For Yachts
Innovative Gear Solutions in Naval Propulsion Systems
Philosophy

The basic factors for a long lasting success in the production of industrial goods are innovative technology, reliable customized products, a creative management, and a human resource policy enabling RENK employees to identify themselves with “their” product.

An additional most important part of the RENK philosophy is the close relationship to our customers, giving us the possibility to understand demands and developments.

RENK as a world leader in developing and manufacturing highly sophisticated gear box systems faces the challenge to continuously develop new technologies in the field of propulsion engineering and to implement such new knowledge into its product.

Research and development is one of our most important tasks in order to provide our clients always a product which is based on the latest state of the art with respect to performance, reliability and design. Following the above, RENK has been succeeding in setting milestones in power transmission engineering for decades.

RENK does not only sell high-tech products, but also makes sure that its gear boxes can be operated to the full satisfaction of the customer without any problem for many years. If necessary, our own field service network ensures that specialized technicians are available on short notice – at any place in the world.

One of the key factors (for the success) of our company is the continuous education and training of our staff. Qualified employees have always enjoyed an interesting and challenging job with RENK.

Thrust bearing that isolates structure borne noise aboard a megayacht by means of integrated elastomer elements thus preventing transmission to the shaft line, the casing and the ship’s foundation. Additional features are radial and angular displacement compensation, and a propeller thrust meter.
Design

High-end reduction gear systems are consisting of a number of high accuracy components. Decades of experience, the latest design and production methods and quality without compromise for gears, bearings, casing structures, clutches and controls are the base of any Megayacht gear system delivered by RENK.

Beside conventional single in/single out gear boxes for gas turbines or diesel engines and based on its vast experience in the field of Navy gear systems, RENK can also provide so called “combined gear box systems”.

Combining Gears

CODAD –
C0mbined Diesel And Diesel.
Two or more diesel engines drive one common propeller or water jet. Diesel engines at equal, or different rated power as a father and son arrangement.

COGAG –
C0mbined Gas turbine And Gas turbine.
Combination of two or more gas turbines to one common output shaft. As option, the gas turbines can be flange mounted to the gear box casing (cantilever design).

CODAG – CODOG
C0mbined Diesel engine And/Or Gas turbine.
Both, diesel engine and gas turbine driving one common output shaft, which allows for each prime mover to be operated close to its optimum specific fuel oil consumption.

CODELAG –
C0mbined Electric and Gas turbine.
Normally equipped with one center arranged gas turbine and electric motors driving two shaft lines.

Low Noise Gears

All type of specially configured Megayacht gears include reduced noise radiation measures adjusted to specifications. Even the “super silent gear” is available from RENK.

Combined gear box arrangements, especially, offer the ship designer all options to create a most intelligent power management optimized for the individual speed profile based on the ship-owner’s requirements. To this end, overall fuel oil consumption of the different combinations of prime movers, and the different propulsion modes are taken into account. The appropriate selection of the most suitable arrangement in combination with a given speed profile for the Megayacht has a significant influence on bunker capacity, operating range etc. and thus on the overall yacht design.

Design Features

To safely engage the different propulsion modes and take care of a smooth and reliable change over between the modes, RENK develops and builds tailor made computer control systems for such combined propulsion systems. The interactive control display gives a comprehensive local overview of the actual operating condition and allows for any desirable local control operation.

RENK as a gear box manufacturer who is specialized in design and tailor made construction of gear box arrangements is prepared to support designers, shipyards, or engine manufacturers already in the very beginning of a Megayacht design. In this respect, RENK understands its job most creative and challenging.

Beside principle arrangements of the prime movers in most cramped engine rooms, RENK specialists also support the client concerning the selection of the various types of couplings, mounts, and line shaft bearings in a propulsion train. To minimize the transmission of noise and vibrations via the steel structure of the foundation or the shaft line, the most effective arrangement of single or double elastic mounts to the gear box is elaborated and recommended by RENK.

Finally, the combination of ingenious light weight, tuned with low noise and vibration requirements forms the ultimate solution for the Megayacht.
Production

The manufacturing of every RENK gear box is permanently controlled and checked on highest level based on our Quality Assurance Standards in conformity with the quality management system EN ISO 9001.

The RENK strategy to comply with highest quality standards starts with the education and steady training of our staff, and is continued by a most demanding audit of our component suppliers.

Not only the investment in RENK’s human resources is handled thoroughly, but to keep our production facilities on the latest stage of the art has further highest priority. Machining and heat treatment facilities are steadily developed in order to set alive all our theoretical knowledge in our products.

This philosophy is also most important with respect to the development of our grinding facilities, to make sure that all our knowledge about tooth corrections and grinding quality will be put into practice.

About Quality and Tests

Our high accuracy grinding facilities ensure all our knowledge about tooth corrections and grinding quality will be put into practice. Large case carburized gears with an outer diameter of up to 3.9 m can be finish machined with the latest grinding technology, in order to realize the world wide highest quality standards.

During final assembly, every RENK gear box is treated according to special assembly and testing procedures as well as RENK standards like tooth contact pattern tests and cross checks of plain bearing seats, which have been developed according to RENK’s extensive experience in the field.

Finally, RENK gear boxes have to undergo numerous tests and measurements at the factory acceptance test bench before they are released to leave the plant. Measurement results are an important input for the noise and vibration prediction which RENK can already provide in a very early design stage for new gears.

CODAD Gear Megayacht

Power: 2 x 7.4 MW; Input speed: 1350 rpm
Output speed: 274 rpm
Weight: 31 t
Low noise CODAD arrangement with fluid couplings.

Innovative Gear Solutions in Naval Propulsion Systems
Research and Development

RENK puts a high demand on its own products and the requirements are growing steadily. Furthermore, the request for highly flexible propulsion concepts leads to more and more complex propulsion systems.

For RENK as the world leader in designing and manufacturing of highly sophisticated gear box plants it is essential to continuously increase the technical expertise based on our own research and development programs.

It is important for RENK that in the course of regular conversations with our clients we get knowledge of their changing demands. A mayor element of the RENK philosophy is to incorporate this feedback from the operator as an important input for our research and development activities.

The final target is to use the knowledge and results of our R&D activities to improve performance and reliability, keep up with highest technical standards and make use of them for an even advanced design and manufacturing.

One of the main R&D topics is to reduce the noise and vibration excitation of the gear mesh, by optimum choice of the geometry parameters of the gear teeth.

For instance, RENK spent a lot of research and development efforts and gathered significant knowledge with the complex system of mechanical links in the systems where undesirable noise and vibrations within the propulsion plants find their way into the ships structure. This knowledge, together with the well experienced RENK single hard and double hard elastic mounts results in best noise performance on board of Megayachts and Navy vessels.

RENK makes use of its long lasting relationship with internationally renowned research institutes. Results out of this high level research projects directly find their way into our products to the benefit of our clients.

Close connections to our partners like engine manufacturers and ship yards, and a steady exchange of experience together with them finally ensures that RENK uses any opportunity to satisfy the increasing demands of its clients.

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References

Decades of RENK’s experience in development, design and manufacturing of special purpose marine gear units on highest quality levels provide the solid basis for gas turbine and diesel engine driven propulsion systems for individual Megayachts throughout the whole world.

For details, please refer to the separate reference list.
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