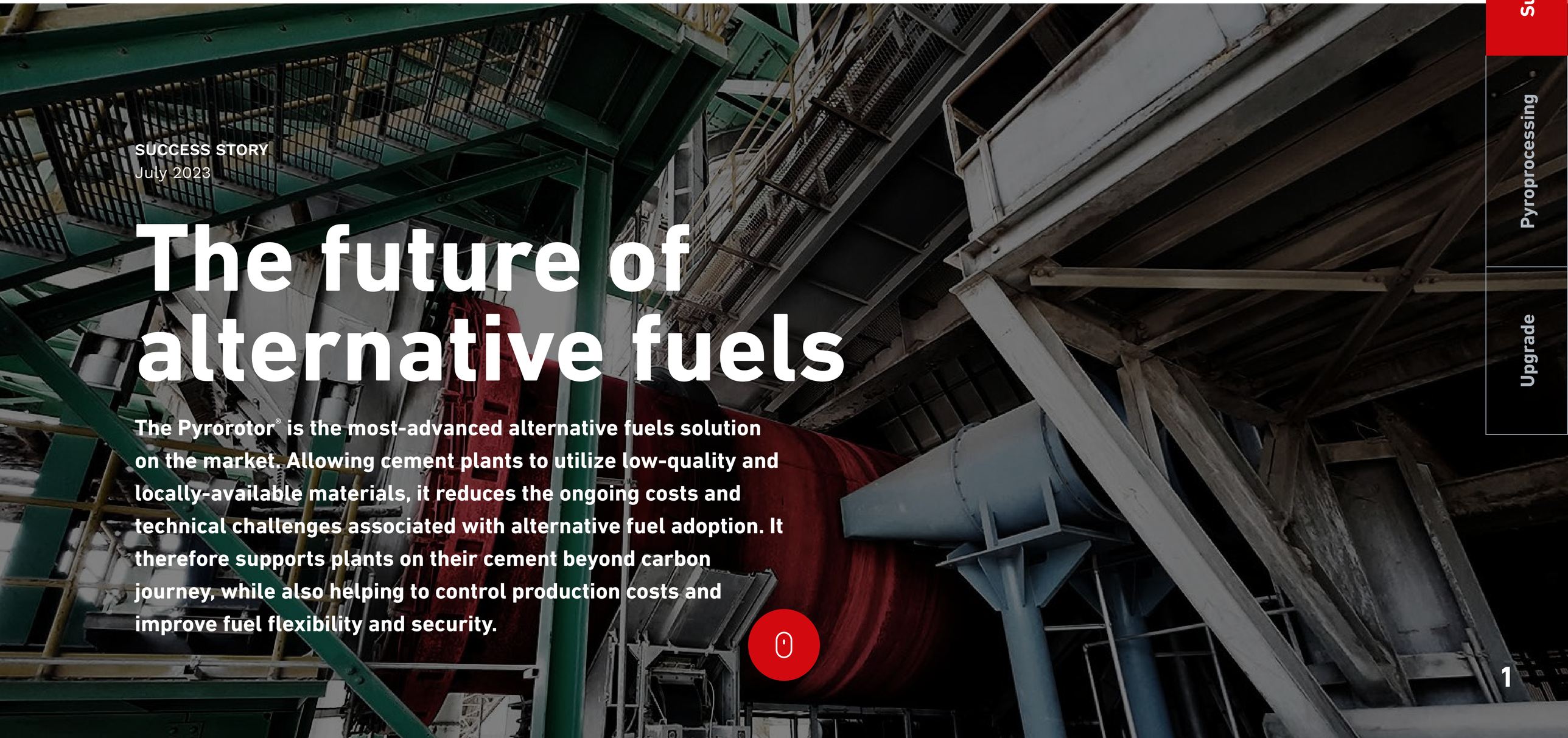


SUCCESS STORY
July 2023

The future of alternative fuels

The Pyrorotor® is the most-advanced alternative fuels solution on the market. Allowing cement plants to utilize low-quality and locally-available materials, it reduces the ongoing costs and technical challenges associated with alternative fuel adoption. It therefore supports plants on their cement beyond carbon journey, while also helping to control production costs and improve fuel flexibility and security.

Unlocking cement's future

Since its launch, the Pyrorotor® proved to be a hit in Asia with ten systems commissioned or under construction in South Korea, as well as one in China. But word is spreading. The latest orders will see Pyrorotor® installations at KÇS Kipaş Çimento A.Ş. in Turkey, as well as at Cimpor Portugal's Alhandra cement plan. These second-generation systems will achieve thermal substitution rates of more than 90% in the calciner – an important step in reducing carbon emissions at both plants.

Tackling today's most pressing challenges

Here at KHD, we believe that the future of cement is cement beyond carbon. Minimizing the use of fossil fuels by raising thermal substitution rates (TSR) is widely recognized as being essential to this net-zero transition. The Pyrorotor® lays the foundation for this: for example, at Asia Cement's Jecheon plant, a Pyrorotor® resulted in CO_2 savings of 20%.
It might not sound much but the journey to net-zero is only possible in many small steps.

Reducing carbon emissions may be the most pressing long-term challenge facing the cement industry, but it is not the only issue causing headaches among cement producers.

Recent spikes in global energy prices and disruption to global fuel supply chains increase the costs of production and squeeze already tight margins. By enabling cement plants to utilize whatever alternative fuels are available locally, the Pyrorotor® improves fuel security and cushions against fluctuations in global fuel markets. And that's not all.

Many regions still lack developed waste management infrastructure. In these areas, the use of waste-derived fuels could play an important role in improving waste management. The difficulty lies in providing fuels that do not negatively impact process stability or product quality. Because the Pyrorotor® can handle even very low-quality fuels, without pre-processing, this difficulty is negated and cement plants can fulfil their potential as sustainable waste management solutions.

How does it work?

As mentioned above, the Pyrorotor® can handle fuels with very low calorific value and very large particle sizes (up to 300 x 100 x 100 mm (3D) for plastics and 300 x 100 x 25 mm (3D) for biomass and tire chips). To do so, it combines optimized combustion conditions with long residency times inside the reactor. And it does so with simple efficiency.

By leveraging a plant's existing tertiary air stream, the Pyrorotor® achieves temperatures of up to 1200 °C in the reactor. No additional burner required. The reactor also rotates to ensures proper mixing of the fuel with the tertiary air.

Finally, speed of rotation can be varied to control residency time. It all works together to guarantee ignition and full fuel burn-out. And as an added benefit, NO_x emissions are reduced, thanks to the principle of staged combustion.

Going global

The 3800-tph KÇS cement plant in Kahramanmaraş, Turkey, currently runs a mix of petcoke, coal, and alternative fuels in the calciner. Its new 3.4m x 10m Pyrorotor® will enable the alternative fuels fraction to be maximized to about 90 %. The upgrade will also ensure NO_x emissions are kept below 800mg NO_2/Nm^3.

Meanwhile, the installation of a similar-sized Pyrorotor® at the Alhandra plant, Portugal, is the first on the Iberian peninsula and forms part of a project to increase production capacity from 3000 tph to 3600 tph. The versatility and reliability of the Pyrorotor® will meet customer demands for an efficient and cost-effective alternative fuels processing solution, which allows very high thermal substitution rates, even when firing low-quality materials.

Both plants can look forward to gaining similar benefits as those achieved by Asia Cement's Jecheon plant, South Korea. Its 3.4m x 10m Pyrorotor® has been operating since 2020, achieving a TSR above 85 % in the calciner, with no impact on clinker quality.

"The KHD Pyrorotor is very intuitive and flexible," said Ju Ik Baek, Research Engineer at Asia Cement. "There are several options to fine tune combustion to ensure various types of fuel can be effectively burned without additional processing. Due to its high reliability, we were easily able to achieve our fuel replacement goal. We also had no problems when connecting the Pyrorotor® to our existing equipment."

An opportunity to improve

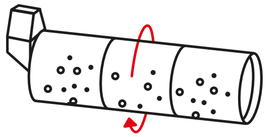
As is happening at the Alhandra plant, installation of the Pyrorotor® also provides an opportunity to review the existing pyroprocess. Our experts can often suggest small but meaningful updates alongside Pyrorotor® implementation to achieve additional production capacity or process stability.

To discover how the Pyrorotor® can help your plant reduce production costs, lower emissions and secure your fuel supply, visit the KHD website or contact our expert team today.

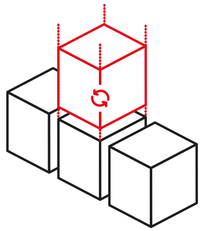
KEY FEATURES

>1200 °C

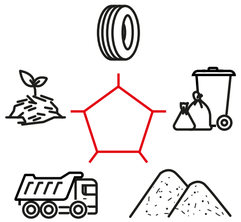
Gas temperatures up to 1200° C (depending on tertiary air flow rate)



Adjust speed of rotation from 0.3 rpm to 3.0 rpm to optimize fuel retention time



Retrofit to any existing plant structure



Use any alternative fuel with almost no pre-processing

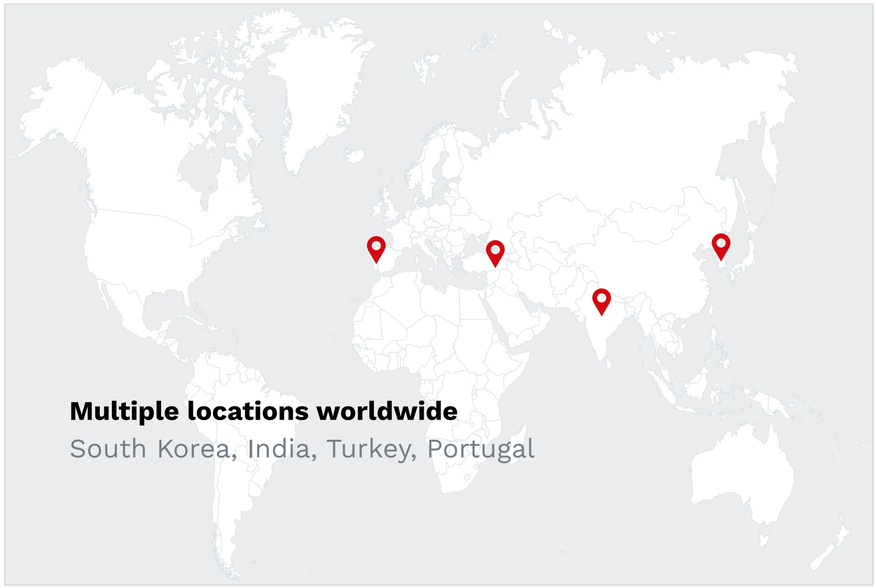
FURTHER INFORMATION

www.khd.com/pyrorotor

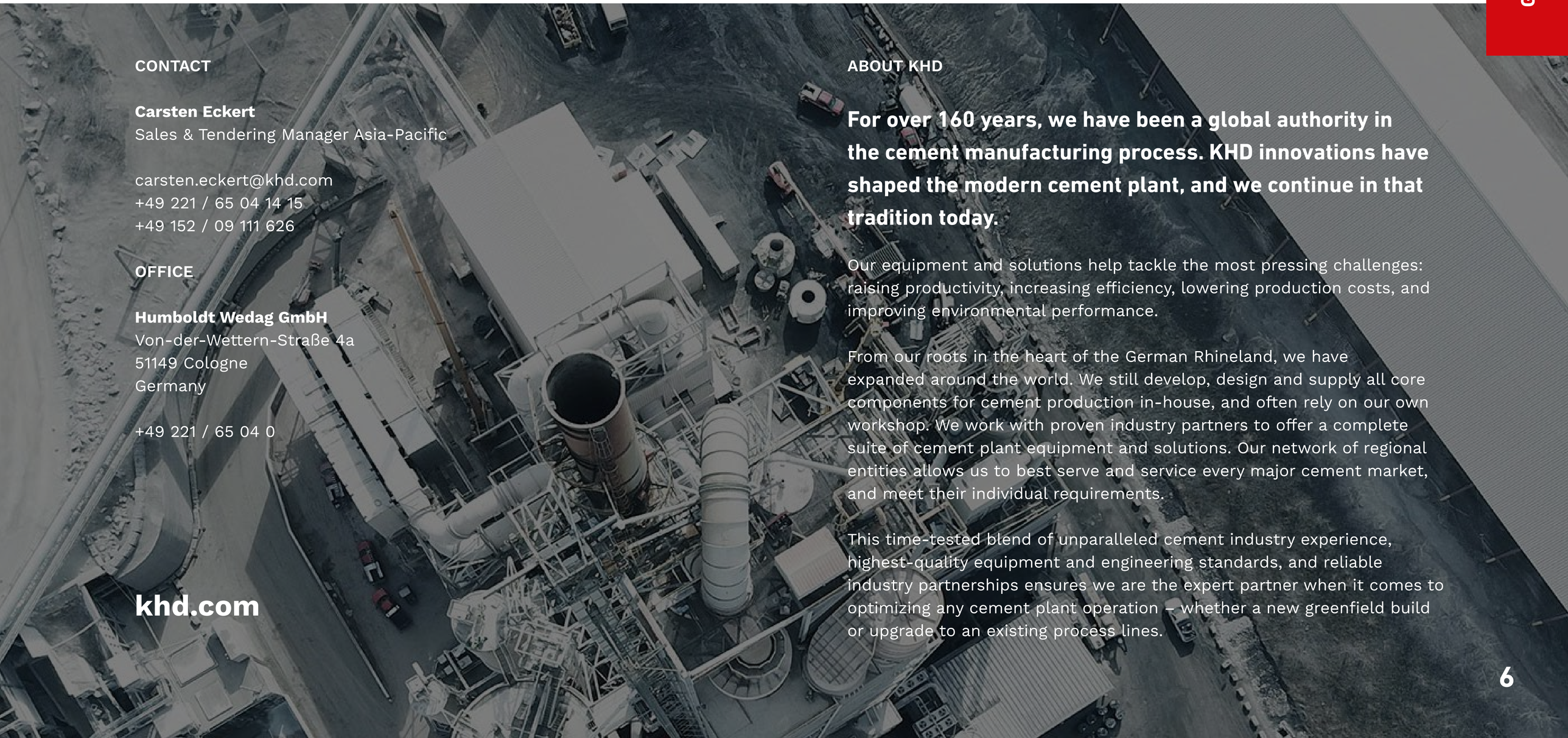
KEY BENEFITS

- Lower your fuel costs by reducing primary fuels to a minimum
- Lower your carbon footprint
- Future-proof your fuel supply with ultimate fuel flexibility

LOCATION



Multiple locations worldwide
South Korea, India, Turkey, Portugal



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ABOUT KHD

For over 160 years, we have been a global authority in the cement manufacturing process. KHD innovations have shaped the modern cement plant, and we continue in that tradition today.

Our equipment and solutions help tackle the most pressing challenges: raising productivity, increasing efficiency, lowering production costs, and improving environmental performance.

From our roots in the heart of the German Rhineland, we have expanded around the world. We still develop, design and supply all core components for cement production in-house, and often rely on our own workshop. We work with proven industry partners to offer a complete suite of cement plant equipment and solutions. Our network of regional entities allows us to best serve and service every major cement market, and meet their individual requirements.

This time-tested blend of unparalleled cement industry experience, highest-quality equipment and engineering standards, and reliable industry partnerships ensures we are the expert partner when it comes to optimizing any cement plant operation – whether a new greenfield build or upgrade to an existing process lines.