The "U" in U-KACC has three meanings: U-type flow, upside-down, and upgrade.

Compared with a conventional low-NOx boiler

30-50% NOx reduction! 60% dust reduction!

A battle against corrosion

Boilers burn coal at high temperatures and use the hot flue gas to heat water and generate steam. Sulfur and corrosive heavy metal contained in coal cause sulfurization deoxidization corrosion. Gasified carbon is partially gasified by high temperatures and unburned carbon, which becomes a cause of dust. The nitrogen contained in the fuel is turned into nitrogen intermediates (e.g., NO, HCN). Subsequently, NO is deoxidized by the other intermediates and becomes N2, which reduces the generation of NOx.

Kawasaki's boilers boast outstanding stability, which is achieved through a mechanism that can absorb fluctuations in steam pressure caused by equipment that consumes steam. Kawasaki's coal-fired boilers are remarkable for their ability to accommodate any variations as well— they can adjust their output in response to changes in the characteristics of coal mined in different regions. These features, combined with the boilers' low-maintenance rates, have led to their track record of safe and stable operation as well as the excellent reputation they enjoy.

Currently, Kawasaki's engineers are working on the manufacture of the Kawasaki UVF boiler (U-KACC), which is equipped with numerous technologies to prevent corrosion and ash adhesion.

The U-KACC, the fourth boiler of the Kawasaki Advanced Clean Combustion (KACC) series, produces 295 tns of evaporation per hour. The latest boiler comes loaded with innovative technologies that are based on an idea that runs counter to the conventional boilers in the series. Instead of using heavy oil as a fuel, it uses asphalt pitch, which is difficult to burn because it remains at the very end of the oil refining process. The U-KACC is a state-of-the-art boiler that makes full use of fossil fuels without producing any waste, and it is inexpensive to run thanks to low fuel costs.

The KACC series cut NOx emissions by 30-50%, and dust by as much as 60% compared to conventional low-NOx boilers. In addition to this excellent environmental performance, the U-KACC boiler incorporates numerous technologies to prevent various types of corrosion, ensuring safe operation and a long service life.

The U-KACC features for achieving ultra-low-NOx, low-dust combustion

Boilers generate steam by heating water or other heat media. The steam they produce is used as process steam in a factory or as an energy source for generators and so on. The size of a boiler is measured in terms of the evaporation of high-temperature, high-pressure steam, which can reach as high as 3,000 tons per hour with a large boiler.

The history of Kawasaki's boiler production dates back to 1880. To date, Kawasaki has supplied approximately 1,000 fuel-fired industrial boilers, mainly in the small to medium-size range. Kawasaki's boilers boast outstanding stability, which is achieved through a mechanism that can absorb fluctuations in steam pressure caused by equipment that consumes steam. Kawasaki's coal-fired boilers are remarkable for their ability to accommodate any variations as well—they can adjust their output in response to changes in the characteristics of coal mined in different regions. These features, combined with the boilers' low-maintenance rates, have led to their track record of safe and stable operation as well as the excellent reputation they enjoy.

Currently, Kawasaki's engineers are working on the manufacture of the Kawasaki UVF boiler (U-KACC), which is scheduled for delivery in 2017 to an oil refinery, where it will be used to generate steam and electricity.

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Boiler Design Department Section 3, Energy Plant Engineering Division
Plant & Infrastructure Company, Kawasaki Heavy Industries, Ltd.

Refractory material
Affixed to the inner water wall of the high-temperature deoxidization zone.

A constriction that separates the furnace and a high-temperature deoxidization zone.

A boiler that can use ash-producing fuel was created by going against conventional wisdom!

Second gas path
The empty gas path is another distinct feature of the U-KACC boiler. Flue gas leaving the furnace makes a U-type flow, separates ash, and then moves up this path, lowering the gas temperature to a suitable level during the process. This design prevents high-temperature corrosion in the superheater.

Flue gas
The nitrogen contained in the fuel is turned into nitrogen intermediates (e.g., NO, HCN). Subsequently, NO is deoxidized by the other intermediates and becomes N2, which reduces the generation of NOx.

Secondary combustion
A sufficient amount of air (oxygen) is introduced to cause low temperature combustion. NOx is reduced to nitrogen by the use of low-temperature combustion.

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Gasified carbon is combusted to reduce the generation of unburned carbon, which becomes a cause of dust.

The ash that remains after burning asphalt pitch needs to be discharged.

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