

Clean Combustion®

The Clean Combustion® from NORAM are highly efficient burner systems. The dynamic technology supports solid, slurry, fluid and gas fuels, at single or multi-fuel operations within the same system. Over 80 installations in Europe, Asia, South America and South Africa have been successfully completed where a majority is rotary lime kiln burners.

The problem

Government policies become stricter while energy prices become more expensive and volatile. Pulp & paper mills inevitably face higher cost and restrictions in emissions. Insufficient burning with static control leads to higher energy usage and emissions while not utilizing the full capacity of the lime kiln.

The solution

The Clean Combustion® multifuel burners have vortex injectors, dynamic gas registers and an adjustable swirl turbulator which helps to optimize the process and ensure complete combustion. This results in **reduced fuel consumption** and **reduced level of undesired exhaust particles**.

How it works

With the Clean Combustion® multifuel burners, see Figure 1, the mixing zone is outside the nozzle with steam as the driving media for extracting the fuel. In the center of each burner there is room for up to three fuel lances.



Figure 1 Clean Combustion® multifuel burner

To control the flame shape, a swirl turbulator is used, see Figure 2, which controls the primary air flow angle.

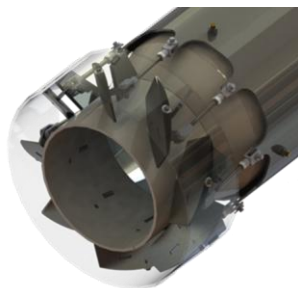


Figure 2 Clean Combustion® swirl turbulator

The benefits

The design of the Clean Combustion® focuses on **easy access**, **self-cleaning** and **reduced maintenance** with connections on the back of the burner and a **high control**.

With the Clean Combustion® nozzle there is a **decreased risk of plugging** and a **higher degree of atomisation**. The fuel pressure is **reduced**. With the swirl turbulator an **optimized combustion** can be achieved even with variations of fuels, flows and fuel quality. Figure 3 shows a flame from an installed Clean Combustion® system.

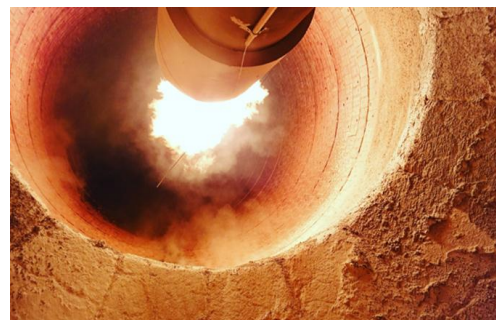


Figure 3 Installed Clean Combustion® system

Energy efficiency and emissions

The energy efficiency have been improved with 10-20% for lime kilns and 3-10% for boilers.

The NOx emissions have been between 50-200 mg/Nm3 (Nitrogen <0.3% mass).

The uptime is increased and is usually between 12-24 months.



Figure 4 A Clean Combustion® Installation

