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## TWINGHY - Digital Twins for Green Hydrogen Transition in Steel Industry

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The EU-funded research project TWINGHY —Digital TWINs for Green HYdrogen transition in steel industry —demonstrates the decarbonization of the reheating process in the steel industry. To this end, partners from industry, research institutes and universities have formed a broad-based consortium to introduce green hydrogen as a fossil-free fuel in place of conventional natural gas heating. Two fuel-flexible natural gas/hydrogen burners are being developed for combustion with air and oxyfuel. Together with the required infrastructure, they are installed and tested in a steel reheating furnace.

Laboratory and industrial scale trials demonstrate the operation of the burners and the furnace on hydrogen fuel. The introduction of hydrogen is expected to have several effects on the process. Stable and safe operation of the burners is assured during laboratory scale development, with additional attention paid to a uniform heating performance and NO<sub>x</sub> emissions. The industrial-scale demonstration is performed in a walking beam reheating furnace at the Celsa 3 steelworks in Castellbisbal, where steel billets are heated up to 1150°C before entering the hot rolling mill. The developed burners are installed in the heating and soaking zones. The furnace is equipped with additional sensors to measure wall and gas temperatures, as well as gas composition to quantify the influence of the fuel switch on process efficiency, heating performance, and NO<sub>x</sub> emissions. This paper provides an overview of the combustion system retrofit, the evaluation procedure of the key performance indicators, and the first results of the project.

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