



RENK develops its naval market domain with large Navy orders

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RENK AG, Augsburg, is known throughout the world as a supplier of sophisticated gear sets for navy ships. A RENK recipe for success: Professional support of shipyards and Navies with technical innovations in both the development and the search for optimization potential, accomplished with continuous improvement of production tools.

As significant milestone in development of new propulsion concepts for frigates, the hybrid CODELAG (**C**ombined **D**iesel **E**lectric **A**nd **G**as Turbine) is being considered as state of the art today. With the German Navy new frigates class F125 and the Italian FREMM frigates, RENK has set the path by introduction of the referring gear technology successfully. One center arranged gas turbine and two electric motors provide their power to both propeller shafts dependent on the mode of operation. The gas turbine and electric motors are acting as high speed propulsors, whereas the electric motors are used as long endurance driver for speeds up to 15 knots. In case of FREMM, the 2 Megawatt motors are sitting directly on the shaft lines, aft of the gear, s. Fig. 1. The F125 application provides higher powered 4,5 Megawatt motors arranged forward of the gear system, which requires a specifically designed twin clutches on either side for appropriate connection of either the motors or the gas turbine to the propulsion train, s. Fig. 3.

In continuation of order processing for the US Navy, RENK has currently eight ship sets for the renowned LCS program under construction. Deliveries of two gear sets a year are planned to both the Austal and the Lockheed Martin team each in parallel from 2012 onwards during a period of five years. The drive concepts are significantly different. With the Lockheed Martin mono-hull, the combined power at max. 85 MW of two gas turbines and two diesel engines is being distributed via two in parallel arranged CODAG propulsion systems to four water jets. Austal's trimaran is also combining four water jets, however, those are being driven singularly from two gas turbines and two diesel engines, at a total of 62 MW power.

Another highlight in frigate propulsion technique is shown with the re-raised combination of one center arranged large waterjet with two controllable pitch propellers, as were equipped three corvettes for the South African Navy back in 2002. The same constellation came now to realization for two frigates for the Algerian Navy being built at Blohm+Voss Naval GmbH. The shipyard relies on the unparalleled expertise of RENK gas turbine and cross connect diesel engine gears, now in service for ten years without any quality caused disruption.

Also on the OPV market (offshore patrol vessels), combined propulsion is the latest art. Here, diesel engines are combined with electric motors in CODELOD to relieve the diesels from their duty to be operated in partial power at loiter or cruise speeds. Small electric motors are much better suitable to cover that speed range. For conventionally sized OPVs a maximum of 500 Kilowatt power per shaft is required to drive the vessel up to 14 knots speed. RENK CODELOD gears are introduced with a number of applications, such like the Holland class OPVs, the Korean Coast Guard large 3000 ton cutters, or the Omani OPVs "Khareef", s. Fig. 4. For the successor program "Al Ofouq", including four ad-

RENK AG
Press Coordination
Gögginger Str. 73
86159 Augsburg, Germany

Contact:
Phone (+49-821).5700-662

press@renk.biz
www.renk.eu

RENK AG enjoys a global reputation as manufacturer of high-grade specialty transmissions for tracked vehicles and gear units for plant engineering and shipbuilding as well as components for propulsion systems and test rigs. The Company is world leader in automatic transmissions for heavy tracked vehicles, gear units for naval vessels, and horizontal slide bearings.

MAN SE, Munich, holds a majority stake in RENK. The MAN Group is one of Europe's leading industrial players in transport-related engineering.

vanced OPVs, RENK was awarded an order for again CODELOD gears transmitting 9,1 Megawatt diesel power and 300 Kilowatt motor power per shaft.

Finally, a highly recognized award completes the RENK order book as per end of this summer, addressing the propulsion system for the new generation fleet tankers for the British Navy. Again, it was decided for a most advanced CODELOD system for those four 25 000 tons vessels, this time based on medium speed diesel engines. The specific propulsion arrangement and high reduction gear ration resulted in a so called “nested gear” design, where the first reduction gear wheels “embrace “ the second reduction pinions. Opposite of the main diesel engines, electric motors act as propulsor (PTI) for cruise speed, or as generator (PTO) used as additional electric source for onboard power supply, where internal of the RENK main propulsion gear the power trains are being organized by automatically shifted multi disc clutches. Together with an intelligent power distribution system, this kind of a propulsion system is considered as highly efficient – RENK gears enable a new step towards further advanced propulsion technology.

Together with their experience in individual drive train solutions aboard fleets of 40 Navies worldwide, RENK’s role as leading gear supplier in this sophisticated field of application has been significantly increased. A number of projects show the preference of customers to receiving RENK’s advice regarding propulsion system optimization in early phases of ship developments when the entire configuration needs to be defined depending on the vessel’s mission profile.

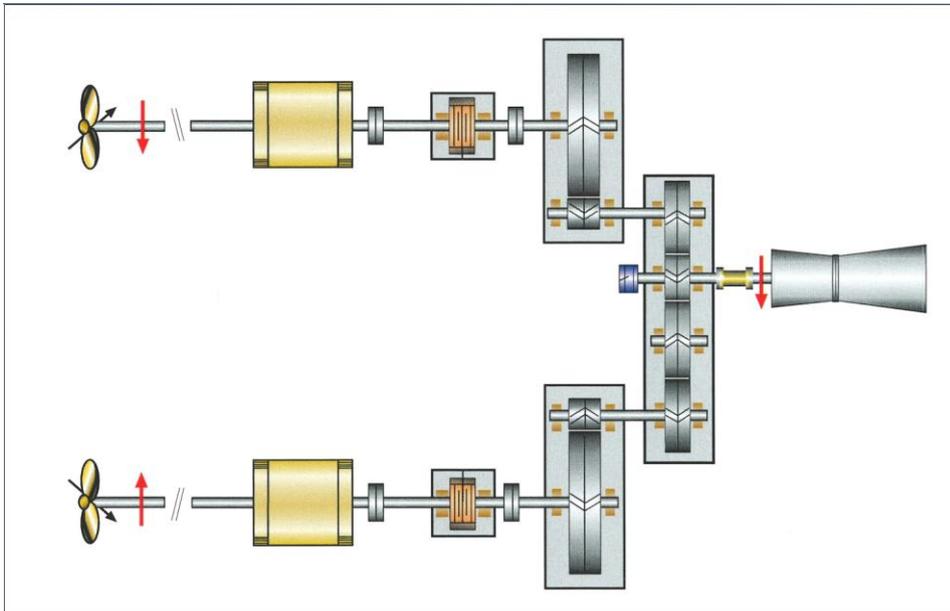


Fig. 1: Schematic of the CODELAG propulsion with RENK main gear arrangement for Italian FREMM



Fig. 2: Frigate type F125 of the German Navy.



Fig. 3: The F125 RENK CODELAG gear system with cross connect gear (center) and port and starboard main gears, view from forward. Clutch arrangements in front of main gears.

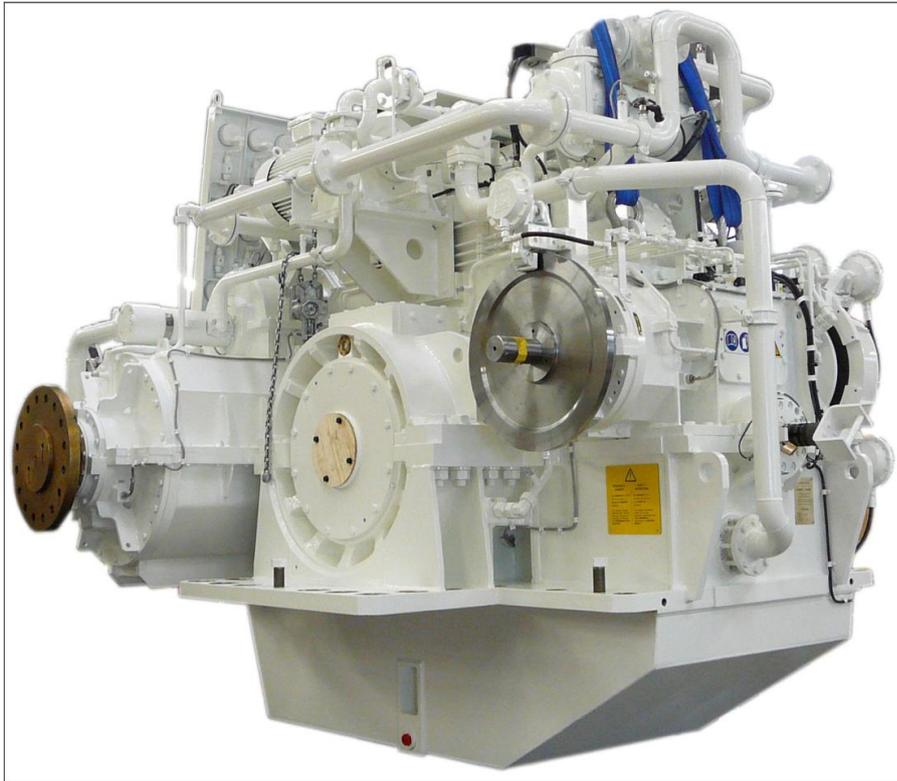


Fig. 4: RENK CODELOD gear ASL 100-E for OPV AI Ofouq.