was truly a momentous year for the ZF Group. It was a year for our Centennial celebration, but also a year of massive expansion with the acquisition of automotive supplier TRW. ZF is now one of the largest automotive suppliers in the world, and is a leader in the development of passive safety technology. Not only will this make the cars we drive today safer, but is an important step in the movement towards a networked automotive landscape that will see autonomous cars whisking people safely from A to B.

What does this have to do with the marine industry? Quite a lot really. As a total organization, ZF spends some one billion Euro in R&D activities. Technology transfer within the ZF Group allows every division of the company to access the latest in developed ideas and concepts. The idea of autonomous deep sea shipping is still in its infancy, but autonomous vehicle technology from ZF’s automotive divisions could very well serve as the basis for systems that take ships safely across the world’s oceans.

But, let’s take a step back to 2016. It’s certainly started out as an interesting year. Oil prices continue to be at a very low level, which certainly provides economic challenges for petroleum dependent economies around the world. It also has resulted in an unparalleled level of off shore support vessels around the world remaining tied to the dock. Other parts of the market are certainly better in the commercial craft sector, but it’s still a guarded market for laying new keels. Certainly we will see further consolidations in the market, not only in fleet operators but in the supply chain as well. We see that even big and long established market players are now feeling the pressure.

ZF Marine is as committed to the pleasure and commercial craft segments as ever. We continue to invest in the development of new technology to make vessel operation easier, safer, and more efficient. Our focus this year is the expansion of our commercial thruster business. Strengthening and expanding our product offering based on the demands from the market. Tow boat operators in both the US Inland Waterway system and in the Amazon region are more and more realizing the benefits of azimuth thruster technology from ZF Marine. The pleasure craft segment remains stable if not growing. Our presence in the watersports arena continues to grow through redesigned and new transmission product offerings. Additionally, we continue to develop technology outside of our traditional transmission arena. ZF Marine introduced the world to joystick control for traditional shaft line pleasure craft vessels with our Joystick Maneuvering System. In the coming months we’re going to introduce new and exciting functionality to the proven JMS system.

The investment also continues with our propeller product family. ZF Marine is actively making improvements to our propeller production facility. The addition of 3D scanning to the quality process allows for each propeller to be 100% measured. This laser scanning insures each propeller is machined and polished to exact specifications. Back Cove Yachts uses ZF propellers exclusively for their beautiful yachts manufactured in the Northeastern United States. You’ll learn more about them and ZF Propellers in this issue.

As you can see, ZF Marine continues to position itself well for both the present and the future. We continuously strive to be your choice for propulsion components and complete system solutions. Our team is more than ready for your next challenge.

Thank you for your time.

Daniel Härter
VP, Industrial Technology
Business Unit Marine Propulsion Systems

ZF Marine manufactures a range of standard and custom designed fixed pitch propellers for both commercial and pleasure craft applications.
**NEWS FROM THE REGIONS**

**NORTH AMERICA**

**MASTERCRAFT BOATS RECEIVES TOP MANUFACTURING AWARD**

ZF Marine’s customer MasterCraft has consistently produced quality, high-performance water sports boats. MasterCraft recently earned the 2015 Industry Week Best Plant Award for operational excellence in leading-edge manufacturing facilities across North America. The company now shares this honor with companies such as Harley Davidson, Toyota, and Lockheed Martin.

**VIKING’S NEW SPORTFISHING YACHT**

ZF Marine’s customer Viking Yacht Company recently introduced the newest addition to its fleet, the Viking 48 Convertible. This newest sportfishing yacht has three staterooms and two heads, and debuted at the Yachts Miami Beach show this past February.

**SOUTH AMERICA**

**INCREASE IN SALES ACTIVITY**

Brazil is facing a tough political and economic climate that is slowing offshore market activity. Despite the challenging market environment, Brazil continues to see a steady stream projects for river going vessels. The Inland Waterway market within the Amazon has managed to thrive in this economic climate due to soybean exports. ZF do Brazil expects an increase in the sale of marine transmissions and ZF thrusters in this region.

**CHANGES FOR PETROBAS**

The Brazilian Government will review Petrobras’ Role as Sole Operator of Brazilian Oil Fields. Brazilian President Dilma Rousseff said she would review Petrobras energy corporations’ current status as sole operator of the country’s pre-salt oil. Rousseff’s announcement comes as the Brazilian Senate considers a bill that would end Petrobras’ exclusive holding. This congressional vote to modify Petrobras’ role could eventually encourage more investment and allow other oil companies to operate the fields, driving new Off Shore Vessel projects once again.

**EUROPE**

**IMPROVING CONTINUOUS IMPROVEMENT**

Research & Development and After Sales & Service have joined forces for a new approach to how ZF Marine improves its products. Our Customer Claim Management System allows for an essential flow of timely and vital information between our After Sales and R&D team. When issues arise in the field, our global Product Competence Centers in Krimpen, Friedrichshafen, Arco, Padova, and Sorocaba are responsible for analyzing these product issues and identifying any possible trends. Both teams then work together to resolve the issue and implement a solution both for the field and for the production facility.

**COMMERCIAL SALES CONTINUE IN EUROPE**

ZF Marine recently secured a large order with Polstemp Shipyard in Poland. The order consisted of 4 Deck Mounted Azimuth Thrusters to be installed on a cable layer pontoon. The pontoon is designed to lay underwater cables for telecommunications, electric power, or other purposes. Last December, all 4 ZF AT 5111 units were shipped for delivery to the yard. The vessel will operate during the summer in the Baltic Sea for cable laying between two countries. The thrusters will be connected to a dynamic positioning system which will allow the vessel to maintain position with a high degree of accuracy in both windy and still conditions.

**ASIA PACIFIC**

**ZF MARINE EXPANDS ITS CUSTOMER PORTFOLIO IN THE CHINA MARKET**

ZF Marine continues to expand the product portfolio for customers in China to best meet their increasing business demands. The portfolio now includes a wider range of transmissions as well as thruster systems and electronic control systems specifically designed for commercial and fast craft applications. Thanks to their compact and efficient design, retractable thrusters, azimuth thrusters, and tunnel thrusters from ZF Marine are gaining special interest from our customers in China.
A POWERFUL FOUNDATION:
Back Cove Yachts builds its brand with simple, tough, dependable ZF technology.

As with many American success stories, Back Cove started small, with modest goals. Jason Constantine, the company’s president and chief operating officer says the company began as a boutique brand intended to expand the product line offered by its sister company.

In the mid 1990s, the management team at Sabre Yachts purchased North End Composites, a Maine company specializing in custom fiberglass work both in, and outside of, the marine industry.

Around 2001, the Sabre Yachts team realized an opportunity for single-engine, smaller yachts and cruisers was beginning to take shape in the U.S. “Sabre really concentrates on larger boats,” Constantine notes. “But we felt that a market existed for a smaller cruiser in the 25-35 foot range.”

“A lot of these first customers were Baby-Boomers nearing retirement age who were lifelong sailors,” adds Kevin Burns, Vice President, Design and Product Development for Back Cove Yachts. “Many of these customers owned Sabre sailboats. But they wanted a power boat they could really wrap their heads around: Things like a simple, robust design powered by a diesel engine with a straight-shaft driveline. It’s a traditional arrangement that comforting and easy for an experienced boater to understand: And that single-diesel, straight-shaft design has carried through with Back Cove to this day.”

Excited by the concept, Sabre decided in 2003 that North End Composites would handle the new model lineup. “We thought it would be a nice little project to supplement North End’s tooling work,” Constantine says with a chuckle. “We figured we’d do 15 – maybe 20 – boats a year. Very quickly, we found ourselves producing 70 to 80 boats a year and our entire focus changed.”

Today, the company manufactures a lineup of five powered boat models ranging from 30- to 41-feet in size. And both Constantine and Burns credit Back Cove’s overall design philosophy with the success of the brand. “Maine is really the heartland of American boat-building,” Burns says. “And the great traditions that were created here certainly inform our designs. We deliver uncluttered boats with every aspect thought-through to insure the highest possible quality.”

For Burns, this all boils down to what he calls “nautical sensibility.” “We have an extremely pragmatic approach to all aspects of our designs,” he explains. “Nothing is affected. Everything is very deliberate and reflects our feeling that a Back Cove Yacht is a boat first. These aren’t floating condominiums or toys. We build real-world capable boats. And that

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forms everything we do and is ingrained in us by the tradition of high-quality boat-building in this area.”

“We don’t do shortcuts,” Constantine adds. “We use only the highest-quality components available and don’t waste time or money on materials or installations that don’t add value to our owners’ boating experience.”

Constantine says that means getting every detail right. “When people step aboard a Back Cove Yacht for the first time, they’re going to see that everything is exactly where it’s supposed to be,” he says. “They don’t have to bend down to look through the windshield, for example. They’ll see and appreciate that everything on that boat is in exactly the right place.”

This attention to detail is carried through with Back Cove’s powertrain offerings. The majority of the company’s builds are spec’d with ZF Marine transmissions. And 100 percent of the company’s boats feature ZF Marine propellers.

Back Cove starts with its single-diesel, straight-shaft design, a proven configuration that Burns says is the most reliable in the world. “You see this configuration all the time on commercial craft,” he notes. “Because it is – by far – the most robust, foolproof way to push a boat around. So everything we do grows from that philosophy.” Back Cove relies on its local ZF distri-
A propeller is a boat’s enabler,” says Larry Kindberg, president of AccuTech. “Props move boats – not engines,” Kindberg says. “So having one that is accurately and correctly made makes all the difference in the world as to how a boat will perform. Back Cove understands that and we work with them, and ZF Marine, to make sure they’re always getting that high level of performance.”

As for ZF Marine transmissions, Burns says they’re practically bulletproof. “We never hear about any warranty claims for ZF Marine transmissions,” he says. “And to me, that is the highest compliment I can pay them. We have every confidence our owner’s boating experience will never be compromised by the failure of a ZF Marine transmission.”

“We’re proud not to offer an off-the-shelf propeller product,” says Drew Orvieto, propeller product manager, for ZF Marine. “And that’s an approach which really works well for Back Cove. They have a fantastic reputation for using high-quality components and we get really involved working with them and Accutech to make sure all the propellers they spec are matched exactly to their vessels.” Orvieto notes that while Accutech is Back Cove’s day-to-day channel to ZF, his engineering team is ready to assist if higher-level performance analysis is needed. “Our staff of naval architects has the highest level commercial engineering software available at their disposal,” he says. “So we’re able to analyze data from simple weight and power all the way up to 3D hull models to make sure we get the right props on a boat. And we can deliver those props in as little as four to five weeks if necessary.”

“I would say the accuracy of the actual propeller specs – ZF and Accutech’s ability to consistently deliver reliable and repeatable prop specs – has been crucial for seeing our powertrain event philosophy come to life and evolve,” Burns says. “We have confidence in those propellers right down to the high-quality metals and materials ZF uses to craft its propellers. We know that each link in our powertrain chain will be as strong as the next.”

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In addition to standard and custom designs, ZF Marine can also manufacture surface piercing propellers as well as stainless steel propellers, upon request.

**ACCUTECH: NO VIBRATIONS ARE GOOD VIBRATIONS**

Larry Kindberg wasn’t interested in getting into the marine propulsion business. He just wanted his sport fishing boat to run right. It was 1998, and Kindberg, a financial planner with a background in aviation, had a new boat that vibrated badly. “I quickly found out that vibration was ‘somebody else’s problem,’” he says today. “No one seemed to know what to do about it. And my boat dealer just told me it was normal. So I learned to live with it.” But a couple of years later, Kindberg hit some rocks and had to replace the original props. “With the replacement props, the boat now vibrated so bad you couldn’t stand on the deck,” he says. Several calls and trips to his local propeller shop only ended in frustration. “They basically told me there was nothing wrong with that prop and not to come back and bother them about it,” he says.

An Internet search for a new prop shop led Kindberg to a propeller hydrodynamics expert from Ryan himself, and set up Ac- cutech featuring PropScan technology in 2001.

Today, Accutech operates out of a 6,000 square foot facility in Dover, New Hampshire with 9 employees. The company specializes in blueprinting marine propellers for accuracy and has been awarded a Coast Guard commendation for boosting fleet fuel economy by 10 percent. Currently, Accutech is working with New York Waterways to outfit their new fast ferry boats with 58-inch ZF propellers. ZF is highly responsive to our needs, with a great selection of prop sizes and styles,” Kindberg says. “They really help us work with performance-focused customers like Back Cove, as well as commercial lobs- ter boats up north. It can be a challenge to prop today’s new, electronically-controlled engines correctly, but ZF gives us the tools and the engineering support we need to deliver that level of marine performance.”

ZF Marine specializes in the manufacture of both standard and custom designed fixed pitch propellers. The range of available standard propeller designs covers a wide variety of pleasure and commercial vessel applications. Custom designs are available for precise matching to the characteristics of a specific hull design ensuring the boat performance, silent operation and optimal fuel efficiency. High quality alloys are carefully chosen to meet classification society requirements and physical properties are precisely controlled and tested for each cast.

In addition to CNC machining and dynamic balancing of each propeller, ZF Marine is taking a step into the future with new quality system technology. Three-dimensional laser scanning compares the finished product with the design’s 3D geometry. This technology uses an optical measuring system that allows light from the laser to bounce off of thousands of points on the propeller and produce a 3D model revealing the level of accuracy (as defined by ISO standards) along the entire surface of the propeller. This process of propeller scanning results in a much more comprehensive and accurate visual representation of the quality of the finished propeller.
The average length of time that it will take to fill a container and enclosed trailer will be about using current methods.

Particularly weak segment is Offshore Oil & Gas: High oil prices have slumped since mid 2014, and are currently standing at around $55 / bbl.

A large container ship engine has roughly 1,000 times more power than the average family car.

In 2015 China was the largest commercial shipbuilding country, followed by Japan and South Korea.

Commercial and Fast Craft Transmissions in Friedrichshafen, Germany
Spare Part Business: 8 people
Technical Support / Field Service: 9 people

Thruster Systems in Krimpen aan de Lek, the Netherlands
Spare Part Business: 7 people
Technical Support: 3 people
Field Service: 13 people

Pleasure Craft Applications in Padova/Arco, Italy
Spare Part Business: 4 people
Technical Support / Field Service: 11 people

Our customers expect us to continuously enhance the performance and durability of our products to keep the operation cost of their vessels at a minimum. Therefore the PCCs and the After-sales network are regularly involved in business development projects to create new solutions and services. Retrofit, vessel upgrades, and global stocking concepts for better parts availability are just three examples of the extended service portfolio we can offer to our customers as a result of this cooperation.

The Product Competence Centers collect field information from around the world and continuously meet with their production, quality, and research and development colleagues in “quality circles” to provide the necessary input and experience for technical product improvements. Furthermore the PCCs work closely with the regional and local competence centers to ensure that specialized knowledge is communicated to ZF Marine locations globally. This is accomplished through continuous improvement of our technical manuals and regular training courses for our global After Sales & Service Networks.

The backbone of our After Sales & Service operation is our service teams worldwide. In this edition of ZF Report, we would like to introduce you to the teams at our three factory based Product Competence Centers (PCCs), located in Friedrichshafen Germany, Krimpen Netherlands, and Arco Italy.

The teams are divided into three categories: Spare Part Sales and Distribution, who work together with the logistics department to ensure that the required spare parts are on hand and available in the least amount of time possible. Our Technical Product Support teams which train and support our Regional and Local Competence Centers (RCC/LCC) worldwide. It is the RCCs and LCCs who give our customers factory support at a local level. And last, but not least, in the rare case of a challenging technical problem, our “flying doctors” go to various locations around the world supporting RCCs and LCCs where their assistance is needed to repair a product in the field.

Shanghai is the busiest port in the world in terms of shipping tonnage with approximately 771.6 million tons in the year 2013.

A container and enclosed trailer will be about 40 minutes using current methods.

From mid 2016, Pleasure Craft production in the United States will subsequently rise through at least the first three quarters of 2018.

The global commercial vessel orderbook continued to grow for the second year on a row.

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PRODUCTS, SERVICE, INFORMATION – ZF MARINE PROPULSION SYSTEMS AT YOUR FINGERTIPS

ZF MarInteractive – the app for smartphone and tablet users from ZF Marine Propulsion Systems. Whether you’re looking for new marine products from ZF for Pleasure Craft, Fast Craft, or Commercial Craft, finding your closest authorized ZF service and parts center, or downloading the latest product information – the ZF MarInteractive app offers all of this at your fingertips. If you’re in the marine industry, and need specifications for ZF products on a regular basis, or just want the peace of mind from having ZF’s service network a touch away during your next voyage, it’s all at ZF MarInteractive.