HoegTemp HTHP at fishmeal plant

Figure 1: HoegTemp HTHP with steam generator at Pelagia Måløy seafood processing plant

Summary of demonstration case

Pelagia has installed a 400 kW HoegTemp heat pump from Enerin at its fishmeal and fish oil factory in Måløy. The heat pump captures waste heat in the form of product-contaminated condensate from the drying process and returns steam to a steam dryer. Pelagia aims to become CO_2-neutral and has installed several heat pumps in Måløy for testing and qualification as a basis for its energy transition strategy.

The heat pump is installed in a newly established machine room, together with ammonia and water heat pumps. Common infrastructure has been established for power supply and waste heat. The HoegTemp heat pump receives the waste heat after the ammonia cycle and must handle large and rapid changes in waste heat temperatures from the process.

The HoegTemp heat pump operates on the stirling cycle, with a closed single phase system undergoing compression and expansion by double-acting pistons. The refrigerant, helium (R704) is non-toxic, non-flammable and has zero ODP and GWP.

Source and sink heat are transferred between the stirling process and external water circuits by several compact heat exchangers integrated with the heat pump. Steam is produced in a steam generator by heat from the sink side external water circuit. The heat pump uses an intermediate water circuit, separated from the contaminated condensate by a plate heat exchanger to avoid fouling of the internal heat exchangers and maintain a steady flow rate independent of condensate flow rate.

The HoegTemp heat pump has been in operation since March 2025, and it is the third of its kind.

The HoegTemp heat pump receives waste heat in the range between 20°C and 90°C and delivers steam at 2-5 barg to a steam dryer. This corresponds to heat pump sink temperatures of 140-165°C. Thermal output is nearly constant regardless of waste heat temperature and steam pressure.

"We use HTHPs as they reduce our energy consumption and our dependence on fossil fuels." Live

Spurkland, CTO Food, Pelagia AS

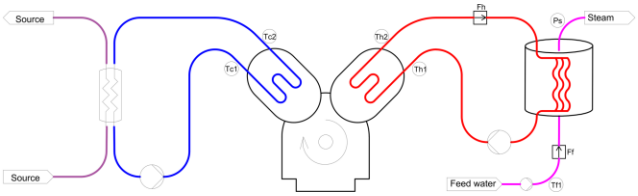

Figure 2: Schematic of HoegTemp HTHP at Pelagia Måløy

Operating experiences

The plant ramps up from cold to full capacity whenever a shipload of fish arrives, to process the leftovers from fillet production. When everything is processed, the plant cools off. The heat demand ramps from zero to 100% before there is available waste heat—and the steam demand, the steam pressure and the waste heat temperature vary considerably throughout the production run. Changes in the flow rate of the waste heat stream also translates to temperature changes in the intermediate water circuit, adding to the operational dynamics of the system.

So far, the heat pump has utilized heat between 16°C and 72°C and delivered steam at 3 to 5 barG. The waste heat temperature has varied up to 40°C in minutes, with no effect on the heating capacity or operating stability. In addition to reducing the oil consumption for heating, the heat pump reduces the waste heat to the environment.

Special learnings

The heat pump is installed together with a cascade system of ammonia heat pump and MVR units, in the same machine room. The ammonia/steam heat pump utilizes the highest-temperature waste heat and delivers low-pressure steam to cookers, while the HoegTemp heat pump utilizes the lower-temperature waste heat and delivers the high-pressure steam to steam dryers. This way, the efficiency advantages of both heat pumps are combined optimally.

FACTS ABOUT THE CASE

Installation year: 2025
Operating hours: Over 600 hours
Working fluid used: Helium R704
Compressor technology: Piston
System manufacturer: Enerin AS
Sector: Food & feed
Performance in design point:

- **Heat source:** Water at 24°C to 72°C
- **Heat sink:** Pressurized water at 167°C → 163°C, generating steam at 5 bar_G
- **Heat supply capacity:** 400 kW
- **$COP_{Heating}$:** 1.75 to 2.35 (measured by supplier, submitted for publication)

Investment cost: 500 000€
Savings: 35 000€/a
Estimated annual CO_2 savings: 500 t/a
Link to webpage or report:
enerin.no pelagia.com

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