plume. At the same time it allows an efficiency increase of the boiler by reducing the exit gas temperature.

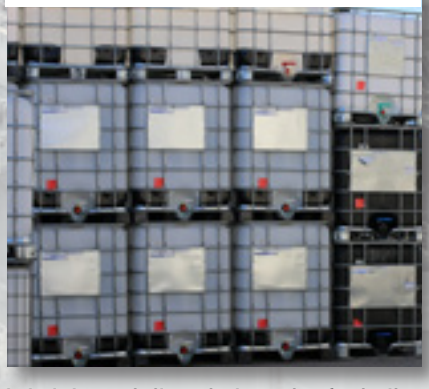
Let us show you how we do this.

PENTOMAG® WHAT IT IS AND DOES

PentoMag® saves fuel oil and removes the plume of your chimney.



PentoMag® keeps heat transfer components clean and protected.

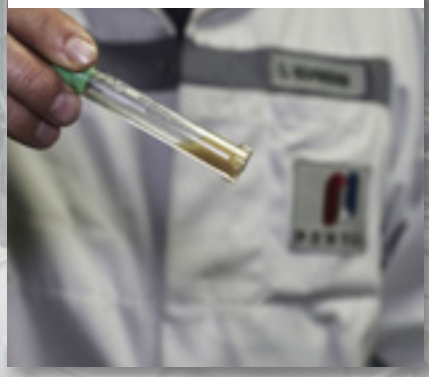


It is injected directly into the fuel oil and is activated in the flame.

PentoMag® allows reduction of exit gas temperature by neutralizing SO_3.

Clean surfaces allow a better heat transfer, more efficiency, and fewer stops for cleaning.

PentoMag® is adapted for the specific requirements of our clients.

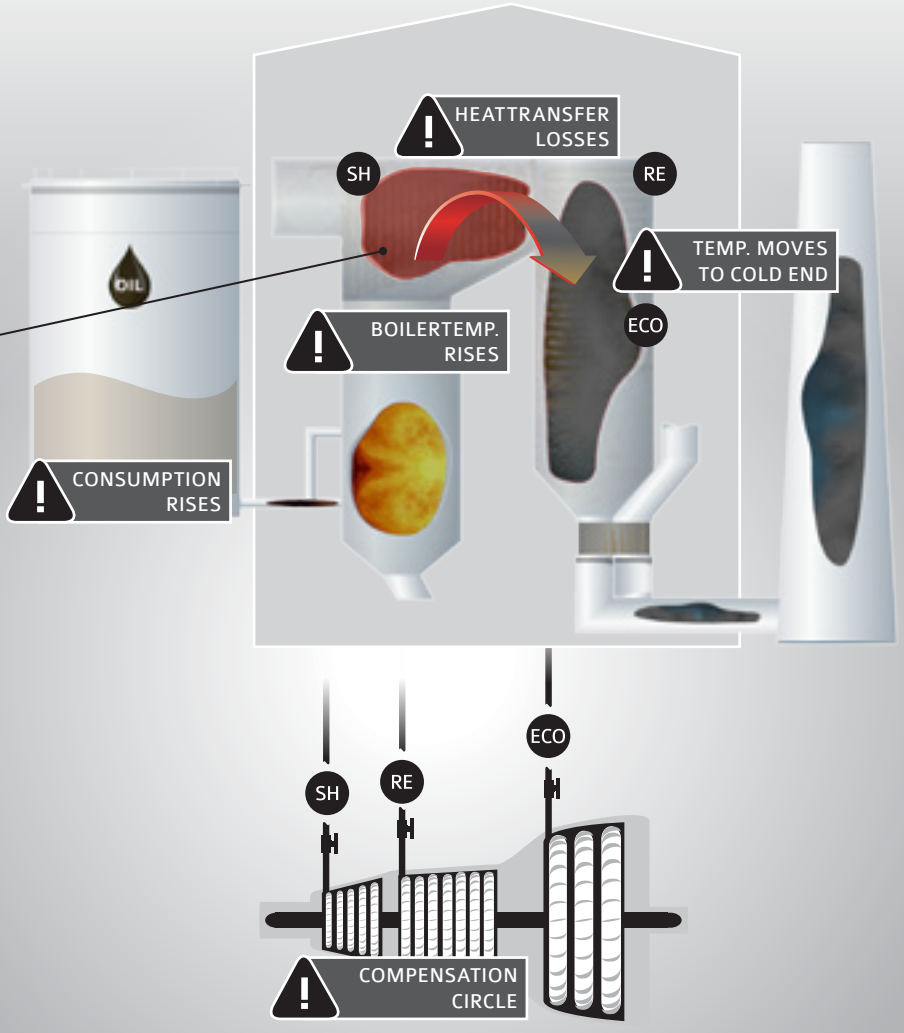


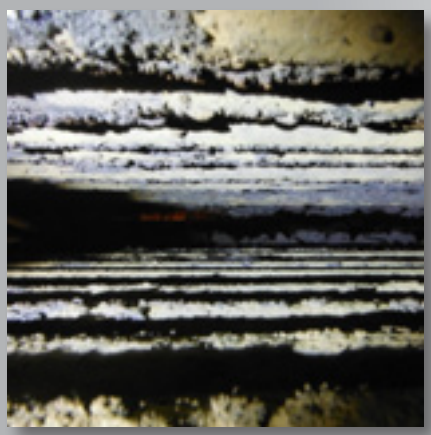
Pentol offers a package of technical service and additives to optimize boiler treatment.

TYPICAL PROBLEMS IN FURNACE AND HIGH TEMPERATURE SECTION

High-temperature corrodes on heat transfer surfaces

Ash sticks to the surface of boiler walls, super heaters, reheaters, and economizers.

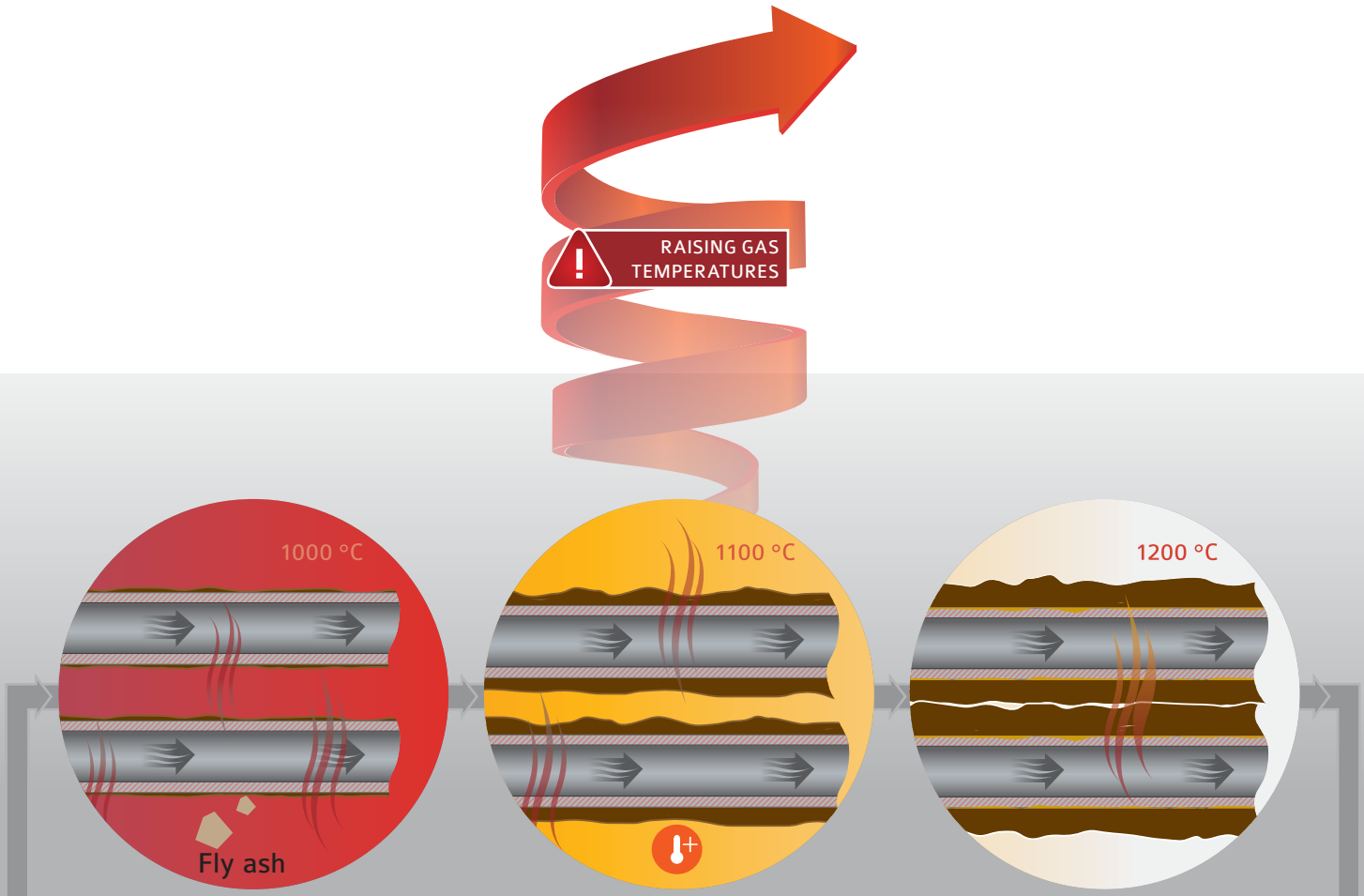




Deposits grow more rapidly. Δp increase. The deposits are corrosive, therefore, hard to remove and catalyse SO_2 to SO_3.

Growing deposits set a long sequence of compensation actions into gear.

Until a service shutdown for cleaning breaks this cycle.



First layer on pipes gets formed.

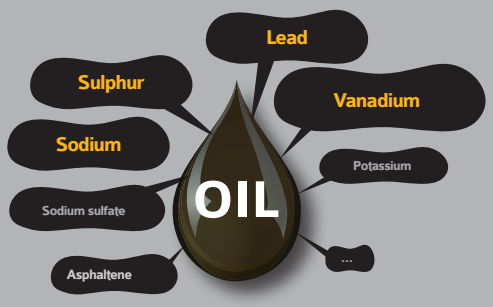
When heat transfer is reduced, the gas temperature will be raised.

Ash with higher melting point melts, too.

At metal temperatures below 600°C, the fly-ash components with a low melting point (vanadium, nickel, sodium, lead, potassium) condense and form a highly corrosive liquid, then solidifying into a hard, tenacious deposit.

Vanadium pentoxide forms a molten slag, adhering to the tube surfaces and its sticky nature resists soot blowing. The vanadium slag reduces heat flux, affecting the efficiency of the boiler and leading to increased fuel demand.

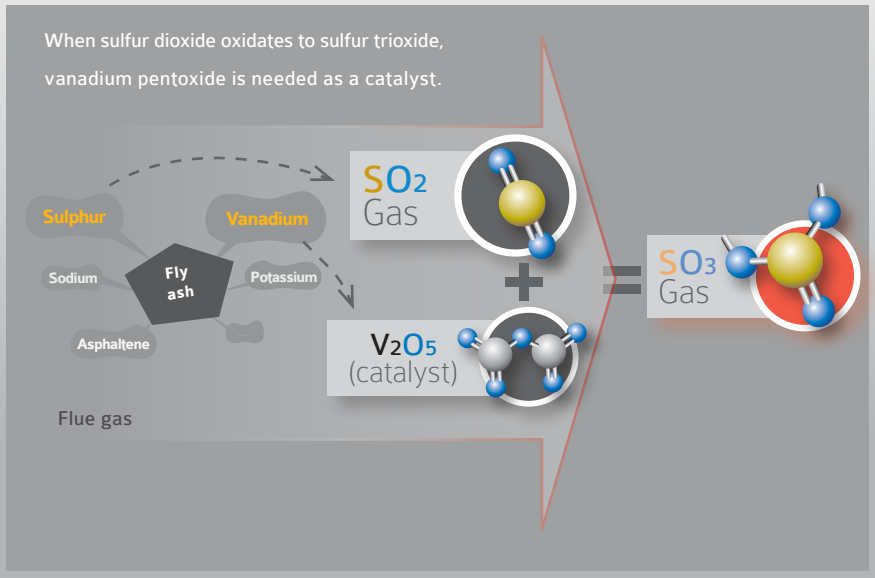
And on top of this, the vanadium slag is a powerful catalyst for the formation of sulfur trioxide, leading to emission problems, corrosion, and load restrictions.



Corrosive chemical reactions are set into gear, after compounds are formed, resulting from individual melting points of heavy fuel oil components.

PENTOMAG® IN HOT END SECTION

The oil-soluble liquid is injected directly into the fuel oil line

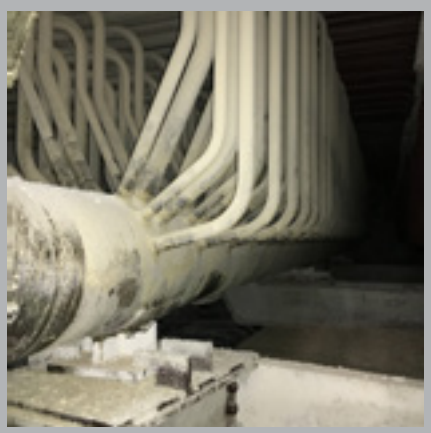


PentoMag® breaks the circle of slag formation. Magnesium oxide (MgO) reacts with vanadium pentoxide to produce magnesium orthovanadate.

This is a high melting point ash product, which is much easier to remove from the furnace tubes by the soot blowers.

Magnesium sulfate is formed on the tubes, making it easy to water wash during the outages because of its water soluble properties.

The thin, powdery, corrosion protecting layer can be easily removed by soot blowing, hand brushing or water washing.



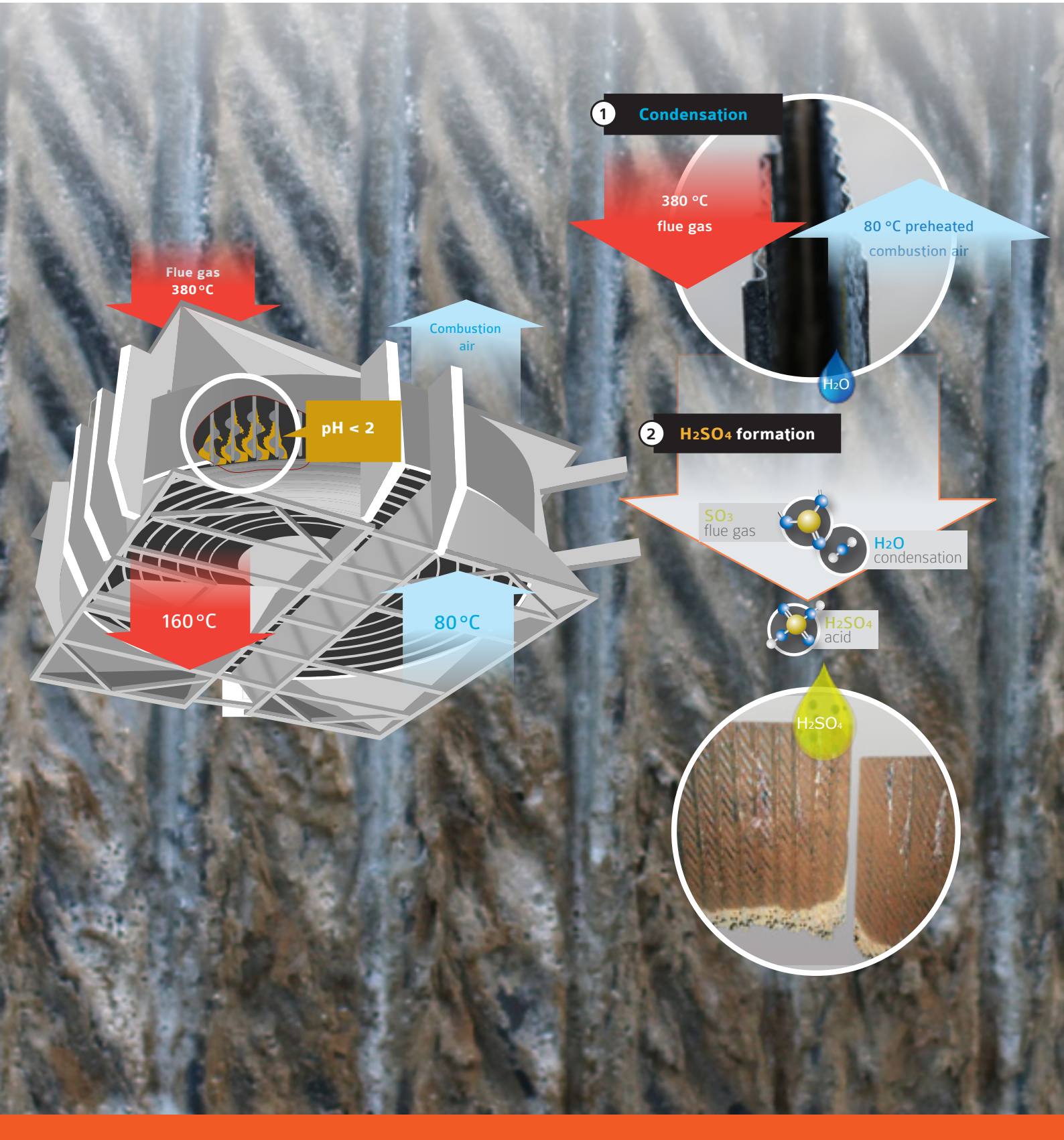
Soot blowing will be most effective. Hard vanadium deposits are converted to powdery magnesium orthovanadate, stopping the corrosion of the pipes and the catalysis of SO_2 to SO_3.

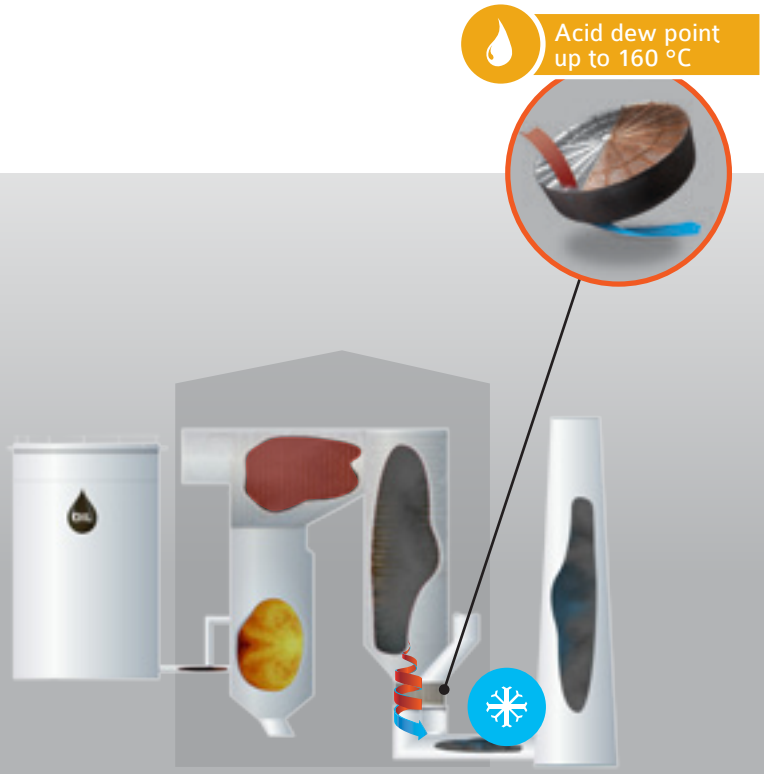
The heat transfer is restored to the design parameters, increasing the power output of the plant.

If you need reliable SO_3 monitoring, you will find our PDF on www.pentol.com

TYPICAL PROBLEMS IN COLD END

Fouling in air preheater from acidic corrosion





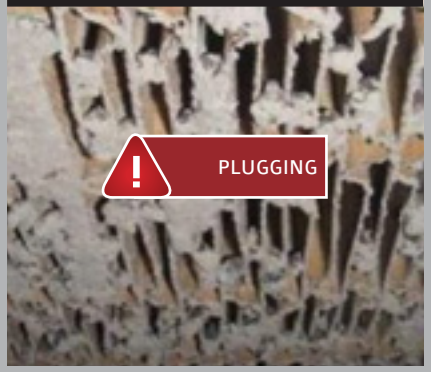
At temperatures below 180°C, SO_3 reacts with water vapor and forms sulfuric acid. Most of the sulfuric acid is trapped in the air preheater, leading to serious corrosion issues and finally plugging the air preheater, as soot blowing is mostly inefficient.
To prevent condensation of SO_3, operators increase exit gas temperature, trying to find a balance between air preheater lifetime and economic requirements.

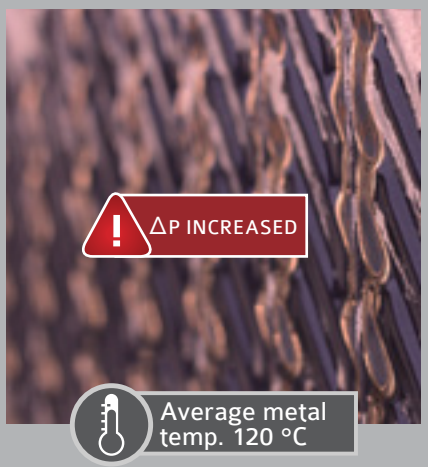
With an exit gas temperature of 160°C, the average metal temperature in the lower end of the air preheater is still around 120°C, well below the acid dew point (ADP). Fouling and corrosion, therefore, mostly occur in the lower end of the air preheater.

Sulfuric acid forms a sticky layer of ash deposits, slowly closing the narrow gaps between the air heater elements and increasing the delta p.

Due to the increased exit gas temperature (EGT), the economic balance of the plant gets worse. An increase of 20°C in EGT reflects a 1% increase in fuel oil consumption.

3 Corrosion and plugging





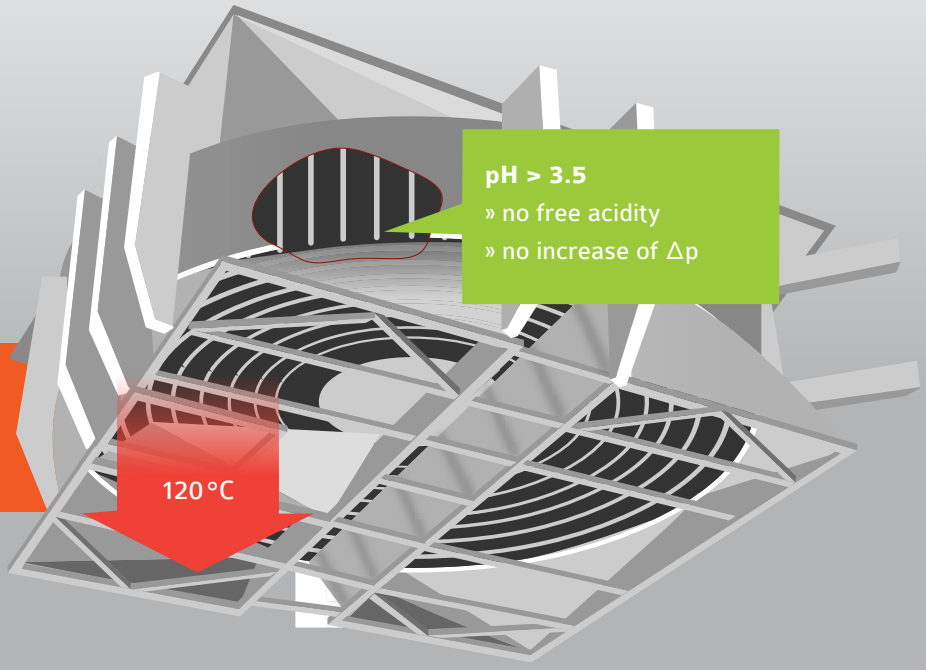
PENTOMAG® IN COLD END SECTION

Cost reduction through decrease of exit gas temperature

PentoMag® helps to neutralize sulfuric acid to avoid corrosion and fouling at the cold end.

A reduction of the exit gas temperature by 20 °C corresponds to fuel oil saving of 1 %.

The average achievable exit gas temperature ranges between 110 and 120 °C.
Just imagine your savings.



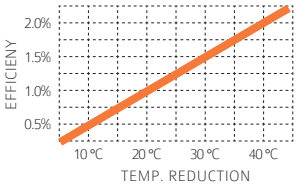
The reduction of catalytic activity on the super heater leads to a reduction of SO_3 arriving at the air heater, resulting in a
- lower acid dew point,
- lower free acidity.

The presence of magnesium oxide in the air heater reduces the corrosion risk by increasing the alkalinity of the ash.

Without sulfuric acid in the air preheater, dust is not collected in the baskets.

The exit gas temperature can safely be reduced by observing the free acidity, leading to an increase of boiler efficiency.

REDUCTION OF EXIT GAS TEMPERATURE



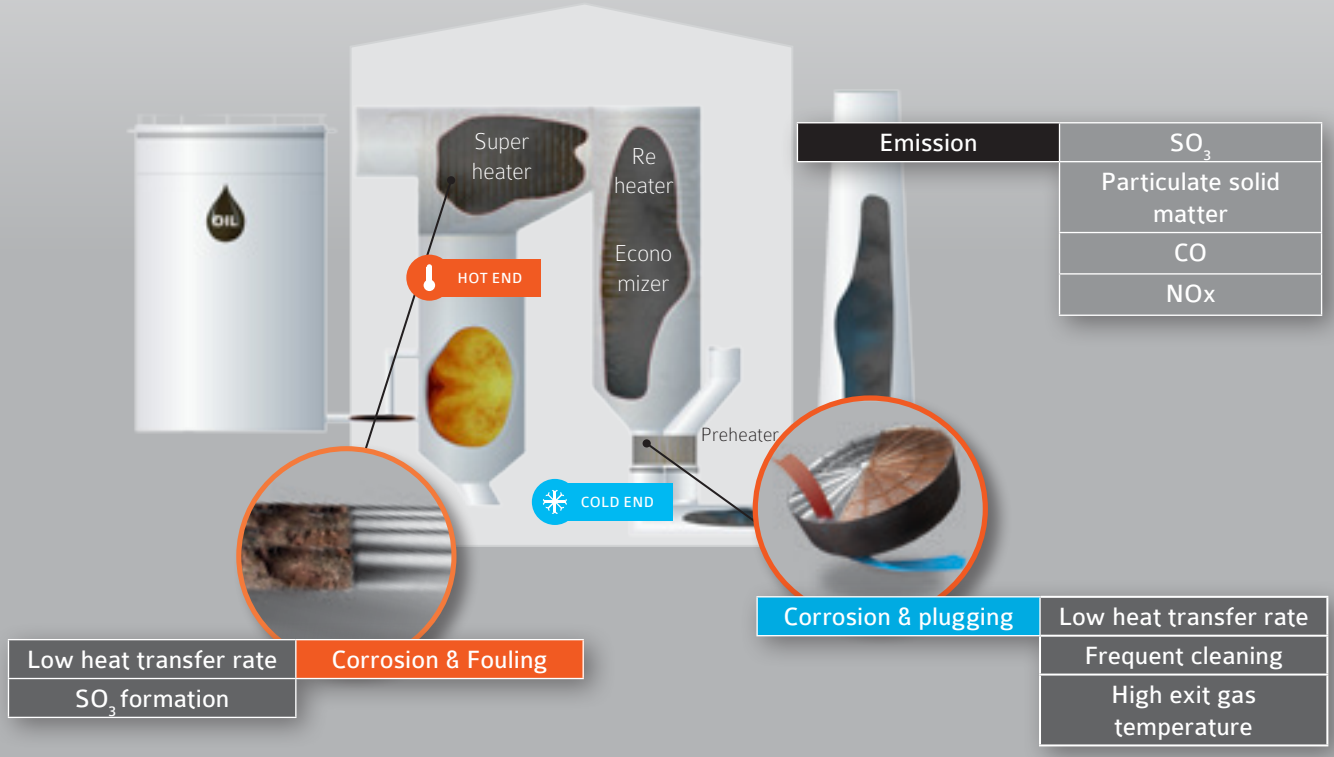
New exit gas temp. 120 °C

We recommend to use PentoMag® with PentoMuls®. You will find our PDF on www.pentol.net

TAILORED BLENDS

from the range of specialty chemicals

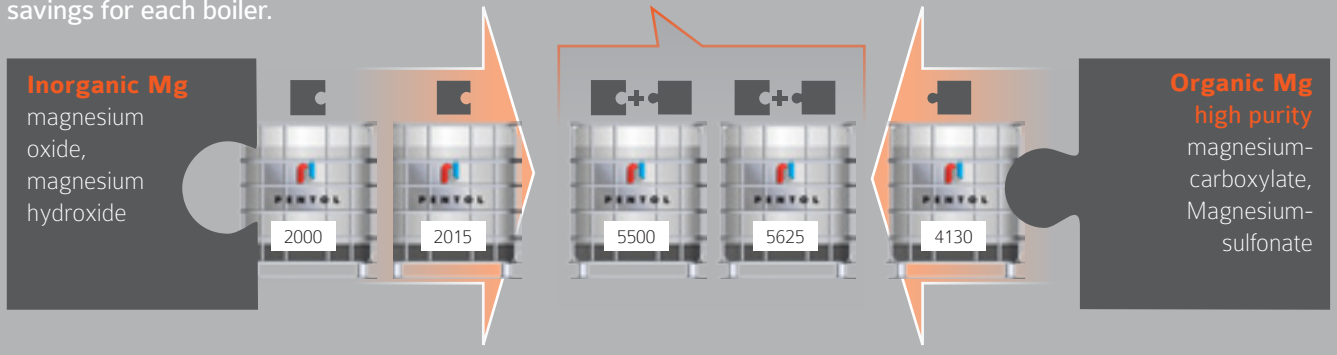
1. Together, we will localize the type and source of the main problem.
2. We will envisage the boiler type and it´s individual parameters.
3. Pentol produces specialty chemicals, tailored for each boiler and customer's needs.



Pentol manufactures a multi-purpose, wide range of specialty chemicals for fuel oil treatment to gain optimum results and maximize savings for each boiler.

After decades of experience, we offer the most advanced solutions, including the best of two chemical worlds.

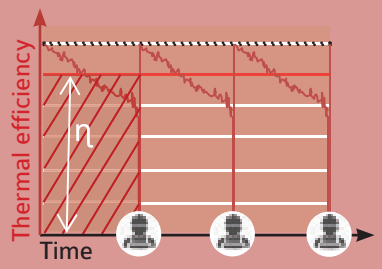
Let´s find your perfectly balanced formula to meet all your tasks.



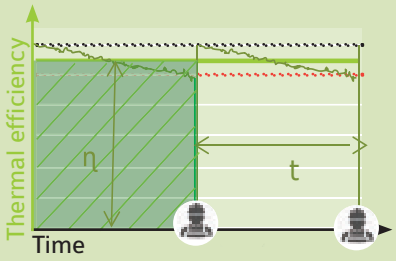
TYPICAL RESULTS WITH PENTOMAG

Clean plant – high availability – extended lifetimes.

Thermal exchange rate on average, without PentoMag



Thermal exchange rate on average, with PentoMag



Reduce fouling, corrosion, and deposits.

Less soot blowing, lower O_2 and atomizing steam consumption.

Reduce maintenance works and down time – extended boiler availability and life.

EQUIPMENT FOR DOSING

Minimal maintenance - maximal precision.

For precise dosing, we offer a range of individual equipment from our production in Germany.

Our long-term experience leads us to a rugged design, easy to use, with minimal maintenance.

SUPPORT IN ALL STAGES

From diagnosis to service.

Victor Gomez,
Sales Manager

Customer relations are important: we keep in touch and assist our clients continuously for best results.

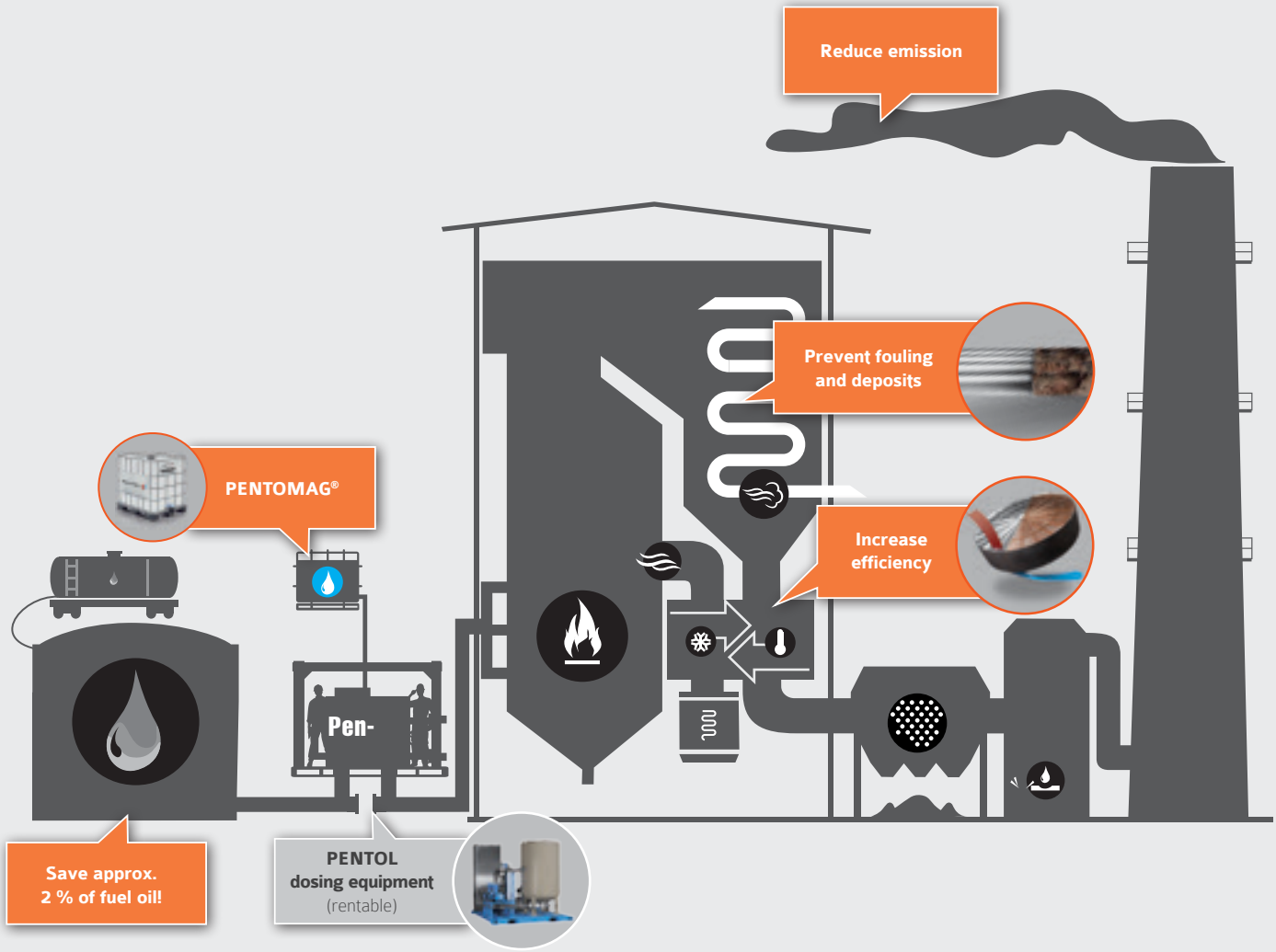
Get 1–2 % more net efficiency

PENTOL

www.pentol.net

PENTOMAG®

For Fuel Oil Fired Plants



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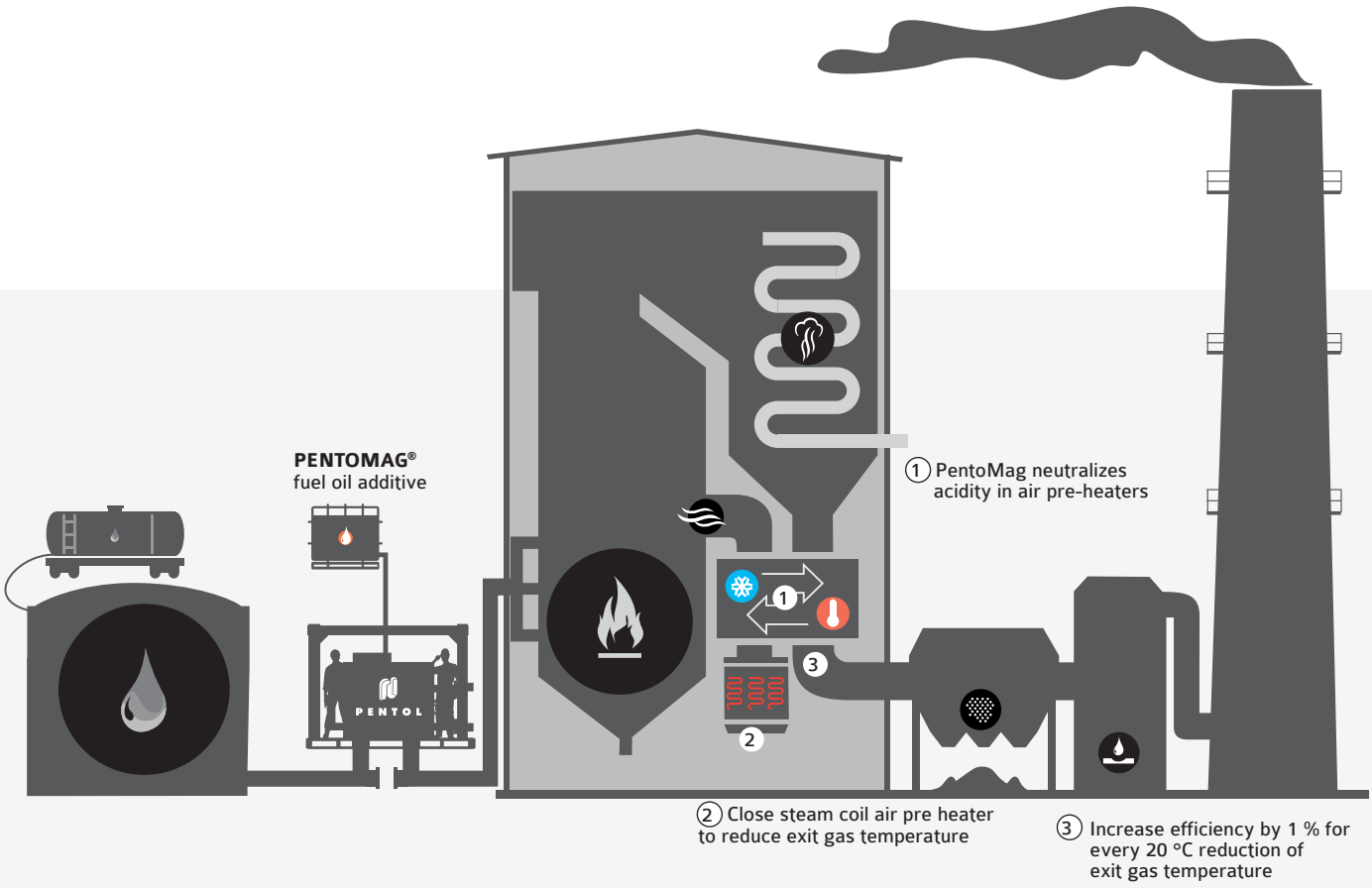
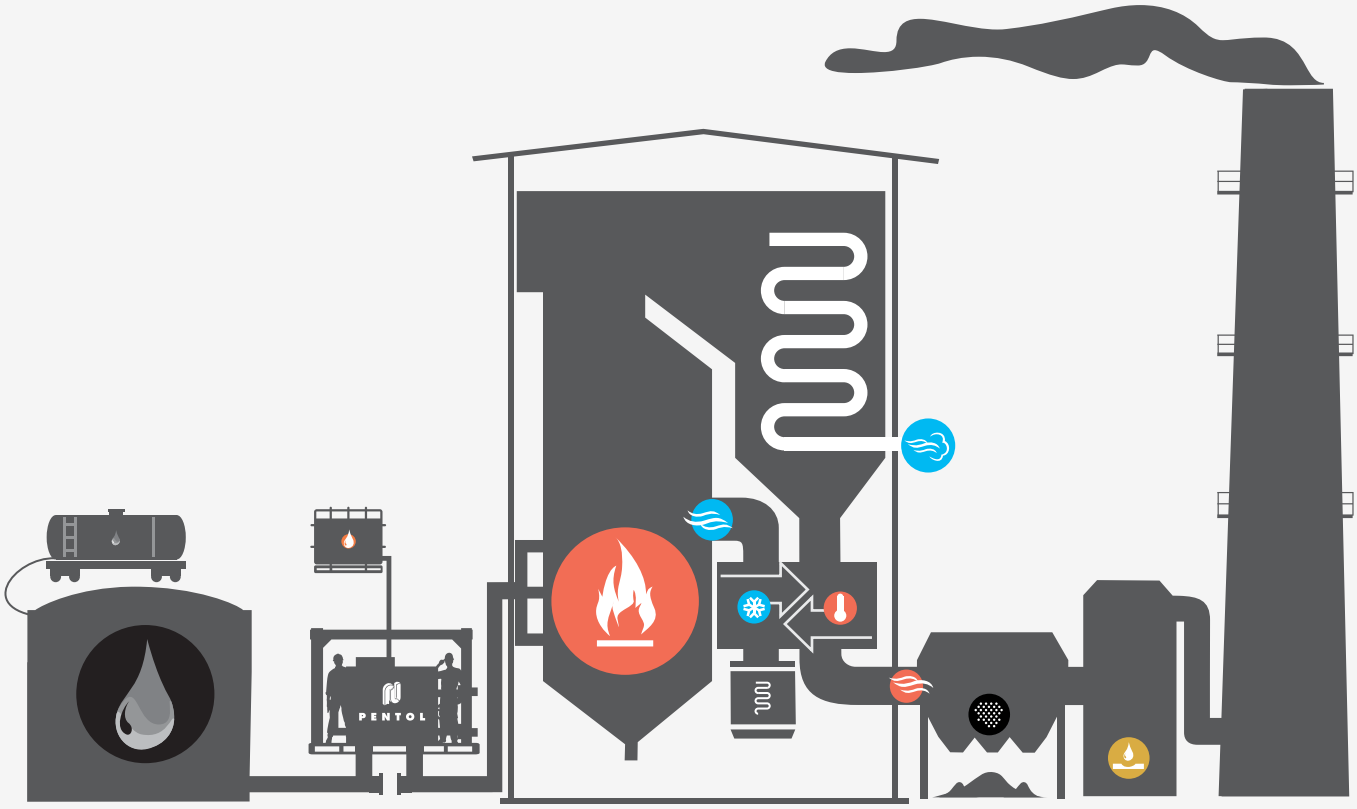

PENTOMAG®
fuel oil additive
PENTOL
1
2
3
1 PentoMag neutralizes acidity in air pre-heaters
2 Close steam coil air pre heater to reduce exit gas temperature
3 Increase efficiency by 1 % for every 20 °C reduction of exit gas temperature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