

Hybrid Burner Operation with Hydrogen and Energy Saving with the iRecu[®]

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Abstract

Particularly in the metal-processing industry, awareness of the environment and sustainability has recently undergone a major change. Numerous energy and environmental management systems have already been established on the way to sustainable production, but efforts are currently being further intensified in line with the increased environmental awareness of politics and society. There is still a great deal of potential for reducing greenhouse gases, particularly in the supply of industrial process heat, which today is still largely based on fossil energy sources.

Kueppers Solutions GmbH is a technology company specializing in innovative burner systems for providing process heat. The focus is on emission reduction, secured hydrogen combustion, most efficient heat recovery and CFD-oriented process analysis. Through an innovative additive manufacturing process of high-temperature components, Kueppers Solutions is able to develop customized burner systems that are optimized for individual process requirements and move the industry further towards sustainable production.

The efficiency of this new technological approach will be demonstrated in a cooperation project between Kueppers Solutions GmbH as a manufacturer of innovative burner systems and the high-tech foundry Nemak Dillingen Casting GmbH & Co. KG. Nemak is a leading supplier of lightweight solutions for the automotive industry, also striving for a leading position in environmental protection. Thus, the most efficient operation of the heat treatment furnaces is of crucial importance, as well as the future substitution of natural gas by regeneratively produced (= green) hydrogen.

The aim of the cooperation project is to make the furnaces H₂-ready using innovative Dual-Fuel burners, thus enabling operation with up to 100 vol% hydrogen without any conversion measures. Another goal of the project is to increase the energy efficiency of the plant by recovering heat from the exhaust gas.

By using the iRecu[®] recuperators, unused exhaust gas heat is used to preheat the combustion air. The recuperators with a specially developed TPMS structure allow a very high degree of relative air preheating, leading to CO₂ savings even in natural gas operation.