



**ABS**  
& AFFILIATED COMPANIES

2015 ANNUAL REVIEW

# **STRONG** & SUSTAINABLE

## **ABS MISSION**

The mission of **ABS** is to serve the public interest as well as the needs of our members and clients by promoting the security of life and property and preserving the natural environment.

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**STRONG & SUSTAINABLE****MAINTAINING A STEADY COURSE**

**S**ince the second half of the 18th century, classification societies have established and maintained technical standards for the construction and operation of vessels and offshore structures with a primary purpose to protect life and property as well as safeguard the environment.

Safety remains the principal focus as classification societies continue evolving at a rapid pace. Structural shifts, regulatory challenges and technology evolution spur research and innovation to improve the effectiveness and delivery of practical guidance and groundbreaking solutions.

Born from the need to promote safety, classification societies continue to set industry benchmarks for securing life and property, and for preserving the natural environment.

As classification societies navigate the increasingly complex, interconnected and challenging global marketplace, ABS continues to chart its class-centric, solid path to deliver strong and sustainable value for its members and clients. With a passion for making the seas a safer place, ABS stands ready to assist and advance the marine and offshore industries.



# **STRONG & SUSTAINABLE**

# **DEFINING THE FUTURE OF CLASS**

**F**or ABS and the ABS Group of Companies, Inc., 2015 was a year of moving forward in strong and sustainable ways with a relentless focus on our class-centric strategy. Even as we navigated an industry slowdown due to steep oil pricing declines and increasing regulatory challenges, we provided exceptional classification services, innovative safety, quality and environmental services, strengthening our relationships and affirming our position as trusted technical advisors in safe, reliable and efficient ways.

## **ABS**

We had a solid performance in 2015, earning the top position for global orderbook share based on gross tonnage (gt) and confirming our strong relationships with vessel owners and shipyards through each of our 220 offices around the world.

Our classed fleet last year surpassed 230 million gt, marking a new chapter in our history. Along with delivering strong safety performance, maintaining our excellent industry reputation, and launching industry-focused technology initiatives, we also maintained our number one position in the *Lloyd's List Class Society Top 10* rankings.

In offshore, we saw a slowdown in orders and some project cancellations. Despite a yearlong industry downturn, we held steady to the leading positions in all major sectors—drilling, production and offshore support vessels (OSVs). Though commodity pricing has been lower for longer-than-expected periods, we remain vigilant in our efforts to deliver exceptional classification services in anticipation of a recovery.

In the marine sector, we laid the groundwork to position ourselves for growth, and we began centralizing our approach to move the organization closer to market drivers, providing a more consistent structure for technology development and even stronger client relationships. We will be better situated to execute our mission and to provide real value to our members and clients.

We delivered strong Port State Control performance for our 2015 classed fleet, and our global survey teams remain laser-focused to sustain and continuously improve this important quality measure.

Dedication to providing great classification services globally, demonstrating industry-recognized leadership and being our clients' trusted technical advisor matter in every environment. It is fundamental to who we are and defines and separates us from our competition.

Safety is the core of our mission and is reflected in how we carry out our mission. It's not a coincidence that organizations embracing a strong safety culture also excel as high-performing organizations in the markets they serve, and we are working toward this exceptional standard.

While ABS improved safety awareness and performance in 2015, we recorded three lost time incidents. We remain convinced that zero lost time incidents are attainable and we continue to strive toward that goal. In 2015, ABS achieved a Total Recordable Incident Rate (TRIR) of 0.74. This reinforces the importance of our obligation and adherence to our *Spirit of ABS*.

The *Spirit of ABS* is who we are as an organization—defined by a core set of traits that make us truly unique. It is about how we work together globally as a team to reliably deliver innovation and quality with integrity. It is our differentiator and the framework for the ways in which we serve the public, industries and clients.

Guided by the enduring principles of the *Spirit of ABS*, our employees are sharply focused on the direction and strong values ABS has embraced since our founding in 1862. Safety, People, Innovation, Reliability and Quality, Integrity and Teamwork enable us to make the world a safer place and nothing could be more important.

## ABS GROUP OF COMPANIES, INC.

In existence to support ABS, the ABS Group of Companies, Inc. (ABS Group) continued to deliver industry-recognized leadership in safety, asset and risk management services. We continued to help industrial clients and governments improve operational efficiency and asset reliability, manage risk and develop processes to meet the highest levels of safety excellence. We remain well-positioned to add value and build long-term growth for the organization.

Innovative projects in 2015 included offshore wind developments and cyber-risk assessments and were complemented by core business successes in the marine, energy, government and pharmaceutical industries, such as incident investigations and asset integrity management programs. These activities demonstrated the need to continue building our diverse portfolio and responding quickly to industry needs during challenging situations and demanding operating conditions.

**F**or ABS and the ABS Group, we conducted global employee surveys in 2015 and the workforce engagement score for both organizations exceeded that of other global, high-performing companies. Employees are strongly aligned to the goals and values, and they feel engaged, enabled and energized to work for their respective companies.

In addition to chairing ABS and the ABS Group, my year as Chairman of the International Association of Classification Societies (IACS) began in 2015, and one of my accomplishments included the establishment of a Cyber Systems Panel to address cyber-enabled physical safety systems. IACS Panels represent the top tier of the Association's issue-specific bodies and enhance the organization's ability to address cyber system safety concerns and support the protection of human life, property and the marine environment.

We enter 2016 well prepared to meet the increasing challenges of operational issues, regulatory requirements and continuing commodity pricing pressures. We are confident that we will emerge as a stronger organization when the market strengthens again.



ABS will continue to excel by delivering exceptional classification services, along with trusted technology development and guidance. ABS Group will continue to support ABS by providing expert-led solutions across the industrial, power, energy and government industries.

A strong commitment to ethics and integrity is not just good business—it is part of the fabric of who we are as an organization and as individuals. Our clients trust us to be their partners. We trust one another to operate according to the highest standards of conduct, and our commitment to ethics and integrity is the foundation for past and future successes that benefit us all.

The headway we made in 2015 is the result of the hard work and perseverance of our workforces and leadership, and I thank every employee and our Boards of Directors personally. Rest assured that no matter the market conditions, we will never lose focus on our missions. And the outcome of our unwavering focus is the strong performance we delivered in 2015, which will sustain us well into the future.

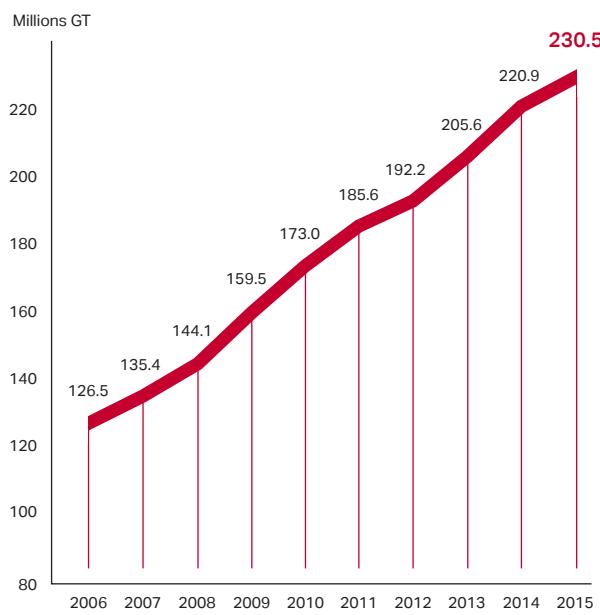
Above all, thank you to all our members and clients for your continued trust in ABS and the ABS Group of Companies, Inc.



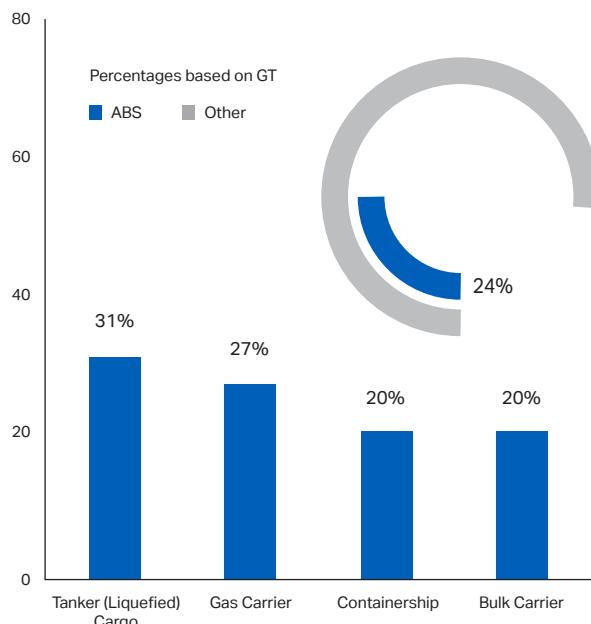
Christopher J. Wiernicki  
Chairman, President & CEO of ABS  
Chairman, ABS Group of Companies, Inc.

# STRONG & SUSTAINABLE 2015 ABS HIGHLIGHTS

## EXISTING FLEET 2015



## ORDERBOOK SHARE 2015



## ABS-CLASSED FLEET

**10 m gt** MARINE & OFFSHORE GROWTH

**841** NEW ASSETS CLASSED

### LARGEST EXPANSION

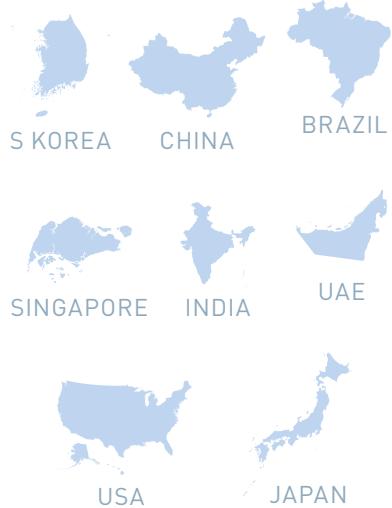


## TRANSFER OF CLASS AGREEMENTS

**1.4 m gt** NET TOTAL OF VESSELS



## STRONG ORDERBOOK FOR SHIP BUILDERS



## LEADING POSITION IN NEW CONSTRUCTION WORLDWIDE

**57.2** MILLION gt  
**2015**



**49.7** MILLION gt  
**2014**

**15%**  
GROWTH  
ABS ORDERBOOK



CONSECUTIVE YEAR INCREASE

## GAS CARRIERS

**10 NEW**  
GAS CARRIERS

FLEET SIZE  
REACHES  
NEARLY  
**11.3 m gt**



  
**6.2 m gt**

TOTAL  
ORDERBOOK

**LPG**  
SECTOR



## OIL TANKERS

EXPANDED  
FLEET BY  
NEARLY  
**3m gt**  
  
**80m gt Overall**

DOUBLED  
ORDERBOOK  
**312**  
VESSELS

**20m**  
ON  gt  
ORDER

## ULCS

EXPANDED  
ORDER  
  
**6.3**  
m gt

NEARLY  
**FIVE FOLD**  
  
VESSELS ON ORDER

  
**ABS**  
SHARE  
RANKING  
INCREASES

## BULK CARRIERS

FLEET INCREASED BY  
MORE THAN **30** NEW  
VESSELS

TONNAGE  
REACHES  
NEARLY **49m gt**

ON ORDER TO ABS CLASS  
**232**  **13 m gt**  
BULK CARRIERS



## OFFSHORE UNITS

MAINTAINED  
**STRONG**   
CLASS SHARE  
**MODUs/MOPUs**

YEAR-END  
**JACKUPS**  
**551** TOTAL UNITS



## CLASSED

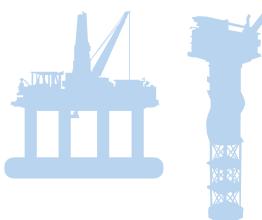
**21**

TENSION LEG  
PLATFORMS

&

**19**

SPARs



## CLOSED

YEAR WITH

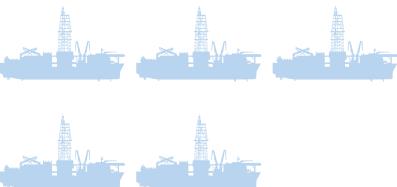
**198**

TOTAL  
PRODUCTION UNITS

## DRILLSHIPS

GREW ACTIVITY  
**ADDED**

**5** NEW  
ASSETS



## OSVS

**84** NEW  
OFFSHORE  
SUPPORT VESSELS  
TO ABS CLASS

**597**  
TOTAL  
VESSELS  
ON ORDER



## STRONG & SUSTAINABLE PERFORMANCE

We delivered strong performance in 2015 by maintaining our strategic focus on quality, operational excellence in service delivery, and targeted innovation investment. Our commitment to provide best-in-class classification services and efficient operations to support safety in marine and offshore operations will position us to emerge even stronger when the global energy climate improves.

The year saw the ABS-classed fleet expand by nearly 10 million gt, adding a net total of 139 new assets since the end of 2014. Driven by deliveries across every major category of assets in both the marine and offshore sectors the largest expansion occurred in the tanker, gas carrier, container ship, and offshore support vessel segments. In addition to new vessel deliveries, Transfer of Class Agreements brought in a net total of 1.4 m gt of vessels marking the second consecutive year of positive transfers for us.

2015 was a year in which we held our leading position in new construction projects across the globe. We closed the year with 57.2 m gt on order, representing 15 percent growth in our global orderbook over the prior year. This was the third consecutive year of growth and the second year in a row that we held the largest share of the global orderbook. The continued expansion of our classed fleet and orderbook is driven by our ability to continuously leverage our global service network in 220 offices around the world to support the marine and offshore industries.

Our strong safety record of our global classed fleet is a key performance metric for us. In 2015, the leading Port State Control authorities continued to rate us amongst the top tier of recognized organizations, earning high marks in the Paris MOU, Tokyo MOU and the U.S. Coast Guard ratings. The year also closed with the ABS-classed fleet once again performing better than industry averages in terms of overall serious casualties and serious hull and machinery casualties.

In 2015, our research and development (R&D) investment continued to expand our innovation ecosystem, supporting industry in contending with new technologies, regulations and shifting operating environments. With nearly 300 projects across our six innovation centers around the world, we embarked on groundbreaking work in alternative fuels, Arctic capabilities and new innovation techniques to define the future of classification. We also spearheaded 37 joint technology projects at top-tier universities worldwide to focus on the most significant industry challenges.

Our Nautical Systems (NS) group continued to deliver cutting-edge software solutions and updates as it has for more than 30 years. Launching the latest version of its holistic Enterprise software suite, as well as a streamlined version for core operational and compliance activities, NS also delivered a secure cloud-based version of its fleet management software in response to clients' mobility needs and requirements.

These investments, as well as our industry-leading joint R&D projects, are advancing the future of the marine and offshore industries through industry, regulatory, and academic collaboration, driving safety and protection of the environment through technology and innovation. These are some of the notable accomplishments that demonstrate our commitment to deliver outstanding performance and best-in-class services to our members and clients, but we also spent time in 2015 laying the groundwork for organizational improvements in the marine sector that will play out in the coming year.

As we move toward the realization of our technical performance objectives, we continue to invest in new training and development methods. We delivered approximately 220,000 hours of training and development for ABS employees and clients, as we continued our annual global awareness events focused on health, safety, environment and quality, and ethics and compliance. I am proud of our performance during the year and would like to personally thank our global team members who deliver world class service to our members and clients every day and build our organization for a strong and sustainable future.



Tony Nassif  
Executive Vice President & COO, ABS

## STRONG & SUSTAINABLE

# GLOBAL INNOVATION ECOSYSTEM 2015 HIGHLIGHTS

## TOP

- Cybersecurity and software quality
- Machinery, systems and structural health
- New survey technologies
- Shaft alignment

*As identified by ABS clients*

## INDUSTRY TECHNICAL CHALLENGES

- Knowledge resource for material and component failures
- Ballast water management
- Noise reduction
- Crew safety
- Hull and propulsion improvements

## FUTURE

### OF CLASSIFICATION

#### STRATEGIC FOCUS AREAS:

1. Enabling technologies
2. Cyber, software and data strategy
3. Asset integrity
4. Energy and environment

# 64

### INDUSTRY PUBLICATIONS

RULES, GUIDES, GUIDANCE  
NOTES AND ADVISORIES

# 29

### SOFTWARE APPLICATIONS

# 6

### GLOBAL R&D CENTERS

# 205

### TECHNICAL PAPERS, ARTICLES AND WORKSHOPS

# 43

### JOINT DEVELOPMENT AND INDUSTRY RESEARCH PROJECTS

With regulatory agencies, operators, class societies, fabricators, owners and designers

# 37

### ACADEMIC RESEARCH PARTNERSHIPS

WORLD-CLASS  
UNIVERSITIES

Launched annual University Partnership Symposium, connecting academia and industry in a forum at which top U.S. universities presented results of ABS-funded research initiatives, including sensor technology, autonomous inspection, materials innovation and nanotechnology

## STRONG & SUSTAINABLE GLOBAL INNOVATION ECOSYSTEM

**A**BS continues at the forefront of marine and offshore innovation. In a constantly evolving industry, ABS works alongside its partners tackling the most pressing technical, operational and regulatory challenges in order that the marine and offshore industries can operate safely, securely and responsibly.

In 2015, ABS made state-of-the-art advancements to address some of the most pressing industry technology challenges.

### MITIGATING RISKS IN CYBERSECURITY AND SOFTWARE QUALITY

New technologies are a key part of today's upgraded machinery, automation and control packages. These systems present both new opportunities and new threats. Increased connectivity heightens the risk of cyber threats; so cybersecurity, software quality and data integrity are key components in providing functional assurance and operational integrity to mitigate the elevated risks.

In 2015, ABS continued its revolutionary work to design the industries' first risk-based management program for asset owners to apply best practice approaches for four key cyber areas: cybersecurity, automated systems safety, data management and software assurance.

The ABS program defines a scalable approach that can be applied to a single component as well as a multi-system suite of assets. The program also can be used with industry regulatory mechanisms within or external to the marine and offshore industries to achieve sustainable, measurable and secure asset condition.

The first part of the ABS cyber project was completed in late 2015 as a Guidance Note to provide best practices for cybersecurity as a foundational element of overall safety and security in the marine and offshore industries.

ABS continues its work with industry partners, IACS and the U.S. Coast Guard (USCG) to better understand cyber challenges. ABS is developing products that will assist in assessing and implementing effective cybersecurity in information and operational technologies.



ABS is an industry leader in recognizing the importance of integrated software quality management and the ABS *Integrated Software Quality Management (ISQM) Guide* places emphasis on the verification of the integration of multiple software packages.

For the past several years, ABS has championed software integrity and system integration, investing in the development of ISQM, a risk-based software development and maintenance process built by ABS on internationally recognized standards. The process verifies the software installation on the facility and then monitors for consistency when there are software updates or hardware changes. It also manages software over the life of the asset, benefitting owners and operators with increased confidence in software reliability. The ultimate goal is increasing safety, decreasing commissioning and downtime, and reducing the risk of software related incidents.

The culmination of this work was the completion and delivery of four newbuilds using this process. Built in Ulsan, South Korea, the latest newbuild joined sister ships as the next high-specification drillship to earn the ABS ISQM notation.

The 2015 delivery of the final ultra-deepwater drillship in the series is a testament not only to the ISQM process but to the strength of ABS' trusted technical relationships.

ABS is the only class society that has classed drilling equipment and other essential marine equipment with a software notation that addresses software quality during construction, at delivery and into operations.

## IMPROVING MACHINERY, SYSTEMS AND STRUCTURAL HEALTH

ABS is leading improvements in this area as demonstrated in its upcoming publication of the *Guidance Notes for Equipment Condition Monitoring Techniques* and the *Guide Surveys Based on Reliability-Centered Maintenance*. The Guide addresses reliability improvements and other risk-based processes for developing preventive maintenance plans based on various optimization schemes, in addition to traditional reliability-centered maintenance (RCM). These techniques can be applied holistically to the entire vessel or facility, system, subsystem or even an individual component.

In the offshore sector, classification traditionally has covered jackup loading conditions. ABS was visionary in its realization that most preventable safety issues occur during movements on and off location. As the industry leader in jackup classification, ABS continues its multi-pronged program to improve machinery, systems and structural safety.



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ABS' jackup safety program elements in 2015 included publication of a jackup safety white paper addressing site assessments and continued research for *Dynamic Monitoring Guidance Notes* coming in 2016. Further, the U.S. standards for the structures of offshore units have been based historically on the working stress design (WSD) method. Recently, the ISO 19900 series of standards promoted the use of design criteria in the load and resistance factor design (LRFD) format. To align with the current trend, ABS is upgrading its classification rules to provide relevant LRFD-based classification criteria as an alternative to WSD-based criteria.

To improve safety for jackups operating in ice, ABS undertook projects on ice loads and strengthening of structures, winterization and other conditions. Engineers are developing a framework to guide industry in designing and assessing ice-capable jackups, which will become the base document for formal ABS guidance on Arctic jackup development.

From SNAME panel participation in London to a joint industry project for wind tunnel testing in Japan, ABS continued its jackup safety leadership in 2015.

## DESIGNING NEW INSPECTION TECHNOLOGIES

The future of classification will require surveyors to work in a more collaborative, less intrusive and more efficient manner. To achieve this vision, ABS is continuing to integrate its traditional class services with innovative concepts, tools and practices to minimize operational risk and reduce non-productive time (NPT) associated with classification surveys which will result in overall asset efficiency.

ABS supports the transition from calendar-driven to equipment-driven surveys and is researching safety regimes related to extended drydock periods as well as new approaches to life extension methodologies. ABS summarized best practices in this area in its *Guidance Note on Life Extension Methodologies for Floating Production Installations*.

Next-generation technologies are already in development and include the use of remote operated vehicles and drones as well as wearable innovation. ABS soon will deploy the world's first wearable human interface that seamlessly connects a surveyor to their environment and provides contextually relevant information.

Drones and advanced 3D modelling technologies as well as state-of-the-art acoustic emissions monitoring are in the process of development and integration at ABS.



## ENHANCING SHAFT ALIGNMENT

A failure in a vessel's propulsion system can result in serious safety concerns, yet stern tube bearing failures on vessels of all classes continue to occur.

In 2015, ABS published a new *Guide for Enhanced Shaft Alignment (ESA)*, defining a comprehensive range of technical criteria to enable more detailed shaft alignment analysis and installation assessment, including: shaft alignment optimization, hull deflection, whirling analysis and shaft alignment verification in more than one service condition. The *Guide* will assist operators seeking additional assurance by enhancing vessel safety and operating performance.

ABS was the only class society to develop the Digital Shaft Alignment Monitoring (D-SAM) system, significantly enhancing the operator's ability to detect and correct stern tube bearing alignment issues. Unlike a traditional temperature sensor, D-SAM continuously monitors both temperature and clearance between the shaft and the bearing. A set of proximity probes is imbedded inside the stern tube bearings, which measures the distance between the shaft and the bearing and provides the crew with direct insight into the clearances and motions in real time.

ABS is leading the way to promote safety improvements for vessel operations.

## MANAGING BALLAST WATER

Roughly 80 percent of globally traded commodities are shipped at some point in their journey across markets. Along with the transport of goods, shipping moves more than 3 billion tons of ballast water annually to stabilize and balance vessels. Shipowners, designers, builders and operators rely on ABS to understand international ballast water regulations and advise on in the installation and proper operation of ballast water management (BWM) systems on their vessels.

Even prior to 2012 when the USCG BWM regulations took effect, ABS led the industry in providing guidance and advisories related to compliance activities.

ABS continues to support the industry with USCG installation extension requests. Additionally, knowledge sharing seminars related to assisting owners with the complex compliance issues of trading in U.S. waters are held regularly with more than 500 clients attending at least one event last year. As the USCG continues the process to type approve BWM equipment for future installations, ABS is leading the industry in advising shipowners and operators in best-in-class practical applications.



© N.E.I. Treatment Systems

## EXPANDING CREW COMPLEXITY SAFETY MANAGEMENT

The emphasis on crew safety continues to expand through Human Factors Engineering, which focuses on the human element as the root of effective safety standards and practices. ABS has developed and published sound practices and principles to assist in operational safety and performance excellence in the ergonomic design of shipping and offshore assets, developing a suite of documents to help in designing interfaces among personnel, hardware, the physical environment and the overall work system for improved safety, productivity and efficiency.

Safety culture is another significant area of focus. ABS has published *Guidance Notes on Safety Culture and Leading Indicators of Safety* for ships and has two documents under development to support offshore exploration and production. The ultimate goal is to help clients reduce incidents and accidents and improve overall safety.



© Interorient

## ADDITIONAL INDUSTRY INNOVATION

Enabling technologies and a comprehensive data strategy to advance innovation in the marine and offshore industries are mirrored in the ABS vision for the future of classification both in the services offered and how those services are delivered. This future vision includes using intelligent systems and sensor technology to monitor systems and structures, collect data and use predictive analytics to determine survey requirements and help owners and operators make risk-informed decisions related to their assets. A comprehensive cyber process, asset integrity, energy efficiency, environmental performance and a streamlined approach for technology qualification are key parts of the ABS vision for the future of classification.

In addition to the most critical industry-identified technology challenges, ABS collaborates with clients to address unique requirements and future needs to further improve the safety of the marine and offshore industries.

### **Improving Offshore Drilling and Production Design**

Exploration and production companies continue to develop high-pressure and high-temperature (HPHT) reservoirs. As the pressure and temperature limits of existing standards are exceeded, ABS has worked with industry on a new approach to equipment classification. ABS is using technology qualification in partnership with original equipment manufacturers (OEM), oil majors and operators to verify and validate the design of HPHT equipment. ABS also is working alongside the Bureau of Safety and Environmental Enforcement (BSEE) to offer independent third-party services for HPHT equipment and systems for upcoming projects and with the American Petroleum Institute (API) as committee participants to update the API 16 and 17 series standards for HPHT equipment.



ABS has conducted technology qualification projects with leading system designers and manufacturers for 20,000 psi HPHT systems equipment, sharing its findings through technical papers and presentations at offshore events in the U.S., Europe, Asia and Latin America.

Drilling techniques continue to evolve to allow operators to lower costs and reduce risks. Managed pressure drilling (MPD) covers a variety of new drilling methods, and ABS is at the forefront of these efforts. ABS has approved equipment for a number of MPD projects and revised the *ABS Guide for the Classification of Drilling Systems (CDS)* to provide the requisite industry standards for MPD equipment and procedures. In 2015, ABS convened the first meeting of the ABS Offshore Equipment Safety Advisory Committee to enhance the CDS Guide. A major update to the CDS Guide will be published in 2016.

With more than 45 global fields using subsea installations today, classification activities continue evolving around functions for above-the-mudline equipment. Data communications standards such as automation and control are critical to safety. ABS is consolidating its subsea approach with a comprehensive set of new and updated Guides and Guidance Notes for publication in 2016.

ABS classes approximately half the global fleet of more than 280 floating production units in service today and issued *Guidance Notes on Life Extension Methodology for Floating Production Installations* to provide guidance for assessing existing floating production installations when the intended period of operation on the original site is beyond the original design life period. The *Guidance Notes* outline a life extension process that includes engineering and survey reassessment of the structure, mooring system, stability, machinery and systems for the entire installation, and additional guidance will be published in 2016.

### **Supporting Liquefied Natural Gas**

Commitment to LNG-fueled vessels and the supporting infrastructure continued to grow in 2015 driven by owners trading vessels in Emission Control Areas and companies keen to establish and promote their environmental stewardship. Leveraging ABS' intimate knowledge of the evolving regulatory landscape in North America, a second edition of its *Guide to Bunkering of Liquefied Natural Gas-fueled Marine Vessels in North America* was published. ABS has shared important lessons learned from first adopters of LNG-fueled vessels and LNG bunkering projects, included a project roadmap of the associated regulatory, stakeholder and technical issues and an in-depth port directory highlighting ongoing projects and local development processes.

## Navigating Arctic Challenges

ABS has unmatched experience in Arctic regulations, participating closely in the development of the International Maritime Organization (IMO) Polar Code since the earliest governance concept for maritime activity in Polar waters began to evolve in the early 1990s.

With extensive knowledge of the Polar Code's intent and application, ABS delivers unparalleled insight to help shipowners and shipbuilders. ABS expanded its industry resources in 2015 with the industry's first Advisory following the IMO's formal adoption of the safety and environmental parts of the Polar Code, including class notations.

Other industry firsts and exclusive activity conducted by ABS include:

- Chairing the IACS Expert Group advising the IMO on Polar Code.
- Conducting an Arctic assessment for a non-ice class USCG cutter.
- Assessing container shipping lines through Arctic shipping routes.

The ABS Arctic research program, with dedicated efforts at the Harsh Environment Technology Center (HETC) in Canada and the Singapore Innovation Research Center (SIRC), is actively investigating ice and cold-weather challenges for both the marine and offshore sectors.

ABS is engaged in applied research projects with the USCG, the U.S. Office of Naval Research (ONR), Department of National Defence Canada and Transport Canada, leading toward the development of advanced safe operational criteria for ships navigating in ice conditions. Major revisions to the industry's first *Guide for Vessels Operating in Low Temperature Environments* updated winterization guidance for designers and operators of ships intended for cold climates.



Pashkov Andrey ©123rf.com

In the offshore sector, ABS is working with industry leaders to develop a tailored design and approval framework for ice-capable mobile offshore drilling units (MODUs). Specifically, ABS is working with a Chinese shipbuilder to provide guidance for the their design of the world's first ice-capable semisubmersible while in Singapore ABS is working with a local shipbuilder to provide guidance for the world's first ice-capable jackup. Additionally, ABS is contributing, along with university and interational oil company partners, to the development of state-of-the-art ice management simulation technology, an innovative approach that permits the rapid examination of complex ice interaction events on floating structures as influenced by physical ice management operations.

### **Securing Containers**

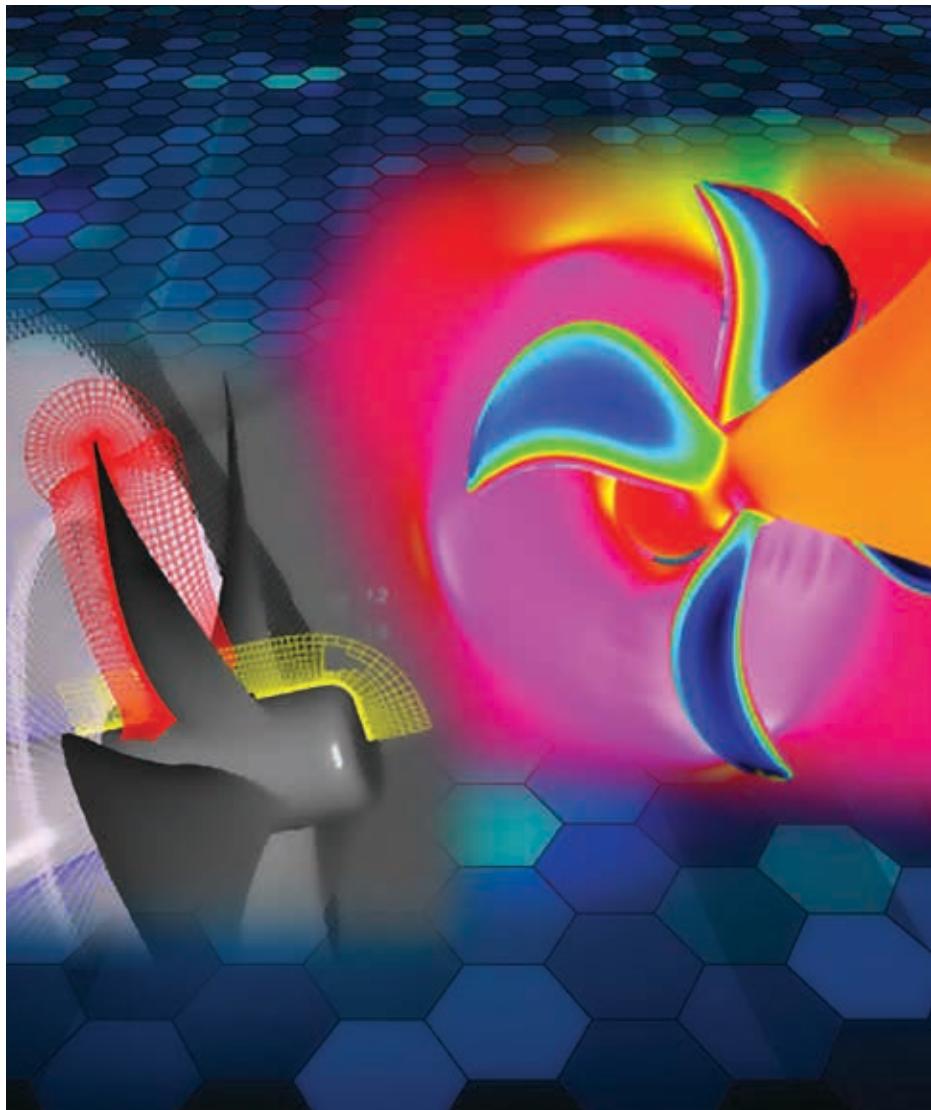
In an effort to move cargo more efficiently, containership capacity has increased dramatically. Recent designs feature higher container stacks and higher lashing bridges.

ABS recognized the need to enhance the ABS *Guide for Certification of Container Securing Systems* and initiated full-scale testing of fully automated twistlocks (FATs) that had been worn due to in-service use. ABS expects to issue the *Guide* in 2016. Unique to ABS, the lessons learned from these tests are embedded into the ABS Eagle C-LASH program via non-linear equations to calculate the forces in a container securing system. This software and *Guide* upgrade enables more accurate evaluation of container securing systems, as they continue to grow in size and complexity, by accounting for additional factors including twist-lock gaps and lashing bridge stiffness.

### **Advancing Computational Fluid Dynamics**

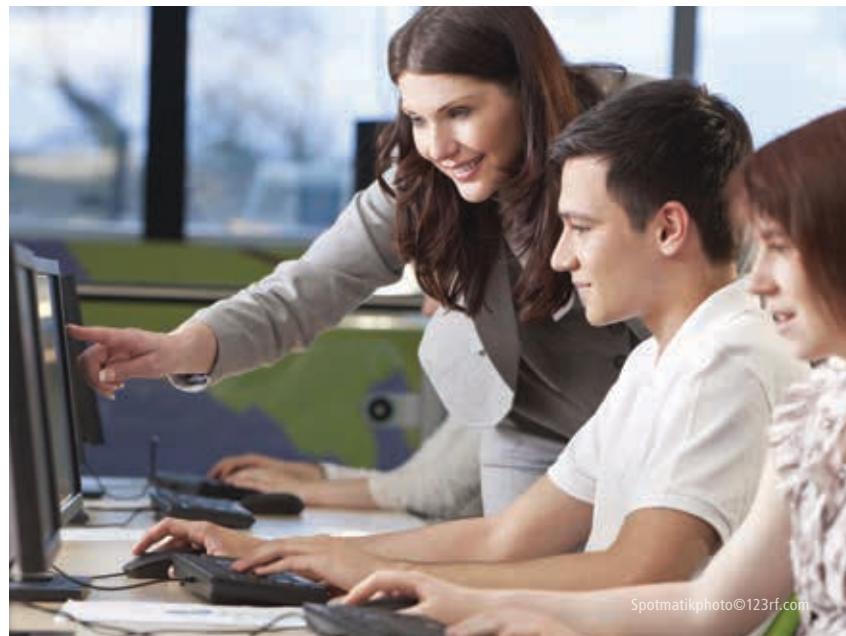
Computational fluid dynamics (CFD) has the potential to change how some of today's most challenging issues in the marine and offshore industry are being addressed. In 2015, ABS used CFD to assist clients with the analysis of energy efficiency, safety, prediction of extreme design loads and operational performance. CFD fulfills a wide array of needs from improved loads prediction, such as slamming and sloshing, to system performance evaluation, vessel operation and efficiency assessment.

ABS is applying CFD to improve structural load estimates with more research and applications in trial currently.



## COLLABORATING WITH INDUSTRY AND ACADEMIA

ABS and its industry and university partners are expediting innovation through collaboration and knowledge-sharing. Research conducted through joint industry projects and university partnerships targets technologies to support the future of classification, which will be continuous and more condition- and risk-based. Among the critical technologies under study are sensors and autonomous inspection, materials innovation and nanotechnology.



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ABS supported endowed academic chairs at eight campuses worldwide:

- Chair of Naval Architecture and Marine Engineering and ABS Chair of Marine Transportation at the State University of New York Maritime College
- School of Maritime Policy and Management at California Maritime
- Chair of Metallurgical and Materials Engineering at Colorado School of Mines
- Chair in Ocean Engineering at University of California Berkeley
- Professor in Marine and Offshore Design Performance at University of Michigan
- Chair of Naval Architecture at Massachusetts Institute of Technology
- Chair in Naval Architecture and Marine Engineering at Webb Institute
- Distinguished Chair at the Singapore University of Technology and Design

## JOINT RESEARCH PROJECTS WITH THE FOLLOWING UNIVERSITIES

**KOREA MARITIME UNIVERSITY**

**CARNEGIE MELLON UNIVERSITY**

**DALIAN UNIVERSITY OF TECHNOLOGY**

**TEXAS A&M UNIVERSITY**

**WUHAN UNIVERSITY OF TECHNOLOGY**

**MASSACHUSETTS INSTITUTE OF TECHNOLOGY**

**MEMORIAL UNIVERSITY OF NEWFOUNDLAND**

**NEW YORK MARITIME**

**PUSAN NATIONAL UNIVERSITY**

COPPE/Universidad Federal  
do Rio de Janeiro

**FLORIDA STATE UNIVERSITY**

**GEORGE WASHINGTON UNIVERSITY**

**KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY**

**SEOUL NATIONAL UNIVERSITY**

**BRIGHAM YOUNG UNIVERSITY**

**LAMAR UNIVERSITY**

**UNIVERSITY OF MICHIGAN**

**SOUTH CHINA UNIVERSITY OF TECHNOLOGY**

**NATIONAL UNIVERSITY OF SINGAPORE**

**SHANGHAI JIAO TONG UNIVERSITY**

**NANYANG TECHNOLOGICAL UNIVERSITY**



**STRONG & SUSTAINABLE**  
**GLOBAL MARINE**  
**OPERATIONS**





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## STRONG & SUSTAINABLE GLOBAL MARINE OPERATIONS

# NAVIGATING THE WATERS OF MARINE REGULATIONS

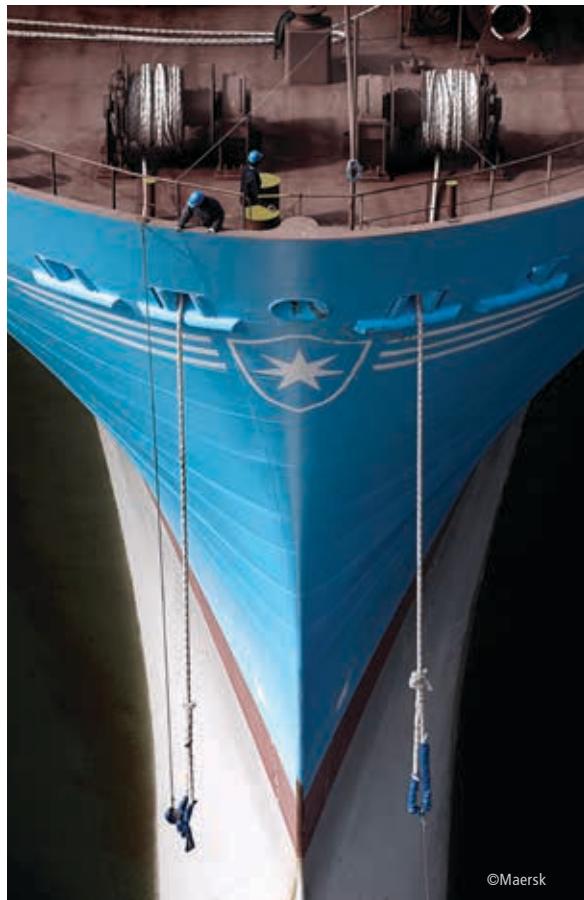
Global economics and changing regulations affected shipping markets worldwide again in 2015, requiring management strategies for long-term sustainability. In this tough environment, ABS focused on helping owners and operators navigate today's issues while proactively preparing for future challenges. The challenging business landscape was further complicated by the number of increasingly demanding global and regional regulations covering emissions to air and water. In addition, owners are seeking the means to improve asset performance by increasing efficiency.

Environmental regulations are increasingly complex in nature with varying requirements and implementation timelines based on the IMO, regional jurisdictions and other authorities. Technological options for compliance are numerous and require careful and informed consideration before selection. As a leading class society, ABS continued to identify practical alternatives to enable its members and clients to comply with regulations while increasing efficiency, optimizing assets and managing technical risks.

### ACTIVITIES IN CORE MARINE SECTORS

#### Containerships

ABS has been at the forefront of containership classification and innovation since the first containership made its maiden voyage more than 50 years ago. Today, the world's first LNG-powered containerships and the most innovative ultra large containerships rely on ABS as their class society.



PRESENTED WITH THE LLOYD'S LIST 2015 MARITIME SERVICE AWARD THAT RECOGNIZES  
ABS' EXCEPTIONAL ACHIEVEMENT OR CONTRIBUTION TO ANY SERVICE SECTOR OF THE  
NORTH AMERICAN MARITIME INDUSTRY BY A COMPANY, INDIVIDUAL OR ORGANIZATION

In 2015, ABS was selected to class:

- 11 second-generation ULCS measuring 19,630 TEU under construction—the largest for the shipping company.
- A record-breaking ULCS at 21,100 TEU.

### **Tankers and Bulk Carriers**

As the world's leading class society for the tanker markets, ABS offers tested practical and technical experience to owners and operators through the duration of a vessel's life cycle. Bulk carriers also represent a significant portion of the ABS-classed fleet. ABS classing, engineering and related technical services cover all bulk carrier designs and sizes, from handy and handymax to capesize and very large ore carriers (VLOCs).

Highlights in the tanker and bulk carrier sectors include:

- Contracted to class more than 200 tankers and bulk carriers in Korea, China and Japan.
- Ordered to class 41 chemical carriers in China.
- Granted AIP for 37.5K Dual Fuel Bulk Carrier.
- Initiated a joint development project for an LNG-ready very large crude carrier (VLCC).
- Implemented NOx Tier 3 requirements for Suezmax tanker design.

### **Gas Carriers**

A pioneer in classification for the safe transport and handling of gas, ABS classed the world's first LNG carrier, the Methane Pioneer, in 1959 and has extensive experience with the full scope of gas-related assets, including the largest LNG carriers in service. ABS formed the Global Gas Solutions Team in response to the rapid escalation in the number of gas-related projects, including LNG and liquefied petroleum gas (LPG) transportation and the expanding use of gas as marine fuel.

Highlights in the gas sector include:

- Selected to class world's first CNG carrier.
- Selected to class nine new construction Very Large Gas Carriers (VLGC) and three LPG carriers.
- Selected to class cutting-edge gas carriers with increased carrying capacity and fuel efficiency through a more efficient hull structure and hybrid propulsion.
- Granted a notable AIP for a gas-block terminal in Asia that will function as an offshore LNG receiving, storage, regasification and bunkering terminal.
- Selected to class the first 2,200 cu m LNG bunker barge that will serve LNG-powered class containerships.
- Granted AIP for an Independent Tank Type-B Gas Containment System, which uses cylindrical tank concept for small-scale LNG carriers.

### **Global Growth**

- Expanded Athens-based team to meet the needs of Greek shipowners with an evolving fleet that includes offshore, LNG and container vessels.
- Established an Energy Efficiency and Environmental Performance center in China.
- Created an Inland Towing Vessel Center of Excellence for towing vessels in the US.



## MARINE SPOTLIGHTS

### Providing Environmental Stewardship

Throughout the marine industry, owners and operators continue to seek solutions to not only meet environmental regulatory requirements, but also demonstrate a commitment to sustainability. ABS continued to support the industry by producing industry-leading guidance on pressing environmental topics. Some projects included:

- Optimized hull form for a given operational profile using Computational Fluid Dynamics (CFD).
- Performed techno-economic evaluations for decision support for lifecycle performance of onboard solutions (LNG Ready, SOx Scrubber Ready, and ballast water management systems).
- Conducted vessel performance analysis for fuel consumption monitoring and hull cleaning/propeller polishing scheduling.
- Released the Guide for the Inventory of Hazardous Materials to assist members and clients in complying with the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.
- Published the *Guide for SOx Scrubber Ready Vessels*, the first ever class notation formalizing the process for owners and operators who wish to plan for retrofit of a SOx scrubber at a future date. This new notation complements a number of existing emissions-related notations available for vessels fitted with an exhaust emission abatement system, including SOx scrubbers, selective catalytic reduction systems and exhaust gas recirculation arrangements for NOx emission control.

### Issued First LNG-Ready Approval to Product Tankers

ABS issued the first LNG-Ready approval in accordance with its *Guide for LNG Fuel Ready Vessels* to a product tanker. The LNG-Ready Level 1 approval was issued together with an approval in principle for the first vessel in a four-ship series. ABS has played a fundamental role in supporting the ambitions of the maritime industry as it moves to embrace the opportunity of LNG as fuel. It helps to provide owners with the guidance and support they need to move ahead with shipbuilding projects that allow them the flexibility to respond to changes over the lifetime of their vessels.

### Supporting LNG Fuel Infrastructure

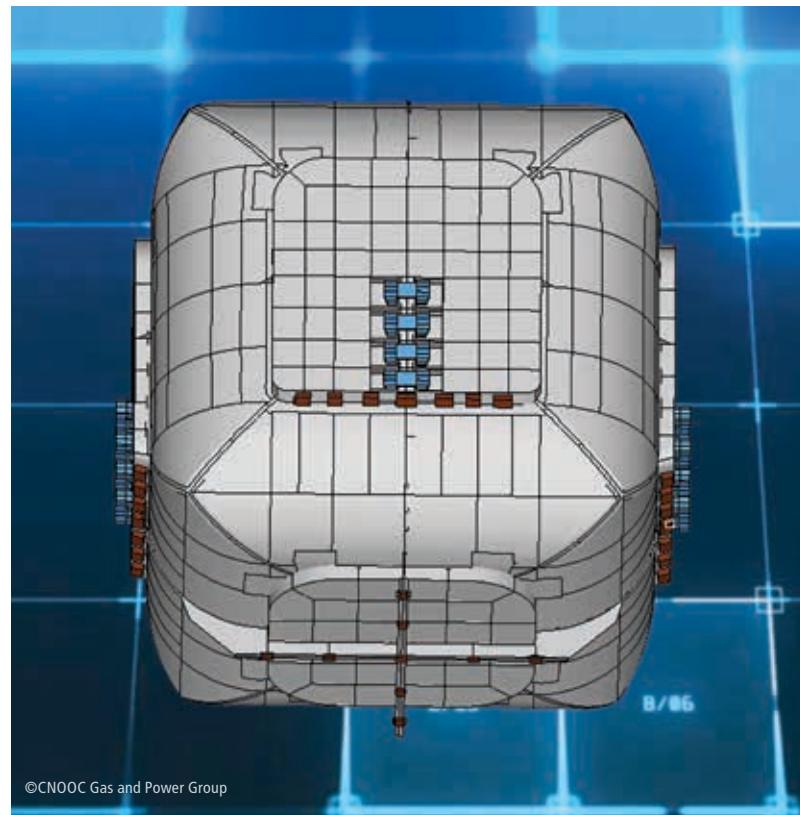
Several recent precedent-setting contracts reaffirmed ABS' class leadership in the gas shipping sector. Building on lessons learned from first adopters of LNG-fueled vessels and LNG bunkering projects, the second edition of the ABS Guide on *Bunkering of Liquefied Natural Gas-fueled Marine Vessels in North America* was published. It offers a roadmap to regulatory, technical and stakeholder issues for companies using or supplying LNG as fuel and supports the transport sector's rapid transition to the use of cleaner fuels.

In addition, ABS has issued *LNG Bunkering Technical and Operational Advisory*, which has been developed in order to respond to the need for better understanding of the issues involved with bunkering vessels with natural gas.

### **Evolving LNG Containment Systems**

ABS' ongoing assessments of new concepts in gas containment in recent years address evolving needs in LNG shipping. In 2015, ABS granted AIP to a new gas containment system design that provides a solution for the small-scale transport of gas and to the Cubic Donut Tank System (CDTS) LNG containment concept. The CDTS design will deliver increased cargo capacity while reducing loading and sloshing risks.

In addition, ABS was chosen to class a new design for a medium-sized LNG carrier. This design uses an innovative gas containment system that consists of an IMO independent tank type A placed in an insulated hold space. The system is designed to fill the gap between smaller ships with IMO type-C tanks and those with larger membrane type containment systems. These projects fully leverage ABS' expertise in gas containment systems and LNG carrier systems.



Cubic Donut Tank System (CDTS) LNG containment concept

### **Classed First LNG Carriers with New System for LNG Storage**

ABS was selected to class two LNG carriers for the world's largest LNG importer. The primary concept of the system is to minimize the impact of primary barrier deformation on the insulation system from the hull.

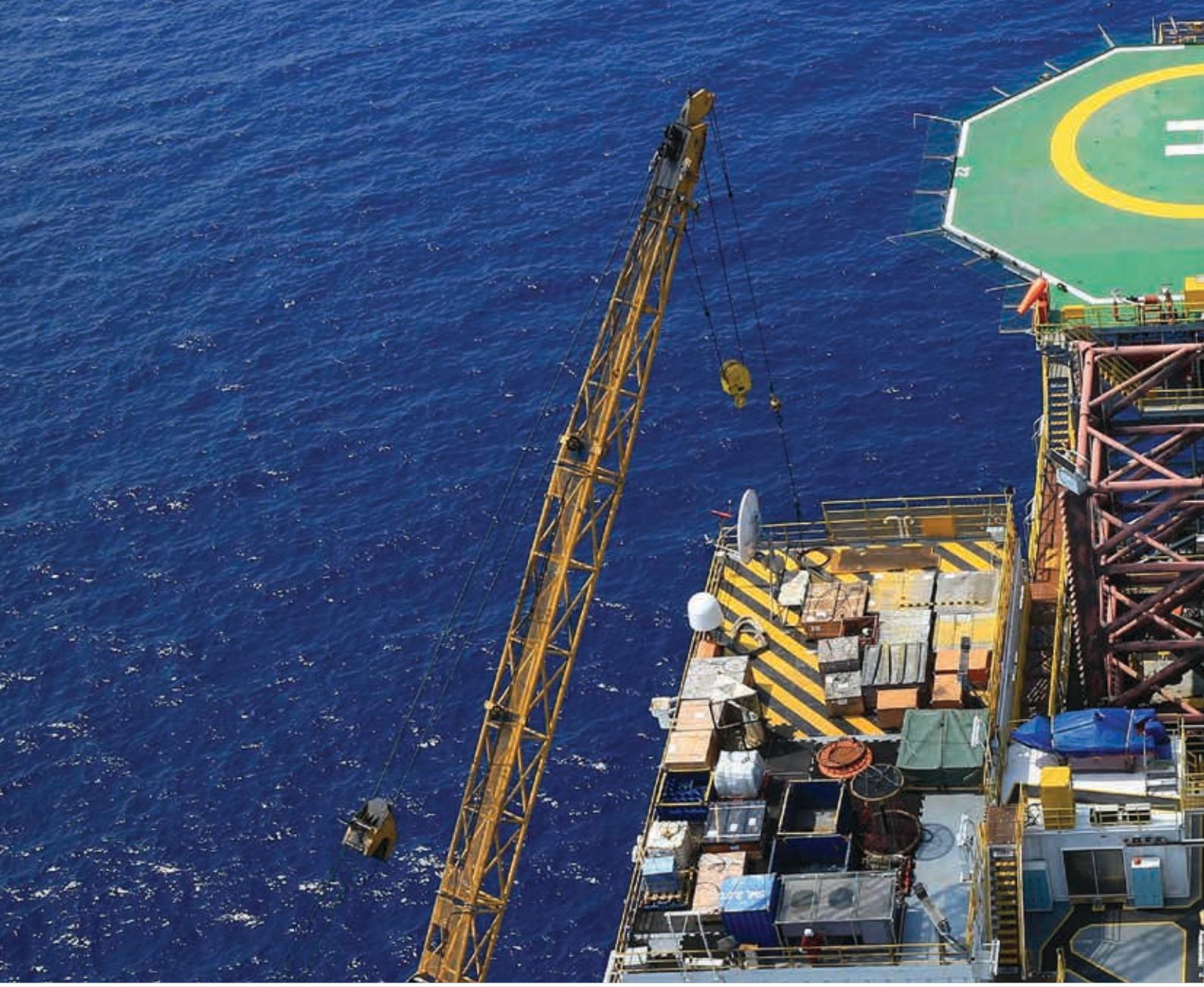
ABS has a long history of supporting designers and builders as they push the development of ships and systems to new levels of innovation and efficiency. The award of these five class contracts confirms our position as a trusted partner to leading maritime and shipbuilding companies.

### **Developing New Generation of Feeder Container Carriers**

ABS signed a development agreement with a merchant ship design and research institute to develop a new generation of feeder container carriers. The objective of this project is to develop the next-generation feeder design with a focus on operational efficiency and flexibility. Innovative feeder container carrier design will meet future market and trade needs that are being driven by the increase in ultra-large container carriers and the growth of specific regional markets.

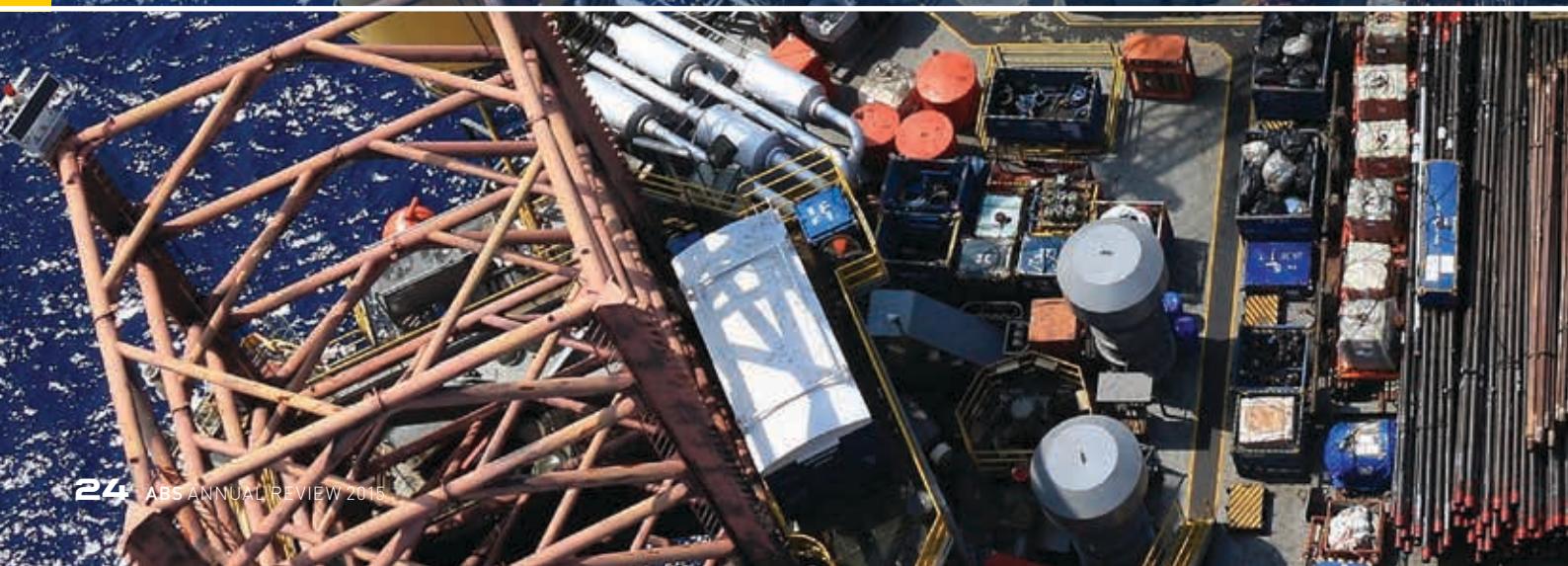
### **Committed to Safety and Environmental Protection**

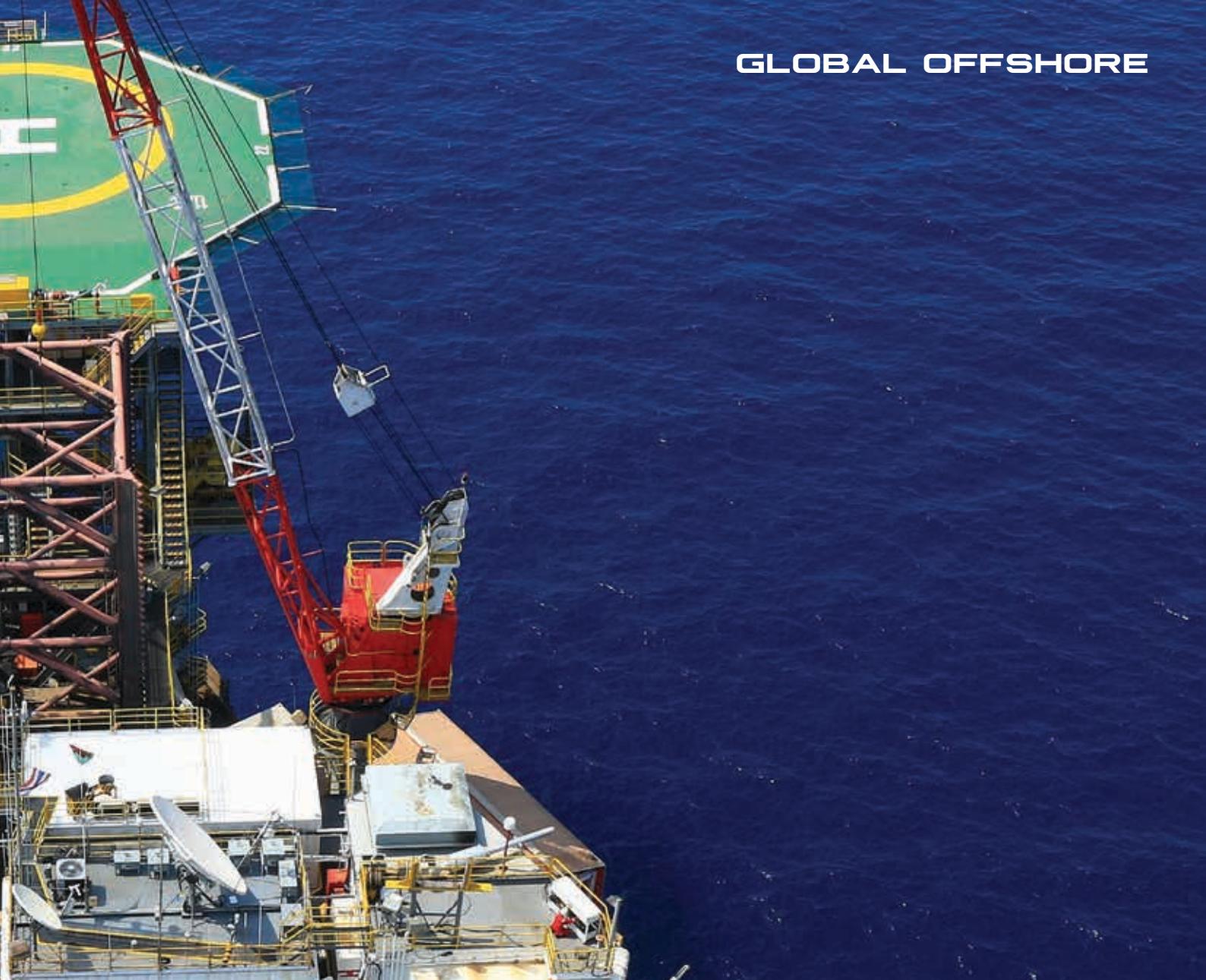
Under the requirements proposed, but not yet enacted, by the USCG, towing vessel companies will be required to receive a Certificate of Inspection and comply with a new set of regulations relating to the construction and operations of safety equipment and recordkeeping. The proposed regulation states that adoption of ABS class with international safety management (ISM) certification will show compliance with the new requirements.



STRONG & SUSTAINABLE

# GLOBAL OFFSHORE OPERATIONS





## **STRONG & SUSTAINABLE GLOBAL OFFSHORE OPERATIONS**

# **INNOVATIVE SOLUTIONS FOR CHANGING GLOBAL ENERGY DEMANDS**

**G**lobal oil and gas prices continued to weigh on the offshore sector in 2015, impacting orders for both drilling and production units. Despite market volatility, ABS remained active globally in the shallow and deepwater market sectors, working closely with shipyards, suppliers, operators and drilling contractors as well as industry leaders that are developing innovative solutions to offshore challenges. ABS was the first class society to venture offshore, certifying the world's first mobile offshore drilling unit (MODU) in 1958 and classing the first jackup, semisubmersible, drillship, FPSO, TLP and spar.

### **Shallow Water**

Although orders slowed, ABS continued to be the preferred choice for shipyards and owners in jackup classification and was selected to class all units ordered in 2015. ABS issued a white paper detailing the wide scope of jackup challenges, including moving on and off location, jackup dynamics monitoring, LRFD, spudcan fixity, and helping the industry transition to new standards for operations in earthquake-prone areas and those threatened by ice. ABS was selected to class the ninth jackup drilling unit in a series for a national drilling company in Abu Dhabi.



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## Deep Water

ABS continued breaking new ground in deep water in 2015 with innovation that paid dividends, placing it firmly in the leading position for classification services for drilling and production units. Operations initiatives ranged from ultra-deepwater concept evaluation, advances in harsh environments and work on all types of floating assets.

ABS realized many successes in the deepwater sector in 2015 including:

- Chosen as the Certified Verification Agent for a deepwater semisubmersible that will be the operator's largest floating platform in the Gulf of Mexico.
- Granted AIP for a heavy-duty, wide beam drillship design that addresses the need for greater offshore drilling capability, including blowout preventer and well control systems designed for 20 ksi.
- Classed the world's largest and most advanced wind farm installation and offshore construction and maintenance vessel.
- Contracted for newbuild class services for China's first privately owned builder and offshore unit fleet operator.
- Classed new 10,000 ton heavy lift vessel that will be used for 19 offshore projects.
- Granted AIP for a drillship designed for HP/HT operations to improve versatility, strength and load capabilities for ultra-deep water and harsh conditions.

## Offshore Support Vessels

The reduction in offshore activity was reflected in 2015 by a slowing of newbuild offshore support vessels. Over the past decade, OSVs have become increasingly sophisticated and technically advanced, and ABS has been active in classing vessels in this sector. In 2015, ABS published its *Guide for Classification of Industrial Systems and Equipment* to provide industry for the first time with holistic requirements for key engineered systems. Other industry milestones include:

- Launched the first, ABS-classed, LNG-fueled supply vessel for work in the Gulf of Mexico.
- Classed the largest offshore subsea construction vessel built to date.
- Selected to class the largest ever built design, next-generation offshore construction vessel (OCV) in Norway.



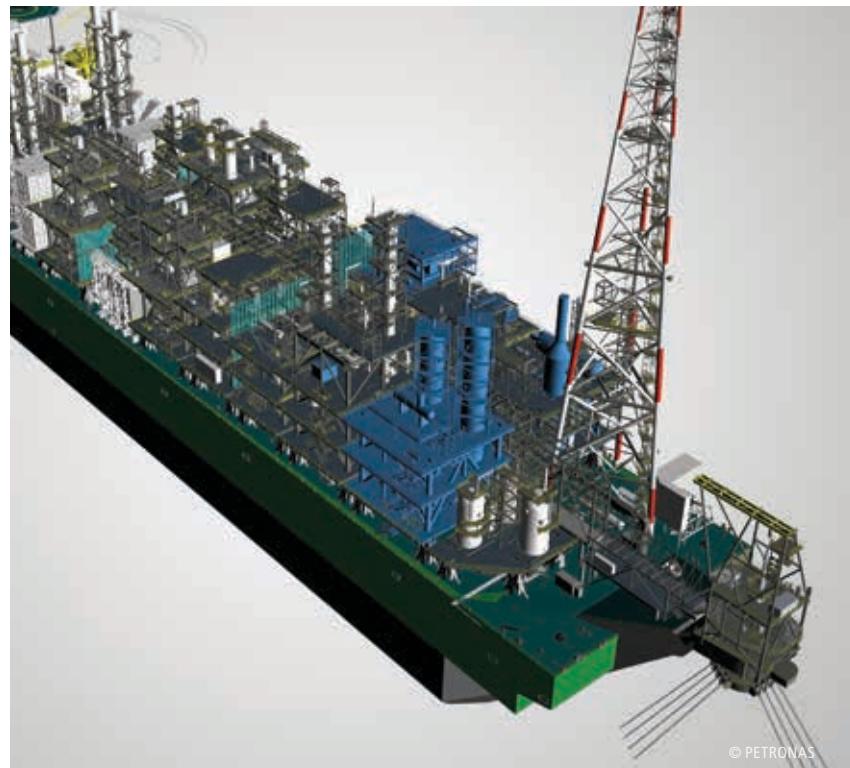
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## Floating Liquefied Natural Gas

With its long history working with floating gas concepts, ABS stepped into the floating LNG (FLNG) sector when companies were just beginning to test the waters, granting AIP to a broad range of FLNG designs. The growing demand for gas around the world increases emphasis on FLNG technology, and ABS is playing a leading role.

### Growing to Meet Industry Needs

- Partnered to develop the industry's first *Hybrid Riser System Design Guidance Note* and currently working on guidance for pipeline laterals based on the SAFEBUCK JIP for HP/HT pipeline designs.
- Worked with BSEE on I3P qualification requirements and a workable execution plan.
- Worked with industry leaders to develop a tailored design and approval framework for ice-capable MODUs.
- Contributed to the development of state-of-the-art ice management simulation technology, an innovative approach that permits the rapid examination of complex ice interaction events on floating structures influenced by physical ice management operations.



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## OFFSHORE SPOTLIGHTS

### Achieved Industry Milestone

ABS has achieved an industry first with the delivery of the final in a four-unit series of high-specification drillships developed using the ABS ISQM process. ABS saw the need for a process to verify the installation and integration of complex software controlled equipment and systems and developed a framework for coordinating and controlling the way software development, integration and maintenance are managed throughout the life of an asset.

### Developed Multipronged Program to Promote Safe Jackup Operations

ABS is investing in R&D that will provide industry-critical data to promote jackup safety. The research will be valuable to drilling contractors that are looking for guidance on improving the safety of their jackup fleets. Jackup issues constitute a significant number of the nearly 200 research projects that included:

- Upgrading classification rules to provide relevant LRFD-based classification criteria as an alternative to Working Stress Design (WSD)-based criteria.
- Developing Guidance Notes to create rational analysis methods for jackups going on and off location to create several new ways to evaluate these critical phases of jackup installation and retrieval operations.
- Providing *Guidance Notes on Geotechnical Performance of Spudcan Foundations*

### **Classed the World's Largest Offshore Wind Installation Vessel**

The ABS-classed vessel is the world's largest and most advanced wind farm installation and offshore construction and maintenance vessel. The vessel has more than 8,000 metric tons of available variable deck load and is equipped with a 1,540-metric-ton leg-encircling crane and a usable deck space in excess of 5,000 sqm, the unit is fitted with 105-m legs with the ability to install components in water depths to 65 m. This innovative rig was designed to meet the installation needs of jumbo-monopiles, jackets and turbines of future wind farms in deeper water farther from shore.

### **Accelerated Time to Production with New Design and Construction Method**

ABS has granted approval in principle for a floating production, storage and offloading (FPSO) vessel design and an epoch-making construction concept. The noah-flex modular construction processes consists of multiple steps that take place in parallel to shorten the construction time efficiently, with keel laying marking the commencement of construction.

### **Improved Onboard Industrial Systems Safety**

The new generation of OSVs require advanced and extensive industrial systems and equipment. ABS engineers worked with industry to develop the *ABS Guide for Building and Classing Industrial Systems and Equipment* for use during design, construction and installation and for use during survey after construction on industrial systems and equipment installed onboard ABS-classed vessels, including high-specification OSVs. The Guide provides industry for the first time with holistic requirements for key engineered systems. Requirements can be applied to cable laying, pile driving, offshore construction, maintenance and anchor handling systems during construction so potential equipment issues can be identified and resolved before construction begins or before the equipment is installed onboard and throughout an asset's full service life.

### **Launched Offshore Standardization Joint Industry Project**

Korean shipyards, operators, drilling contractors and engineering companies joined ABS to develop new offshore design guidelines. The objective of the JIP is to establish new global design standardization procedures based on relevant industry standards, international regulations and class requirements across the offshore industry.



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## STRONG & SUSTAINABLE NAUTICAL SYSTEMS

# INNOVATIVE SOFTWARE SOLUTIONS

**A**BS Nautical Systems (NS) has developed cutting-edge software for the marine and offshore industries for more than three decades, creating practical tools that reflect unique understanding of the challenges in the marine and offshore business. In 2015, ABS NS updated its Enterprise software suite, and launched two powerful platforms developed to address today's complex industry challenges.

### UPDATED NS ENTERPRISE

The latest version of ABS NS Enterprise software suite in 2015 represented the most comprehensive release in ABS' full marine enterprise resource planning (ERP) system in several years. Delivering complete asset management and compliance management solutions for the marine and offshore industries, NS6.4 includes capabilities that make it easier and more efficient to deploy and manage the software, including an automated software installer, remote vessel software installation, serialized items, and visual crew planner.

### NS CLOUD LAUNCHED

Additional development work in 2015 led to a cloud-accessible version of NS Enterprise, offering the maritime and offshore industry an easy and scalable way to implement, deploy and manage ABS software to achieve efficient fleet management.

Known as NS Cloud, the software provides a powerful infrastructure housed on a secure and private Microsoft Azure platform with built-in compliance to EU, U.S. and other regional standards. This approach reduces the cost of onsite data storage and onsite infrastructure management without compromising performance.



### UNIFIED AT THE CORE

In 2015, ABS NS launched NS Core, a streamlined version of NS Enterprise that unifies all core operational and compliance activities in a single workspace and specifically developed to serve the workboat sector. With the Subchapter M regulation coming into effect, NS recognized the need for a software solution that would enable owners and operators in the workboat sector to support Safety Management Systems without overburdening crew and office staff.

NS Core facilitates critical operational and compliance tasks through tools that simplify user adoption, minimize errors and improve training for new users. This move has made it possible for many companies to take advantage of the NS solutions in a new way.

### ENABLING OPERATIONAL EXCELLENCE

ABS NS added customers in every operating region in 2015, expanding its users in all offshore and marine market sectors. For example, the Enterprise software suite was installed on 58 OSVs for a Dubai-based operator to streamline fleet management and optimize operational performance. In Singapore, the Enterprise software suite was implemented across a fleet of 48 containerships to improve efficiencies and operational processes.

# STRONG & SUSTAINABLE GLOBAL CORPORATE CITIZENSHIP AND SUSTAINABILITY

## DEVELOPING TALENT PIPELINE

It will take a highly educated, well-trained and qualified workforce to lead ABS and the industries it serves in the future. ABS is committed to building a sustainable pipeline of the up-and-coming generation of professionals in the marine, offshore energy and gas industries through planned philanthropic giving to academic institutions around the world.

- Provided funding to Cass Business School at City University of London for the development of two master's degree programs through the university's Costas Grammenos Centre for Shipping, Trade and Finance.
- Completed capital funding for the new lab complex at the Stevens Institute of Technology in Hoboken, New Jersey.
- Opened the new ABS Center for Engineering, Science and Research at Maine Maritime Academy in January 2015. ABS donated the lead gift for this state-of-the-art building to nurture the education of those who are inspired to deliver future innovations. It was the first academic building constructed on the campus in Castine, Maine, in 30 years.
- Increased scholarship commitments by adding support to 10 new schools worldwide and added three new universities in Mexico to those receiving funding. Overall, ABS scholarship funding supported 427 scholars at colleges and universities in the Americas, China, Europe and the Pacific region.



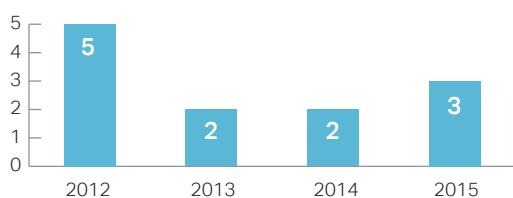
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Additionally, ABS supported endowed academic chairs at eight campuses worldwide. Refer to page 17 for details.

## STRENGTHENING THE HEALTH, SAFETY, QUALITY AND ENVIRONMENTAL CULTURE

Globally, ABS maintained a strong Health, Safety, Quality and Environmental (HSQE) culture in 2015, with engagement increasing for several leading safety behaviors to include timely reporting of potential incidents or hazards, as well as documenting near misses.

*Lost-Time Incidents*



*Total Recordable Incident Rate (200,000 hrs.)*

2012	2013	2014	2015
0.62	0.54	0.48	0.74

ABS' industry-recognized, quality management system continued to deliver comprehensive classification services through established processes allowing ABS to provide quality products and services to clients in the most effective manner. ABS' HSQE system is certified by BSI, an independent, third-party certification body that regularly audits ABS to ensure it maintains its high standards of excellence.





**STRONG & SUSTAINABLE**

# **ABS CORPORATE GOVERNANCE**

Hxdbzxy@123rf.com

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Michael L. Carthew Lead Director	John A. Hickey	Dean E. Taylor
Choo Chiau Beng	William E. Jenkins	Elizabeth D. Whitaker, Esq.
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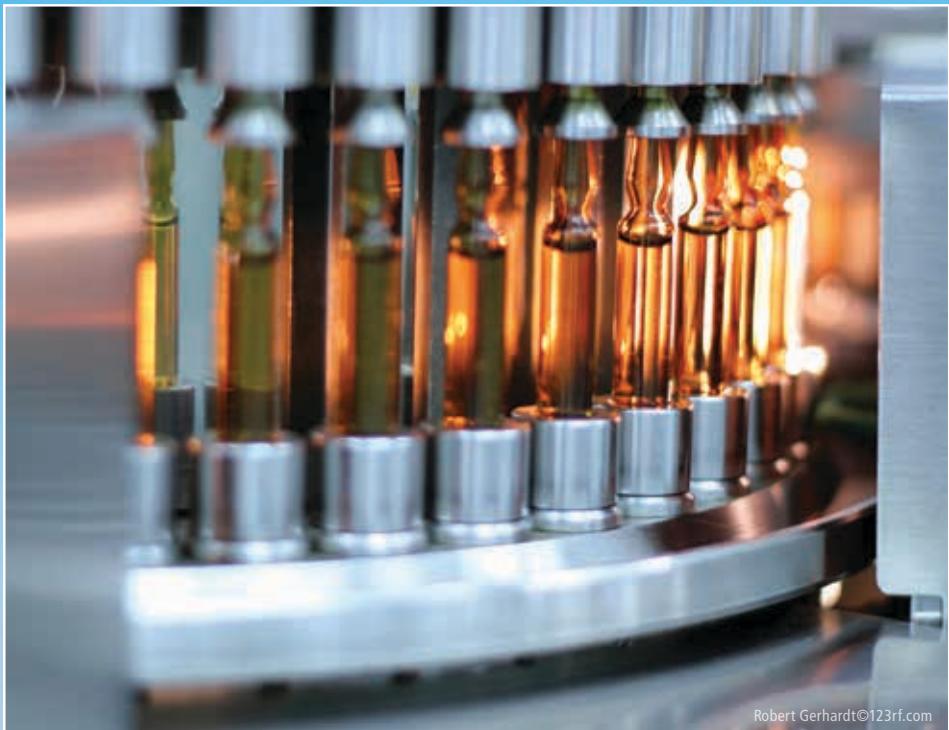
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Yang Ming Marine Transport Corporation

Adam W. Moilanen  
ABS

Tony Nassif  
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**ABS GROUP OF**  
**COMPANIES, INC.**



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The mission of ABS Group of Companies, Inc., is to be a leading global provider of technical services that better enables our clients to operate safely, reliably, efficiently and in compliance with applicable regulations and standards. We are focused on adding value to the industries we serve and strategically capturing synergies with ABS.



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Pedro Antonio SalaverrÃa  
Calahorra©123rf.com

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## **ADDING VALUE**

**A**BS Group of Companies, Inc., through its operating subsidiaries, continues to strengthen its core businesses by offering a broad scope of technical solutions to address safety, efficiency and reliability across diverse markets. ABS Group also continues to see positive results and benefits by leveraging strengths and expertise within its global service network and as a strategic partner to its parent company.

As a leading global provider of integrated safety, risk and compliance management and asset reliability services, ABS Group is focused on adding value to the markets it serves. The unique combination of service offerings provides clients with the means to improve safety, optimize asset performance and maximize profitability.

As technical services companies continue to diversify across a challenging global marketplace, ABS Group remains committed to meeting the diverse needs of its clients. Its reputation for delivering strong and sustainable results across multiple industries is the foundation on which it continues to build its technical expertise. ABS Group continues to deliver safety and operational excellence while minimizing business impacts as a trusted service provider and advisor to the government sector.

A SUBSIDIARY OF ABS, ABS GROUP OF COMPANIES, INC. AND ITS AFFILIATED COMPANIES (ABS GROUP) PROVIDES A RANGE OF TECHNICAL SOLUTIONS TO SUPPORT SAFE, RELIABLE AND HIGH-PERFORMANCE ASSETS AND OPERATIONS. WE WORK IN A VARIETY OF ASSET-INTENSIVE INDUSTRIES INCLUDING MARINE, OFFSHORE AND ONSHORE OIL AND GAS, PHARMACEUTICALS AND CHEMICALS, POWER GENERATION AND THE PUBLIC SECTOR. WITH MORE THAN 2,000 PROFESSIONALS IN OVER 35 COUNTRIES, WE DELIVER RELIABLE SOLUTIONS JUST ACROSS TOWN, AND ALL AROUND THE WORLD.

## STRONG & SUSTAINABLE BUILDING LONG-TERM GROWTH

**A**BS Group closed a challenging 2015 well positioned for long-term growth and diversification across our global network. Despite challenging markets, our success in 2015 and our confidence in the future comes from a strong global reputation for providing reliable technical services and innovative solutions; and our people, who continue to provide expert-led solutions across the industrial, power, energy and government sectors.

We began a number of strategic initiatives during 2015 based on our unique capabilities and reputation as a global leader in providing safety, reliability and efficiency services. These initiatives included introducing our Offshore Asset Integrity Management (AIM) program, which offers a holistic approach and suite of tools to help our clients in the offshore industry improve reliability and integrity and achieve high production uptime while navigating the current market conditions.

Building on the productive strides made in the U.S. economy in 2015, we expanded into two strategic focus areas—North American Oil and Gas, with a focus on midstream and downstream assets, and North American Power. Our service teams spent the past year laying the groundwork and developing a strategy for addressing service demands in these growing markets.

Beyond North America, our global team helped clients improve efficiency and reliability, manage risk and integrity and, above all, meet the requisite level of safety in a number of diverse market sectors.

Looking ahead, we continue to build on our trusted reputation, working toward our goal to provide enhanced safety, reliability and integrity services and innovative solutions for a broad spectrum of industrial and government clients around the world. Every day we earn our clients' trust as we help organizations become more efficient, risk informed and safer in any market conditions.

Thank you for your continued support of ABS Group.



Todd Grove  
President and Chief Executive Officer,  
ABS Group of Companies, Inc.



# STRONG & SUSTAINABLE A TRUSTED ADVISOR

**D**espite a challenging global economy, ABS Group is well positioned for 2016 with a vision of sustaining and advancing its unique capabilities as a globally recognized leader in safety, asset and risk management services across the diverse industries it serves.

## OPTIMIZING OFFSHORE SAFETY AND PERFORMANCE

Complex offshore assets require careful maintenance and management strategies to optimize performance, reliability and profitability over their complete life cycle. To assist the global offshore industry with meeting these objectives, ABS Group launched an offshore-focused Asset Integrity Management (AIM) service offering in 2015. This unique, integrated solution helps owners and operators decrease cost, improve operational performance, prevent downtime and increase efficiency—benefits that are helping clients streamline operations in current market conditions.

Globally, ABS Group made major investments to develop more targeted solutions for the offshore industry addressing a broad range of technical challenges. In 2015, ABS Group met service demands for risk-based inspection, life extension and other evaluations and decommissioning services, and also addressed automation control systems safety and is now developing an “intelligent maintenance strategy” for a newbuild fleet of FLNG vessels.

### Securing Cyber Safety for Offshore Control Systems

A number of companies began taking more proactive strides over the past year to mitigate the threat of cyber attacks on offshore assets. As an example, ABS Group helped an international drilling contractor secure its industrial automation control

systems by developing a strategy for managing potential threats and vulnerabilities in these critical operating systems. ABS Group will continue to work as a strategic partner to provide risk management services in the area of cyber safety in addition to those services offered by ABS.

### Comprehensive Incident Response Services

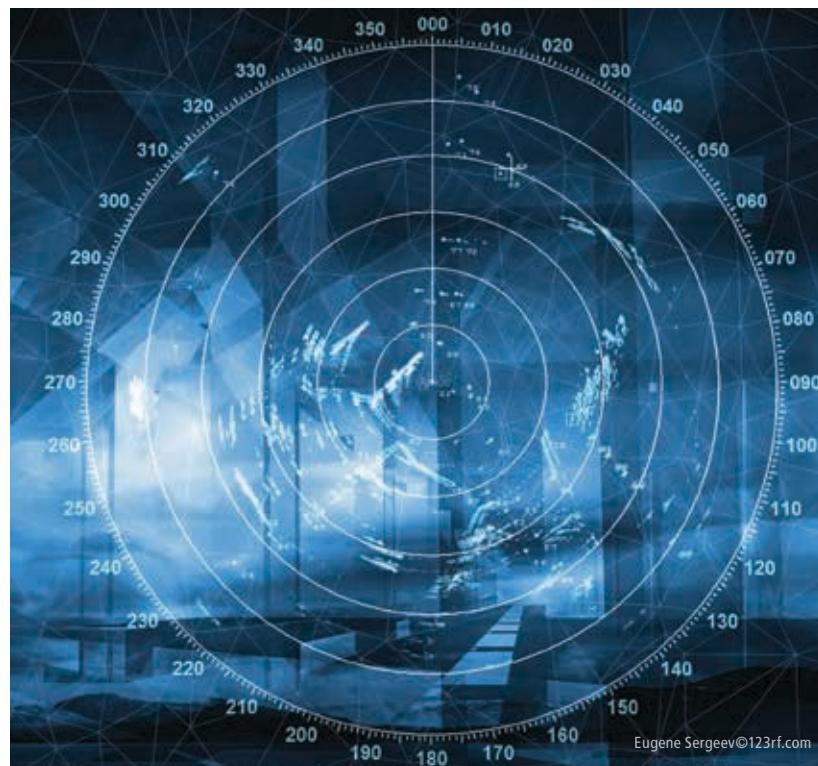
ABS Group integrates leading safety and risk management resources from around the world. The company's broad range of expertise and knowledge includes a comprehensive understanding of the regulations covering offshore operations within the



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U.S. Outer Continental Shelf (OCS), Gulf of Mexico, North Sea, offshore Brazil and the Middle East and Asia-Pacific regions.

Leveraging this breadth of experience, ABS Group maintains a global reputation for providing accident investigation and emergency management services. In 2015, ABS Group utilized these capabilities to advise a national oil company following a major offshore accident. ABS Group's incident investigation team provided incident scene/emergency management and root cause analysis services for the operator while also interfacing with governmental authorities and stakeholders.



### **Delivering Risk Services for Johan Sverdrup Development**

As part of ABS Group's global Safety, Risk and Compliance resources, Safetec Nordic AS (Safetec), a wholly owned subsidiary of ABS Group, is finalizing the most advanced offshore barrier management system in the Barents Sea. Safetec also is providing safety and risk management solutions for the Johan Sverdrup development, the largest newbuild project in the North Sea, with expected resources ranging from 1.7 to 3 billion barrels of oil equivalent.

Through a holistic and data-driven approach to risk management, extensive technical knowledge and understanding of offshore regulations, ABS Group will continue to support the safety and reliability of high-performance assets and operations in the offshore market.

### **STRATEGIC SHIFT TO NORTH AMERICAN ONSHORE ENERGY AND POWER**

In 2015, ABS Group launched two new market-based initiatives, one targeting oil and gas midstream and downstream operations, petrochemical and LNG plants; and the other targeting the evolving power sector. These initiatives are designed to capitalize on the impact that expanded oil and gas capacity in North America brings to industry as both an attractive fuel and a lower-cost feedstock.

The North American oil and gas initiative for midstream and downstream operations combines technology development and service capability expansion to keep pace with the growing and ever-changing needs of oil and gas clients in the U.S., Canada and Mexico. This initiative will position ABS Group further as a leader in asset integrity management and safety, risk and compliance management in these onshore markets.

### **Managing Pipeline and Process Safety**

In 2015, the North American oil and gas initiative expanded its business in the pipeline segment by helping companies improve their integrity management, implement pipeline safety management best practices and prepare for compliance with evolving U.S. regulatory requirements. In the downstream and LNG segments, ABS Group helped companies improve their capital project performance, pursue operational excellence and comply with changes in process safety regulations.



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### **Supporting New Fleet of Conventional Power Assets**

The North American Power initiative repositions ABS Group as a leader in project support services and asset management for the new fleet of conventional power generation assets being deployed across North America. In 2015, ABS Group continued to expand its integrated service capabilities to this market in order to help power generation and utility providers improve the performance of existing infrastructure and manage and consolidate assets.

### **Assisting with NERC Compliance**

Another key area of focus in the North American power market is the expanding reliability, physical security, and cybersecurity requirements for generation and transmission asset owners and operators. These requirements are driven both by regulations such as the North American Electric Reliability Corporation (NERC), and by utilities and independent power producers proactively improving their security programs to mitigate risk. In 2015, ABS Group continued its work with utilities on physical security assessments and improvement plans, and added to its technical staff to address the growing NERC regulatory needs of our power sector clients.

### **Servicing Additional North American Markets**

ABS Group also extend into other critical industrial sectors in North America, such as the water/wastewater industry. In 2015, ABS Group provided structural engineering services to one of the largest water suppliers in the U.S.—more evidence that ABS Group can assist in any asset-intensive market requiring technical, performance and safety-related advisory services.

## **OTHER SECTOR SERVICES: FROM TRADITIONAL TO EMERGING MARKETS**

### **Marine Technical Services**

ABS Group works as the strategic partner to its parent company in a number of traditional markets, including the first market to which it began providing non-classification marine technical services more than 40 years ago. In 2015, ABS Group continued to build on this heritage for setting standards of excellence in the global marine and shipping industry.

ABS Group assists the marine industry with maintaining the efficient operation of vessels of varying ages through its Condition Assessment Program, which had a record year of performance providing ratings for ships carrying cargo, such as bulk oil, freight and LNG.

For marine clients, ABS Group continued to provide feasibility studies, independent engineering review – including life extension studies to optimize our clients' assets for extended service life and other analyses such as spectral fatigue, construction monitoring, regulatory compliance guidance and third party inspections.

ABS Group also worked with a multi-asset type global shipping company to benchmark its Enterprise Asset Management practices relative to structural and machinery maintenance. These assessments addressed almost a dozen areas of asset management, including inventory control, Computerized Maintenance Management System (CMMS) utilization and maintenance hierarchy. The resulting implementation plan helped the client transition its maintenance practices from reactive to predictive while optimizing its maintenance spend.

### **Supporting the Emerging LNG Market in North America**

In 2015, ABS Group saw further growth supporting emerging markets such as global gas. To assist ABS with these efforts, ABS Group conducted industry research and analysis that resulted in an update to the ABS Guide *Bunkering of Liquefied Natural Gas-Fueled Marine Vessels in North America*. Additionally, ABS Group has been working with many clients globally providing marine services that address waterway suitability studies for proposed new LNG terminals as well as LNG bunkering facilities.

### **Global Certification Services for the Chemical Industry**

While expanding services in North America in the oil, gas and chemical market, ABS Group maintained a strong presence in the global chemicals market in 2015. For example, ABS Group's subsidiary, ABS Quality Evaluations (ABS QE), a wholly owned subsidiary of ABS Group, helped a major global chemicals company optimize its ISO and OHSAS certification management program across more than 100 facility locations. ABS QE's Global Certification Program helped the client achieve a more consistent approach to auditing, enabling the client to gain a holistic overview of its business and saving them as much as 40 percent in audit costs.

### **A Vital Ally to Government**

Government organizations face extraordinary pressure and scrutiny in light of a dynamic and fluid environment where risk presents itself in nearly all facets of daily operation. To assist these organizations with better understanding and managing risk, ABS Group has worked with public entities for over 20 years to create holistic solutions through an Enterprise Risk Management approach.

In 2015, ABS Group continued its support of key agencies in the government sector, including the USCG and U.S. Department of Homeland Security, to address important safety and security issues. ABS Group also continued supporting the Bureau of Safety and Environmental Enforcement (BSEE) through work as an independent Certified Verification Agent (CVA) and through safety studies addressing offshore risk and operational issues.

### **Gathering Cybersecurity Data for the USCG**

To address the risk of cyber threats to the marine transportation system, ABS Group assisted the USCG with interviewing a cross-section of maritime industry representatives. ABS Group gathered critical information about industrial control systems, vulnerabilities relative to various threats and potential consequences of cyber exploitation that will help inform USCG policy development and support training efforts.

### **Assessing Offshore Wind Energy Inspection Procedures**

In a safety study delivered to BSEE in 2015, ABS Group analyzed global offshore wind energy procedures and applicable state, national and international regulations and standards to better understand offshore wind installation and inspection procedures for the OCS. Following the risk assessment, ABS Group provided BSEE with recommendations for the regulatory and inspection process of offshore wind farms, including details about logistics, training, safety and risk management.

### **Supporting BSEE to Mitigate Aviation Safety Risk**

ABS Group conducted two significant flight safety assessments in 2015 related to offshore rotorcraft operations on the Offshore Continental Shelf (OCS). ABS Group led an assessment for BSEE to assess the potential effects of methane ingestion on or near OCS helidecks and to identify and eliminate risk. The HFE team also designed a fatigue risk management system for helicopter maintenance as part of the overall aviation safety support project for BSEE.

### **Developing a Transportation Road Map for Transit Authority**

ABS Group's is also supporting transportation projects at the state and local level. On behalf of a nationally recognized transit authority, ABS Group led a comprehensive Enterprise Asset Management assessment with the goal of enhancing the reliability of the transit authority's bus transit services. ABS Group developed a road map with recommendations for improved maintenance and data management. These methods can be used to further improve the reliability of public transportation globally.

### **Mitigating Risk in Pharmaceuticals, Process Industries**

ABS Group applies its experience in safety and risk management, performance optimization and quality assurance to other diverse industries, including aerospace, automotive, commercial properties, mining, pharmaceuticals and other process-driven industries. In 2015, ABS Group's Asset Performance Optimization (APO) services continued to help clients in these markets reduce costs and increase asset life and efficiency by implementing Enterprise Asset Management strategies.

Major pharmaceutical companies continue to be a significant market for ABS Group. In 2015, ABS Group's subsidiary Genesis Technology Solutions, Inc. (GenesisSolutions) advised more than 20 companies on services, including Asset Reliability and Mechanical Integrity programs, CMMS upgrades and data compliance, creation of Master Asset Lists, Proactive Maintenance Optimization, Preventive Maintenance support and technical expertise.

ABS Group is expanding these integrated APO services to ABS Group's more traditional markets as these clients seek to implement best practices and optimize performance and maintenance efficiencies.

### **Expertise in Renewables**

With traditional energy markets focusing on reducing costs in 2015, this was also a year of innovation in emerging markets such as renewable energy. ABS Group was at the forefront, supporting innovative concepts and projects focused on harnessing wind as an energy resource. As a trusted advisor to the global offshore wind industry, ABS Group continued to provide key support services in Technical Inspection and Verification for the U.S. and European markets in 2015.

A European design firm selected ABS Group to provide certification services for a novel floating platform foundation concept that will produce offshore renewable wind energy in the U.K. These services are ongoing as ABS Group assists this client with demonstrating the viability of a game-changing approach to offshore wind installations. ABS Group's work also continued on the first offshore wind farm in the U.S., providing CVA services to confirm that the project meets the necessary regulatory, safety and quality requirements. Our European renewables team was awarded a significant multi-year quality surveillance contract in early 2015 for one of the largest offshore wind farms being constructed in the North Sea.

ABS Group's experience verifying floating wind concepts and working with offshore structures and marine assets qualifies us uniquely to advise the renewable industry on a number of innovative advances. ABS Group anticipates demand for our insight and services will increase in the coming years as renewable energy continues to expand.

## **ADAPTING TO FUTURE INDUSTRY NEEDS**

ABS Group remains steadfast in its mission to be a leading global provider of technical services to both the industrial and government sectors. Our goal is to assist clients with operating safer, more reliably and more efficiently, and in compliance with the appropriate regulations and standards.

In 2015, ABS Group continued to adapt to new challenges in a changing marketplace, with our global network of operating companies dedicated to addressing the needs of diverse industries worldwide. As evidenced by our 2015 performance, ABS Group is focused on adding value to multiple industries and will continue to strengthen a shared reputation for providing expert-led solutions as a trusted and independent safety advisor to both industry and government.



**STRONG & SUSTAINABLE**  
**ABS GROUP OF COMPANIES, INC.**  
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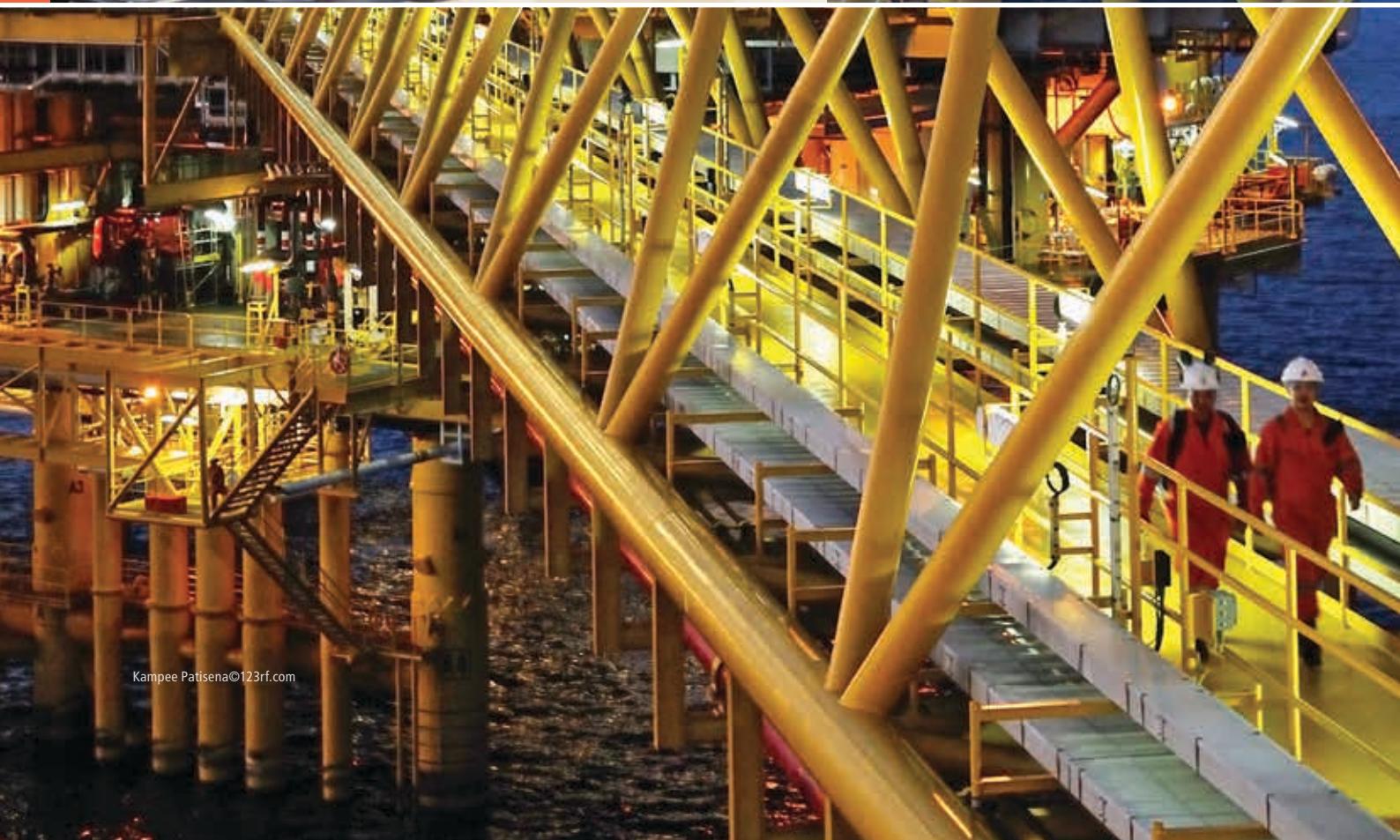
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