Development of Simulation Models for a Metal Hydride Compressor and Thermal Storage

Description

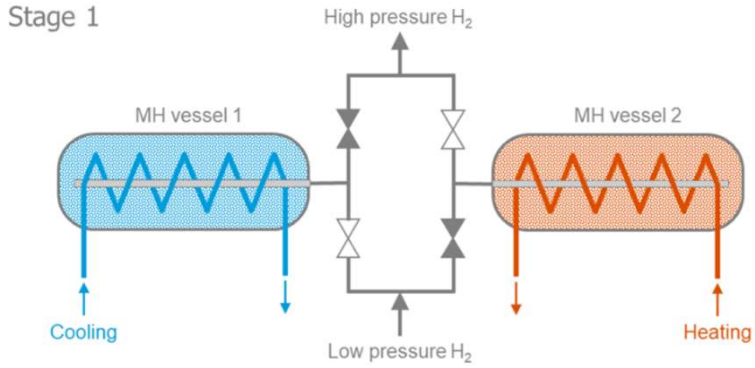
Metal hydrides (MH) are known as a material-based hydrogen storage technology, where hydrogen is absorbed and chemically bound into the metal lattice. In addition to its storage function, by utilizing the pressure-temperature correlation of its reaction equilibrium, metal hydrides can also be used as a thermally driven hydrogen compressor. By supplying heat to a hydride saturated with hydrogen, the equilibrium pressure rises, allowing for hydrogen to be released at high pressures. Alternatively, by absorbing hydrogen, reaction heat is released, thus the hydride can also function as a de facto thermal storage. Both MH applications are gaining increased attention due to possible synergies with different technologies in hydrogen energy systems.

This thesis consist of three main parts:

(1) Literature research and selection of suitable metal hydride materials for compression and thermal storage depending on their properties.

(2) Adaptation of existing MH hydrogen storage models for use as a compressor or thermal storage within Matlab/Simulink.

(3) Identification of applications and synergies with other technologies within hydrogen energy systems and system simulation with HyCentA's existing model library to evaluate efficiency.



Source: Hystorsys AS (https://www.hystorsys.no/)

Work Packages

- Literature research on materials and applications (1 month)
- Development of compressor and thermal storage models (2 months)
- System simulation of energy systems and efficiency evaluation (2 months)
- Written thesis (1 months)

- **Start**: immediately
- **Duration**: approx. 6 months
- **Paid Master Thesis**
- **Contact**: Dr. techn. Nejc Klopcic, klopcic@hycenta.at
  Dr. techn. Franz Winkler, winkler@hycenta.at