



Innovation Type:
Experimental rig

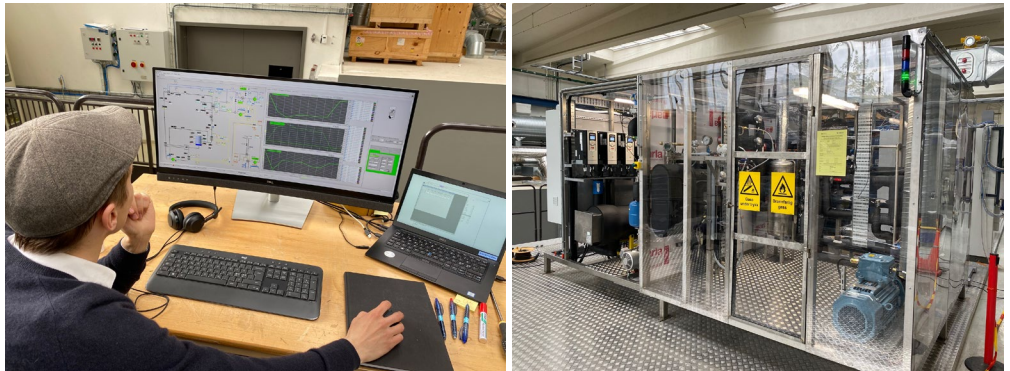
Development stage:
Operational rig

TRL: 4, rig for laboratory verification

Status: Operational rig

Contact: Stian Trædal
(Stian.Tradal@sintef.no)

Heat Exchanger test rig



To enable testing of novel heat exchanger prototypes, working fluid mixtures, heat transfer coefficients and pressure drops, a new heat exchanger test rig is constructed in SINTEF and NTNUs thermal laboratories in Trondheim. The rig is designed with a main focus on hydrocarbon working fluids. Heating, cooling, evaporation and condensation experiments can be performed at temperatures from 0 – 150 °C and pressures up to 70 bar(g), for heat exchangers with thermal capacities up to 20 - 30 kW.

HighEFF Overall Goals

	Energy use & emissions	X
	New solutions	
	New methods and tools	

Relevant Sectors

Oil, Gas and Energy **Metal and Material**

Food and Chemical Industry Clusters

Challenge

New heat exchanger concepts and working fluid mixtures are usually developed using computer modelling and simulations. Promising concepts that emerge needs to be experimentally validated. There are however few existing test rigs to test heat exchangers using hydrocarbon working fluids.

Solution

A new heat exchanger test rig has been built in the HighEFF lab project and was finalised in 2021. The rig design and engineering was supported by simulations and input from RA2.

Potential

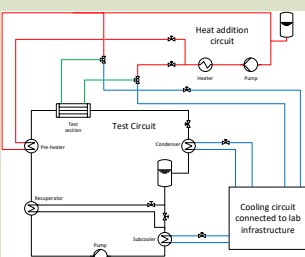
The test rig is operational and can be used to test prototypes and working fluids.

Further related HighEFF work

- Heat exchanger tests are planned within HighEFF

Reference

<https://www.sintef.no/projectweb/highefflab/>



Principal schematic





HighEFF definition of innovation:

Innovation can be a product, a technology, a component, a process or sub-process, a model or sub-model, a concept, an experimental rig or a service that is new or significant improved with respect to properties, technical specifications or ease of use. Innovation can also be new application of existing knowledge or commercialization of R&D results.

The innovation should be adopted by somebody, or be ready for utilization provided that it is made probable that the innovation will be utilized within a limited timeframe

List:

- Product
- Technology
- Component
- Process
- Sub-process
- Model
- Sub-model
- Concept
- Experimental rig
- Service
- New application
- Methodology
- Organisation
- Market



WS2019	I2.1.1	FlexHX	World-class heat exchanger design and optimisation model development	2.1, 3.1, 4.2	SINTEF ER	High					Model
OWP2020	I2.1.2	Novel heat exchanger designs for power and heat pumping cycles		2.1, 4.2		Med-High	Med-High	SINTEF ER	ALFA LAVAL		Component
AWP2018	I2.2.1	Improved Ejector		2.2	SINTEF ER	High	Med-High	SINTEF ER; NTNU	DANFOSS		Component
AWP2018	I2.2.2	Largescale Compressor for HTHP		2.2	SINTEF ER	High	Med-High	SINTEF ER	DORIN		Component
OWP2020	I2.2.3	Compressor concepts	Compressor concepts for targeted fluids, capacity ranges and operational conditions, e.g. semi-hermetic compressors able to operate at high suction temperatures and pressures	2.2	SINTEF ER	Med-High	Med-High	SINTEF ER	DORIN, MAYEKAWA		Component
OWP2020	I2.2.4	Improved reliability for compressor parts		2.2	SINTEF ER	Med-High	Med-High	SINTEF ER	DORIN, MAYEKAWA		Component
OWP2020	I2.2.5	Expander and ejector concepts for targeted fluids, capacity ranges and operational conditions		2.2	SINTEF ER	Med-High	Med-High	SINTEF ER	DANFOSS		Component
OWP2020	I2.2.6	Components for cycle enhancement, e.g. ejector concepts for off-design operation		2.2	SINTEF ER	Med-High	Med-High	SINTEF ER	DANFOSS		Component