RATH REDUCES CO_2 EMISSIONS BY 70% IN SILICON CARBIDE PRODUCTION

By Heinz Wallner

Heinz Wallner is head of production at RATH's Krummnußbaum plant in Lower Austria. View the original article, published on the RATH website in October 2023, at https://www.rath-group.com/en/news. Reproduced with permission.

At the RATH plant in Krummnußbaum, two new vacuum nitriding furnaces, used exclusively for the production of silicon carbide plates and bricks in a nitrogen atmosphere, are now being operated with electricity. The result: CO_2 emissions are around 70% lower than with the previous gas-fired furnace, and fossil fuels are reduced to a minimum. By operating these furnaces electrically, RATH is taking a global pioneering role in the refractory industry.

Efficient, resource-saving use of materials and a sustainable approach to the environment in the manufacture of its premium products for application temperatures up to 1,800°C are highly relevant to internationally operating refractories manufacturer RATH. Great focus is therefore being placed on the continuous and innovative optimization of production.

This focus can be clearly seen at RATH's Krummnußbaum plant in Lower Austria: Two furnaces, in which silicon carbide plates and bricks for the lining of domestic waste incinerators are produced in a nitrogen atmosphere, have been operated electrically since February 2022. Only thermal post-combustion is still gas-powered. In other words, three out of 10 industrial furnaces are now operated electrically at this RATH plant.

Encouragingly, CO_2 emissions have been reduced by around 70% in the electrically powered furnaces compared to our gas-powered furnace. For SiC production, this means a CO_2 reduction per ton of fuel of about 1.9 tons.

Moreover, the electric operation of these two furnaces makes RATH a pioneer in the industry when it comes to silicon carbide production in a nitrogen atmosphere.

LOWER ENERGY REQUIREMENTS THANKS TO HEAT TREATMENT PROCESS CONVERSION

By changing the heat treatment process from gas to electricity, the existing material and geometry of the firing boxes were adapted and integrated into the firing chamber. To enable the products inside the boxes to be exposed to a nitrogen atmosphere, the firing boxes have to be subjected to high temperatures. The aforementioned changes allow for shorter heating and firing times for this energy and time-intensive process, which in turn results in lower energy requirements.

An electrically operated furnace at RATH's Krummnußbaum plant in Lower Austria. *Credit: RATH Group*

In terms of product quality, the balance is also positive.

In the run-up to the acquisition, RATH carried out trials in small batches in collaboration with the furnace manufacturer. The furnaces were ordered after numerous tests had been carried out in external laboratories and had yielded optimum quality. The procedure has paid off—the product quality is outstanding.

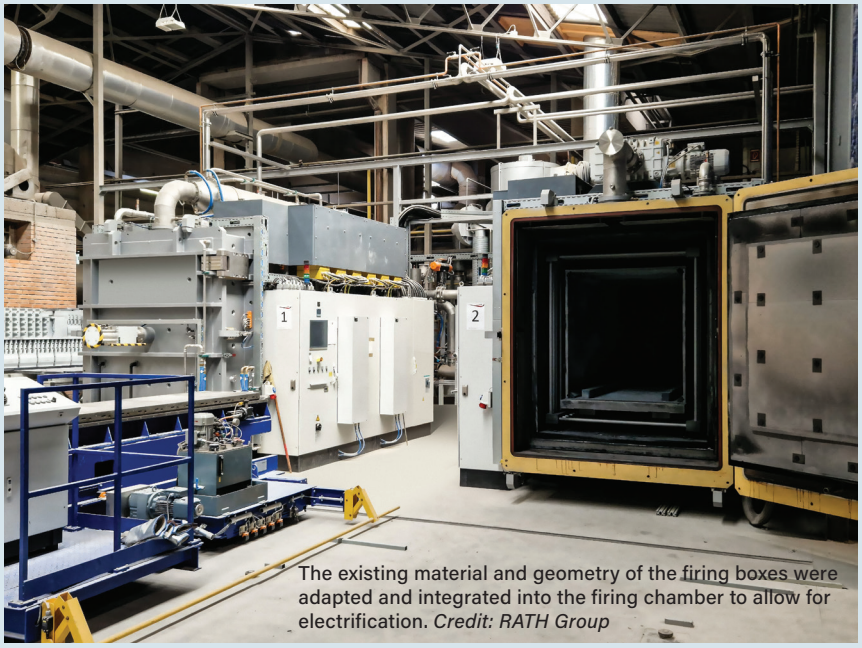
The biggest challenge was to define the best process parameters for the firing. In addition, the electrical infrastructure (transformer station) had to be expanded and a cooling system had to be installed for the two furnaces.

ELECTRICITY FROM THE COMPANY'S OWN PHOTOVOLTAIC PLANT

When it comes to energy generation, RATH in Krummnußbaum is also future-oriented.

A photovoltaic system was erected on the roofs of the factory halls and put into operation in 2020. This 696 kWp photovoltaic plant generates up to 700 MWh per year, which means that around 20% of the daily electricity requirement currently comes from solar energy. The photovoltaic system results in a reduction of around 350 tons in CO_2 emissions per year.

Since 2020, around 99% of the electricity produced annually by this self-consumption plant has been used directly at the Krummnußbaum plant. Any surplus energy is fed back into the grid.



The existing material and geometry of the firing boxes were adapted and integrated into the firing chamber to allow for electrification. *Credit: RATH Group*