

HYBRIT: New research shows hydrogen-reduced iron has superior properties

New research within the HYBRIT project, driven by SSAB, LKAB and Vattenfall, shows superior results on the properties and quality of the hydrogen direct reduced sponge iron (H-DRI) made using HYBRIT technology. Test results prove that the direct reduction of iron ore using hydrogen offers a superior product that is easy to handle, transport and store. It also virtually eliminates CO₂ emissions in the reduction process.

The HYBRIT initiative was started by SSAB, LKAB and Vattenfall to develop a new technology for hydrogen based iron- and steelmaking with the aim to establish a fossil-free value chain from the mine to finished steel product. In June 2021, the HYBRIT-initiative succeeded in producing the world's first hydrogen direct reduced sponge iron at the pilot plant built with support from the Swedish Energy Agency.

New test results from the HYBRIT pilot plant and the R&D Lab reveal that direct reduced iron (DRI) with hydrogen creates a product with significantly improved properties and quality. Hydrogen-reduced carbon-free DRI produced with HYBRIT technology in the pilot plant is highly metallized and has superior mechanical and aging properties compared to direct reduced iron using fossil-based reducing gas such as natural gas. Hybrit Development AB has filed patent applications describing the included inventions to the European Patent Office.

"We are very pleased with and proud by the consistency in the good results and excited by the opportunities this can offer to the steel industry's green transition. Thanks to years of dedicated work from the research team, we have made the hydrogen-based pathway to decarbonize steelmaking more accessible and efficient. It can help to mitigate climate change," says **Martin Pei**, CTO of SSAB and member of the Hybrit board.

"These extraordinary test results confirm that we are on the right track in establishing an efficient fossil-free value chain in the iron and steel industry. One element behind the high quality of the sponge iron produced is the high-quality iron ore from LKAB's mine, which together with the groundbreaking HYBRIT technology paves the way for future fossil-free steelmaking. The HYBRIT pilot project continues to provide us with invaluable research as we continue the journey towards industrial production, starting first with a demonstration facility in Gällivare in 2026," says **Lars Ydreskog**, SVP Strategic Projects LKAB and Chairman of the Hybrit board.

"It is very encouraging to see that these results not only confirms the climate benefits of replacing fossil fuels with hydrogen from fossil-free electricity, but also that decarbonization can actually lead to better industrial processes and products. This new knowledge is a direct result of close value chain cooperation, determined innovative thinking and bold efforts in piloting new technology – a recipe to copy for other industrial sectors," says **Andreas Regnell**, Senior Vice President and Head of Strategic Development at Vattenfall and member of the Hybrit board.

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