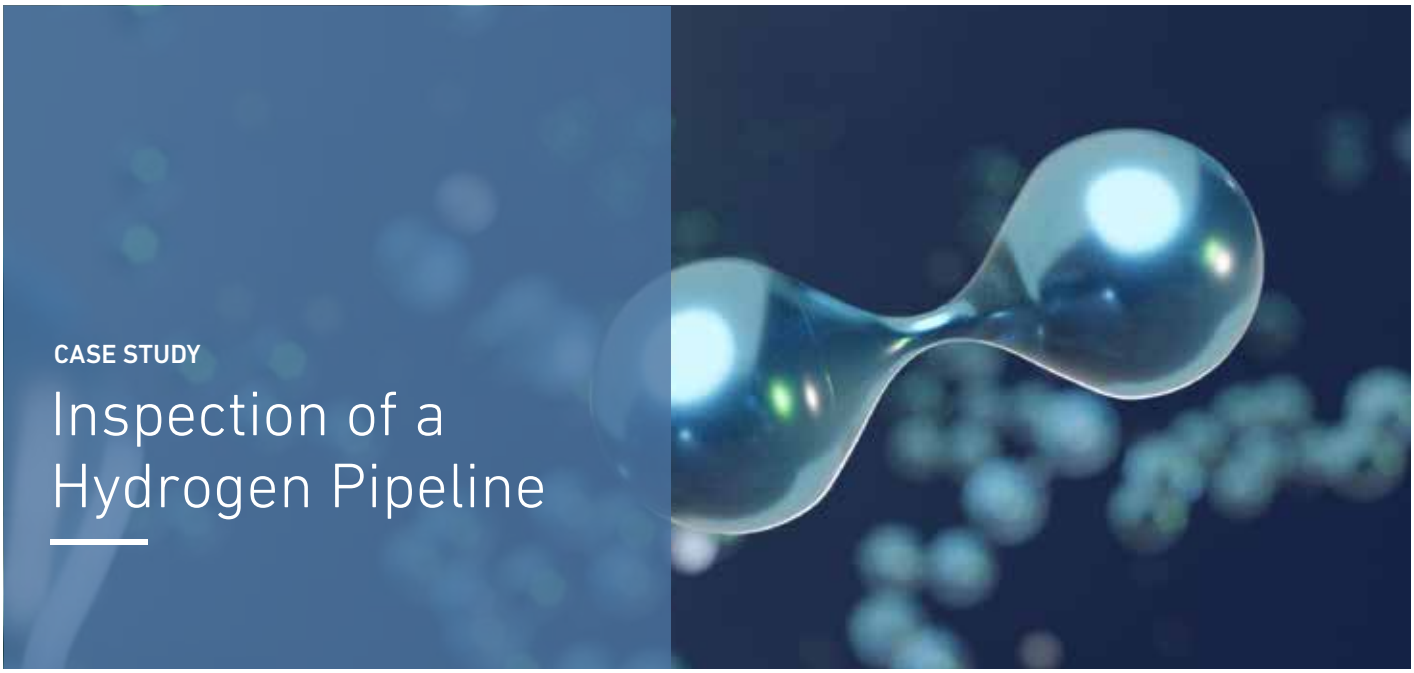

CASE STUDY

# Inspection of a Hydrogen Pipeline

## The Challenge

In recent years, the demand for alternatives to hydrocarbon fuels has been steadily increasing. One way to decarbonize our future is investing in the so-called hydrogen economy.

Hydrogen is very small and mobile, which enables it to permeate various materials. This may lead not only to leaks of much higher volume than with natural gas but also to the embrittlement of pipe material. To prevent this from happening, hydrogen pipelines must be subject to thorough and rigorous integrity management.

A 12-mile pipeline segment, 10" in diameter and installed in 1996, was set up for the transport of hydrogen. The only way to inspect hydrogen pipelines was by utilizing water as a propellant. However, this process comes at a high cost to the operator, as it requires the line be taken out of service for the inspection and the drying process. As the industry gained a better understanding, the operators pushed for more cost-effective solutions.

## Our Solution

The operator approached ROSEN for a method to safely inspect the line segment with a combination of geometry and magnetic flux leakage (MFL) technologies.

Due to the harsh product, the tool was set up with non-standard cups, differing in shore. For the standard tool set up, a minimum of 435 PSI is typically requested. However, this was not something the operator would be able to provide while propelling with the product. Instead, it was required that the team move forward with a pressure of ~270 PSI and a flow rate of 11 MMscfd. In order to reduce excessive velocity from pressure build-up in installations while still providing enough seal to propel the tool through the line, various bypass holes and notches were applied. Finally, protective measures for the magnet circuits were taken.

Once the tool was extracted, there was no damage, and the cups showed minimal wear. The resulting data showed 100-percent sensor coverage for both the geometry and MFL portions, and magnetization levels were within the predicted ranges. While the tool did experience a few spikes in velocity, the overall data quality was acceptable for evaluation.

**The ATEX-compliant MFL ILI tool**

**The ILI tool upon arrival at receiver**

The operator returned to ROSEN when it was time to re-inspect the line segment. This time around, they were able to provide a pressure of ~340 PSI while maintaining the same flow rate. Once again, the cups showed minimal wear, and the tool was generally in good condition. However, the combination tool did acquire some damage because of the higher-than-usual velocity while coming into the receiver and hitting the door of the trap.

During the data review, it was noted that the tool still experienced a few velocity spikes, but the increased pressure allowed for an overall reduced speed and a more stable inspection. The data was again at 100-percent sensor coverage for both the geometry and MFL portions and was acceptable for evaluation.

## Your Benefit

Besides adapting existing technologies and services to the special requirements of a hydrogen grid, ROSEN's services for hydrogen assets are integrated into a holistic integrity management framework that addresses hydrogen-related threats, interactions and defects. Pipeline operators are thus able to make sustainable decisions for the conversion of their existing gas grids to hydrogen, ensuring hydrogen-transport operations that are reliable in all aspects of performance, safety and security.