Propulsion Optimisation
Energy-efficient fishing vessel solutions

Engineering the Future – since 1758.
MAN Diesel & Turbo
MAN Diesel & Turbo has long and proud traditions with powering fishing vessels of all kinds. The complete propulsion package concept dates back to 1902 when the first Alpha CP Propeller was produced, and since then the propulsion equipment has continuously been developed into more advanced solutions to meet the requirements of tomorrow. As always with a solid approach to operational reliability, durability and increasing demands for higher output and efficiency. The vessels' flexibility, operational patterns and power modes of today offer even more specific optimisation parameters – in the quest for the lowest possible consumption and emissions. A green approach for advanced and environmentally friendly ships.

Maximal propulsion efficiency is ‘the king of the catch’ for any fishing vessel and we offer our expertise in tailoring propulsion package performance on the basis of ships' operational profiles and the corresponding/matching optimisation of engine, gearbox, PTO, propeller blades, nozzle, rudder, propulsion control system – speed setting, manoeuvring and load control.

Energy-efficient Propulsion Packages
Based on a century with fishing vessels
Robust Propulsion Equipment
Quality packages tailored and integrated

Main engines
MAN Diesel & Turbo is offering a range of fuel-efficient, powerful and reliable medium-speed main engines – as the ideal power source for a wide range of fishing vessels. The most popular engine series are L21/31, L27/38, L32/40 and L&V32/44CR, which span the power range between 1,200 and 12,000 kW. A family of versatile and durable engines characterised by:

- Good performance over the entire load range
- Quick acceleration and good load response
- A high-torque layout – ideal for heavy-duty operation and floating frequency in shaft alternator mode
- Smokeless at idling, part load and full load
- Low fuel oil consumption
- Low emissions in accordance with IMO Tier II.

Very often in fishing vessel installations starting air bottles, heat exchangers, cooling water heater and stand-by pumps are part of our package supply together with a high-comfort resilient engine seating with flexible connections. SCR NO\textsubscript{X} reduction may be included.

Reduction gearboxes
A wide range of single and two-speed gearbox solutions are available with flexible PTO/PTI/PTH solutions for ‘power take-off’, ‘power boost’ ‘take-home’ and ‘hybrid’ concepts. Very often fishing vessel installations have the alternator and flexible coupling as part of the package supply together with an integrated shaft brake system working in conjunction with the clutch coupling of the gearbox. An additional bridge panel is available with ‘the skipper’s push button’ for quick and safe clutch/brake activation.

Propulsion control systems
The Alphatronic 3000 system is offering a vast number of control options for main bridge, bridge wings or aft bridge and engine control room. The control system not only optimises the function of the propeller but also the engine – as well as securing the vessel’s manoeuvrability and best overall economy with respect to engine dynamics, fuel oil consumption and propeller efficiency.

Propellers
MAN Alpha’s 3-, 4- and 5-bladed CP Propellers are the most efficient and flexible propulsors for fishing vessels. MAN Diesel & Turbo’s unique competence within hydrodynamics and propeller design secures the optimal design and layout of propellers as the prime targets for fishing vessels’ overall propulsion performance.

Nozzles
This is maximised efficiency with due respect to controlled cavitation, pressure impulses, vibration and noise. With free-running propellers special high-efficient Kappel blades may be specified together with fairing cones and rudder bulbs for maximal efficiency.

Nozzles
For tailoring the propeller thrust and pulling performance to the fishing vessels’ working patterns, various MAN Alpha nozzle designs may be customised to the specific application. High-efficiency high-thrust customisation of the AHT propeller nozzle is popular for trawlers – offering increased pulling power and still very limited free-sailing resistance.
State-of-the-art Engine Technology

32/44CR – the benchmark for fishing vessels

US EPA certified medium-speed Common Rail engines are today’s choice for high-end propulsion installations. Modern fishing vessels have adopted this technology – securing high power, low fuel oil consumption and reduced exhaust gas emissions.

Unrivalled flexibility and optimisation

The powerful 32/44CR engines rated at 600 kW/cylinder – uses the latest MAN Diesel & Turbo Common Rail technology, which offers flexible setting of injection timing, duration and pressure for each cylinder. This flexibility allows the fuel consumption and emissions of the 32/44CR to be optimised at any point on its operating profile. Boost injection for superior acceleration capabilities is a new patented standard feature. Optional fuel mapping for optimised partload engine characteristics is available.

Optimized flexibility and operating economy is prioritised with the technology applied for the 32/44CR engine series – including also:

- Improved charge air cooling
- Enhanced turbocharging
- Miller valve timing
- Revised injection timing
- Higher compression ratios
- Low swirl inlet ports
- Variable valve timing (VVT)

The overall operational benefits of the 32/44CR are:

- Low fuel oil consumption
- Low emissions
- Low operating costs
- Low life cycle costs
- Long service life

SeCoS\textsuperscript{m} electronics

The 32/44CR is equipped with the newest generation of MAN Diesel & Turbo’s engine management system. SeCoS\textsuperscript{m} accumulate all functions of modern engine management into one complete system. Through integration on the engine, it forms one unit with the drive assembly.

SeCoS\textsuperscript{m} offers:

- Integrated self-diagnosis functions
- Maximum reliability and availability
- Simple use and diagnosis
- Quick exchange of modules (plug in)
- Trouble-free and time-saving commissioning

Fuel capability

Marine diesel oil operation (MSD/MDO) is specified for most fishing vessels today. The robust and proven common rail injection system of the 32/44CR is, however, basically designed for operation with more and demanding fuels – including heavy fuel oil (HFO – with viscosities up to 700 cSt at 50 °C and fuel injection temperatures up to 150 °C).

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Perfecting Propulsion and Aft Ship Technology
Savings and benefits with energy optimisation

The hybrid propulsion concept ‘HyProp ECO’ is fuel-efficient and highly flexible for the optimal matching of variable power modes to accommodate modern vessels’ different fishing and steaming patterns.

Task and load pattern optimisation
For the best matching of the operational profile of each individual fishing vessel extensive tailoring and fine-tuning are needed – not only in relation to the ship and hull design, but also for the interaction of the propulsion machinery including the customised propeller, nozzle and aft ship design. General fuel saving potentials for energy optimised ships are up to 15%.

Floating frequency
As a result of a vessel’s floating frequency system (from 60 to 50 Hz), the propulsion system is able to operate in ‘shaft alternator mode’ with reduced engine and propeller speed. With this part-load optimisation feature, offering up to 17% lower engine/propeller speed, the fuel consumption can be reduced with up to 15%.

Perfect engine characteristics at low speed
High torque and approx. 50% power is available for engines operating at speeds reduced from the 60 Hz loadpoint to 50 Hz.

Propeller and nozzle optimisation
A beneficial propulsion optimisation process is also related to the hull-integration of propeller and nozzle. The optimisation and adaptation of a large propeller and nozzle (e.g. with ‘headbox’ mounting and optimised tilt of the nozzle) to the vessel’s aft ship design are carried out in close cooperation with the shipyard’s naval architects and engineers. The pulling power gain and fuel saving potentials are up to 6%.

As always, the propeller blades and nozzle are optimised to the individual ship application and wake field. Careful assessment of the vessel’s operational power/speed/duration profiles is decisive – considering the compromises in finding the perfect design solution for e.g. efficient high-speed steaming, searching and maximum pulling power efficiency at trawling speed.

Hybrid propulsion system: Karstensens Shipyard’s pelagic trawler, M/S Herøyhav, powered by MAN 9L27/38 main engine (3,285 kW), two-speed gearbox with PTO/PTMPTH (2,700/1,500/2,400 kW), Alpha CP Propeller VBS 1020 (4,200 mm), Alpha AHT nozzle L/D 0.4) Total propulsion power including the auxiliary engine input is 4,785 kW.

Safety and environment – no oil to water: M/S Herøyhav has a water-lubricated stern-tube system that eliminates any risk of sealing damage and any leakages of stern-tube oil to the sea in the event of impact with fishing gear wires.
Latest Propulsion References
Steaming ahead with new technology

Two very different fishing vessel designs, each powered and ‘propulsion optimised’ for their specific task and fishing pattern – by means of a L32/44CR package solution with individually tailored powertrain, control and aft ship equipment.

M/S Kvanney – Trawler/Purse Seiner:
- MAN 6L32/44CR main engine
- VBS 1020 CP propeller – blade design for ducted operation
- AHT propeller nozzle
- Rudder with rudder bulb
- Alphatronic 3000 propulsion controls

M/S Playa del Ris – Tuna Purse Seiner:
- MAN 8L32/44CR main engine
- VBS 1100 CP propeller – Kappel blade design
- Twisted rudder with rudder bulb
- Alphatronic 3000 propulsion controls

Optional fine adjustment of propeller pitch setting
A new Alphatronic 3000 softkey function for pitch setting fine adjustment is available - customised for fishing vessels’ trawling conditions. In combinator mode the fine adjustment controls both propeller speed and pitch setting. Further our speed pilot feature is available in the Alphatronic 3000 system for optimising the voyage planning for trawling, searching and steaming speeds – with fuel saving potentials of up to 4%.

M/S Kvanney propulsion package: MAN 6L32/44CR (3,600 kW) main engine, VBS 1020 CP Propeller with fairing cone for AHT nozzle and rudder bulb. 2 x MAN 9L16/24 GenSets (each 940 kW) will deliver power for the hybrid propulsion system, which operates with floating frequency. The propulsion control system is Alphatronic 3000

M/S Playa del Ris propulsion package: MAN 8L32/44CR (4,800 kW) main engine, VBS 1100 CP Propeller with Kappel blades, fairing cone and rudder bulb for a twisted rudder. The propulsion control system is Alphatronic 3000.
Global Service Support
PrimeServ hubs at all hot spots

PrimeServ’s worldwide service support
With more than 150 PrimeServ service stations and service partners worldwide, plus a growing network of PrimeServ Academies, the MAN Diesel & Turbo organisation is highly committed to expanding and developing the most efficient and accessible after-sales organisation in the business.

For engines, gearboxes, propellers, nozzles and control systems – PrimeServ provides:
- Delivery of high-demand spares within 24 hours
- Fast, reliable and competent customer support
- Ongoing training and qualification of personnel
- Global service, open 24/7, 365 days a year.

Retrofit and upgrade packages
Fuel-saving propulsion and aftship retrofit solutions are offered for your existing fleet. Take advantage of new designs and technology or general product improvements, matching e.g. new requirements or changed operating profiles for your ships. Attractive investments are available with short payback time.
Worldwide Fishing Vessel References
Powering any kind of fishing – all kinds of vessels

- Pandruc, 7L32/44CR, 7L23/30H & 5L23/30H, France
- Haugegut, 6L32/44CR, Norway
- Kvanney, 6L32/44CR, 2 x 9L16/24, Norway
- Cattleya, 9L27/38, Denmark
- Newfoundland Lynx, 12V28/32A, Canada
- Serina, 12V32/44CR, 2 x 6L21/31, UK
- Newnrefs, 9L27/38, Norway
- Gullensso, 9L27/38, Norway
- Vinnslustodin HF, 6L27/38, Iceland
- HB Grandi, 6L27/38, Iceland
- Jean Pierre Le Roche, 8L27/38, France
- Ruth, 8L32/44CR, Denmark
- Rogns, 9L27/38, Norway
- Hermes, 8L32/40, Norway
- Northern Clarion III, 10L32/44CR, Canada
- Playa de Adorri, 8L32/44CR, Spain
- Fisherman’s Finest, 8L32/44CR, EPA Tier II, USA
- Western Viking, 9L27/38, Ireland
- Makhanal S. Agapov, 16V32/40CD, 7L27/38 & 6L21/31, Russia
- Herøyhav, 9L27/38, Norway
- Voyager, 12V32/44CR, UK
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