Marine diesel and gas engines are among the most efficient prime movers. But a substantial part of the energy in the fuel is usually discarded as waste heat in the exhaust gas and the cooling water. Recovering this otherwise wasted energy can be an attractive proposition. The recovered low-temperature heat can have many applications, including warming accommodation areas, de-icing decks and stairways, and tank heating.

Ulmatec Pyro is a leading manufacturer and supplier of heating and waste treatment systems for the marine industry. Its highly skilled organisation aims to be the best at serving the customer. Know-how in Ulmatec Pyro builds on experience and customer feedback from as far back as 1951, when it was founded. More than 15 000 ships worldwide have been equipped with Pyro™ heating systems to date.

Pyro heat recovery systems exploit this lost energy for other applications. That means up to 60% of the energy produced can be utilised, giving a financial and environmental gain.

By recovering waste energy, the marine industry can avoid burning fuel to generate heat. The annual savings can be substantial:
- 100 kW electrical heating = 200 000 l fuel
- 100 kW fuel-fired heating = 100 000 l fuel
- 100 kW heating by heat recovery = 0 l fuel
PYRO™ CENTRAL HEATING SYSTEM

The Pyro™ central heating system is both effective and flexible, providing substantial cuts in fuel consumption and utilising “green” energy from waste heat. The latter is fully exploited for accommodation heating and other consumers before needing to use high-grade primary energy in the form of oil or gas.

- The Pyro™ central heating system consists of products such as exhaust gas economisers and fuel-fired heaters and heat exchangers, plus an advanced and flexible PLC-based control system to run the advanced flow control unit and all other system components.
- This system is based on a primary thermal fluid circuit, comprising flow and return pipes and a circulating pump module.
- Pyro™ central heating systems are well suited both for newbuilds and for upgrading existing ships.
- For upgrading projects, Ulmatec can supply complete packages of engineering, production and installation.
- The Pyro™ central heating system is type-approved by the main classification societies for the (EO) notation.

USES CONVENTIONAL FUEL ONLY WHEN “GREEN” ENERGY IS INSUFFICIENT/UNAVAILABLE

- The key to the Pyro™ solution is that heat suppliers and consumers are all connected as parallel links between the flow and return sides of the primary circuit, and each has its own control valve. That yields a significant reduction in pipe dimensions.
- The system can also be designed in a flexible serial and/or parallel combination, utilising heat recovery from the high-temperature (HT) and exhaust gas systems. That provides the opportunity to supply more energy and/or higher temperatures to part or all of the consumer system.
- Each consumer/consumer group is separately supplied with the flow needed to provide the required amount of heat.

IMPROVED SHIP EFFICIENCY THROUGH WASTE-HEAT RECOVERY

- Payback time likely to be less than a year
- Substantial cut in emissions
- Easy to design
- Easy to install
- Easy to operate

Flexibility
- Optimum waste heat recovery
- Heat recovered at different temperature levels
- Minimal use of primary energy for top-up
- Automatically pre-heated standby engines to reduce wear and tear (pre-heating temperature at several levels).
PYRO™ TANK HEATING SYSTEM

Pyro™ tank heating systems exploit “green energy” from heat recovery in high-temperature (HT) cooling systems and/or exhaust gas economisers in the exhaust gas system. Heating elements in the tank comprise small high-performance heating coils. Pyro™ heating coils are designed for fast and easy mounting and dismantling.

- Closed pressurised heating system for marine installations based on thermal fluid (water) circulation and a working temperature up to 100°C.
- Working pressure normally 3 bar.
- Automatically controlled and monitored by a control system, and can be interfaced to the main computer system (IAS). Manual control is a standard feature.
- Complies with Nofo 2009 standard and the OILREC class notation.

ENERGY UTILISATION

- Fully integrated in the ship’s central heating system.
- High-performance heating coils with capacity up to 200 kW.
- The discharge pump connected to the tank can be used for internal circulation in the tank, yielding more effective heat exchange.

LOW INSTALLATION AND OPERATING COSTS

- Significant reduction in installation cost.
- No need for complex piping systems.
- Small heating coil fitted in each tank close to the discharge pump suction line heats tank contents efficiently.

No steam required for ORO

- The Pyro™ tank heating system has also been developed for offshore support vessels equipped with tank capacity for recovered oil, and meets Nofo 2009 standards. The system uses waste heat to provide ORO tank heating, thereby saving fuel and reduce installed capacity for fuel fired heater.
- With no steam required and utilising “green energy” from the heat recovery system, the system has low operating costs and emissions.
- Fast and easy mounting and dismantling of heating coils when not in use.
Ulmatec Pyro offers fuel-fired heaters designed for the marine environment. An optimum combustion technology makes these units a cost-efficient and environment-friendly choice.

- Pyro™ fuel-fired heaters have a capacity range from 7–3,500 kW.
- All comply with regulations from the major classification societies, and the control system has been type-approved by DNV, LRS and ABS.

**HIGH OUTPUT – FULLY AFTER-BURNING**

- The Pyro™ fuel-fired heater for use with oil and liquefied natural gas (LNG) is a smoke-tube type, which ensures full afterburning within the furnace in the first return of the exhaust gas.
- After the second return, the exhaust gas enters the smoke tubes for its energy to be utilised.

- High output smoke-tube type
- Fully after-burning
- Easy service
- Easy to operate
- Easy to install
- Easy to design into a system

**Ulmatec Pyro™ fuel-fired heaters – range**

- SERIES 1 – Oil-fired, 7 kW
- SERIES 2 – Oil- and gas-fired, 23–35 kW
- SERIES 3 – Oil- and gas-fired, 58–105 kW
- SERIES 4 – Oil and gas fired, 123–290 kW
- SERIES 5 – Oil- and gas-fired, 406–1,162 kW
- SERIES 6 – Oil- and gas-fired, 1,453–3,500 kW

- All-welded boiler steel.
- Electrical heating element can be integrated in the heater for standstill heating or booster effect.
- Insert coils to generate sanitary hot water (SHW) for domestic use.
- Doors for cleaning and inspection.
PYRO™ EXHAUST GAS ECONOMISER

Installing a Pyro™ exhaust gas economiser cuts operating costs and emissions. Depending on size and heating requirements, the investment can be recovered within a couple of years or even as quickly as a few months.

- Pyro™ exhaust gas economisers are all-welded smoke-tube hot water generators designed for water temperatures up to 120°C and a maximum working pressure of 3 bar.
- Can be delivered as single-engine, multi-engine or combination types, covering a wide range.
- Supplied in various sizes and capabilities in accordance with total heat requirement and available waste heat.
- Advanced computer programmes ensure correct data for dimensioning and for environment-friendly use of energy.
- Can be supplied in special versions for inclined or horizontal installation.

MATCHING CUSTOMER REQUIREMENTS

- Water temperature is automatically controlled by a specially designed valve, which diverts the gas flow through a bypass when the temperature reaches the pre-set level.
- This means that only part of the exhaust gas flow is used, depending on demand. That reduces the physical size of the boiler, allowing requirements to be met in an optimum way.

PROTECTING THE ENVIRONMENT – SHORT PAYBACK TIME

The graph shows how oil consumption varies in accordance with the heating system employed. Estimated efficiency factors.

Assumed efficiency factors:
- Diesel engine 40%
- Fuel-fired heater 80%
- Exhaust gas economiser 90%

Flexibility
- Opting for Pyro™ exhaust gas economisers protects the environment, cuts operating costs and provides a very short payback time.
- By using exhaust gas heat from the main and/or auxiliary engines, an exhaust gas economiser will provide heating under normal operating conditions for accommodation areas, hot water, evaporators, oil preheating and so forth.
- Eliminates acid corrosion problems caused by extremely low temperature in exhaust gas system.
- To simplify cleaning and service, Pyro™ exhaust gas economisers are fitted with removable plugs, inspection holes and equipment for dosing with special chemicals.
The Pyro™ incinerator, with its compact single-chamber design, is one of the most efficient units on the market. Automatically controlled sludge incineration means that almost no operator intervention is required. Sludge capacity is high and, combined with a continuous feed solution for solid waste, the incinerator provides an environment-friendly way to handle your waste.

- High-quality refractory materials are chosen specially to ensure long-lasting high chemical and abrasion resistance.
- Insulated with castable refractory materials, air supply through double casing.
- Pyro™ incinerators are equipped with the new generation of PLC control systems/panels.
- Produced in compliance with existing rules and Marpol regulations. Type-approved by DNV and LRS.

Pyro™ incinerators provide automatically controlled incineration with built-in safety functions in order to work satisfactorily without attention.

- Continuous feed solution for solid waste.
- Gases are completely combusted, making operation odour-free and invisible.
- The sludge system automatically closes and discharges sludge into the incinerator.
- The sludge pump’s excess capacity is returned to the sludge tank.

Large feeding sluice, with capacity of 60 l.

**COMBUSTION OF SOLID WASTE AND SLUDGE OIL**

**HIGH CAPACITY AND ENVIRONMENT-FRIENDLY**

- Large feeding sluice, with capacity of 60 l.
- Solid waste treatment of 40–60 kg/hour.
- Liquid/sludge waste treatment of 50–112 kg/hour.
- Sludge used to incinerate solid waste.
- Maximum heat release of 423–821 kW.
- Exhaust outlet of maximum 350°C.

**Pyro™ SH-20SM incinerator**
- Complies with Marpol 73/78, MEPC.76(40) and annex VI
- Solid waste capacity 40 kg/h
- Liquid waste capacity 50 kg/h
- Max capacity 423 kW
- Sludge tank, 500–1 000 l, steam- or electric-heated

**Pyro™ SM-550 incinerator**
- In compliance with Marpol 73/78, MEPC.76(40) and annex VI
- Solid waste capacity 60 kg/h
- Liquid waste capacity 112 kg/h
- Max capacity 821 kW
- Sludge tank, 500–1 000 l, steam- or electric-heated
SYSTEM DESIGN
FOR OPTIMUM FUNCTIONALITY AND COST

Choosing heating and waste treatment systems from Ulmatec Pyro ensures that every component in the system works together with all the others in an appropriate way. In cooperation with the customer, Ulmatec Pyro designs and supplies heating and waste treatment systems for optimum functionality and cost.

Ulmatec Pyro cooperates with reliable partners which offer high-performance products and quality customer support. Ulmatec Pyro is well stocked with spare parts, and is ready to assist the customer at any time.

Heating and waste treatment systems from Ulmatec Pyro

Ulmatec Pyro is a leading supplier and manufacturer of heating and waste treatment systems for the marine industry, backed by solid experience and customer feedback built up since 1952. More than 15 000 ships worldwide have been equipped with Pyro™ heating system to date. A solution from Ulmatec Pyro utilises waste heat, and uses fuel only when such “green” energy is not sufficient/available. Heat generators and consumers are split into separate temperature circuits and connected together for optimal energy saving.

Ulmatec Pyro is a part of the Ulmatec group and located at Gamlem near Ålesund on the west coast of Norway.
ULMATEC provides highly functional and specialised marine solutions for rigs and ships based on customer needs. It offers complete projects, system deliveries in close cooperation with renowned naval architects, and third-party verification of external deliveries.

Ulmatec is an abbreviation for Ulstein Marine Technology AS. This company can trace its history back to 1917 and to Ulstein Mek Verksted, the origin of the Ulstein group. After 1999, a number of new marine businesses flourished following the acquisition of Ulstein by Vickers and Rolls-Royce. One of these was Ulmatec. Established in 2000, it is now the parent of a group of companies delivering marine technology and services worldwide.