

Development of Hydrogen Field Test Standard for Hydrogen Refueling Station

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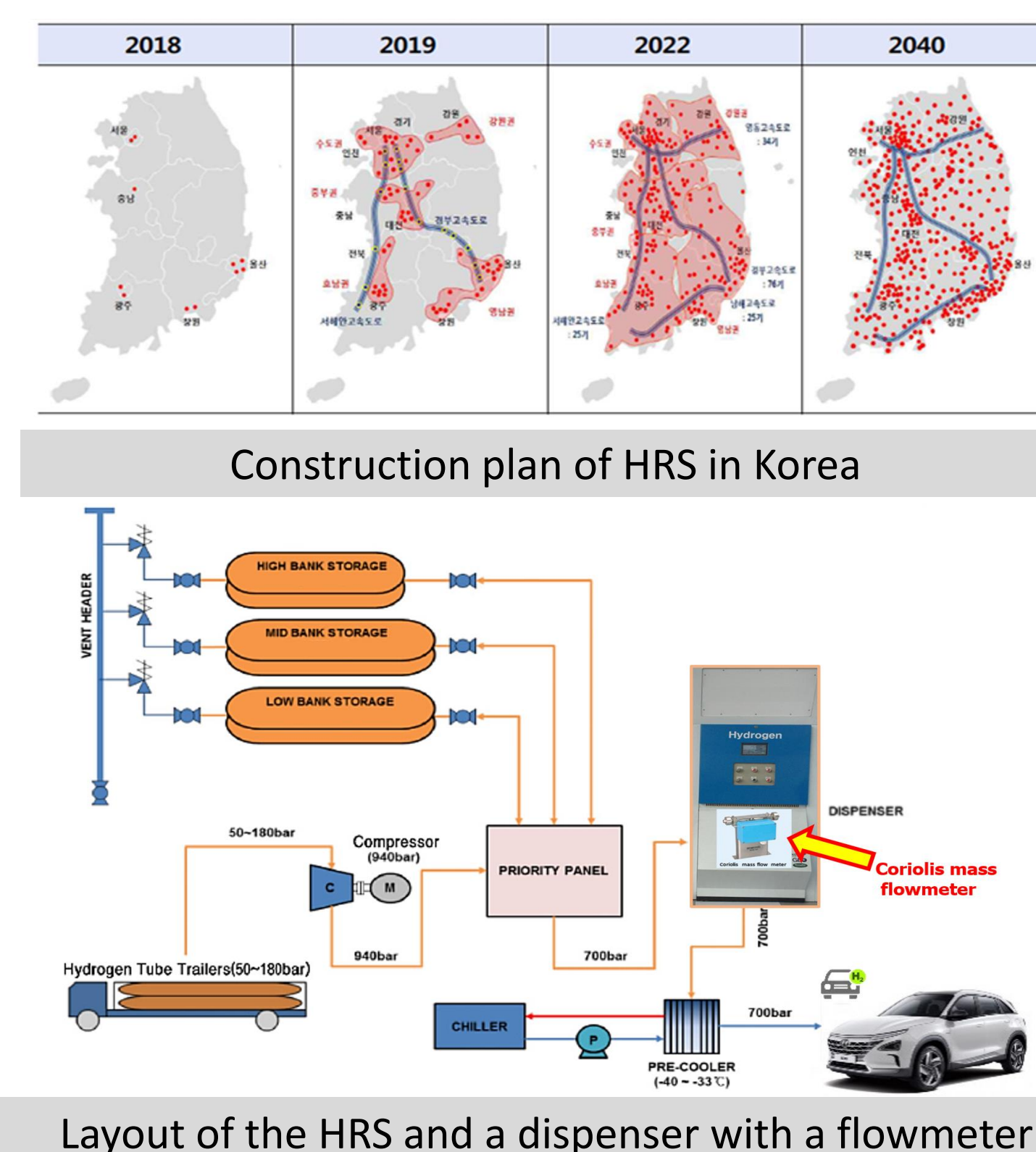
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Abstract

- As interest in developing eco-friendly cars grew in response to global warming and air pollution problems, the Korean government has implemented policies to build hydrogen vehicles and hydrogen refueling station
- To develop the necessary methodologies and calibration facilities to allow hydrogen refueling stations, KRISS have developed a KRISS Hydrogen Field Test Standard (HTFS) based on the gravimetric principle.
- KRISS have carried out on-site test for field verifications and calibrations of the measurement accuracy at the hydrogen stations located in Korea using KRISS HTFS.

Introduction

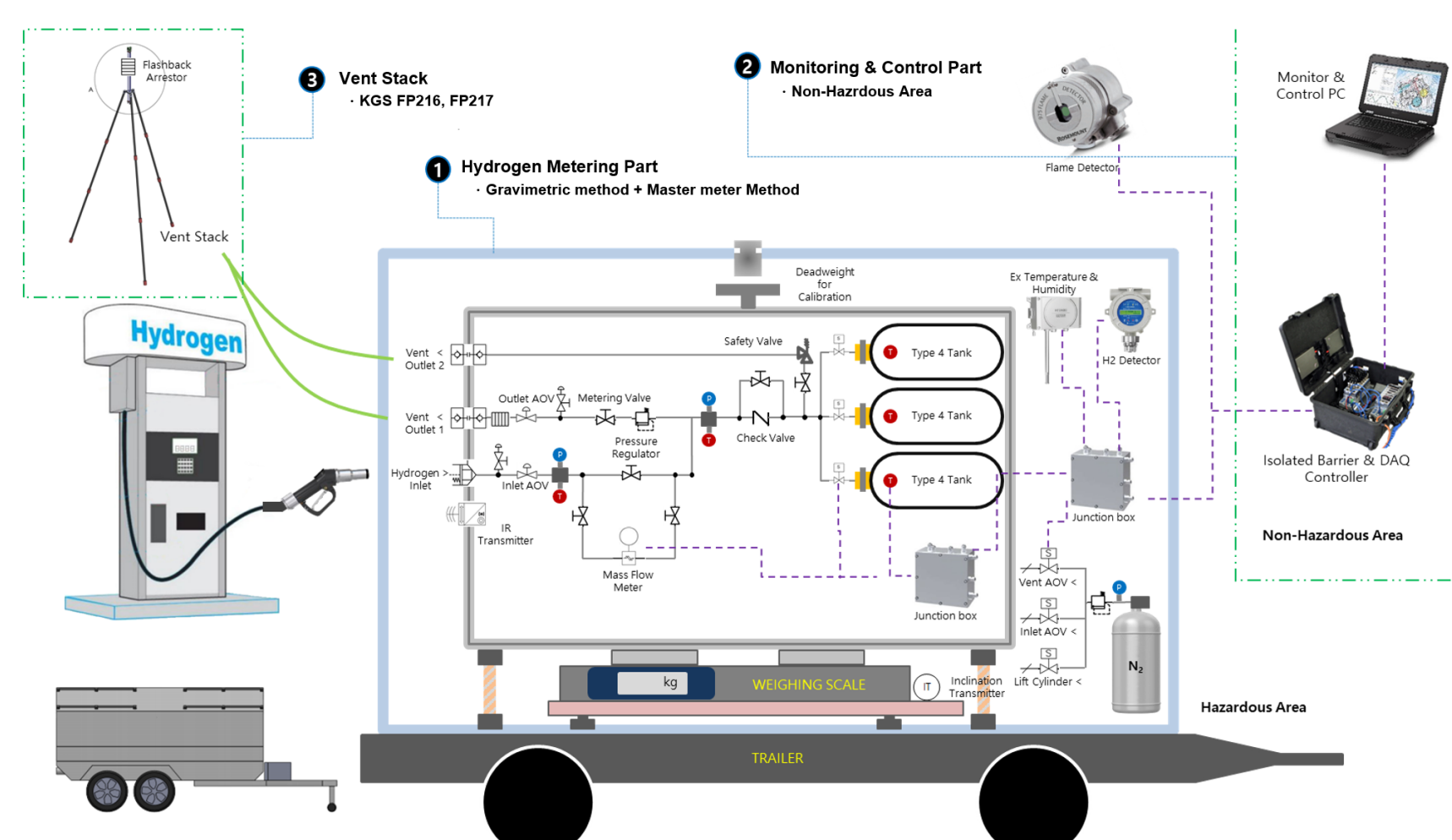
- Hydrogen Fuel Cell Electric Vehicles and Hydrogen Refueling Stations**
 - The Korean government's formulated policies with the road map
 - 36,000 hydrogen vehicles and 330 hydrogen refueling stations
- Metrological conditions and requirements for refueling process**
 - Wide range of temperatures (-40°C to 85°C) and high pressure (up to 87.5 MPa) with accuracy level 2 to 4 % according to OIML
- Verification/Calibration for Flow metering in hydrogen dispenser**
 - Mass flow meter (Coriolis-type) for verification of measurement accuracy is carried out in the water as a different medium other than hydrogen, not high pressure when injecting hydrogen in Korea.



Layout of the HRS and a dispenser with a flowmeter

Development of KRISS Hydrogen Field Test Standard

- Develop the necessary methodologies and calibration facilities to allow hydrogen refueling station**
 - On site test and calibration of measurement accuracy of the mass flowmeters used at HRS.
 - Three 52 L pressure cylinder tanks (type IV), a 300 kg weighing with 0.5 g resolution, the Coriolis mass flow meter, needle valves, temperature sensors, pressure sensors, and a receptacle
 - Flow meter determined by weighing the amount of hydrogen gas collected in the pressure tanks on a weighing scale based on the gravimetric principle



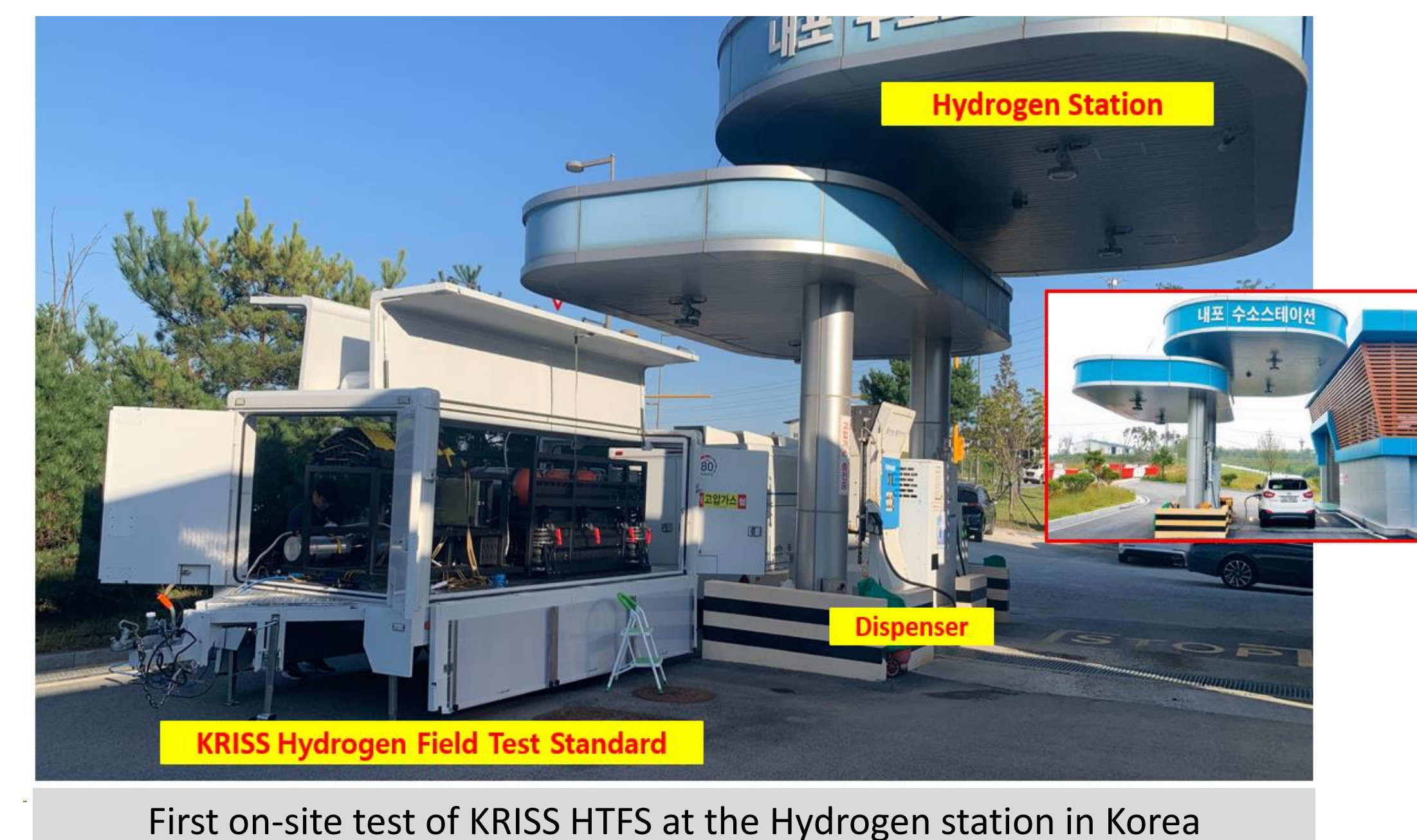
Design of KRISS Hydrogen Field Test Standard



Development of KRISS Hydrogen Field Test Standard

On-Site Test of KRISS HTFS at the Hydrogen Refueling Stations in Korea

- On-site test for field verifications and calibrations of the measurement accuracy**
 - In 2022, for the first time in Korea, an on-site test for field verifications and calibrations of the measurement accuracy was carried out at the hydrogen station located in Korea using KRISS HTFS.
 - Maximum allowable error in type evaluation on OIML R 139 was sufficiently satisfied from 2% to 4%.

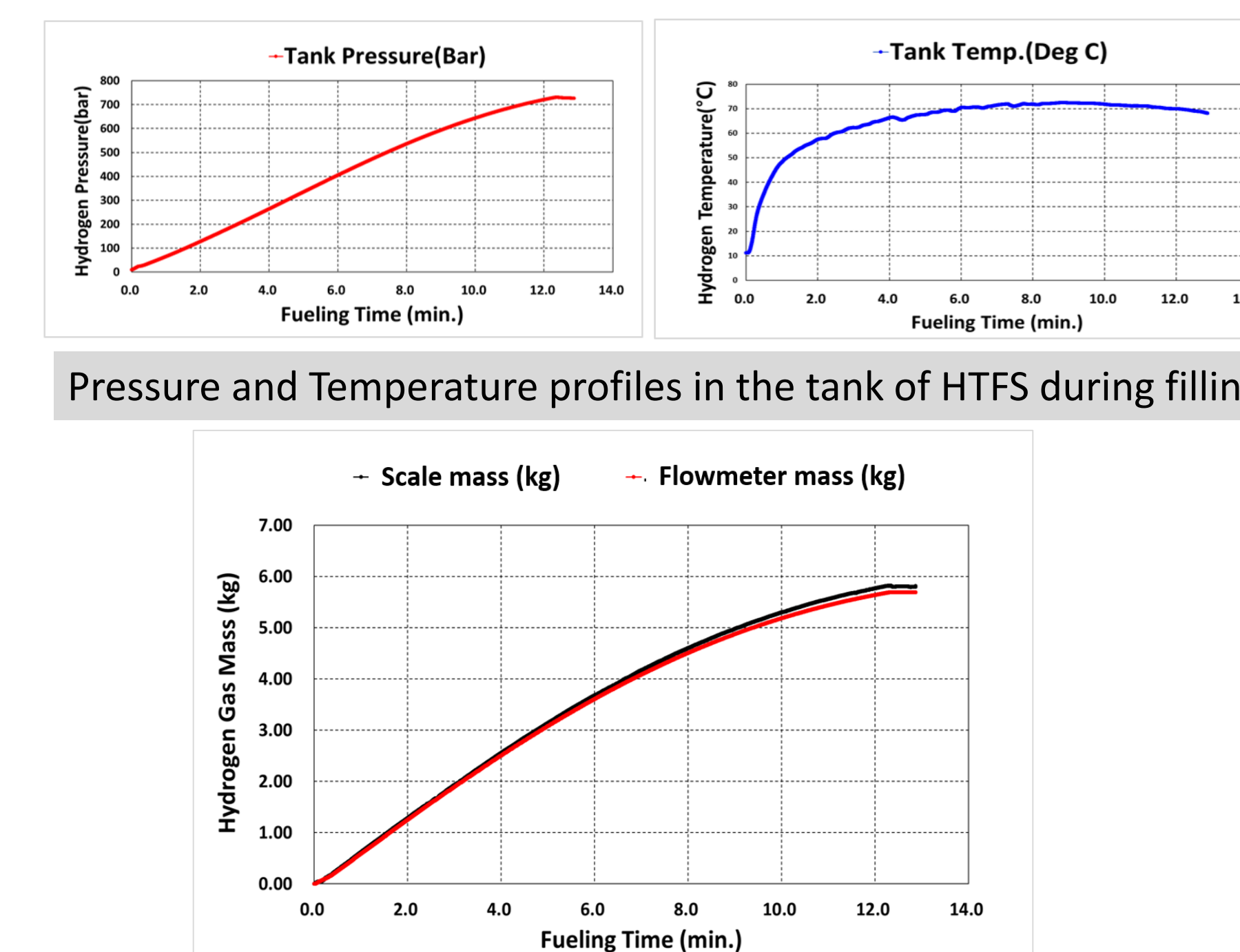


First on-site test of KRISS HTFS at the Hydrogen station in Korea



Connecting nozzle of hydrogen dispenser to KRISS HTFS

- National-wide test for legal metrology of hydrogen stations by KRISS HTFS**
 - Since the first on-site test of hydrogen station in Korea from 2022, the KRISS HTFS has been used to select more stations in four regions in Korea and conduct verification tests.



Comparison between mass of HTFS and HRS during filling



On-site test of KRISS HTFS at the Hydrogen station in Korea from 2022-2025

Collaborations

- On-site tests with KRISS HTFS were carried out in collaboration with the legal metrology authority of Korean government to prepare implementation of measurement act for hydrogen station.
- KRISS is actively engaged in collaborative research other NMIs in Europe and Japan, including initiatives to conduct international comparisons for hydrogen flow field test.

References

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