

Industrial Solutions

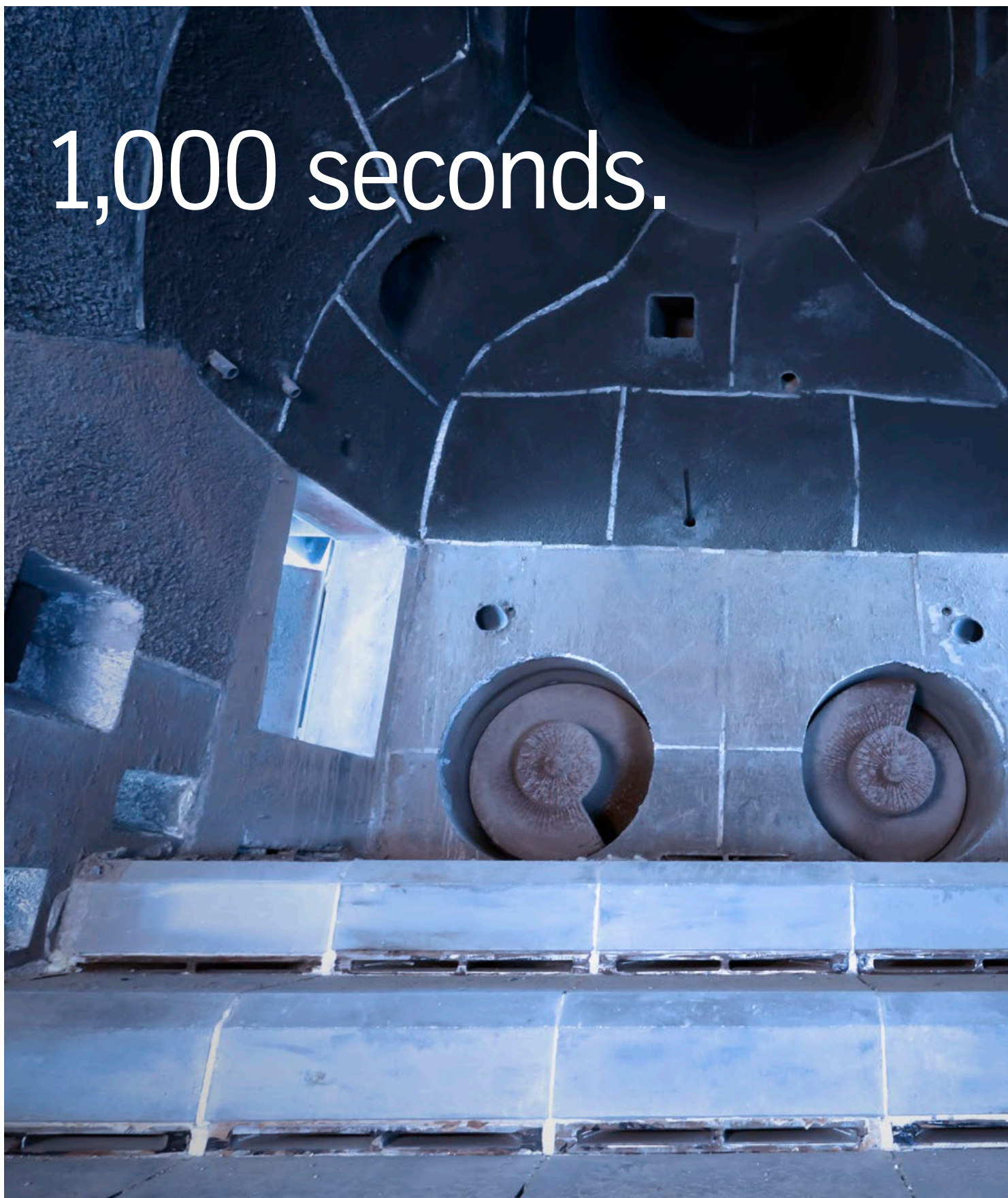
PREPOL®-SC.

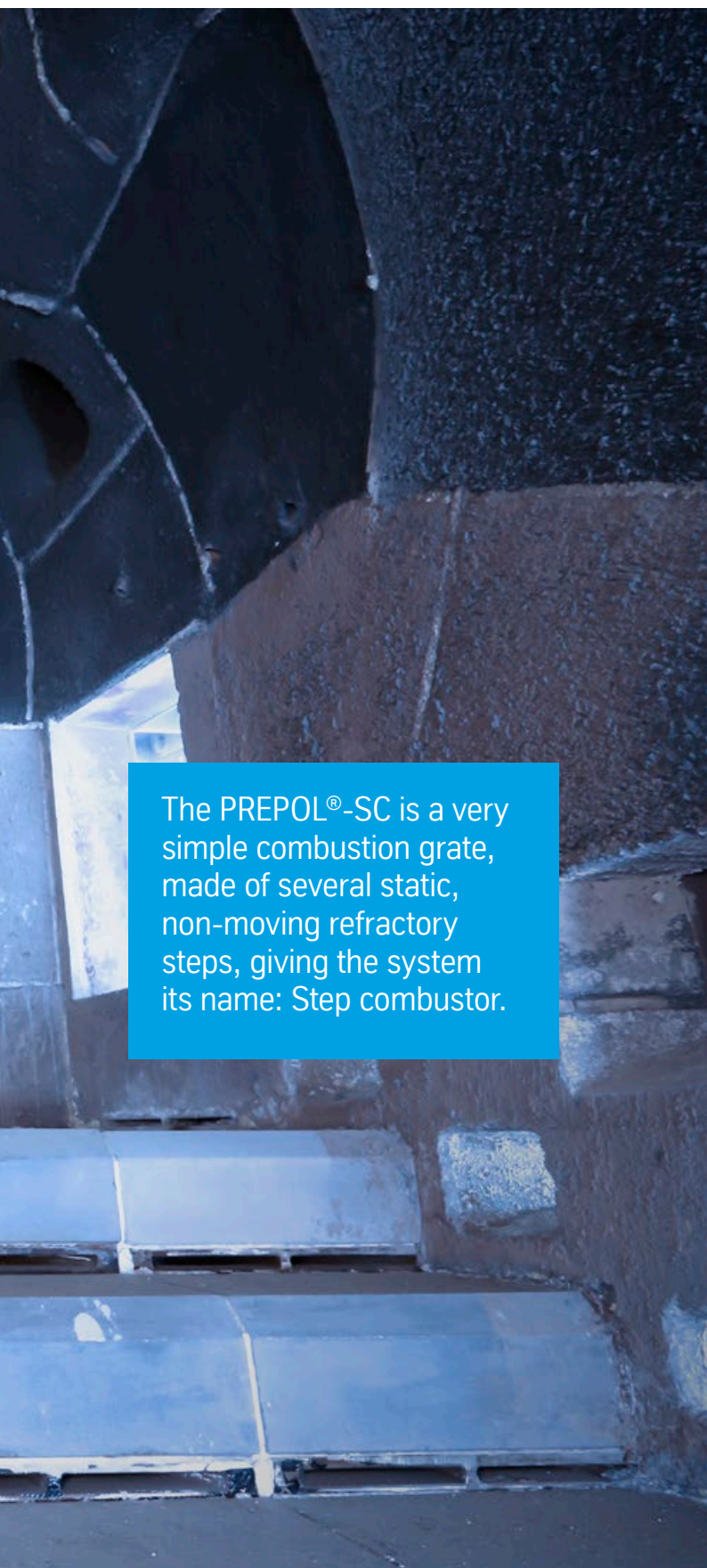
Enough time for making money!



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1,000 seconds.





The PREPOL®-SC is a very simple combustion grate, made of several static, non-moving refractory steps, giving the system its name: Step combustor.

The PREPOL®-SC is an add-on for the PREPOL® precalciner. On this simple combustion grate, waste can burn for more than 1,000 seconds at high temperatures. Compared to ordinary calciner technology with only up to 7 seconds residence time the PREPOL®-SC opens a new dimension in combustion: New sorts of wastes can be utilized resulting in a new level of fuel-cost savings.

One small step for precalciners, one giant leap for combustion.

The step-shaped grate can be connected to any kind of precalciner loop and is nothing more than a tube-like extension: small in size but with huge potential in terms of combustion! The grate area of the unit is big enough to offer waste a residence time of more than 1,000 seconds. Especially for existing plants that face operation problems when burning waste-derived fuels due to short calciner loops originally sized for the combustion of solid fuels, this huge extension of time can be reached with minimum effort: Compared to an extension of the calciner loop, the SC offers residence time in a significant smaller volume. This is possible as the fuel lies on the grate instead of following the gas stream in the loop. The small volume and the resulting lower weight of the combustion chamber mean that less civil-construction reinforcement is required.

Several steps ahead.

The combustor is connected to the tertiary air channel so that the hot air can deliver what is needed for complete and successful combustion: Heat for drying and ignition, and oxygen for safe and complete combustion.

The refractory steps of the grate are equipped with air nozzles. These are connected to air-pulse cannons. The air pulses swirl the fuel up and progressively convey it along the grate. Moreover, the swirling-up constantly turns over the fuel and assists the combustion process, ensuring that a very high throughput rate is achieved per unit area of grate. A further advantage is that the light, already-converted char of the fuel particles is quickly blown out of the combustor and entrained in the suspension gas stream of the calciner, while the heavier particles remain on the grate for further thermal processing. The fuel transformation is thus positively assisted by the active fuel conveyance system throughout the entire fuel retention time.

One step in preparation, several steps in combustion.

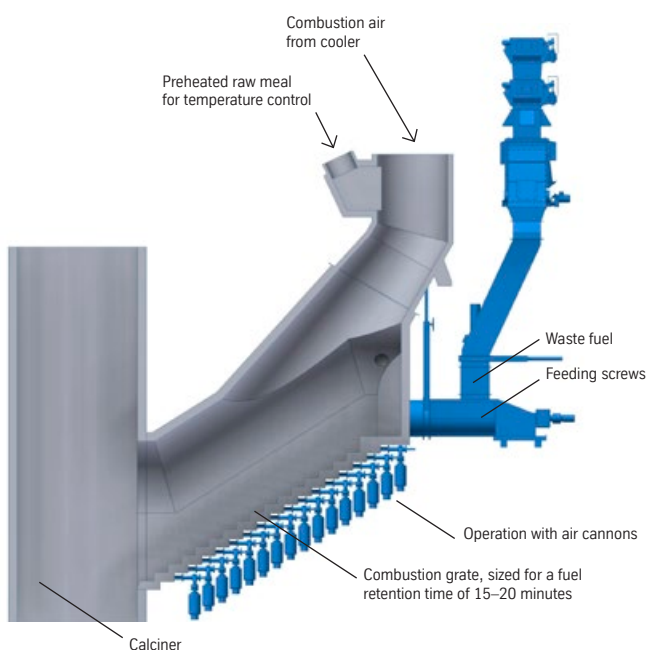
With standard precalciner equipment, processed refuse-derived secondary fuels can only be successfully used if the waste has passed through a multistage mechanical processing plant. The secondary fuel has to be in such small pieces that it can be entrained in the gas stream and totally burns out within a retention time of approx. 5 seconds in the calciner. This demands an edge length of about 50–100 mm. In order to meet this requirement, multistage mechanical processing is needed.

Using the advanced PREPOL®-SC technology, heavy waste fuels can be used that are non-flyable and that have an edge length of up to 300 mm. Waste preparation is only needed in order to adjust the heating value and to control contaminations, inert constituents and harmful substances. Instead of multiple shredding and sorting steps in fuel preparation, the fuel is treated on the multiple steps of the combustion grate.



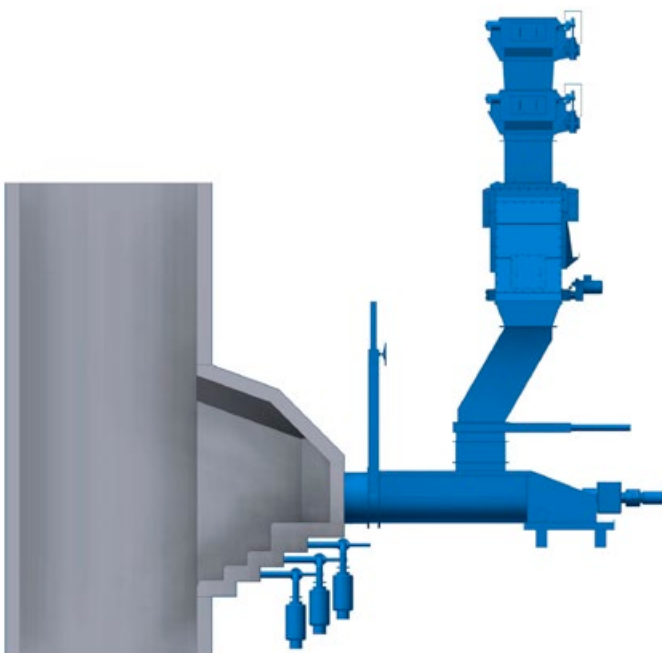
Right from the start.

In order to ensure the best combustion performance, the step combustor is equipped with a sophisticated feeding system. The material is fed in by two screw conveyors which push the fuel onto the first step of the grate without projecting into the combustion chamber themselves. The cold fuel protects the conveyors from direct contact with the fire. The first step of the combustion grate is the platform-like ignition table, on which the incoming fuel piles up. The heap of fuel acts as a seal against false air, prevents hot gas from flowing back into the screw conveyors and protects the feeding screws against overheating. The fuel remains on the ignition table for a few minutes and is slowly dried, pyrolysed and ignited by contact with the tertiary air. The heap of fuel buffers variations in feed rate and chemical properties.



PREPOL®-SC-S. Short but still powerful.

If space in the preheater is limited, it is worth thinking about the short version of the step combustor, the so-called PREPOL®-SC-S. In this version, the combustor only consists of the first three steps of the grate together with the screw feeding system. The retention time is small compared to the PREPOL®-SC but big compared to ordinary calciner loops: about 150-300 seconds can be achieved; enough time to dry and devolatilize the fuel. The grate becomes so short that the fuel enters close to the calciner duct. Hence it is not necessary to connect tertiary air and hot meal – the flow turbulence alone delivers the required air-meal mixture to the grate. This makes retrofitting of the system even easier.



The core characteristics of the PREPOL-SC.



Safe.

The thermal process always takes place in an air excess of at least 30 %. It is therefore impossible for dangerous carbonisation gases such as CO, H₂ and C_xH_n to form.

Forced feeding of the fuel seals the system off from the environment. In an overpressure situation (e.g. failure of the system fans), ignition of the fuel in the conveyors can be prevented. During a stoppage, the combustor is completely isolated from the conveyors by pneumatically-operated airlock slide valves.



Effective.

The use of air cannons ensures that the fuel is actively transported and turned over. Every air blast brings the fuel into contact with fresh oxygen, and every agitation separates the smaller particles, so that only the large fuel particle fraction remains on the step grate.

The PREPOL-SC thus operates extremely effectively, as the fuel is only processed as far as necessary until it can enter the calciner as gas-stream-entrainable char. Related to the low space requirement of the combustor, very large quantities of fuel can thus be processed effectively.



Simple and reliable.

The combustor consists entirely of mechanical components that have already thoroughly proven their reliability in the cement industry. Moreover, both the screw conveyors and the air cannons have been specially optimised for the rough conditions of the fuel-handling applications. The astonishing thing is: although both systems actively assist fuel conversion through agitation of the fuel, they are not subjected to the thermal and chemical stresses in the combustion space. The mechanically-moved components are located completely outside the combustor.

A further advantage: The simple geometry of the system makes it very easy to add it on to any kind of existing precalciner system, yet the installation time is very short.



Flexible.

The PREPOL-SC is made for all kind of fuels, but is flexible in size. According to given boundary conditions, the width and length of the unit can be adjusted. For complex retrofits, the grate can be shortened: This PREPOL-SC-S still offers more than 50 times more combustion time compared to existing calciner loops but needs a minimum of space.

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