

A submersible liquid hydrogen pump –design and initial testing

As the hydrogen market expands, the need for efficient distribution of liquid hydrogen (LH₂) becomes increasingly important. The potential utilisation of liquid hydrogen in mobile applications or as an energy import vector is subject of current investigations. Reducing flash gas losses during LH₂ transfer and ensuring adequate pressurization of downstream applications, such as fuel cells and combustion engines, are challenges. Therefore, it is essential to develop pumps for liquid hydrogen and, along with this, develop test rigs in order to understand how liquid hydrogen pumps behave under various conditions. This contribution shows the current status of the development of a three-staged liquid hydrogen turbo pump with a designed of pressure head of 1 *bar* and a flow rate of 2100 *l/hr*. It also presents a test rig for such small cryogenic pumps. The objectives are to demonstrate the pump's feasibility and to investigate the underlying thermodynamics (e.g. low-loss transfer and cavitation behaviour). The focus is on the technical implementation, particularly the mechanical design and component selection, as well as on providing insight into the initial commissioning tests.

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Author: BISCHOFF, Henrik-Gerd (TU-Dresden)

Co-authors: Prof. THOMAS, Christiane (TU-Dresden); HABERSTROH, Christoph

Presenter: BISCHOFF, Henrik-Gerd (TU-Dresden)

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