

SCHOTTEL REPORT



TRADE ROUTE ARCTIC

Receding ice is turning the Northeast Passage into a new route for world trade

MARINE RESEARCH
ADVENTURE

DIGITAL FLEET
CHECK

No. 15

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COOLLY CUTTING CORNERS 74° 48' N, 82° 13' E

The Northeast Passage will be navigable for ships in the future. Which advantages will this bring and for whom? **Page 10**



ELECTRICALLY REJUVENATED 47° 51' N, 12° 20' E

The Retrofit Team mastered the task of a system change while retaining the existing rudderpropeller. **Page 06**

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AT YOUR SERVICE 26° 55' S, 48° 38' W

Paula Francisco shows what good spare parts support means at SCHOTTEL. **Page 08**



MARINE RESEARCH ADVENTURE 22° 37' N, 120° 18' E

Research vessels roam remote waters. Many decision-makers rely on technology from SCHOTTEL. **Page 14**

DEAR READERS,

Two clear trends have been visible in the market in recent years: reducing emissions and improving vessel operations. As a result, there has been an increased focus on new vessel concepts. Looking at the vessels' operational profiles, optimizing the propulsion concepts in order to reduce fuel consumption and emissions have been the center of attention. Accordingly, there has also been an increase in diesel-electric or gas-electric propelled vessels. In the latest development, we see battery-operated vessels on the market. It is very clear that the focus on reduced emissions will continue in the future. Lower charter rates are leading to lower earnings for vessel owners. This creates demand for optimizing vessel operations and availability. Digitization and more intelligent products can help to improve the planning of vessel operations as well as maintenance tasks, with the continuous aim of optimizing available resources and ensuring high efficiency of overall operation. We are sure that there will be a higher demand for assistance and autonomous systems. To support high availability and improved operations on vessels, a global high-quality OEM service which is available 24/7 will become even more important. Unexpected vessel down-times result in heavy direct and indirect losses for the vessel owner. The loss of reputation is especially difficult to measure in costs, however, this certainly exerts an impact on the ability to win new charters. Enhancing our customers' success is what we at SCHOTTEL like to do most!

Please find more detailed information on all above mentioned topics, such as future-orientated developments, a global sales workforce and strong service teams, in this issue.

Enjoy reading!



Stefan Kaul (right)
CEO & President
Industrial Operations

Hans Laheij (left)
Deputy CEO &
President Marine

DIGITAL FLEET CHECK

SCHOTTEL is steering a new course for its customers and launching a standalone software product onto the market: Fleet Management. The goal is to make fleets even more efficient. An initial customer trial is already in progress

SMART SERVICES

OPERATIONAL PERFORMANCE

PREDICTIVE MAINTENANCE

VESSEL SURVEILLANCE

VESSEL PERFORMANCE

REDUCED FUEL CONSUMPTION

REAL TIME DATA

In the container segment, large shipping companies already use data collected digitally, for instance to reduce fuel consumption. In the case of tug fleets, on the other hand, detailed data and operation analysis is still relatively uncharted territory. SCHOTTEL aims to change this situation – with a combination of sensors, data acquisition hardware and a software solution tailored to customer requirements. The result: SCHOTTEL Fleet Management, an efficient and clearly structured online portal. “Our Fleet Management system provides you with clear information about the operation of your own vessel or the entire fleet,” explains Alexander Neideck from the development team. Here, SCHOTTEL is able to pool together the experience of a large service team that has maintained close relations with operators of individual vessels and entire fleets for decades. Now this wealth of experience enables the company to generate a user-oriented solution that provides added value for the customers.

EVERYTHING AT A GLANCE

How does it work? The most important figures for the user can be viewed at a glance in the portal. These include information about fuel consumption, speed, thruster manoeuvres and environmental influences. What information is displayed depends, in part, on the number of sensors that are used in the vessel to collect data. “Depending on requirements, we can read data from existing sources or install new measuring equipment on the vessel,” says Oliver Dietz, the team member responsible for measurement data acquisition. The values enter the system via corresponding interfaces and are immediately available in the online portal.

FULLY TAPPING POTENTIAL AND AVOIDING DAMAGE

The evaluation options are varied and indicate potential that can be tapped in terms of fuel consumption or condition-based maintenance. Viewing the data enables you to achieve more. “The precise visualization of the detailed individual consumption figures, for example, makes it possible to establish a benchmark for the fleet or to adapt operating behaviour accordingly,” says Alexander Neideck, highlighting the advantage.

Another important aspect is the much more precise detection and localization of damage: the continuous data analysis ensures that irregularities are discovered before serious damage occurs. Furthermore, detailed knowledge of the condition of the system makes it possible to undertake maintenance work in good time in the event of a problem.

REGULAR FEEDBACK LOOPS

As is customary in software development, further development is carried out in regular dialogue with the customer. “We intensively discuss the usage characteristics beforehand and jointly work towards custom-tailored solutions,” explains Neideck.

Regular feedback loops ensure optimal implementation in customer systems – particularly with regard to operator control and new functionalities. An interdisciplinary team of shipping experts, IT specialists, data analysts and electrical and mechanical engineers takes care of this.

Furthermore, Oliver Dietz and Alexander Neideck have been accompanying a customer's daily vessel operation during the current development phase in order to see things from the customer's perspective and experience their everyday requirements at first hand. The knowledge thus obtained flows directly into new functionalities of the portal and the right interfaces.

NOT MANUFACTURER-SPECIFIC

The good news for existing workflows: Fleet Management is not just one of many different digital systems that build on one another and that SCHOTTEL is using to expand its portfolio. It can be combined via data interfaces for use on a cross-manufacturer and cross-system basis. This means that non-SCHOTTEL data can also be acquired – an important argument for customers with multiple vessels and an existing data infrastructure. In this way, Fleet Management is able to generate awareness of optimization potential in virtually any aspect of tug operation.



ADVANTAGES AT A GLANCE:

On the vessel

- Use of existing data sources
- Integration of optional sensors
- On-board information system

SCHOTTEL Cloud

- Analyses
- Data collection
- Expert support

Mobile office

- Web-based platform
- Mobile devices
- Data export



ELECTRICALLY REJUVENATED

The SCHOTTEL Retrofit Team has already replaced numerous long-serving propulsion systems with new ones. However, the contract with Chiemsee-Schiffahrt was a real premiere

The keel of MS Stefanie was laid in 1977. For more than 41 years, it has reliably carried up to 350 passengers per trip. Since this is to continue in the future, the operator felt that it was time for a modernization. This was not simply a matter of an aesthetic tune-up, but rather about the vessel's core: the diesel propulsion system. As a long-standing service partner, SCHOTTEL was the first choice for the conversion – or, to put it more precisely, the specialists from the Retrofit Team were. “The customer was open to future-oriented propulsion concepts, so we recommended the switch to a modern, diesel-electric propulsion system,” recalls Wolfgang Lange from the SCHOTTEL Retrofit Team in Spay. The plan also entailed replacing the outdated mechanical handwheel control with an electrically driven steering system. “This kind of system change while retaining the existing rudderpropeller had never been carried out by anyone up to that point. That made this project something special,” notes Lange.

A CLEAN SOLUTION

The reasons for the switch from diesel to diesel-electric were varied. With the new propulsion system, it is not just the performance which is improved. Maintenance too becomes easier

since the availability of spare parts is ensured for the next 20 years. The propulsion system can be comfortably rotated through 360 degrees at constant speed and the rudderpropeller can be controlled more precisely – without the need for a clutch. Another major advantage: as there is no hydraulic equipment, the propulsion system runs very quietly to the benefit of the passengers.

THE GOAL: PLUG & PLAY

The conversion planning presented the Retrofit Team with a number of challenges. “We matched the additionally required control cabinet exactly to the space available in the engine room. The customer thus avoided a costly conversion,” explains Lange.

Chiemsee-Schiffahrt carried out the roughly eight-week exchange of the propulsion system during the idle period in winter. For SCHOTTEL, this meant preparing all parts exactly and enabling plug & play installation of each element to the greatest extent possible. As Günther Hartl, Operations Manager at Chiemsee-Schiffahrt Ludwig Fessler KG, confirms, this evidently went rather well: “We were more than satisfied with the collaboration and the transition to electric. We are fit for the future. And the guests on board enjoy the peace and quiet.”



CHIEMSEE-SCHIFFFAHRT

For more than 170 years, Chiemsee steamships have been carrying passengers across the lake or to its islands. Today, the passenger transport company has 14 ships in service, which can accommodate between 25 and 950 people. The partnership with SCHOTTEL has been existing for decades.

TRADE FAIR DATES



13–15 MARCH 2019 // COLOMBIAMAR

Cartagena de Indias

9–11 APRIL 2019 // SEA ASIA

Singapore

9 MAY 2019 // MARITIME DAY/SJÖFARTENS DAG

Mariehamn

14–15 MAY 2019 // TUGNOLOGY

Liverpool

14 – 16 MAY 2019 // IMDEX ASIA

Singapore

4 – 7 JUNE 2019 // NOR-SHIPING

Oslo

STEFAN KAUL NEW CEO



Stefan Kaul has become SCHOTTEL's new Chief Executive Officer (CEO), following Dr Christian Strahberger. Kaul has been part of the company since 1989 and held primary responsibility for all engineering activities in his former position as Chief Technology Officer since 2007. The replacement is an important part of increasing the company's operational effectiveness and further strengthening the focus on delivering customer value. In addition to his position as CEO, Kaul will head the new "Industrial Operations" department. A second new "Marine" department will focus on sales, marketing and services and will be managed by Hans Laheij as Deputy CEO & President Marine. Laheij joined the company in 2016 and previously held the position of VP Sales & Marketing.

WHAT CUSTOMERS ARE SAYING ABOUT SCHOTTEL

HOW LARGE IS YOUR FLEET AND WHERE DOES IT OPERATE?

Our fleet currently consists of 18 tugs which are active in various ports in Peru.

ARE THERE NEW CHALLENGES FOR YOUR COMPANY?

Yes, we are striving for growth in three major areas: port concessions and private terminals, tugboat services and maritime services as well as logistics. Our aim is a stronger customer orientation. We want to offer customers optimized services and competitive all-in-one solutions.

ARE THE REQUIREMENTS FOR PROPULSION SYSTEMS CHANGING AS WELL?

Of course. Already in 2008, Tramarsa decided on a fleet renewal process. We searched for a tug design that would meet the needs of a Peruvian port while taking future trade growth in South America into account. In practical terms, we are permanently increasing the level of propulsive power and manoeuvrability. The hybrid tug is the future – the sooner it's here, the better.

WHAT ARE THE REASONS FOR YOUR PARTNERSHIP WITH SCHOTTEL?

We have been making very good experiences with SCHOTTEL for many years now. The propulsion systems have a level of quality that allows us to achieve maximum efficiency and reliability in port service. Our customers value that as well. Beyond that, SCHOTTEL responds extremely quickly to inquiries and is available practically around the clock.

WHY WOULD YOU RECOMMEND SCHOTTEL?

Because all products and each individual component are characterized by outstanding quality and service life. Added to this, there is the targeted after-sales service – which is exactly what tug operators need.

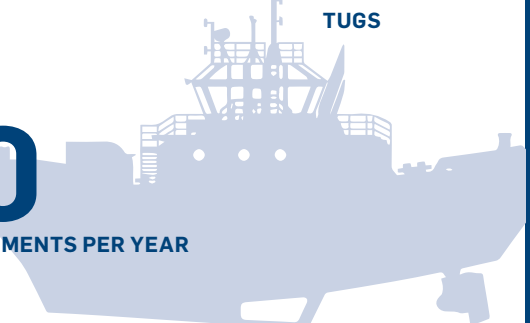


William Revilla Valdivia,
Ship and Tugs Manager
Trabajos Maritimos S. A. –
TRAMARSA OPERADORES
MARÍTIMOS Y PORTUARIOS

18
TUGS

9,000

ASSIGNMENTS PER YEAR



AT YOUR SERVICE

Paula Francisco loves to learn – and her job as a Supply Analyst at the SCHOTTEL subsidiary in Brazil gives her plenty of chances to do just that



No two days are alike for Paula Francisco, Supply Analyst for spare parts at SCHOTTEL do Brasil in the port city of Itajaí. In theory, her job is very operational: “We get the parts, package them up and ship them off to customers,” she explains. However, the challenge comes when everything is needed in a hurry, which is often the case. “Unforeseen breakdowns require fast action. That’s when I have to get creative to come up with a solution,” comments Paula Francisco. In these moments in particular, customers count on SCHOTTEL.

Paula Francisco works closely with forwarding agents as well as with customs brokers to expedite the parts. If they can’t deliver quickly enough, she tries to organize a driver to deliver a part personally. If that doesn’t work, she keeps looking for a solution until she has an answer. “When I’ve made the seemingly impossible possible, it’s fantastic – I feel like a superhero,” says Paula Francisco with a smile. With her high degree of dedication, she enjoys a good standing among her customers and colleagues. Because each day is different, Paula Francisco constantly learns new things. “I’m curious about everything. The more I know, the more I can do. And the more I can do, the more I can offer our customers,” she says.

AN INDUSTRY EXPERT

Paula Francisco joined SCHOTTEL do Brasil in 2013. Her previous experience in import and export, as well as a bachelor’s degree in logistics, was what landed her the job, she says. Since that time, besides working, she has earned an MBA in import and export management with support from SCHOTTEL. This expertise is essential, as the subsidiary in Brazil is also responsible for customers in neighbouring Paraguay and Uruguay.

Recently, Paula Francisco expanded her international experience during a short-term secondment at SCHOTTEL Inc., the company’s US subsidiary in Houma, Louisiana. It soon became apparent, she says, that “our customer bases and our markets are very different, but the problems that come up are nearly the same.” Examples include filling express orders or ensuring that the warehouse organization supports a smooth logistics process.

As expected, Paula Francisco found opportunities to learn in Houma. Since returning to Brazil, she has been adjusting the organizational structure in the warehouse in Itajaí – inspired by what she saw in the United States. In addition to this, she has an even wider network she can tap into when looking for solutions. “It was such an enriching experience to work in another country and culture,” says Paula Francisco. “Sami Weatherall and Salina Rios from the US office took care of every detail to help me feel at home. Gary Aucoin, General Manager of SCHOTTEL Inc., shared a lot of his experience with me too.”

A COMPANY THAT “IS GOING PLACES”

Always learning – that’s Paula Francisco. Yet there’s so much more she likes about her job: that she deals with people from all hierarchical levels in an international setting, is surrounded by industry veterans and has many opportunities to develop personally and professionally. She is also pleased when she can apply what she has learned to better serve her customers across Brazil, Paraguay or Uruguay. Paula Francisco is happy to be part of a company that, in her words, “is going places.”

On-site service. The team at SCHOTTEL do Brasil offers customer support throughout South America.



COOLLY CUTTING CORNERS

With the melting of the Arctic ice, freighters from Asia are able to travel north of the Siberian mainland to Europe. What does it mean for global shipping traffic?



Pack ice, polar bears and bitter cold – for years it was mostly adventurers, researchers or militaries who braved entry into the Arctic Ocean. Recently, however, the sea route along the North Pole has also been attracting merchant vessels. Climate scientists agree, after all, that the Northeast Passage – a route which in earlier times was almost completely frozen over – will be navigable all summer long by the middle of the century. Could this alarming consequence of climate change turn out to be – for shipping companies at least – a positive development? If ships from Japan, Korea or China can reach Europe by travelling north of Asia, they would save themselves the detour through the Suez Canal – thus shortening the voyage on major routes by 5,000 to 6,000 kilometres. “That could bring with it considerable cost advantages,” says Malte Humpert, founder of the Arctic Institute in Washington, D.C. This holds true even if the revenue per trip were to decrease on shorter routes, since shipping companies calculate their freight rates in tonnes per mile.

Travel through the Arctic expanse is something mariners have been attempting for a long time. Equipped as an icebreaker, the US tanker “Manhattan” was the first ship to navigate a route along the North Pole to Asia in 1969. Back then, however, the overall expense proved to be too high on account of severe ice damage.

TRIAL RUN THROUGH THE ARCTIC OCEAN

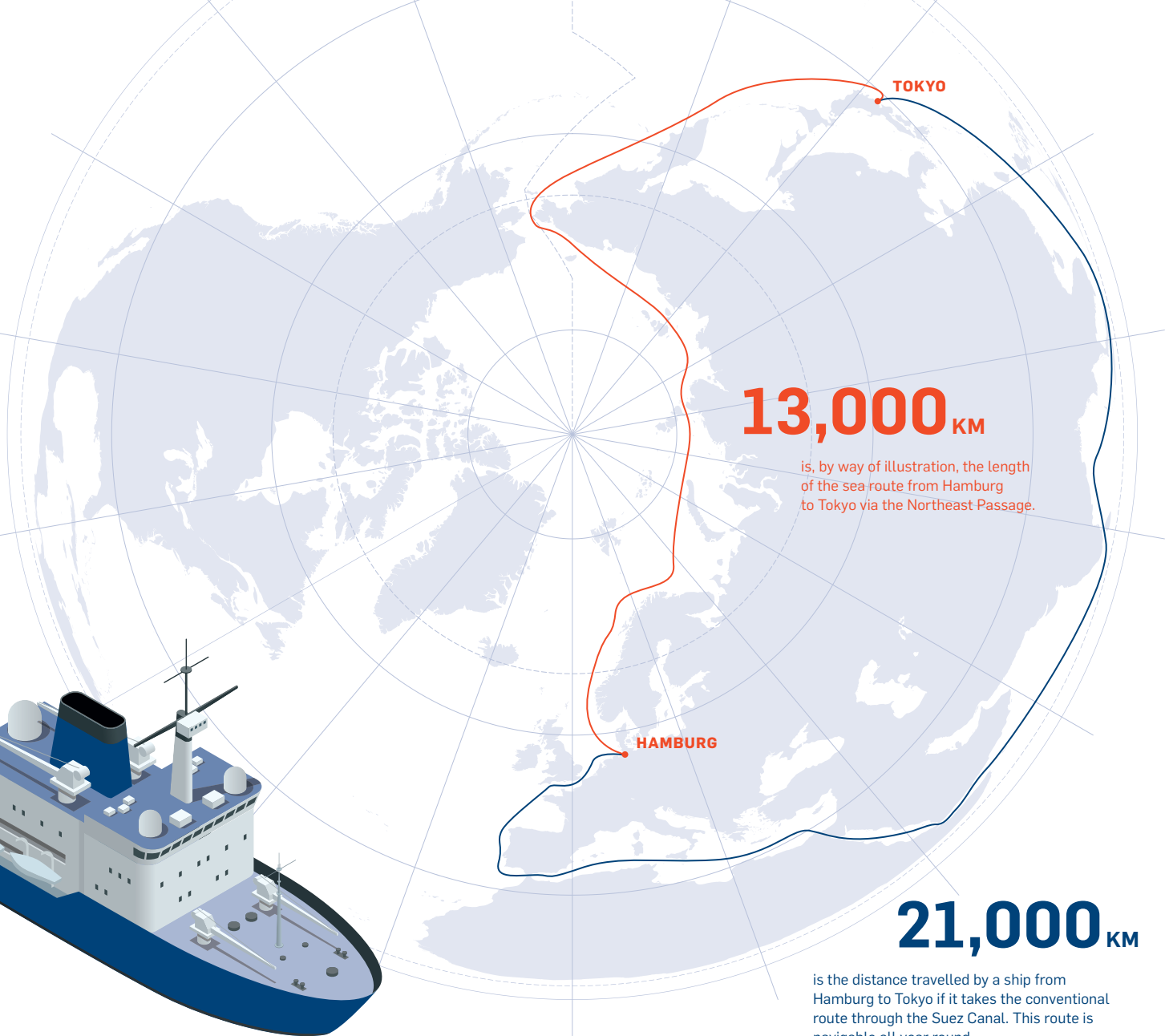
Since the ice is melting, shipping companies are increasingly testing the polar sea routes. In September, the Danish company Maersk sent the container ship “Venta Maersk” from Vladivostok through the Bering Strait to Saint Petersburg. The world’s largest shipping company stresses that its primary objective was to gain experience. “Up to this point, we do not see the Northeast Passage as a viable alternative to the existing East-West routes.”

Experts like Humpert know the reason for this reserve. “For container ships, travelling the Northern Sea Route makes little sense.” In a manner similar to scheduled bus services, they stop off in the ports of Singapore, India or Saudi Arabia on their way from Asia to Europe in order to unload containers and to pick up new freight. There are no such lucrative stops on the Siberian coast. And added to this comes a further disadvantage: “Since, even in the future, the Northeast Passage will only be free of ice during the summer, shipping companies would have to reschedule the routes of their container ships twice a year,” says Burkhard Lemper from the Institute of Shipping Economics and Logistics at the Bremen University of Applied Sciences. He notes that this makes planning significantly more difficult and raises questions about cost-effectiveness in the foreseeable future. Besides this, the route is only worthwhile from ports in the northern region of East Asia. Even from Hong Kong, the southern route is shorter.

SHORTER ROUTES FOR NATURAL RESOURCES

Although the Northeast Passage will thus not replace the Suez Canal, it has been developing into an important traffic artery between East and West for years. “The freight volume is increasing exponentially,” says Humpert. At the beginning of the millennium, he notes, it was around one million tonnes, rising to around ten million last year. This year, experts anticipate about 18 million tonnes – with 80 million tonnes expected as soon as 2025.

Thus, for tankers and bulk carriers, the route may indeed be worth exploiting after all if they transport liquid gas, oil or ore directly to their destination. Particularly if these goods are shipped from Siberian commodity ports. This is why the ice-free Northeast Passage is an important transport route for Russia.



Raw materials make up almost half of the nation's exports. More than 18 percent of known natural gas reserves are located in Russia. Many mineral resources lie in the soil of northern Siberia near the Arctic Ocean. Cities such as Norilsk, known for its nickel mining, can only be reached by water. The less ice there is there, the easier transportation becomes. To date, Russia has been clearing a path through the ice using increasingly advanced technology. The ore freighter "Monchegorsk" made a trial run in 2010 from the port city of Dudinka (west of Norilsk) to Shanghai and back. The "Monchegorsk" represents a new generation of ships – it is both a bulk carrier and an icebreaker. Freighters sailing in the polar region have especially high requirements in terms of the materials used. That makes them expensive and, as a result, the field of competitors so far is quite small.

CHINA LOOKS TO THE ARCTIC

Since the Northeast Passage shortens sea routes and provides access to major reserves of natural resources, it is also of interest to China.

For example: recently, an LNG plant co-financed by Chinese investors started operation on the Siberian peninsula of Yamal, which extends into the Arctic Ocean. The valuable raw materials are being shipped across this ocean. China handles most of its trade by ship. In 2017, goods worth around 375 billion euro were imported into the EU – an increase of more than 60 percent since 2007. Shorter trade routes mean improved access to important markets. This is why, already in 2013, China sent a small container ship on a trial run through the Northeast Passage. The "Yong Sheng" from the state-owned shipping company Cosco took only 35 days – instead of 48 – to reach Rotterdam. While the northern route can shorten the journey from Asia to Europe, it offers fewer advantages for ships travelling towards America. These use the Panama Canal – and, according to US expert Humpert, they will continue to do so in the future. Nevertheless, even if the icy northern route does not replace the journey across the Pacific Ocean, new trade opportunities are opening there – particularly for the transportation of natural resources.

UNLIMITED FLEXIBILITY

The new SYDRIVE azimuth propulsion system enables a hybrid drive solution for any existing vessel design

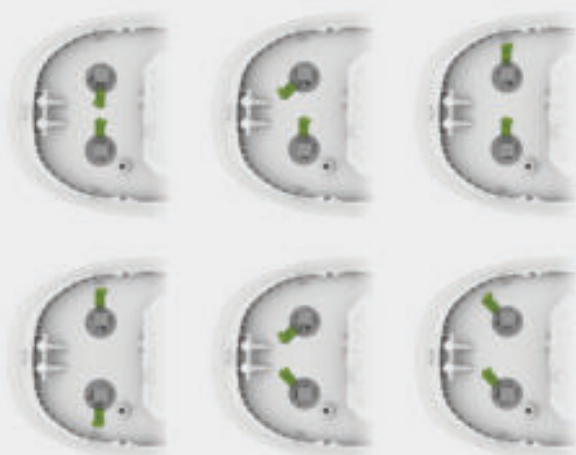
WHY HYBRID?

Operation profiles of tugs and workboats feature low engine loads for up to 90 percent of operation time. In such instances, an engine that is rated for maximum propulsive power works in an unfavourable partial-load range that is inefficient in terms of emissions and fuel consumption. Hybrid drive systems are predestined for requirements with highly variable power ranges. These generally consist of two separate power sources (diesel and/or electric motors) per propeller with different power ratings.

THAT'S WHY SYDRIVE!

Depending on the desired operating mode and the required propulsive power, SCHOTTEL SYDRIVE activates the appropriate power source or both together. The engines and motors are operated efficiently in their optimal load ranges, thereby cutting fuel consumption and emissions.

SCHOTTEL SYDRIVE allows any configuration of the three separately positioned power intakes, thus enabling the hybrid drive system to be integrated into existing vessel designs. SYDRIVE does not require design modifications.



ADVANTAGES AT A GLANCE:

Hybridization of SCHOTTEL azimuth thrusters between 400 – 4,000 kW in all different vessel types

Three power intake positions allow an installation angle of $\pm 90^\circ$ or $\pm 135^\circ$ between the power sources

The power intakes are not subject to any power limitation, enabling a master-slave ratio of up to 50:50

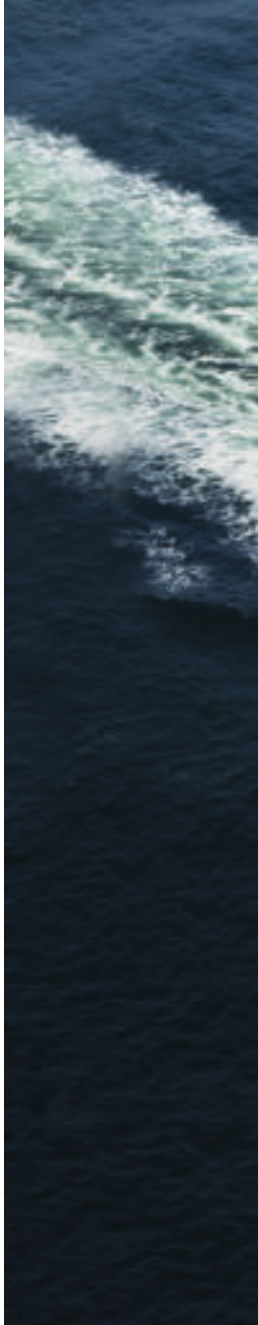
Possible retrofitting of existing vessels with SCHOTTEL azimuth thrusters

SCHOTTEL quality and experience, high availability

INTERESTED? GET IN TOUCH:

sales@schottel.de





MARINE RESEARCH ADVENTURE

Research vessels are travelling from the tropics to the arctic, gathering data on marine pollution, climate change or marine biology. These voyages place high demands on vessel equipment and propulsion systems. Your companion around the world: SCHOTTEL technology and service

For ages, research voyages have stirred our imagination. Trekking through farflung territories, scientists brave the unbending forces of nature to return home with important knowledge. However, the voyages are not simply undertaken out of a sheer thirst for adventure. Today, more than ever, the focus is on fields with far-reaching consequences for humans, the environment and the economy – whether it is climate change, research on marine raw materials, deep-sea biodiversity, geodynamics or geohazards. Since the vessels operate around the world, they require reliable service and maintenance experts for the propulsion equipment in order to withstand the often lengthy missions. SCHOTTEL is thus a partner in demand.

"Ships do not regularly travel to their home port. The entire world is really their home," notes Joachim Müller, Senior Sales Manager for the Tugs & Offshore Energy Segment at SCHOTTEL. "This is why they also must be maintained from anywhere in the world. Thanks to our international network, we at SCHOTTEL are well able to carry this out."

STRICTEST PROPULSION SYSTEM REQUIREMENTS

In earlier days, already existing ships were used for marine research – for example, by moving the canons off the ships onto dry land and thus making room for measuring instruments and further equipment. Today, research vessels are primarily floating platforms, equipped with relevant equipment and precisely tailored to the high demands of science. "For example, in order to send remote-controlled diving robots into the depths of the sea, the vessel must be highly manoeuvrable and be able to hold its position precisely and automatically against wind and

currents for many days," explains Joachim Müller. "A further criterion: noise emission. The propulsion systems are designed for a minimal introduction of noise into the water so that research using highly sensitive sensors is affected as little as possible. This is a challenging task for our developers who have access to state-of-the-art computer tools and calculation methods."

An important element in meeting these requirements is the SCHOTTEL Pump Jet, which is installed in numerous research vessels around the world. Not only does it ensure low-noise propulsion, but it also makes it possible to manoeuvre in shallow water – where even ground contact is possible. An important advantage in marine research where the success of a mission can depend on the pin-point accuracy of the positioning.

FLAGSHIP OF TECHNOLOGY

Around the world, older vessels are being replaced with new, technologically impressive research vessels. SCHOTTEL has been on board here for many years, delivering propulsion and steering systems which are not only tailored to the special requirements of the marine research vessel sector but also contribute to sustainability and cost-effectiveness.

On the German research vessel "Sonne", for example, a combination of a SCHOTTEL Pump Jet and two SCHOTTEL Rudderpropellers, which provides the ship with maximum flexibility for all research purposes, is used. The "Sonne" has also been awarded a renowned German environmental certificate for its efficiency and environmentally friendly operation. The vessel runs exclusively on low-sulphur diesel fuel.



INTERNATIONALLY IN DEMAND

SCHOTTEL technology is installed in research vessels around the world, including vessels from these countries: China, Germany, India, Lithuania, Norway, Poland, Russia, USA.



FROM CONSTRUCTION TO USE IN RESEARCH

State authorities such as the German Federal Ministry of Education and Research (BMBF) often issue a call for tenders for the construction of a research vessel. Upon completion, shipping companies apply for the operation of the vessel. National and international research teams then submit voyage proposals, which are then evaluated and, if applicable, approved by a scientific committee.

Modern catalytic converters reduce nitrogen oxide emissions in order to pollute the environment as little as possible.

It all starts, however, with the overall efficiency of the propulsion system and the particular efficiency of the propeller. With the expertise to fully exploit all the possibilities here, low energy consumption is achieved right from the outset. After all, sustainability is becoming increasingly important – and not just in marine research.

THE FUTURE IS SUSTAINABLE

The latest research vessels, for example, have gas-electric motors installed which minimize both nitrogen oxide as well as sulphur emissions. This not only serves to protect the environment but also allows scientists, for example, to obtain realistic air measurements. A further important component of environmental protection is the SCHOTTEL LEACON system, which ensures that, even in the event of a leak, no oil

from the propulsion system enters the seawater and the ship can continue its mission. “For instance, a vessel researching biodiversity in the Antarctic ought not leave a trail of oil behind it,” stresses Joachim Müller. The system has also been recognized by US authorities, allowing correspondingly equipped vessels to operate in US waters – even if they do not use biodegradable oil as a lubricant.

No matter where the adventures of research vessels lead in the future – SCHOTTEL will continue to support the marine research vessel sector in not only gathering knowledge but also meeting the highest requirements for propulsion technology, cost-effectiveness and environmental protection.



ADDED VALUE FOR LATIN AMERICA

To offer state-of-the-art vessels, COTECMAR works closely with its suppliers, one of which is SCHOTTEL. The first collaboration dates back 15 years with work on a propulsion system for riverine vessels



COTECMAR AT A GLANCE

COTECMAR works in the field of scientific and technological research to support the development of Colombia's maritime industry. The company's primary aim is to meet the needs of the Colombian Navy.

Water everywhere: Colombia has 3,208 kilometres of coastline on both the Pacific Ocean and the Caribbean Sea, plus more than 18,000 kilometres of navigable inland waterways. In particular, the country's rivers call for special solutions – whether the Magdalena River that flows through the Colombian highlands or the legendary Amazon with its many tributaries. It takes a special shipbuilder to construct vessels capable of managing a whole range of situations. One of the companies to successfully take on the challenge is COTECMAR.

For almost two decades, COTECMAR has been developing, designing and constructing vessels for the Colombian Navy as well as for commercial clients. A special focus has always been on R&D to maintain the security and guarantee the tactical operation of the Colombian Navy's vessels. The dedication to constant improvement has allowed COTECMAR to extend its market reach to other Latin American countries. Along the way, the company has established strong relationships not only with its clients but also with its suppliers – such as SCHOTTEL.



3,208 KM

is the length of the Colombian coastline along the Pacific Ocean and the Caribbean Sea.

COLOMBIA

THE START OF A LONG-TERM PARTNERSHIP

Collaboration between the two companies dates back to 2003. The first project focussed on the development of a propulsion system for riverine vessels. "For a safe operation, the propulsion system has to be flexible and permit proper manoeuvrability," notes CN Henry Goyeneche, Vicepresident of Technology and Operations. After jointly reviewing several options, the decision was made for SCHOTTEL Pump Jets, which were installed in four Large Riverine Support Patrol Vessels. The same propulsion technology was later employed in two of the company's Light Riverine Patrol Support Vessels. One of the main features of the Pump Jets is their capability to navigate in shallow waters, an operation that is limited with conventional propellers. The next large project the two companies collaborated on with the same kind of thruster was for Landing Craft Utility vessels. The ships are used for logistics and humanitarian operations in riverine and coastal zones. Here too, manoeuvrability was a big topic, especially for humanitarian rescue in areas of difficult access.

"SCHOTTEL was a strong ally," recalls CN Goyeneche. Today, six Landing Craft Utility vessels are in operation for the Colombian Navy and one for the Honduran Navy. In the past fifteen years, both partners have collaborated on nine propulsion projects. In general, the approach is as follows: according to the requirements, the relationship is very close. Propulsion systems from the SCHOTTEL portfolio are designed and optimized to meet vessel specifications and then carefully aligned

with any customer specific modifications. The ultimate goal is to supply a solution that has an optimal price-performance ratio and is efficient in terms of investment and life cycle costs. "SCHOTTEL continuously invests in R&D, too. This clear commitment is a common element between our companies," notes Julio Carrasquilla, General Manager at SCHOTTEL de Colombia, who is usually the first contact on site.

A STRONG BASIS FOR ONGOING COLLABORATION

Long-term industry forecasts for Latin America show a growth trend. COTECMAR is gearing up to take on larger and even more complex projects in its yards in Cartagena. "We stand out in the market with our extensive vessel portfolio and design services that help us customize our products to offer real added value," says CN Henry Goyeneche. SCHOTTEL is and will remain an important partner on COTECMAR's declared path of becoming a naval leader in Latin America.

18,000 KM

is the total length of all navigable waterways in Colombia.



SETTING THE PACE IN THE HIGH NORTH

Technology from SCHOTTEL is helping Norwegian ferry operators cut their emissions

In 2016, lawmakers in Norway set an ambitious target: to halve emissions from domestic water-going vessels by 2040. The first milestone on the path to lower emissions is for 50 percent of the country's ferry fleet, comprising some 160 vessels, to meet that goal by 2024.

To cut emissions, local ferries, which have a time between stops of around five to seven minutes, are being outfitted with batteries that are charged while people disembark and board. Ferries for routes in which the intervals between stops are greater – for example, 40 minutes and longer – are being equipped with hybrid biodiesel-electric or LNG-electric configurations. In either case, whether battery only or hybrid, it takes special propeller technology to keep these vessels going.

SCHOTTEL IN THE LEAD

That's where SCHOTTEL enters the picture with the Rudder EcoPeller® (SRE). It is based on the SCHOTTEL Combi Drive design principle: The electric motor is vertically integrated into the support tube of the EcoPeller. The space-saving design offers outstanding overall propulsion efficiency and excellent course-keeping stability. The effects are low energy consumption, low operating costs, low vibration and low noise levels. "The SRE fits the ferry market's needs to a T," comments Jan Helge Telseth, Sales Director for SCHOTTEL Norway AS.

The orders to outfit a total of eight ferries with the Rudder EcoPeller® put SCHOTTEL in the leading position in the Norwegian market for efficient ferry drive systems. "The good thing is that the SRE is suitable for both new builds and retrofits, plus it can be employed on all types of vessels – not just ferries," says the sales expert.

Norway isn't alone in its efforts to cut maritime emissions: similar legislation has been adopted in Denmark, the Netherlands, Sweden and the UK. SCHOTTEL is set to share the experience gained in Norway with ship builders and operators in these countries too.

The transition to lower-emission vessels in Norway is keeping Jan Helge Telseth and his team busy. Nonetheless, he does take time in between to contemplate what could be on the horizon: "I think it's just a matter of time before we see further innovations in autonomous driving. A primary driver here is the logistic companies that want to move transport from land to sea with the use of battery-powered autonomous vessels. We already have robotic systems calculating the best way to cross a fjord, and before long we'll be seeing the implementation of auto docking." An innovative spirit is alive and well in Europe's High North.



SCHOTTEL NORDIC AS

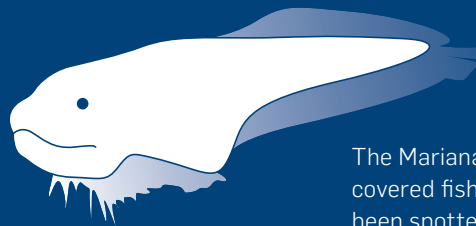
With the forming of SCHOTTEL Nordic AS in November 2018, SCHOTTEL is now able to provide both new building advice and after sales services in the Nordic region. The latter will continue to be located in Gardermoen, offering workshop facilities for the overhaul of thrusters as well as warehousing. The company will be headed by Jan Helge Telseth located in Bergen. Petter Lund Hansen will serve as General Manager of Service and Upgrades in Gardermoen, and Sales Manager Idar Hatløy will be located in Ulsteinvik. Contact: nordic@schottel.com

LOOKOUT

140_m

Around the world, 140 million TEU standard containers (20 ft and 40 ft) were transported in 2017. By 2022, this number is expected to increase to 178 million TEUs. ^{1*}

DEEP SEA LIFE



The Mariana snailfish is a newly discovered fish species that has recently been spotted in the Mariana Trench at a depth of 8,000 m. Despite the enormous pressure, scientists do not rule out life at even greater depths. ^{2*}

180 pirate attacks were registered in 2017. In 2010, piracy was at its highest point to date, with 445 reported cases. ^{3*}

200_t

The quadrimaran "Manta" is to begin its cleaning mission in the ocean in 2022. It can collect, sort and compress up to 600 m³ of macroplastics, equivalent to 200 t of plastic refuse. ^{4*}

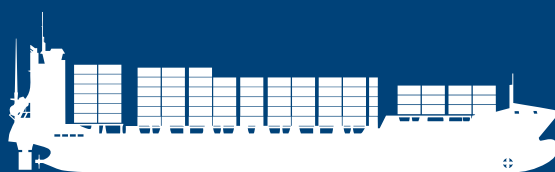
Although freshwater typically turns to ice at 0°C/32°F, the freezing point of saline water is significantly lower. It only freezes at approx. -16°C/3.2°F. ^{5*}



180

Approximately 90% of the global transport of goods is by sea. In addition to this, roughly 40,000 merchant vessels are in use, including tankers, bulk carriers and container ships. ^{6*}

1628



With roughly 95% of its original parts, the Vasa is the only preserved ship from the 17th century. It sank on 10 August 1628 in Stockholm harbour and can today be viewed in the eponymous Swedish museum. ^{7*}

Source:

1* Statista; 2* geo.de, January 2018; 3* Statista 2018; 4* theseacleaners.org, reset.org; 5* br.de; 6* German Federal Environmental Agency, worldoceanreview.com; 7* vasamuseet.se

MASTHEAD

YOU CAN FIND US HERE:

SCHOTTEL GmbH
Mainzer Strasse 99
56322 Spay/Rhine
Germany
Phone: +49 / 26 2861 0
24 h Emergency Hotline:
Phone: +49 / 26 2861 800



CLOSE CUSTOMER PROXIMITY AROUND THE WORLD:

EUROPE

SCHOTTEL France
Phone: +33 / 14 38 23 130
SCHOTTEL Norway
Phone: +47 / 63 87 17 00
SCHOTTEL Nederland
Phone: +31 / 79 36 11 391
SCHOTTEL Russia
Phone: +7 / 81 25 78 50 68

AMERICAS

SCHOTTEL USA
Phone: +1 / 98 53 46 83 02
SCHOTTEL Canada
Phone: +1 / 58 13 29 56 66
SCHOTTEL Brazil
Phone: +55 / 21 22 03 02 18
SCHOTTEL Colombia
Phone: +57 / 56 43 69 97

MIDDLE EAST

SCHOTTEL Dubai
Phone: +971 / 48 80 77 50

ASIA PACIFIC

SCHOTTEL China
Phone: +86 / 51 26 66 51 923

SCHOTTEL FAR EAST

Phone: +65 / 68 61 09 55
SCHOTTEL Australia
Phone: +61 / 89 33 55 063

FOR FURTHER ADDRESSES:

www.schottel.de

PUBLISHER

SCHOTTEL GmbH
Mainzer Strasse 99
56322 Spay/Rhine
Project Management
(person responsible for
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AUTHORING, DESIGN & PRODUCTION

3st kommunikation GmbH
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