SCHOTTEL REPORT

OF SEARCHING AND CATCHING

Modern fishing combines real craftsmanship and digital technology

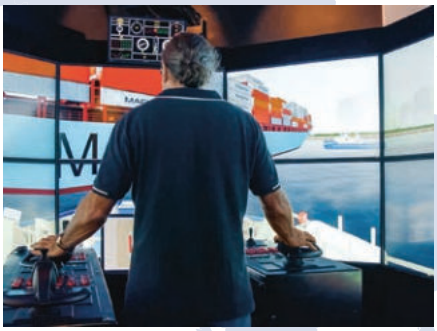
SIMULATED SEAFARING
New training centre in Australia

SMOOTH SAILING
Superyacht White Rabbit

No. 16

OF SEARCHING AND CATCHING 55° 8' N, 3° 9' E

In terms of making a living and nutrition the fishing industry ensures the survival of billions of people around the world. Thanks to innovative solutions, it is becoming more efficient and sustainable all the time. **Page 10**



SIMULATED SEAFARING 32° 3' S, 115° 44' E

At the new SCHOTTEL training centre in Australia, highly realistic simulations help prospective captains and engineers with their training. **Page 04**

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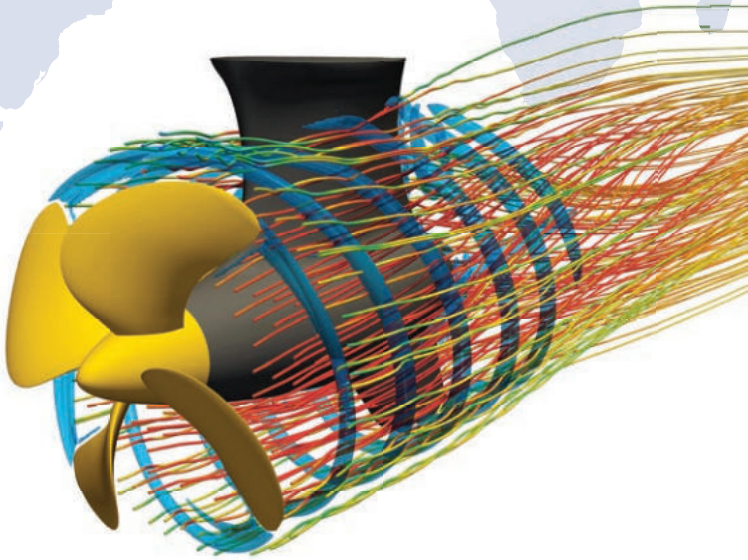

MODEL TRIAL 4.0 50° 8' N, 7° 34' E

Thanks to computer-based CFD simulations, SCHOTTEL customers benefit from even greater expertise in the design of their products. **Page 16**

SMOOTH SAILING 1° 17' N, 103° 51' E

The superyacht White Rabbit is anything but mundane. In this interview, the shipbuilder Echo Yachts explains the propulsion role that SCHOTTEL plays. **Page 18**

DEAR READERS,

The SCHOTTEL Project Management team is on board for every order – from before signing of the contract until after the marine propulsion system is put into operation. It is important for us to be involved at a very early stage. In this way we can influence important factors that set the course for our primary task: ensuring quality, delivery reliability and dependability. As soon as we take on the project, we assume responsibility for coordination at all internal and external interfaces. Moreover, when it comes to interface meetings with other suppliers of our customers, we are also involved to ensure a smooth work flow.

Unfortunately, it is not always the case that everything runs 100 percent smoothly during the course of the project. Sometimes this is because we install highly specialized supplier components that only few manufacturers are able to produce to our quality standards. If their capacities are stretched, this may have a negative influence on delivery times. Design modifications that take the latest optimizations into account also have a noticeable effect. Taken in isolation, each of these may be relatively minor in scope. However, they can sometimes add up, throwing scheduled projects into disarray.

Whatever the situation entailing changes, SCHOTTEL is always there to lend a helping hand and jointly identify solutions. All interfaces involved, and we in Project Management, move with the customers. From their feedback, we notice that this partnership approach is particularly appreciated.

Despite or even because of certain obstacles, we love what we are able to achieve as a small cog inthe overall SCHOTTEL machinery. Every order, every development, every commissioning reflects the close cooperation among the entire workforce, both at home and abroad, geared towards fulfilling the wishes of our customers. You can read about a number of the particular achievements of our international team from the past few months in this issue of SCHOTTEL Report.

Happy reading!

Jasper Grevink
Director Project Management

Photos: SCHOTTEL, Cheryl Davis, Getty Images, Echo Yachts
Graphic: SCHOTTEL

SIMULATED SEAFARING

A new SCHOTTEL training centre in Australia helps to prepare crews and engineers to better manage faults and carry out repairs on their own. The new site offers even more with its high tech set-up and simulations

At first glance, it looks like a bridge on a brand new tug with control panels, flashing lights, electronic chart displays, navigating equipment and panoramic windows. It is so realistic, in fact, that one could be forgiven for not noticing the lack of characteristic vessel motions. Nevertheless, a closer look reveals that the windows are screens with simulations of different port situations and tug operations. Welcome aboard the new SCHOTTEL training centre in Fremantle, Western Australia. Along with existing facilities in Houma, USA, and in Spay, Germany, this newest site ensures international coverage for theoretical and practical training. Trainees are taught how to repair eventual damages on their own or – if that is not possible – at least describe them in order to receive quick assistance and make the ship ready to sail again. All this pays off as a worthwhile investment for ship owners and operators in order to keep expensive downtimes to a minimum. The advanced simulation equipment at the SCHOTTEL Academy's outside facility in Fremantle helps create situations incredibly close to the real world – but it also goes a step further than that.

Originally set up by the towage and emergency response company Svitzer, the simulator system is now also backed by a completely functional engine room. This training site represents a total investment from both parties of about half a million euros (about 560,000 US dollars). "The control panels in the simulated engine room are the same as those we install in the vessels, complete with identical wiring," says Mohamed Ghonem, Managing Director of SCHOTTEL Australia. However, what really makes the seminars so authentic is the way the bridge and the control system are connected.

A NETWORK OF TRAINING CENTRES

The new facilities in Fremantle are part of the SCHOTTEL Academy, a worldwide network of training centres and approved trainers. In courses ranging in length from two to five days and encompassing classroom sessions, online classes, on-site training and simulation exercises, participants have the opportunity to become more familiar with company's propulsion units. The guiding idea behind is that detailed knowledge of correct handling and preventive maintenance procedures gives users the know-how for long-term smooth operation of SCHOTTEL products. Following the successful completion of the training, participants receive a technical certificate.

Photos: Cheryl Davis, SCHOTTEL

“We can bring people in here and train them in a safe environment. It keeps our employees at the forefront of technology.”

Jeff Summers, Chevron Contract Manager at Svitzer

LIKE IN THE REAL WORLD

In the setup in Fremantle – which is unique worldwide – the bridge communicates with the control system, thus enabling straight feedback to the computer operating the bridge. “This allows eventual failures to be simulated and controlled. As a result, the handling with a direct response feels real, since it is not being replicated with yet another computer,” comments the Managing Director. The training, however, is not just the simulation. Practical considerations such as simple maintenance work and the early detection of damage also play a key role. Crews and engineers learn how to operate propellers safely and efficiently. Plus, they are taught how to respond to every type of incident described in the company’s manuals. Those trained enhance their qualifications in becoming adept at reading fault codes and tracking failures to components during troubleshooting scenarios while also practising the exchange and programming of these components. Having this competence onboard is especially valuable.

“Faults can occur when a tug is out at sea or working in remote areas, both of which are situations in which we cannot easily reach them to carry out repairs,” says Mohamed Ghonem. This is especially relevant in Australia which has a number of secluded ports in the west and north where the country’s oil & gas reserves and mining products are loaded on ships accompanied by tug escort and berthing services. To date, many of the training centre graduates – a large number of whom have up to eight years of experience – work in these outlying regions. Thanks to this professional experience, they are able to raise specific issues from everyday work with the trainers and obtain tailored advice. The staff at the centre also take particular pleasure in the fact that all those who have gone through the training have acknowledged learning something new. Part of this success is down to customization, as the agenda for each session is adapted according to the specifications of the equipment used by the customer. Special requests are taken into consideration, too. In return, trainees provide valuable feedback on the handling of the SCHOTTEL equipment – which is crucial for future product optimization.

A SHOWCASE FOR PROPULSION

Aside from being a space for training courses, the centre also doubles as a showcase in which potential customers can try out how SCHOTTEL thrusters work without setting foot on a vessel. The realistic assembly not only gives visitors the chance to experience manoeuvring in different ports, but also to inspect equipment such as the wiring and controls for eventual installation on their own ship – whether as a newbuild or a retrofit. In short, visitors can gain an impression of the propulsion expert’s technology before buying it.

This year, the team in Fremantle is set to welcome around 35 people from Australia and South East Asia to training sessions. Once the participants have completed their courses, they will be better equipped to find solutions for the issues they confront while on the water. “When operators are well trained, we can support them even better in the future,” concludes Mohamed Ghonem.

MANAGING DIRECTOR MOHAMED GHONEM welcomes customers and training participants to SCHOTTEL Australia Pty Ltd 14 Mews Road, Fremantle WA 6160, Australia.

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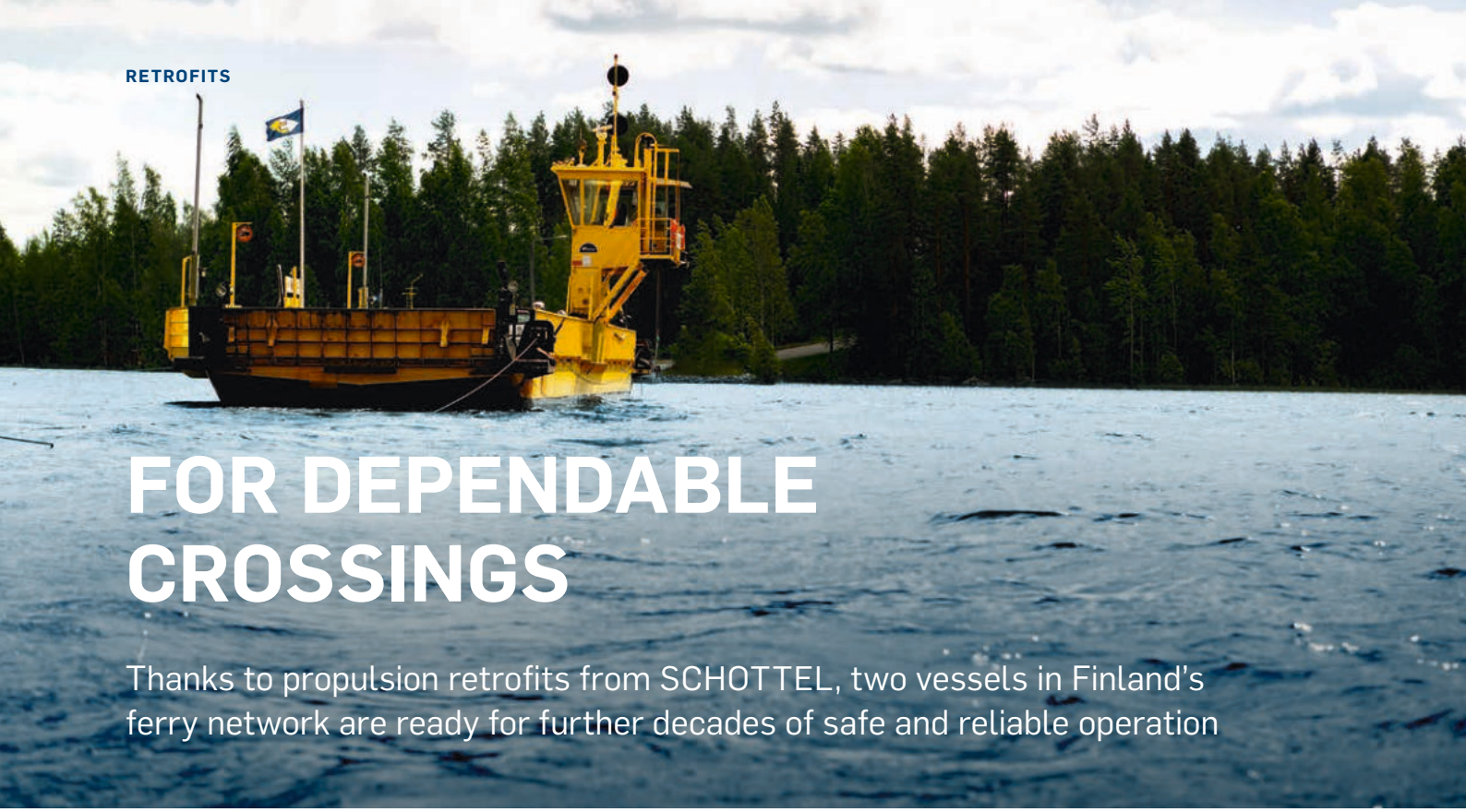


FOR DEPENDABLE CROSSINGS

Thanks to propulsion retrofits from SCHOTTEL, two vessels in Finland's ferry network are ready for further decades of safe and reliable operation

With its 187,888 lakes, Finland has rightly earned its nickname of "the land of a thousand lakes". If that was not enough, the northern European country also has 1,250 kilometres of Baltic coast and nearly 800 islands larger than a square kilometre in size. FinFerries is a state-owned company and one of the operators responsible for ensuring that all this water remains passable – with an extensive network of over 40 routes across Finland from the coastal areas to the Lakeland district in the east. A good number of these ferries operate around the clock on an as-needed basis. In the winter, to prevent ice from forming, they stay on the move constantly between the points they serve. To offer that kind of service, extreme dependability is a must. In fact, a boost in propeller system reliability was one of the motivators for a recent retrofit on two vessels. One of them serves the Hanhivirta route in Lakeland and the other the Mossala route in the Archipelago Sea.

While the two ferries do share a number of similarities – for example, both are double-ended and can hold either 14 cars or up to 60 tons of payload – they were originally equipped with various propeller systems manufactured in different years. For the retrofit, however, the customer requested a tailored concept to allow the same propeller assembly to be used in both ferries without having to alter the steelwork. At the same time, the solution had to be quick and easy to install in order to meet a tight retrofit deadline.

MORE STANDARDIZATION

"Our solution was to employ our SRP 150 Rudderpropeller in both ferries. In the Hanhivirta ferry, it could be installed in the existing well. For the Mossala ferry, we had to come up with an adapter ring because its well was considerably larger," explains Michael Heibel, Service Project Manager at SCHOTTEL. To prepare for the installation at the FinFerries site, a team of engineers from the company attended a one-week training session at the SCHOTTEL Academy in Spay, Germany.

The advantage of this retrofit for the customer is a higher degree of standardization in its fleet – which reduces costs for spare parts and increases availability. In addition to the two SRP 150s for the Hanhivirta and the Mossala vessels, FinFerries also ordered a separate unit as a spare. This allows for quick replacement in case of an outage and ensures 24/7 service.

The idea of a same ruderpropeller model for different types of ferries was not exactly new – SCHOTTEL had previously employed a comparable concept in 2015 for the state-owned ferry company operating between the Åland Islands, an autonomous province belonging to Finland. "The success there very likely helped FinFerries to decide in our favour," says Michael Heibel. The retrofit project with the Hanhivirta and the Mossala ferries is the first between SCHOTTEL and FinFerries – and the service expert is confident about a follow-up order.

SPARE PARTS FOR DECADES

Vessels like those employed by FinFerries have a lifetime of up to fifty years and longer. However, when spare parts are needed, there's no time to wait. From its warehouse in Spay, Germany, SCHOTTEL can get spare parts dispatched to any customer worldwide within 24 hours of order placement. As an OEM, SCHOTTEL guarantees the availability of spare parts for the coming decades.

CONTACT THE RETROFIT TEAM:

modernizations@schottel.de

Photos: FinFerries, SCHOTTEL, Graphics: SCHOTTEL

NEWS

TRADE FAIR DATES 2019

9–11 SEPTEMBER // BALTEXPO, POL

10–13 SEPTEMBER // DSEI, GBR

15–17 SEPTEMBER // CFA CONFERENCE, CAN

17–20 SEPTEMBER // NEVA, RUS

23–24 SEPTEMBER // OFFSHORE MARINE & WORKBOATS MIDDLE EAST, UAE

24–25 SEPTEMBER // SHIPPING-TECHNICS-LOGISTICS, GER

25–28 SEPTEMBER // MONACO YACHT SHOW

2–4 OCTOBER // NAVEGISTIC, PRY

5–9 OCTOBER // INTERFERRY CONFERENCE, GBR

22–25 OCTOBER // KORMARINE, KOR

5–8 NOVEMBER // EUROPORT, NED

19–21 NOVEMBER // METSTRADE, NED

4–6 DECEMBER // INT. WORKBOAT SHOW, USA

3–6 DECEMBER // MARINTEC CHINA

NEW: SCHOTTEL TURKEY

SCHOTTEL expanded its international network of subsidiaries with the opening of a new branch office in Istanbul in January. This is an important step to ensure even greater presence for regional customers and partners in a country with a significant number of newbuildings. The company has already been active in Turkey since the 1970s and has a large customer base there. Managing Director and head of the SCHOTTEL Turkey subsidiary is Mustafa Muslum, who has many years of experience in the shipping sector.

Contact: mmuslum@schottel.com

NEW FEATURE FOR GREATER SAFETY

With immediate effect, SCHOTTEL is offering its propulsion solutions with an additional safety function: Safeguard Basic, developed by VULKAN Couplings, constantly monitors the load of torque-transmitting components. It warns of overloading of the power train at various stages, thereby making it possible to avoid unplanned downtimes. It is centred on two proximity sensors that measure the torsion angle of the shaft. Safeguard is available in two versions: either as the Safeguard Basic monitoring unit or as an integral part of the system in the Safeguard Active variant that enables direct intervention in the control of the propulsion system. The system, comprising SCHOTTEL Rudderpropellers and VULKAN shaft lines with Safeguard, is suitable for both newbuildings and retrofits.

5-BLADED PROPELLER WITH OPTIMIZED CP HUB

With a new generation of the CP hub, SCHOTTEL has further optimized the concept of the 5-bladed controllable pitch propeller. The new hub shape serves to reduce formation and risk of cavitation. As a result, the propellers are ideally suited for higher speeds and thus for use e. g. in military ships or yachts, which require high power density, low pressure pulses and minimized noise generation. The new hub is also available with full-feathering mode.

More information at: sales@schottel.com

CREATIVE SPIRIT

Joining the right parts to form a functional unit: the fascination that Manfred Heer had as a development engineer is an even greater asset to him as Vice President Technology. In this role, he is responsible for getting the appropriate experts together for each job. What is more, he has his own unique method of bringing everyone on board when it comes to new innovations

When Manfred Heer travels on business, he always brings home lots of new ideas. As Vice President Technology, he is continually talking about current developments with colleagues at various sites. Like the graduate engineer himself, the international market for marine propulsion systems is in constant motion, making active exchange with customers essential. This is the only way for SCHOTTEL innovations to meet market expectations. Manfred Heer is working on just that.

He took on the new leadership role in September of last year. His office is located in Dörth/Germany, where the entire mechanical and hydrodynamic engineering team is also based. "This ensures close proximity," he explains. For interdisciplinary collaboration, he travels regularly to Wismar and Spay, too. This is because he is responsible for over 100 employees from all the technical and development-oriented departments – and these are spread across the three German company sites. More specifically, Manfred Heer coordinates technical order processing and development in the fields of propulsion technology, hydrodynamics and electrical engineering. Previously, the family man worked in development for 16 years – and boasts a total of 27 years of experience at SCHOTTEL. Among other tasks as a project manager, he headed major development projects such as the Siemens/SCHOTTEL pod drive, which is still in operation around the globe today. "That was a milestone which played a decisive role in all the products that followed. It was a project that enabled us to take the plunge into the oceans. At the time, I was on intimate terms with each and every screw," he remembers.

WELL CONNECTED

This period taught him the importance of customer proximity to an international company. "In my most intense year, I took 40 business trips to customers around the entire world. That was really exciting. Today, I'm happy with a different travel frequency." Of course, there are a lot more changes in his new role. He is now less concerned with testing and implementing new products at customer sites. Instead, he focuses more strongly on strategic questions and the development of holistic solutions. "This is an important task for the future. For example, I am involved in combining our thrusters with systems such as SCHOTTEL Fleet Management," he explains. The solution uses monitoring software to connect vessel components by means of sensors. This enables the customer to easily monitor his thrusters and systems and at the same time to improve the operation of his vessels on the basis of various indicators. For the development teams, this brings new challenges, as mechanical engineering, electrical engineering, hydrodynamics and IT have to collaborate hand in hand on an interdisciplinary basis.

DEVELOPING DEVELOPMENT

The course towards these types of innovations is becoming increasingly complex: take the more extensive test procedures required to check numerous design variants as an example. "In parallel with the thorough hardware tests, we increasingly use the possibilities offered by simulation," notes Heer, adding, "These days, developments are not so much creative individual events but rather much more closely geared to the market and costs." As Vice President Technology, he sees the company's future in the pursuit of new solutions and SCHOTTEL's typical flexibility. This means that it will be difficult for the company to position itself on the basis of material costs or modern and efficient production alone. Rather, SCHOTTEL can stand apart from its competitors thanks to its unique developments with special features. "We make individual customer requests possible. Many of our sales and service colleagues are engineers themselves and provide insight with regard to technical feasibility. We all speak the same language."

Photo: SCHOTTEL

A TALENT FOR THE INTERPERSONAL

Never mind that it is his job, Manfred Heer truly delights in this close collaboration across departments. He brings the necessary project thinking as well as a wealth of experience from his time as a development engineer. That is how he also knows that there are many different options that need to be checked again and again during the design phase in terms of their benefit to the customer. His method for success has always remained the same: “I have learned that you find the greatest team consensus when everyone has a precise image in their head of how the customer is going to benefit from our solution in the end. I aim to constantly sharpen this image.”

The fact that he knows the SCHOTTEL departments so well also has to do with the size of the company. “You know almost everyone, yet we are still large enough to radiate a significant strength on the market. And we have a unique degree of identification with marine engineering. We move so many different types of vessels with our propulsion systems – from the luxury yacht to the drilling ship.” As for the family guy, he prefers to get around on his quad bike or go on outings with his children. Both help him to clear his mind. After all, every creative spirit needs time to develop new ideas.

Photo: Getty Images

OF SEARCHING AND CATCHING

It is usually only coastal inhabitants who are familiar with the craft of fishermen. And yet the industry is one of the most important economic sectors worldwide. Fish ensure the survival of billions of people. Shipbuilders, engineers and programmers are constantly refining fishing techniques. This is not only about high yields – but also about the preservation of stocks

The trawler braces powerfully against the waves. Having cast the net, the captain observes the spots of colour displayed on one of his screens. The sensors attached to the net continuously send data to the bridge. On the monitor, he tracks the size of his yield so far. Finally, he has the fishing gear drawn out of the water. With skilled movements, the crew process the fish and put them on ice.

Casting nets, catching fish and selling them – this is the trade of roughly 40 million people around the world. According to the UN's Food and Agriculture Organization (FAO), there are 4.6 million fishing vessels plying the waters of the globe. Not all are equipped with technology as modern as on the trawler described above. People in many parts of the world set out to catch fish in canoes or pirogues. In some areas, fish is not a meal you treat yourself to every few weeks, but rather a staple food. "Particularly in poorer countries, fish supplies about 70 percent of the animal protein that humans consume," says marine biologist Ray Holborn, professor of aquatic and fishery sciences at the University of Washington in Seattle. This means that fish ensures the survival of billions of people.

The demand is met by fishing fleets all over the world. On average, each person eats more than 20 kilograms of fish per year. This also includes the fish produced by aquaculture. Fenced breeding facilities in the water have led to twice as much fish being produced today as in the mid-1980s. Meanwhile, the amount of fish caught in the wild has remained stable. According to the FAO, about 80 million tonnes of fish are caught in the open sea – about half of global production.

FISHING ALONG NEW SHORES

Today's fishing boat numbers have regionally changed. In America and Europe, their numbers are shrinking. China, on the other hand, is experiencing the opposite trend. While the People's Republic had practically no fishing fleet in the 1970s, it now has around 200,000 vessels. The weight of the catch at sea amounts to 15 billion tonnes per year. A fifth of the global total. Countries such as Indonesia, India or Vietnam have developed at a similar pace. Population growth and increasing prosperity, in particular, are leading to a growing need for fishing boats.

This has led to a boom in the construction of fishing vessels in places like Russia, for example. According to information from the renowned industry journal IntraFISH, the country is seeking to increase the capacity of half of its national fishing fleet by 2030. 33 new vessels are to be added over the next five years. A large portion of the estimated capital expenditure of nearly 11 billion euro is coming from the private sector and not from the state. The reason for the boom in construction is not simply the growing hunger for fish. Climate change, for example, is melting Arctic ice, thus opening up new fishing grounds. Beyond this, the extremely low interest rates currently offered provide an opportunity for fleet modernization.

BOOM FOR HUGE VESSELS

The large vessel trend is evident in Norway, the USA or New Zealand. The newbuildings are often modern factory ships up to 140 metres in length and offering storage capacity for thousands of tonnes of fish. On-board facilities include cold stores and conveyor belts for fast gutting and filleting. These vessels are often at sea for months. Despite shift work, many processes are automated which allow them to operate with a crew of 30.

Digitalization has long since changed everyday operations in the fishing industry. A modern net can cost about 100,000 euro, including sensors for 80,000 euro (111,000/90,000 US-Dollar). Sonar technology emits sounds which are reflected back and displayed as an image on a screen. Through experience, a captain can identify the kind of fish involved. These systems, referred to as "fish finders" in expert circles, form part of the basic equipment. Even recreational anglers can order them on the Internet. The offerings include remote-controlled submarines which can be used to determine whether it is worth casting the net.

Even with all the modern technology, fishing is still a true craft.

While making life easier for fishermen, modern fishing technology is viewed critically by conservationists. Despite internationally agreed catch quotas, numerous species are endangered. According to the FAO, 40 percent of the world's commercially exploited stocks are overfished. However, to obtain an accurate picture, it is necessary to look more closely notes marine biologist Holborn. In his view, America and Europe are on the right course in the fight against overfishing. Here, there are fishing quotas that are subject to monitoring. He stresses that this is not the case everywhere in the world. "There is hardly any effective monitoring, especially in the southern and eastern Mediterranean, which favours illegal fishing," says Jörg Holborn.

The situation along East Asian coasts is similarly calamitous. He reports of regions in China where fishermen have to travel 20 hours to make a catch. That is why large vessels which can remain at sea for a long period of time are preferred. So are modern factory ships making the situation worse? "Yes and no," says Holborn. "They also have advantages." They can, of course, be monitored much more easily than hundreds of small boats. Fishing vessels cannot keep their routes a secret, having to use a transponder for the automatic identification system (AIS) like all other ships. Internet sites like www.marinetraffic.com show the route of every large vessel.

LICENCE TO FISH

Fishermen are only allowed to work in certain waters. Where they cast their nets is regulated in international agreements. A 200-mile economic zone extends off their own country's coast. Beyond this, individual ocean areas are governed by rules agreed by the bordering states in regional fisheries management organizations (RFMOs). International communities such as the EU also have a set of rules for their own waters.

20 KG

is the average amount of fish per year eaten by each person on Earth.

70 %

of the animal protein consumed in many countries is supplied by fish.

European vessels fishing in other regions of the world need permission to do so. The purpose of these agreements is to conserve fish stocks and set catch quotas. This requires exact data, which must be collected again and again. The estimates are complex. If too many large fish are caught, for example, they eat fewer small fish, which then multiply more rapidly. "Certain stocks might therefore expand even though fishing activity increases," says Holborn. The recovery of decimated species, however, can take years. Some types of redfish, for example, need 15 years to reach sexual maturity.

SUSTAINABILITY IS THE FUTURE

It is therefore not easy for consumers to know which fish they can buy with a clear conscience. Various labels help with this, of which the best known is issued by the Marine Stewardship Council (MSC). The MSC was founded more than 20 years ago by the WWF environmental foundation and the Unilever food company. The aim of the label is to guarantee that fish from the wild have been caught sustainably and with minimal bycatch. Seafood enterprises with a modern approach to sustainability try to take even what they do not need ashore for commercial exploitation or avoid catching it in the first place. One of those implementing such measures is the German-based company Kutterfisch, whose ships sail in the North and Baltic Seas. To reduce bycatch, Kutterfisch uses nets with a 20 percent larger mesh size. Researchers are allowed to accompany fishermen at sea to collect data and thus assess stocks. On every Kutterfisch trawler, cameras monitor the crew. Their faces are pixelated, but it is possible to see what they are doing. The Thünen Institute, an agency of the German Federal Ministry for Food and Agriculture, can retrieve the data and check whether catch levels are being adhered to. Horst Huthsfeldt, former Managing Director of Kutterfisch, considers sustainable operations important for remaining competitive. "It's not the big that eat the small, but rather the fast that eat the slow," he says. His aim is for Kutterfisch to be one of the faster companies.

Despite the use of digital technology, Huthsfeldt does not believe that humans have only a minor role to play in catching fish. "Experience is still crucial." Many of his captains have been keeping their own records for 25 years. At sea, they make a note of wind strength, air temperature, catch size and position. Huthsfeldt states that these journals are often just as valuable as modern technology. "Only those with long experience can say where the fish are swimming."

4.6 MILLION

fishing vessels are navigating the world's waters.

FISHING IN THE SOUTH ATLANTIC

The Argos Cíes is one of the most modern fishing vessels in the world: with a length of 74 metres and a width of 14 metres, it is the largest trawler ever to have been built at the Nodosa shipyard in northern Spain. With a controllable pitch propeller from SCHOTTEL, the propulsion system can be optimally adapted to the required operation profile. Additonally, a transverse thruster enables greater manoeuvrability and significantly reduces the vessel's turning radius. The Argos Cíes is mainly used to catch squid in the South Atlantic.

Photos: Getty Images, Nodosa Shipyard

A BRIDGE BETWEEN EAST AND WEST

Med Marine has made a name for itself nationally as a tug operator, and internationally as a trusted manufacturer of various vessel types

Considering Turkey's geographic position as a bridge between East and West, ports are particularly important for the country and its economy. And where there are ports, there are tugs. Med Marine – founded in 1983 by Recai Hakan Şen, who is the company's CEO – operates a fleet of tugs in the busiest Turkish harbours of Izmit Bay, Iskenderun Bay and the Port of Erdemir. There, the company provides a wide range of services. Along with towage, pilotage and emergency response, it offers salvage and wreck removal. For all these tasks, high performance and absolute dependability are a must. After all, the tugs tow capesized cargo ships, Suezmax tankers, container vessels and other vessels up to 400 metres in length. To meet these requirements, Med Marine relies on propulsion solutions from SCHOTTEL.

In addition to comprehensive port services, the Med Marine portfolio covers another important line of business: the Turkish firm manufactures its own tugs as well as pilot and mooring boats. "We collaborate with our experienced crew, learn from their challenges, and tailor our vessels to meet their needs," explains Med Marine CEO Recai Hakan Şen. The vessels are built in the company's own Ereğli Shipyard on the Black Sea. The site, which extends over an area of some 162,000 square metres, or the equivalent of around 20 football fields, is one of Turkey's biggest shipyards. In terms of slipway capacity, it is the country's largest – there are four slipways of various dimensions and slopes. Plus, it is self-sufficient – from its own shop blasting and priming facilities all the way to its finishing capabilities.

TRUSTED MARKET PLAYER

Aside from building its own vessels, Med Marine also constructs tugs, mooring and pilot boats, and chemical tankers for national and international clients. More than 2,000 experienced employees ensure this is carried out with precision. The vessels from Turkey are known for their reliability, sustainability and quality – characteristics that have helped the company gain success globally. The first tug was sold in the international market in 2001, chemical tankers were added to the portfolio in 2005. Med Marine's vessels are registered in ports throughout Europe, North America, and the Middle East.

Photos: Med Marine

Recai Hakan Şen attributes part of this success to the SCHOTTEL propulsion systems that are integrated into his company's vessels – currently covering ten tugboat, four pilot boat, and three mooring boat designs, as well as transverse thrusters in the chemical tankers. Med Marine has come to value the expert's dependability: "SCHOTTEL is a company which proves itself in the world through its technical understanding and quality. Equipping our tugs with their propulsion solutions contributes to the saleability of our vessels. Working with SCHOTTEL, which is very professional and successful in technical issues, is quite easy and enjoyable," states Şen.

MEETING TOMORROW'S CHALLENGES

A further factor that leads to the saleability of Med Marine's vessels is careful attention to market needs. "At the moment, environmental issues are shaping the shipbuilding market more than ever," comments the CEO. Problems caused by fuel oil consumption, such as high particulate matter exhaust, have prompted many operators to transition to liquefied natural gas (LNG). As a result, infrastructure with more and more LNG terminals is growing – and Med Marine offers specialized tugs for these new facilities. The company has adjusted its own production technologies and processes to be environmentally friendlier.

"One aspect is for vessels to be more efficient in regard to fuel consumption, and to achieve that, we are really focused on hybrid solutions," reveals Recai Hakan Şen. In fact, he sees potential for SCHOTTEL to assist with hybrid technologies and to help achieve higher propeller efficiency. The new SCHOTTEL subsidiary in Istanbul is certain to be instrumental in collaborating on finding suitable propulsion solutions for future Med Marine designs. Furthermore, for existing vessels, Med Marine can expect even tighter cooperation regarding after-sales service and parts supply. It looks like the German propulsion expert and the Turkish tug operator and shipbuilder have a bright future together.

400 METRES

long vessels can be towed by Med Marine tugs.

With around 162,000 square metres, Ereğli Shipyard is considered one of the largest shipyards in Turkey.

MODEL TRIAL 4.0: AN INSIGHT INTO CFD

Flows are complex physical processes and require special investigation methods. CFD simulations are used for this. Thanks to this computer-based method, SCHOTTEL customers benefit from even greater expertise in the design of their products

At SCHOTTEL, CFD simulations have been an integral part of the hydrodynamic design process for years. Computational Fluid Dynamics (CFD for short) can be used to simulate and analyze a wide range of different applications, such as open-water propeller performance, vessel resistance, towing power, manoeuvrability, risk of cavitation or noise development.

The findings obtained during a CFD simulation are then used for further optimization of the propulsion solutions.

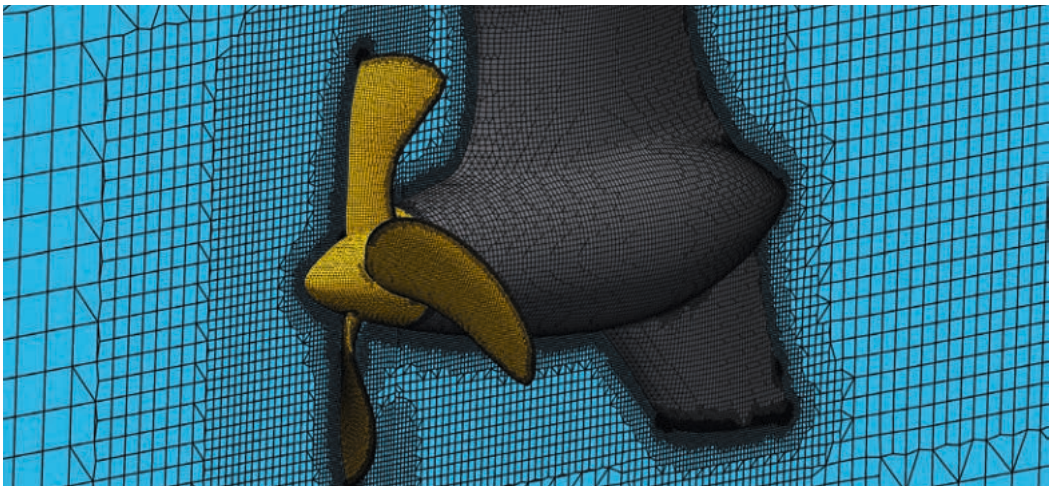
CONSERVATION EQUATIONS AS COMPUTATIONAL BASIS

In order to ensure that SCHOTTEL products are always state-of-the-art, detailed knowledge of their flow behaviour is a basic requirement. Until now, the main method for determining measured variables, such as pressure, thrust or speed, was model trials; the variables were then scaled up to full size. Although Computational Fluid Dynamics has been widely applied in research for many years, it has only recently gained greater recognition in the industrial environment. At SCHOTTEL, investments in the six-digit euro range have currently being made to ensure that the high level of the CFD calculations is also maintained in the future.

Conservation equations for physical variables such as mass, momentum and energy, are used to describe the flow properties of complex components. At the end of the calculation, the computational solution of these equations provides exact information about the three-dimensional flow field throughout the entire area under investigation.

IMPROVED UNDERSTANDING OF THE PHENOMENON

Even if CFD simulations are still associated with above-average expertise, high time requirements and powerful computers, they are generally considered to be the less expensive and faster alternative to complex model trials. CFD calculations benefit from the fact that the

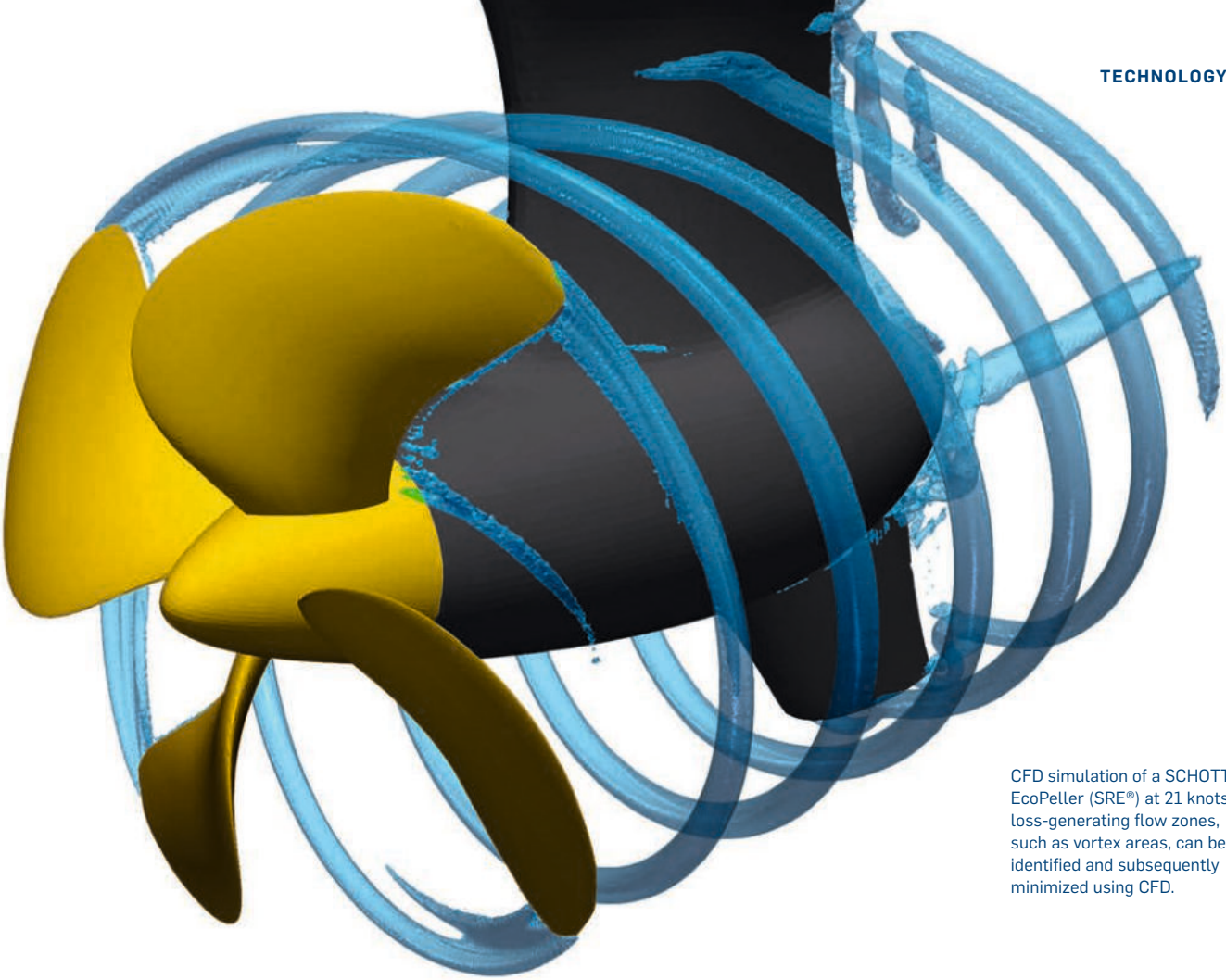


Example of a mesh for the CFD simulation of an SRE®: the flow area (blue) and surface mesh of the propeller (bronze) and the housing (grey) are shown.

Graphics: SCHOTTEL

CONSERVATION EQUATIONS

Conservation equations are equations in which the value of a variable does not change, i. e. is conserved, in certain physical processes. The best-known law of conservation is that of the conservation of energy. Put colloquially: “The energy you put in is the same as the energy you get back. In other words, no energy is lost and no energy is created out of nothing.” The five conservation equations of mass, momentum in all dimensions and energy are also referred to as the Navier-Stokes equations.



CFD simulation of a SCHOTTEL EcoPeller (SRE®) at 21 knots: loss-generating flow zones, such as vortex areas, can be identified and subsequently minimized using CFD.

model can be freely expanded, scaled and modified at any time and with minimal effort. In this way, the simulations can also be applied to flows for which experiments are difficult to implement or empirical measurements cannot be determined.

CFD SIMULATION PROCEDURE

The procedure during a CFD simulation can be divided into three steps: pre-processing, the actual calculation during the solution phase and post-processing; in the latter step, the results are validated and visualized.

First of all, a 3D model is mapped: geometry details that are not, or only partially, relevant for the simulation are completely removed or represented in a simplified form. Following geometric preparation of the model, its so-called mesh is generated, in which the flow area is divided into a finite number of cells. A mesh of poor quality – for example one for which too few cells were generated, resulting in a mesh that is too coarse or contains strongly degenerated cells – can lead to significant errors in the result, even including failure of the simulation. In the next step (solution), calculation of the conservation equations is performed. Pre-processing also includes definition of the initial and boundary conditions, such as velocity, volume flow, pressure or speed. Correct definition of these parameters has considerable influence on the quality and accuracy of the results.

Pre-processing is followed by the actual calculation, which may take several hours or even days. This requires appropriate hardware and software that solves the conservation equations in the calculation area cell by cell.

VALIDATION AND VISUALIZATION

Following successful calculation, the results of computational simulations are checked for plausibility. The validation process includes comparisons with empirical values, basic equations or values from model trials. In the final step, the results are visualized and presented in graphics, diagrams or animations.

Computational methods such as CFD not only combine state-of-the-art technologies with know-how acquired over many years, but also make a significant contribution to the successful development and production of efficient and reliable propulsion solutions.

SMOOTH SAILING

A major requirement for the award-winning White Rabbit superyacht was that the vessel be quiet and free of vibration. Mark Stothard, Managing Director of Echo Yachts, explains how SCHOTTEL helped deliver

MARK STOTHARD
Mark Stothard is the Managing Director of Echo Yachts, which he founded in 2014. An aircraft engineer by trade, he has been in the boat building industry since the early 1980's.

ECHO YACHTS IS A BUILDER OF SUPERYACHTS. WHAT MAKES A YACHT A SUPERYACHT?
A yacht can be either a sailing or a highly finished motor vessel, and anything over 30 metres in length is typically referred to as a superyacht.

ONE VESSEL WHICH RECENTLY LEFT YOUR SHIPYARD WAS THE M/Y WHITE RABBIT, A RECENT RECIPIENT OF THE BOAT INTERNATIONAL'S 2019 DESIGN & INNOVATION AWARDS. WHAT MAKES IT SPECIAL?
The White Rabbit is a superlative superyacht in many regards: it is the largest all aluminium superyacht and the largest trimaran superyacht ever built, plus the largest to ever be constructed in Australia. The long slender hulls of the trimaran allow for up to 40 percent less installed power – 5,000 kW in our vessel compared to 8,000 kW in a monohull steel superyacht of the same volume and top speed. Ultimately, this means far less fuel consumption for the same top speed and far less fuel capacity for same long range cruising. This equates to lower environmental, running and maintenance costs.

WHAT WERE SOME OF THE CHALLENGES WITH CONSTRUCTION?
The main challenge in the build of any superyacht is simply the amount of detail and the high standard of finishes required, which, in turn, results in a huge number of man-hours to achieve the necessary level of perfection we deliver.

Photos: Echo Yachts

THE WHITE RABBIT: FACTS AND FIGURES

- **84.00** metres long and
- **20.14** metres wide
- Over **1,200** square metres of luxury guest accommodation fit-out
- Space for up to **30** guests and **32** crew members

Then there are many complex systems on board, such as the navigation and dynamic positioning technologies, communications and entertainment systems, fire detection and control, desalination, sewage treatment, oily water separation and a cranes for tender launching – to name just a few. And of course, a suitable propulsion and manoeuvring system is central to the vessel. In the White Rabbit, this comprises, among other brands' components, two continuous duty SCHOTTEL Pump Jets as stern thrusters and one SCHOTTEL hub-less bow thruster for low noise and vibration manoeuvring. The SCHOTTEL equipment is also seamlessly integrated into the overall dynamic positioning system.

WHY WAS THIS PROPULSION AND MANOEUVRING SYSTEM SELECTED?

Our client challenged us with engineering boldness, requesting we pay extra special attention to ensuring a drive train and manoeuvring system that is extremely quiet and also vibration free. The SCHOTTEL components we selected were most suited to the outcomes we were hoping to achieve – and achieve we did! These systems work seamlessly, efficiently and quietly, making the vessel very manoeuvrable and comfortable for the guests onboard.

WHAT DID SCHOTTEL SUPPORT LOOK LIKE?

We worked with the office in Fremantle near Perth. They were very helpful with service and assistance during the build and commissioning of the vessel.

ECHO YACHTS

Based in Henderson, Western Australia, Echo Yachts specializes in the 100 % custom design and manufacture of world class superyachts. The full-service firm brings together experts from all over the world to come up with bespoke solutions for its customers. Echo Yachts also provides services for all facets of vessel maintenance, repair and refits.

SCHOTTEL SYDRIVE-M

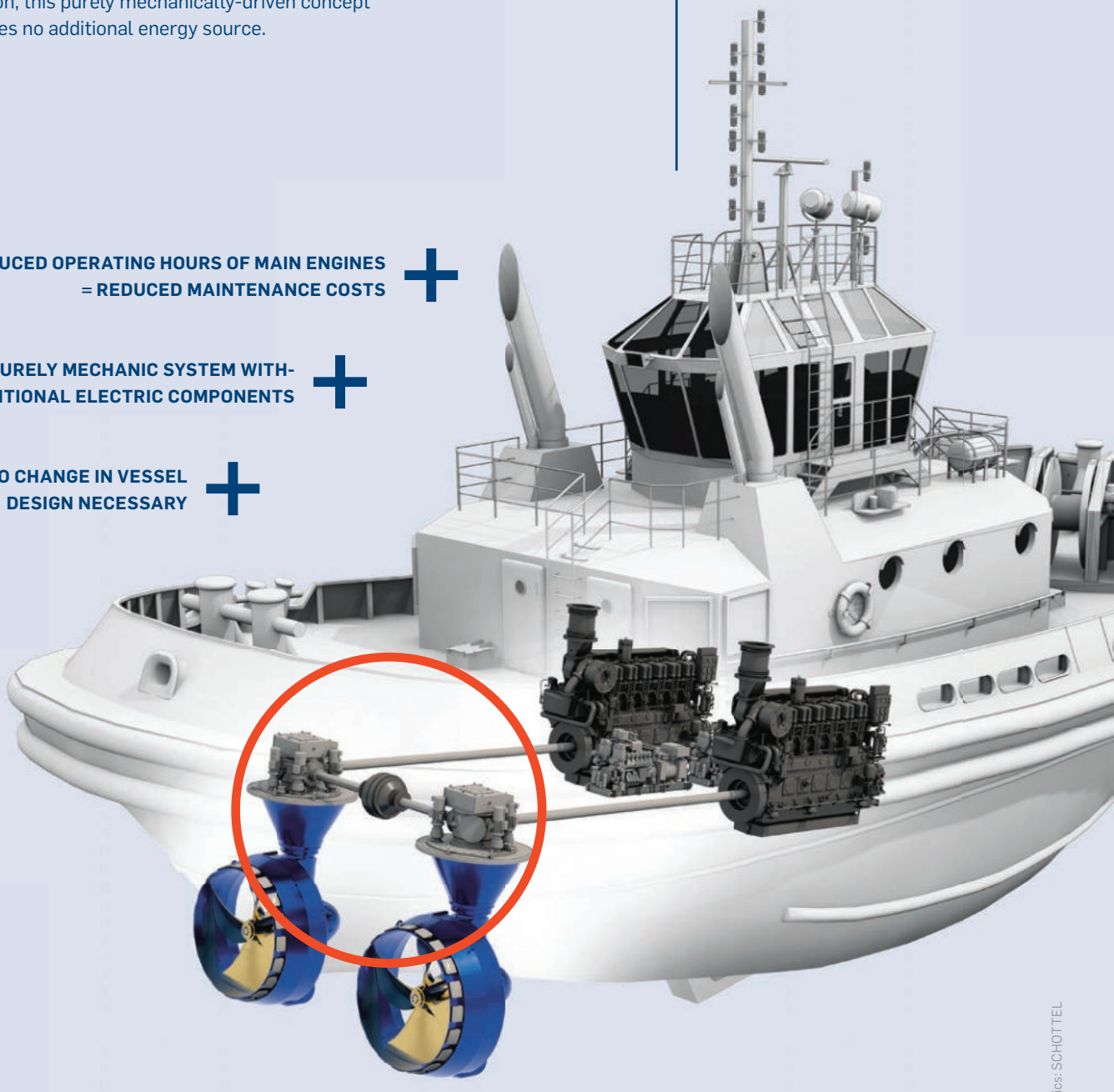
NEW HYBRID DRIVE SYSTEM

SCHOTTEL SYDRIVE-M is a new variable propulsion system for purely mechanical hybrid operation, offering the flexibility to operate vessels more efficiently in different modes. It is less complex than common electric hybrid concepts, requiring neither supplementary automation nor electrical components, but only an additional synchronous shaftline and at least one additional simple on/off clutch. In contrast to common perceptions of hybridization, this purely mechanically-driven concept thus requires no additional energy source.

REDUCED OPERATING HOURS OF MAIN ENGINES = REDUCED MAINTENANCE COSTS +

EASY AND PURELY MECHANIC SYSTEM WITHOUT ADDITIONAL ELECTRIC COMPONENTS +

NO CHANGE IN VESSEL DESIGN NECESSARY +



Graphics: SCHOTTEL

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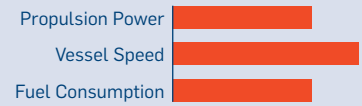
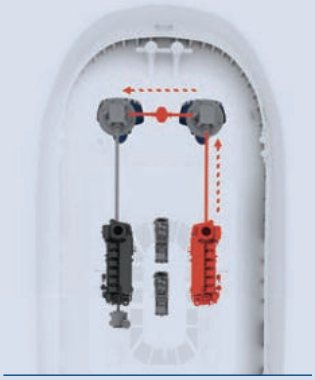


LIGHT OPERATION OR FREE SAILING MODE

In this synchronized Light Operation Mode, one of the two main propulsion engines remains alternating off. This leads to a noticeable reduction of operating hours of the main propulsion engines, and thus to a reduction of maintenance costs. In addition, the single running main engine remaining in operation is now better loaded by two thrusters and operates in a better specific fuel consumption range, leading to less fuel consumption and emissions.



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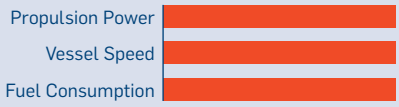
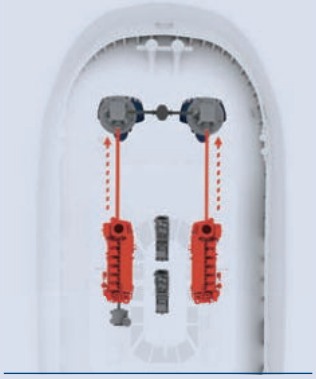


FULL THRUST OPERATION MODE

For short operation times when full propulsion power is needed, the connection between the two thrusters is disengaged and each engine is engaged to each thruster. The system is now identical to any other directly driven propulsion system.



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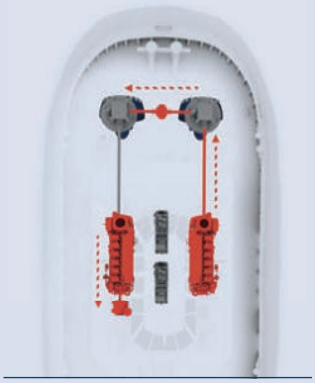
FIFI-MODE

For any directly driven vessel the new SYDRIVE-M system provides a solution to enable fire-fighting operation with no need of an additional investment in components like medium or heavy duty slipping clutches, CP propellers or dedicated engines to supply power to a FiFi-pump. For the SYDRIVE-M FiFi-mode, the disengaged main engine is used to drive the FiFi-pump through its front PTO.



+ **LESS FUEL CONSUMPTION & LESS EMISSIONS**

+ **SUITABLE FOR NEW BUILDS AND RETROFITS**

+ **AVAILABLE FOR SCHOTTEL SRP AND SRE®**

+ **SCHOTTEL QUALITY AND EXPERIENCE, HIGH AVAILABILITY**

This constructional simplicity makes SYDRIVE-M suitable for installation in common vessel designs, and is recommended for easy retrofitting, since it is suitable for existing designs. No matter whether new build or retrofit, vessel operation remains unchanged. In other words, captains and crew receive a tug “like any other” diesel-mechanical tug, with no need for costly special training or knowledge of electrical/electronic systems.

sydrive.schottel.com sales@schottel.com

SUCCESS STORY

MORE THAN 1,000 SCHOTTEL RUDDERPROPELLERS TYPE SRP 460 DELIVERED

To date, more than 1,000 SCHOTTEL Rudderpropellers types 490 and 460 have been delivered – making them the most successful azimuth thrusters worldwide. Rudderpropellers with a maximum power rating for tug duties between 2,350 and 2,550 kW per engine, such as the SRP 490 and the SRP 460, are among SCHOTTEL's azimuth thrusters that have undergone several technical updates to offer customers state-of-the-art design, construction and economical operation. The SRP 460, formerly SRP 1515, was first delivered in 1999.

At present the SRP 490 is suitable for the 80 ton bollard pull class. Today, the standard range includes SCHOTTEL ProAnode enhancing corrosion protection, the award-winning SCHOTTEL HTG® (High Torque Gear) technology as well as the latest high-performance nozzles SDC40 and SDV45. Plus, it provides an extension for mounting the LEACON system.

One in a thousand: for more than 20 years, the SRP 460 and its strengthened version SRP 490 are in reliable service.

Photo: SCHOTTEL

LOOKOUT

NaCl

Approximately 3.5 % of ocean water consists of sodium chloride – this corresponds to around 50 million gigatonnes of salt. 1*

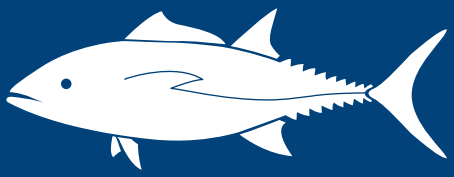
Denmark's Silicon Valley: The Danish government intends to begin building nine islands south of Copenhagen in 2022. Some 380 companies are to be located there. 2*

A global problem: Around 90 % of all sea birds ingest plastic over the course of their lifetimes. It is predicted that nearly every sea bird will be affected by the year 2050. 3*

90 %

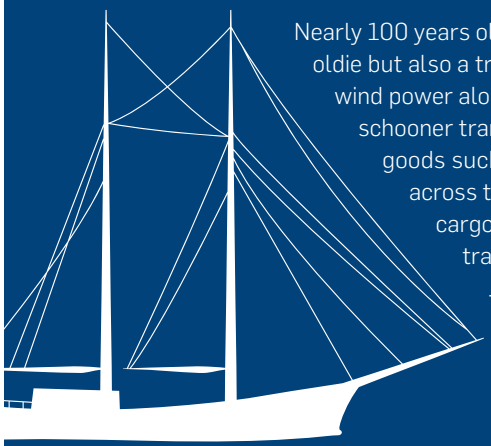
Hit list of the world's largest atolls (ring-shaped reefs, mostly coral reefs, surrounding a central lagoon):

1. Great Chagos Bank, Indian Ocean, 12,642 km²
2. Reed Bank, Spratly Islands, 8,866 km²
3. Macclesfield Bank, South Chinese Sea, 6,448 km²
4. North Bank, North of the Saya de Malha Bank, 5,800 km²
5. Cay Sal Bank, Florida Straits, 5,226 km²
6. Rosalind Bank, Caribbean Sea, 4,500 km²
7. Boduthiladhunmathi Atoll, Maldives, 3,850 km² 4*



Heavyweight: In January 2019, a **612 pound** tuna was auctioned in Japan at a record price of over **3 million euro**. 5*

SUSTAINABLE SAILING



Nearly 100 years old, the Avontuur is not only a real oldie but also a true environmental hero: using wind power alone, the two-masted gaff-rigged schooner transports sustainably produced goods such as rum, coffee and chocolate across the seas. Its mission: to promote cargo sailing as the future of clean sea transport. 6*

SAIL-THRU

In the world's first sail-thru supermarket, water enthusiasts can now do their shopping without setting foot on land. The supermarket ship drops anchor for six days a week off the coast of Dubai and can be accessed by small yachts and jet skiers. A delivery service is available for supplying ordered goods to larger vessels. 7*

Sources:
1* www.bbc.com; 2* www. theguardian.com; 3* www. nationalgeographic.de; 4* www.worldatlas.com;
5* www.nytimes.com; 6* www. timbercoast.com; 7* www.cnn.com

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