

# Turbo2Steam: R718 heat pump for steam generation

Steam is commonly used in the industry as a heat carrier or directly used in the industrial process. Water (R718) as working fluid is competitive with the commonly used synthetic fluids in efficiency and applicability, but components and systems need to be developed further. This heat pump test rig is able to test different compressor solutions and produce 5 bar steam from a 100°C waste heat source.

The most important component in the heat pump are the compressors. This heat pump test rig uses turbo compressors from the automotive industry because of low investment cost, matching pressure ratios and volumetric flowrate for many industrial applications.

The test rig consists currently of two **oil free turbo compressors** in 2 stages, with different impeller designs.

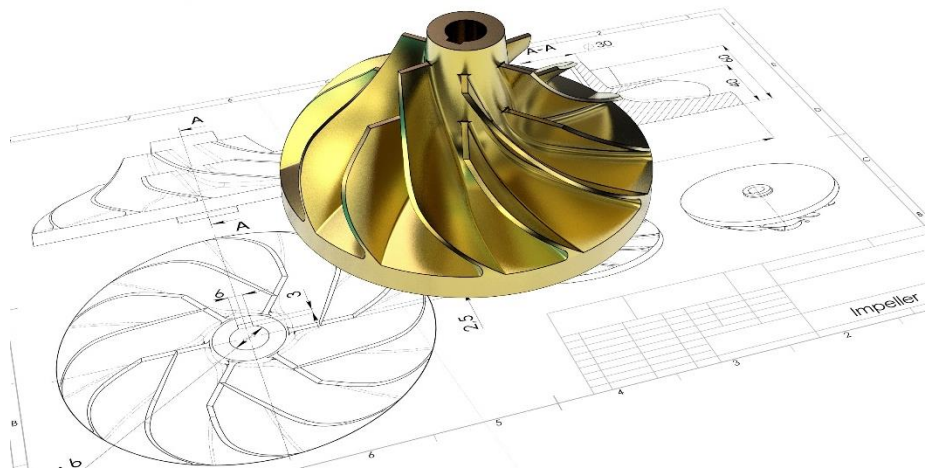


Figure 1: Typical impeller design for a turbo compressor

With a rotational impeller speed up to 90.000 RPM, or 1500 rounds per second, the heat pump can deliver 500 kW of 5 bar steam from 100°C waste heat. The impellers are specially designed to match the requested conditions from the industry.

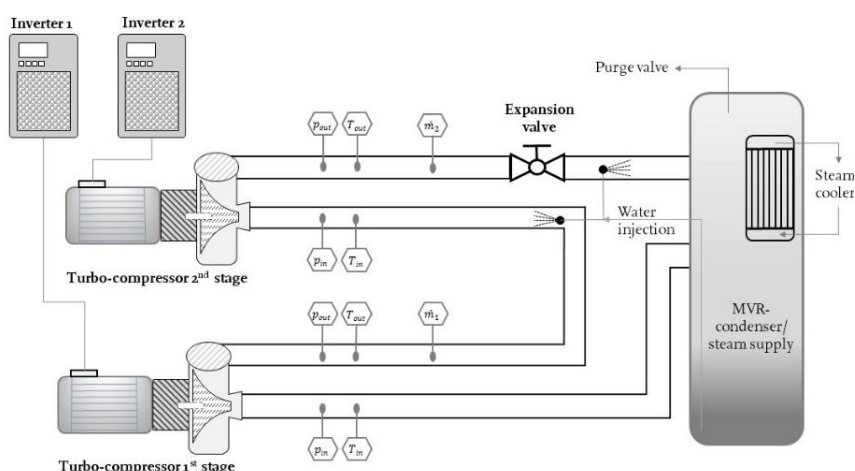


Figure 2: Illustration of test rig at SINTEF

With the Turbo2Steam installation it is possible to validate real compressor performance in an experimental setup and demonstrate the industrial potential in a relevant size. The test rig is currently used by the DryF project in which the MVR heat pump will be used for steam driers hereby reducing energy consumption up to 80% compared to conventional drying technologies. The system is available for other compressor tests from middle of 2020.

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