

PREHEATER MODIFICATIONS

OPTIMISE PERFORMANCE. INCREASE EFFICIENCY.



GET MORE FROM YOUR **PREHEATER**

Your preheater holds a lot of potential – to burn more waste fuels, increase throughput, reduce costs and cut emissions. But unlocking this potential requires clever engineering, new technologies and a great deal of knowledge and experience.

Preheater modifications can win you a lot of process gains with a quick return on investment. Cyclone and calciner upgrades are a relatively quick path to reducing power and fuel consumption, while modifications in this area also hold the key to increasing the use of alternative fuels and cutting NOx emissions.

But every process is different and there can be no one-size-fitsall solution. So choosing the right approach for your plant is not just about the equipment, but is also a question of selecting a technical partner with a broad range of experience and expertise.

Having completed many preheater modifications in the past, Fuller Technologies can help you reach your production goals with minimal disruption and maximum cost-efficiency.

KEY BENEFITS

■
Increase
capacity

■
Reduce
emissions

■
Burn more
alternative fuels

■
Increase
operational reliability
and stability

■
Reduce
maintenance

WHAT DO YOU WANT TO ACHIEVE WITH YOUR PREHEATER **UPGRADE?**

In some cases, preheater upgrades are a matter of necessity. Whether through poor design, wear or buildup, the preheater can become a bottleneck, causing you lost productivity and stressful downtime.

At other times, a preheater modification can be the gateway to greater fuel substitution, lower emissions and increased capacity. When it comes to planning your preheater modification, we can help you consider both the problems that need solving and the opportunities available to you through relatively simple upgrades.

Reduce maintenance

Old and worn out equipment can require a lot of maintenance, which comes with high costs and can even cause unplanned outages. Meanwhile, build-up in the kiln riser duct, calciner, cyclone and other sections of the preheater can inhibit performance and leave you constantly battling to achieve 'good enough' performance, wasting resources in the process.

Often, solving a maintenance problem results in wider process benefits. For example, just replacing a worn dip tube with a new model that is better able to withstand corrosive environments can create significant power and fuel savings (and associated environmental benefits) in addition to eliminating the maintenance issue.

Increase capacity

Calcliner modifications can enable you to extend residence time, improving combustion efficiency and enabling a higher throughput. Those same modifications can also lead to reduced NOx emissions and lower fuel and power costs. And it doesn't matter what your current layout looks like – there is almost always a solution.

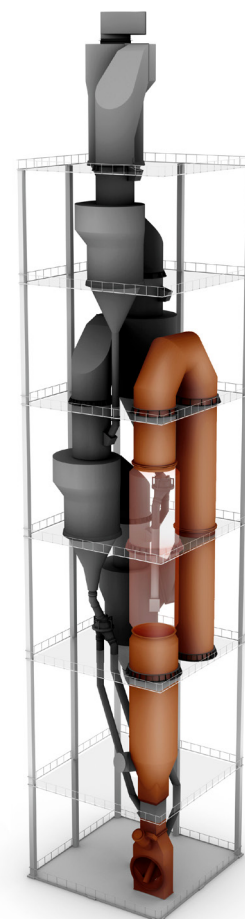
Reduce power consumption

With power consumption being such a significant part of operating costs, any power savings that can be achieved are worthwhile. By modifying or replacing your existing cyclones, we can significantly reduce pressure drop and lower fan power consumption.

Increase alternative fuel utilization

Calcliner modifications are also a good way to enable greater use of alternative fuels. For example, a calcliner can be modified to increase residence times, or burn lumpier alternative fuels.

For the most flexibility, even the use of very lumpy fuels, the addition of a HOTDISC® Reactor can enable 80% or above fuel substitution in the Calcliner.



LOWER EMISSIONS AND IMPROVE COMBUSTION WITH CALCINER MODIFICATIONS

Our latest Low-NOx calciner design can be retrofitted to almost any existing process. Modifications to the Calcliner can help you to improve combustion, reduce fuel consumption and achieve lower CO and NOx emissions.

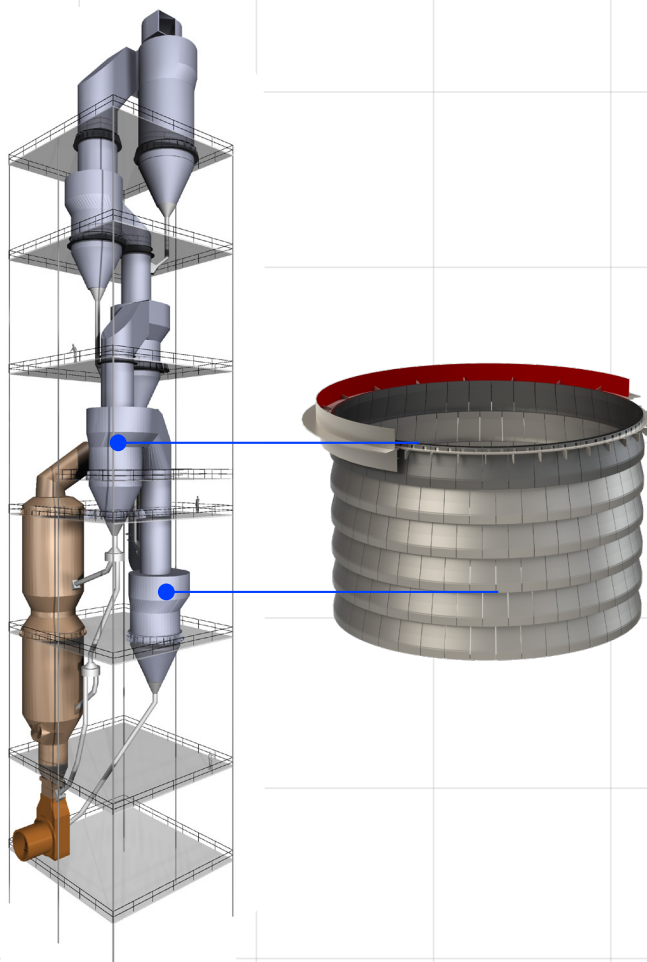
Modifications that extend the residence time enable more complete combustion and a higher degree of calcination, as well as providing the opportunity to utilise greater quantities of waste fuels. This has a significant impact on your pyro process as it not only reduces operating costs but also facilitates increased productivity.

MODIFICATIONS TO FINE-TUNE PREHEATER PERFORMANCE

Cast central pipe

For the lower cyclone stages our cast central pipe can be a game-changer – offering power savings of 4-8% and fuel savings as much as 5-10 kcal/kg of clinker produced, compared to having no cast central pipe.

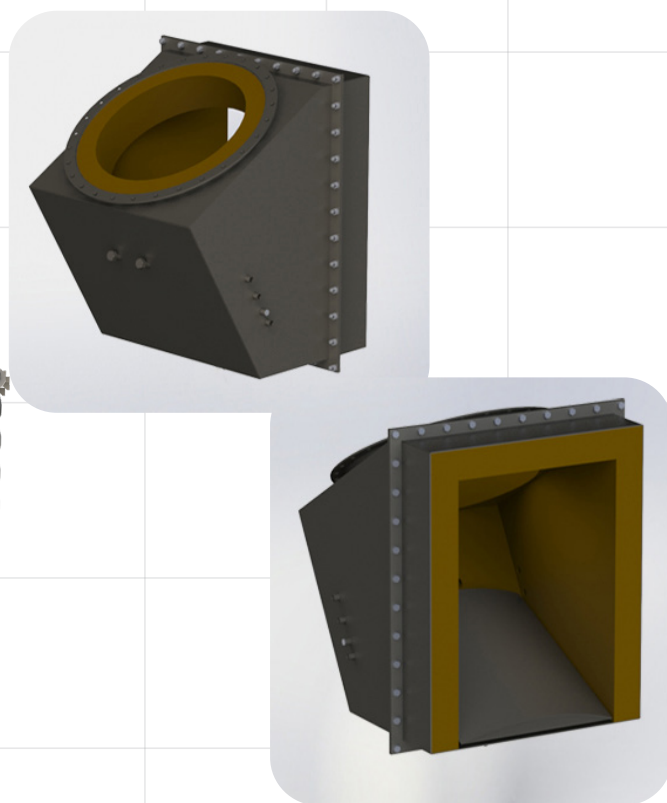
This is a quick, easy switch that promises high availability, low risk of blockages, and increased production. The design of the cast central pipe segments has also been upgraded recently to improve wear life, and we have added an additional length to the range, which could mean you need less segments overall – a further cost saving. We offer several different materials, depending on the corrosiveness of the environment.



Distribution box modification

Your existing distribution box or splash plate could be causing a bottleneck in your preheater. By upgrading to a newer, more modern design you can optimise material dispersion into the gas stream and minimise fall-through, with small power and fuel savings.

Our design features an adjustable spreader plate. This gives you much greater flexibility as you can change the inclination of the spreader plate up and down in order to optimise the dispersion of the raw meal into the gas stream.



Dividing gates

Dividing gates set the route of the meal from cyclones to control the temperature in the riser and calciner areas. If your older-style gate is prone to maintenance issues, replacement could be the answer.

We offer two-way and Multi Dividing Gates.

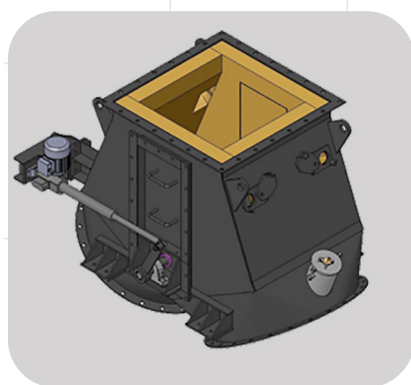
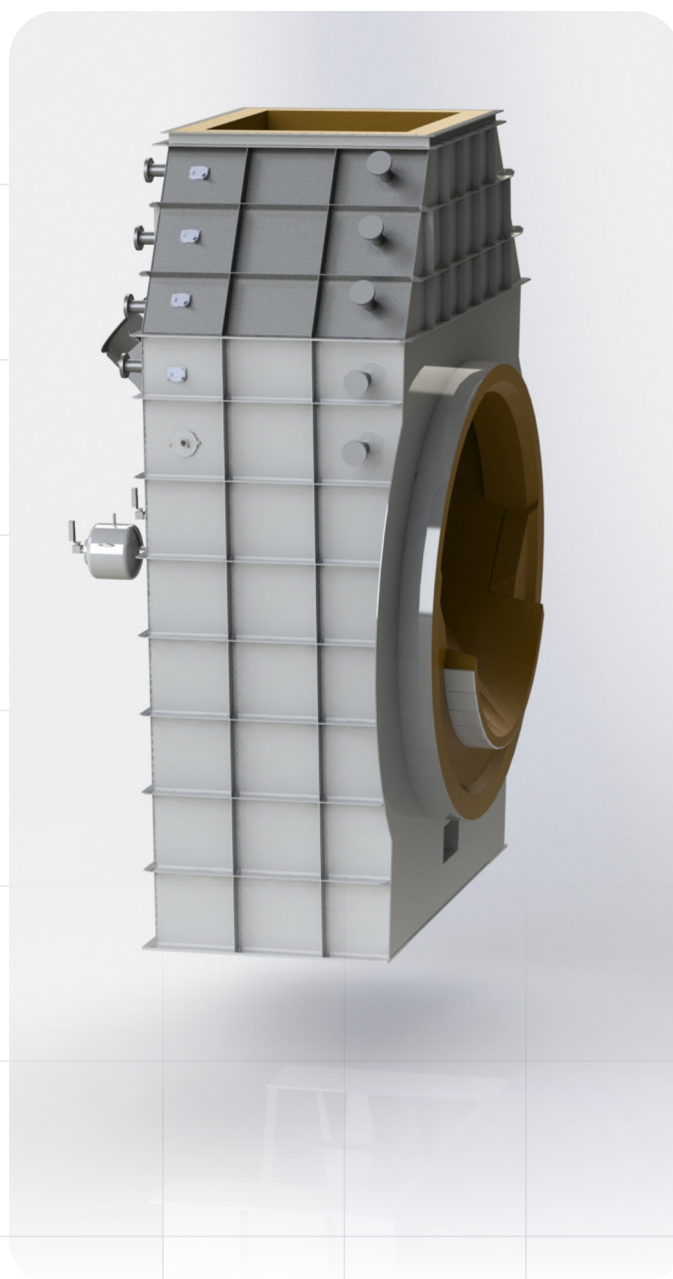
Diverter gate

The two-way diverter gate consists of a mild steel casing with lining inside. The movable diverter flap is made of stainless steel and moved by a motorized linear actuator. The diverter flap can be positioned to vary the split from 0-100% to both outlets.

For ease of maintenance, access doors are provided on each side of the gate, and you can also choose to locate the gate on a floor to avoid adding a separate platform up in the air.

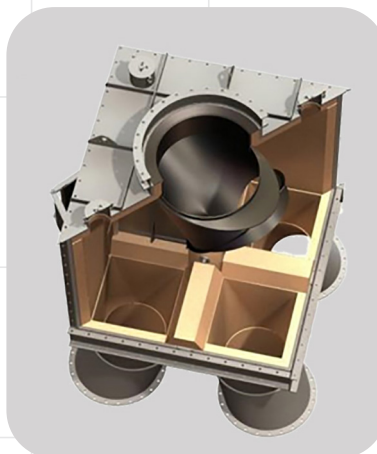
Multi Dividing Gate

With up to four material splits in a single unit, this Multi Dividing Gate gives ultimate flexibility with movable flaps that determine if material is split into two, three or four ways. The Multi Dividing Gate has four outlets, which are joined as needed to determine the final number of material streams. The Multi Dividing Gate gives a height advantage compared to using multiple two-way dividing gates in series when 3 or more material splits are needed.



TWO-WAY GATE

**MULTI
DIVIDING
GATE**



Kiln Riser Transition Piece (K RTP)

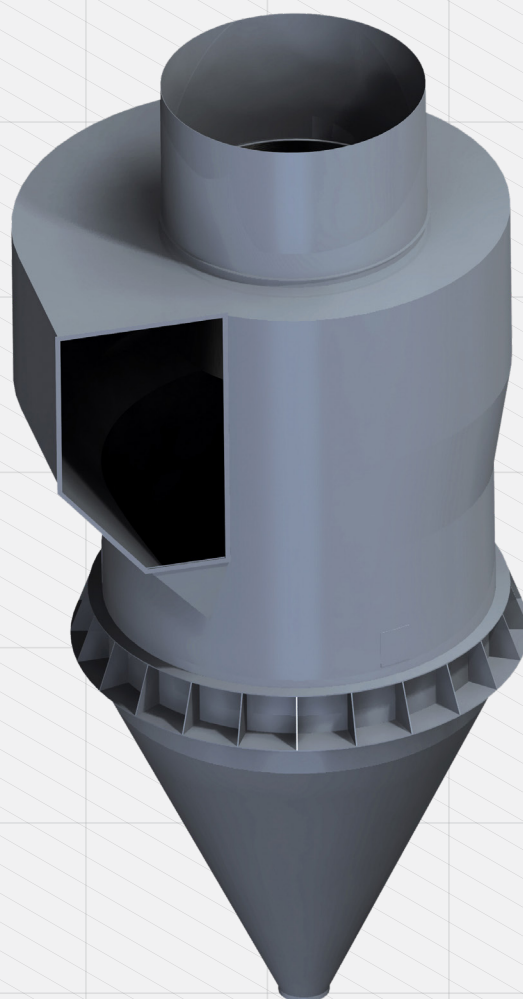
If you are running your kiln to its limits, you will likely be experiencing high gas velocity in your KRTP, which can lead to dust cycling. Our latest KRTP design includes a trough for the meal to flow through the feed shelf into the kiln. The meal flowing in the trough helps keep it out of the path of the gas flow, to reduce the dust recirculation.

REDUCING PRESSURE DROP THROUGH CYCLONE MODIFICATIONS & REPLACEMENTS

Cyclone replacements

With cyclone replacements, there is potential to reduce pressure drop and power consumption. We can do this with minimal disruption and quite quickly – normally within a standard maintenance outage. Where feasible, we cut off the cyclone, preserving the cone and existing material pipe for continuing use. The old cyclone is then replaced with the most up-to-date design, usually in a larger size.

The biggest benefits are usually gained by replacing the top cyclone, which tends to have the highest pressure drop. A replacement ensures improved cyclone collection efficiency and lower fuel consumption. With these operational benefits, the costs savings are significant, ensuring a quick ROI.



HIGHER EFFICIENCY & LOWER EMISSIONS

Because the existing preheater layout does not typically allow for 'off-the-shelf' solutions, preheater modifications require creative engineering. With many years' experience and significant process knowledge, we have the know-how to create specialised, site-specific solutions.

A customer in China recently undertook a project to replace all five cyclones in each string, with the aim of reducing energy consumption and emissions, while increasing production.

The project also included the installation of a new Low-NO_x inline calciner (ILC) with a retention time of 6 seconds, new tertiary air duct (TAD) routing, and a new kiln inlet and KRTP. The results were impressive:

- Production increased from 5740 to 6500 tpd
- Fuel consumption reduced from 760 to 696 kcal/kg
- Top stage cyclone outlet pressure reduced from 55 to 50 mbar
- NO_x emissions dropped to 100 mg/Nm³ @ 10% O₂ with SNCR

On top of all this, the plant is ready to begin firing alternative fuels, ensuring further cost savings in the future.



CASE STORY

BURNING WASTE FUELS /ALTERNATIVE FUELS

One customer located in Turkey contracted Fuller to install a new ILC calciner within the existing preheater structure.

The project also included a new 4-stage preheater, built next to the calciner, a new HOTDISC® 8.0 m Reactor, a new kiln inlet seal, 10% kiln bypass system and a cooler upgrade.

As a result of these modifications the plant is achieving 90% refuse-derived fuel (RDF) substitution in the Calciner and a 1300 tpd increase in production to 5000 tpd.



ADAPTING TO A CHALLENGING LAYOUT

A customer in Korea was very interested in installing a HOTDISC® Reactor, but the standard design didn't fit within their existing separate-line calciner (SLC) calciner layout.

We took on the challenge and created an alternate version of the HOTDISC that offers similar efficiency and low-emissions.

The results exceeded expectations. New installations were executed at two separate plants within the agreed upon schedule and both exceeded the guarantee of 85% alternative fuel replacement in the calciner with solid recovered fuel (SRF).



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