Partnership

Edited and Printed by CCS 2017 . 6 / The 27th issue in total

China's first 20,000 DWT river-ocean ship put into construction

Recently, technical seminars for Zhoushan river-ocean intermodal direct ship and the first 20,000 DWT river-ocean intermodal ship built ceremony were held in Zhoushan. Construction of the first river-ocean intermodal ship is not only a major breakthrough in the history of China's water transport, but also marks significant achievements of the strategic cooperation made by CCS and Zhoushan municipal government.

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为客户和社会创造价值

Safety, environmental protection and creating value for clients and society

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Dynamics

New Deliveries

The third issue in 2017
(The 27th issue in total)

Edited and Printed by CCS

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Sender Object: Manager and technical staff
Printing party: Beijing Tiancheng Printing Co.,Ltd.

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New Service Products

Outstanding Teams

China Classification Society and Shanghai Waigaoqiao Shipbuilding Co., Ltd. signed a strategic cooperation agreement

On June 2, 2017, China Classification Society (CCS) and Shanghai Waigaoqiao Shipbuilding Co. Lt. (SWS) signed strategic cooperation agreement in Beijing. Sun Licheng, the president of CCS, Sun Feng, the vice president of CCS, Sheng Jigang, the General Manager of Shanghai Waigaoqiao Shipbuilding Co., Ltd and Sun Wei, the Deputy General Manager of China Shipbuilding Group attended the signing ceremony.

Under the cooperation agreement, the two sides will close cooperate in the fields of technical standards and scientific research cooperation, luxury cruise construction, new technologies such as flaw detection.

By upholding the mission of "green and environment protection, innovation and taking the lead" and by committing to the technical ideology of energy-saving, green, environment-friendliness and low carbon, SWS has become the well-known ship construction center in the world after over ten years' quantum leap development, and is firmly in the top shipbuilding group in terms of scale, product value and product structure. In the field of the construction of super large oil tankers, super large container ships, super large ore carriers/bulk carriers and large size LNG carriers and other value-added ships, SWS has made contributions to shipping and environment protection due to its remarkable economic benefits based on its excellent technology and high quality, high speed and high quality production.

CCS has been actively carrying out intelligent ship research in recent years and has provided design index, rules and standards, verification mode and related data base and application platform for intelligent ships. CCS is the first in the world to publish Rules for Green Ships and Rules for

Intelligent Ships. Rules for Cruises was also released timely to cater to the need of luxury cruise design and construction in China. In order to safeguard the quality of super large ships, CCS developed the new crack detection technology and is cooperating more closely with the domestic shipbuilding industry in the field of advanced technology. CCS' mission of "safety, environment-protection and creating value for the clients and society" has been widely recognized by the industry, as well as its service quality and brand.

The signing of the strategic cooperation agreement will promote the bilateral cooperation relations to a new level. CCS will bring its advantages in rule development scientific research, shipbuilding, survey and certification, energy efficiency service to full play and make use of its global resources, advanced technology and talents to support and promote the comprehensive operation and development of SWS in the field of ship construction.

A 8500 TEU container ship of Maersk Line transferred to CCS

Recently, M.V Maersk Sofia, the 8500 TEU container ship of Maersk Line was transferred to CCS single class.

As the largest container shipping company in the world, the position of Maersk Line in the global container liner market cannot be overstated, with its container transportation capacity and container ships respectively accounting for 15.7% and 9.7% of the global market.

In 2016, Maersk Line and CCS signed the Memorandum on Cooperation, laying a solid foundation for mutual technical exchanges and cooperation.

The transfer of the first container liner ship of Maersk Line to CCS unveiled the new chapter of cooperation between Maersk and CCS and laid the foundation for extensive cooperation between the two parties in the global market.

CCS signed memorandum of cooperation for coordinated development with ship inspection bodies in Beijing, Tianjin and Hebei

Recently, ship inspection bodies in Beijing, Tianjin and Hebei gathered in Tianjin Branch of China Classification Society and signed the memorandum of cooperation for the implement of collaborative development of ship inspection bodies in Beijing, Tianjin and Hebei. Yang Xinzhai, the deputy director of Ministry of Transport Maritime Safety Administration, E Hai-liang, section chief of ship inspection office, Liu Fusheng, the director of Tianjin Maritime Safety Administration, Huang Haibo, the deputy inspector, Wu Bingjun, the deputy director of Tianjin Municipal Transportation Commission, Tang Jianxin, the director of Hebei port and Shipping Bureau, Tao Wenxian, the deputydirector of the Marine Bureau and Zhu Kai, the vice president of China Classification Society attended and witnessed the signing ceremony.

In the memorandum a number of consensus has been reached for collaborative development of ship inspection bodies in Beijing, Tianjin and Hebei: Firstly, carry out regional ship policy and technical research for energy saving and environmental protection, including convenient inspection technical support for ship registration in the free trade area, inspection standards of tourist ships in key waters of Xiong'an New Area water system and the Beijing water system, and regional ship inspection standards for those which are below 5 meters; Secondly, establish inspection business exchange mechanism, business collaboration mechanism and talent co-cultivation mechanism for those four ship inspection bodies so as to jointly improve the overall level of inspection technology to promote the improvement of inspection service quality. Thirdly, establish regional cooperation approval mechanism between those mentioned three inspection bodies with Tianjin branch for marine products and testing service body approval.

Yang Xinzhu, deputy director of Ministry of Transport Maritime Safety Administration and Liu Fusheng, deputy director of Tianjin Maritime Safety Administration pointed out that the memorandum means a new stage for ship inspection of Beijing, Tianjin and Hebei, and as a major step forward in promoting the overall planning of traffic integration, it created a precedent for the development and cooperation modal of regional survey bodies and the central ship inspection bodies. It is expected that ship inspection cooperation would obtain demonstration results which can be copied for reference as an model of cooperation and development for other shipping inspection bodies.

Zhu Kai, the vice president briefly introduced the development and achievements of CCS over recent years especially in the field of scientific research, on behalf of the China Classification Society he thanked Ministry of Transport Maritime Safety Administration, Tianjin Maritime Safety Administration for their support in the establishment of ship inspection cooperation platform, he also gave a positive response to traffic authorities of above three provinces for their trust in CCS and believed that the signing and implementation of this cooperation memorandum is an important task in carrying out *Opinions On The Construction Of World - Class Chinese Classification Societies* issued by the Ministry of Transport. Started from the Tianjin Branch, China Classification Society will implement the memorandum of cooperation with its system-wide technical force through technical exchanges, technical cooperation, personnel training, thus to promote regional shipping safety, environmental protection, green, intelligent technology in Beijing, Tianjin and Heibei.

Technical seminar on Zhoushan river-ocean ship type and commencing ceremony for the construction of the first ship was held in Zhoushan

Recently, technical seminars for Zhoushan river-ocean intermodal direct ship and the first 20,000 DWT river-ocean intermodal ship built ceremony were held in Zhoushan. As the main research unit of river-ocean intermodal direct ship, specification and regulation, China Classification Society (CCS) attended the seminar, and made a special interpretation for the research, laws and regulations of river-ocean intermodal direct ship. At the same time, CCS and Zhoushan government signed the river-ocean intermodal cooperation agreement, while the river-ocean intermodal department of CCS plan approval office is also officially opened. Under the witness of Secretary of Municipal Party Committee Yu Donglai, Mayor Wen Nuan, Deputy Director of the Yangtze River Shipping Administration Zhu Ruming and Vice President of CCS Sun Feng, 20,000 DWT river-ocean intermodal bulk cargo ship officially started to be built in Zengzhou shipyard, Zhejiang Province. It is the first river-ocean intermodal direct ship to be built after the implementation of *Interim Rules On Statutory Inspection of Navigable Vessels for River-Ocean Navigation* and *Code for Construction of River-Ocean Navigation Vessels for Specific Routes* which has the ability to navigate both in river and ocean with advanced technology and economical characteristics.

Construction of the first river-ocean intermodal ship is not only a major breakthrough in the history of China's water transport, but also marks significant achievements of the strategic cooperation made by CCS and Zhoushan municipal government.

CCS promotes the application of Beidou navigation satellite system

Recenly, China Classification Society (CCS) passed the ship borne satellite navigation system receiver test and inspection approval of Shanghai Institute of Metrology and Testing Technology Research Institute, which becomes the first product testing and testing institution for ship-borne Beidou satellite navigation system receiver products.

In order to ensure the promotion and application of Beidou navigation device in maritime field, on one hand CCS actively participated in the research work of related technical requirements of Beidou marine navigation device, on the other hand, it carried out test capability construction and test institution accreditation for type test of relevant products. After nearly two years of research and technical preparation, CCS not only mastered the inspection requirements, test methods and acceptance criteria of Beidou navigation device, but also instructed and helped the Shanghai Metrology and Testing Technology Research Institute to complete the system construction of performance testing of receiving devices of ship borne satellite navigation system (BDS, including GPS), marine environmental testing and electromagnetic compatibility testing. Finally Shanghai Metrology and Testing Technology Research Institute became the one of the first two Beidou satellite navigation and positioning services product testing institutions approved by CCS.

In 2011, the Ministry of Transport and the PLA General Armament Department jointly held the launch project of China’s second generation satellite navigation demonstration project. Leaders of the Ministry of Transport attending the meeting stressed that the transport industry should become the pioneer of civilian promotion of Beidou system. In 2014, Beidou satellite navigation system officially became an integral part of the World Wide Radio Navigation System (WWRNS) as a result of the MSC. 379 (93) resolution adopted by the International Maritime Organization, obtaining the international legal status for maritime applications. In November 2016, Maritime Bureau of the Ministry of Transport promulgated the 2016 amended notification of "Technical Specifications for Statutory Inspection of Domestic Navigation" and officially defined the application requirements of Beidou navigation system in the field of navigation. It means that hundreds of thousands of domestic ships in operation can be equipped with Beidou navigation products, which provided basis for the promotion and realization of economic and social benefits of Beidou system.

“XUN XIAN 5” and “XUN XIAN6”successfully delivered

On June 7th, 2017, “XUN XIAN 5”and “XUN XIAN6”, the two theme luxury yachts which are classed with CCS were delivered successfully in Yantai.

The two theme yachts are the first tourism ships which are modeled and designed by tourism company with original ideas and oriented for high-end public tourism market with the theme of “looking for fairy land”, and they are the pioneer products in China to make use of the cruise ideology to enter maritime culture and tourism and entertainment. The ships have a number of innovations in modeling, layout and use of novelty equipment.

On the same day, CCS signed Framework Cooperation Agreement on Marine Tourism Equipment Project with CIMC RAFFLES and Beibuwan Tourism Co., Ltd. According to the agreement, the three parties will collaboratively build the innovation platform of marine tourism equipment project, strive to develop the alliance of maritime leisure innovation and development and to update comprehensively the tourism in domestic sea islands and healthy and cultural tourism from the perspective of supply-side reform. It is also the significant practice of CCS to implement Opinions on the Construction of a world-class International China Classification Society issued by the Ministry of Transport

CCS Mediterranean regional committee 2017 annual meeting was held

Nowadays, China Classification Society (CCS) Mediterranean regional committee 2017 annual meeting was held in Athens, Greece. The annual meeting was chaired by the President of the Mediterranean Regional Committee, Mr. Palios, who, on behalf of the Committee, praised CCS’s work and achievements over the past year and expressed its appreciation for CCS’s important role in the international shipping and shipbuilding industry. He also looked forward that CCS Mediterranean region would play a more important role as a platform for connecting China with Greece and Cyprus.

CCS President Sun Licheng delivered a speech in which he thanked the Committee members for the support and trust they have given to CCS, and briefed members about the current international shipping situation, new technical revolution and CCS latest development, expressing CCS wish to make joint efforts with the shipping industry to address the existing difficulties and challenges to realize mutual and common benefit.

Panagiotis Kouroumplis, the Minister of Greek Ministry of Transport and Maritime Policy made a special presence at the meeting to express appreciation and thanks for the active role CCS has played over the years to make efforts to build maritime exchange stage between China and Greece. CCS representative reported to the Committee on the achievements CCS has made in technical research, safety performance, business increase and international cooperation, especially the solutions and service products CCS has developed to address the current technical and market hot issues. Besides, the meeting has elected new members and has invited Greek experts to deliver speeches on special topics. Those attended the meeting had full exchanges on hot issues in shipping industry, strengthening cooperation between CCS and Chinese industry as well as other matters.

CCS Mediterranean Regional Committee was established in 2002, there are nearly 30 Greek and Cyprus major ship-owners joining the organization as Committee members.

“ANJI 23” car carrier

“ANJI 23” built by the Jiangsu Jinling Shipyard for Anji Automobile Logistics Co., Ltd., is so far the largest car carrier, with 3800 car spaces, invested by Chinese ship owner, designed and manufactured by Chinese shipyard and designed and developed by China on its own. The ship was surveyed and classed with CCS.

The ship is green, energy efficient, intelligent with fast speed, lower fuel consumption and higher utilization efficiency of loading area, and it is the first car carrier which has obtained CCS Greenship II classification additional notation. The ship represents the advanced level of independent design, construction, inspection and operation management of car carrier in China.

“HUAN DAO JIAO LONG 2 ” sightseeing passenger submersible

This type of submersible is designed and developed by the same team of manned 7000m deep submergence vehicle JIAO LONG from 702 Institute, and is an innovative result from successful application of the JIAO LONG manned submersible. The ship applies fully-transparent-plexiglass pressure-proof hull design, including three columnar hulls with thickness of 57mm and diameter up to 1689mm and a spherical pressure-proof hull, which are connected by a circular metal outside rim. The ship was subject to CCS construction survey and was classed with CCS.

The passenger submersible, HUAN DAO JIAO LONG 2, has 3 groups, a total of 6 pod thrusters, having auto-navigation capability such as self-propelling, diving, and floating, with design depth of 40 meters (now limited to 32 meters, which is the maximum operating depth of Ya Long bay), at the pilot stage, it can carry 9 people (including the driver), with 3.0 knots the maximum speed. Equipped with underwater sonic telephone, radio communication, underwater positioning and other advanced equipment; with emergency ejecting device, the submersible can come up quickly through the mechanical release of heavy cargo when there is emergency.

The type of submersible has a protection mother ship, HUAN DAO 001, which is mainly used for daily maintenance and supply, and for the rescue work in emergency.

HUAN DAO JIAO LONG is the first fully transparent manned submersible for marine tourism in the world, and is also the only one manned submersible for civil sightseeing approved by CCS. As a global pioneer, it can sail unrestrictedly within a depth of 40m, which fills a gap in the marine tourism market.

“NAN LIN WAN” oil tanker

This 114000 DWT crude oil / product oil tanker is built by Guangzhou Shipyard International Company Limited and for COSCO SHIPPING Tanker Co., Ltd., it will service for Royal Dutch /Shell Group of Companies in time charter after delivery. The ship was subject to CCS construction survey and was classed with CCS.

NAN LIN WAN is 250m in overall length, 245.4m in length BP, 44m in moulded breadth, 21.5m in moulded depth, 13.7m in design draft, about 114,000 tons in deadweight, 14.5 knots in service speed, and about 20,000 nautical miles in endurance. The ship is an Aframax independently researched and developed by Guangzhou Shipyard International Company Limited, with optimized ship line and new engine system, the ship has many prominent advantages such as large deadweight, large hold capacity, compact and reasonable layout and ultra-low fuel consumption, especially its leading performance in energy saving in China.

“SHI ZI YANG 7” high-speed passenger catamaran

The ship is a high-speed passenger catamaran built by Guangdong Hongshen Shipbuilding & Engineering Co., Ltd. for the Dongguan Humen Longwei Passenger Ferry Co., Ltd., sailing in the Pearl River waters. The ship was subject to CCS construction survey and was classed with CCS.

It’s 40m in length, 9.5m in moulded breadth, 3.2m in moulded depth 199 in capacity of passenger and 387 tons in gross tonnage.The ship is a catamaran and is composed of the left and right two demihulls which are connected by cross-structure. Each demihull is divided into six watertight compartments by five transverse bulkheads.

The ship is a high-speed passenger ship with double engines, double water-spraying devices and one stern diesel engine. Its propeller uses two main engines MTU12V2000M72, two water-spraying devices MJP 650DD CSU and two sets of supplemental steering units Humphree. The intermediate shaft is of carbon fiber with light weight, which reduces noise and vibration when sailing. The exhaust water jacket of the main engine is made of titanium, which increases durability. Using two-speed cabin axial-flow fan, which can be switched to low-speed mode when passengers are embarking and disembarking to reduce noise. The storage battery of the whole ship is lithium battery, which is light-weighted, maintenance-free and durable with strong storage capacity and stable voltage.

“ BEI HAI KAI TUO ” crude oil / product oil tanker

This ship is the first of the two 55000 DWT crude oil / product oil tankers built by Guangzhou Shipbuilding International Co., Ltd.

for Shanghai Beihai Shipping Co., Ltd.. The ship was subject to CCS construction survey and was classed with CCS.

The ship is 219.0 meters long and 35.00 meters wide and 18.40 meters deep with GT of 39618 tons and NT of 18216 tons. The host power is 9600 kilowatts and design speed is 14.5 knots with unlimited navigation area. The ship is comfortable and environmental friendly with low carbon emissions. It has B-level ice zone strengthening with single-point mooring device and other additional notations, and comply with the requirements of Hong Kong Convention. The ship used a lot of innovative technology and environmental protection technology which greatly improved its economic performance indicators and competitive edge. The ship is mainly used for oil transportation from domestic oil platform to the coast and after operation, it will offer tailored services for the target refineries.

“Tong Yang 77” ro-ro passenger ship

The ship is a Ro-Ro Passenger Ship built by Fujian Southeast Shipbuilding Co., Ltd., which is exported to Indonesia and sails between Indonesian islands for transporting passengers and trucks.

The ship was subject to CCS construction survey and was classed with CCS.

The overall length of the ship is 106.25 m, length BP is 99.20 m, moulded breadth is 20.40 m, moulded depth 6.50 m, design draft is 4.20 m and double bottom height is 1300 mm. Propeller design takes into account the engine power reserve of 15%; when the ship is under the condition of design draft and no fouling with the main engine reaching its rated speed in calm deep water area, and the wind is less than gentle breeze, the speed of the ship is about 15.0 knot. The ship applies AU-type four-blade propeller with the material of Cu3 nickel-aluminum bronze. Fuel load of about 106 tons of diesel meets the endurance of 1000 sea miles when the ship is in full load sailing at service speed (Vs = 15.0 knot). With freshwater capacity of 189.6 tons and food and grain reserve, it can ensure self-supplying for 17 crews in 20 days.

“DA JI” and “DA QING” multi-purpose heavy lift ship

DA JI and DA QING, are the first and second 28000 DWT multi-purpose cargo ships designed by SDARI and built by Shanghai Shipyard Co., Ltd. for COSCO SHIPPING Specialized Carriers Co., Ltd.. The ship was subject to CCS construction survey and was classed with CCS.

The port side of the ship's main deck is equipped with two single-arm derricks with SWL of 350 tons and another one with SWL of 100 tons. And the two with SWL of 350 tons can be jointly operated, lifting 700 tons of cargo maximally. Cargo hold No.2 has a length of 54m, which can be loaded with bulky and lengthy special cargo, and is equipped with four anti-heeling water tanks. The cargo hold can be loaded with bulk cargo such as grain, steel coil and dangerous goods. Using the lift-away pontoon-bridge-type tween deck as a partition increases the flexibility of the ship's loading to load different cargo at the same time, while reduces the difficulty of cargo collection and improves the operating efficiency of the ship. In addition to loading bulk cargo and special equipment, the ship can also be loaded with 1045TEU container on the main deck, which fully embodies the versatility and flexibility of multi-purpose ship.

“TIAN HE ZUO”oil tanker

This international ocean-going oil tanker is built by Shanhaiguan Shipbuilding Industry Co., Ltd. for COSCO SHIPPING Tanker(Shanghai) Co., Ltd. The ship was subject to CCS construction survey and was classed with CCS.

The ship is 220.0 meters long and 32.26 meters wide and 20.60 meters deep with a design draft of 13.60 meters. It can accommodate 45 crews with unrestricted navigation. The DWT and GT of the ship are separately 64983.61 tons and 40779 tons, and the host power is 9000 kilowatts. From the bow to the stern, the whole ship is symmetrically arranged with 12 cargo tanks. Its design speed is up to 14.20 knots. This ship used a set of turbine cargo pump system produced by Wuhan Marine Machinery Plant Co., Ltd. in the mode of “2 +1” (2 sets of imported products +1 set of domestic products). It is the first time that home-made fuel pump system is installed and used in domestic vessels.

Functional design requirements of *CCS Rules for Cruise Ships*

By Gu Yajuan

The key of cruise design is to realize three goals as follows: safety design of luxury passenger ship, functional design of passenger casual experience and guarantee design of passenger health and safety. *CCS Rules for Cruise ships* which went into effect on 1 January 2017 grasps accurately these three goals, provides additional notations for cruises and identifies specifically the safety requirements for cruise design; the Rules provides Cruising Experience Design Index (CEDI) and the requirements for passenger space, degree of comfort and passenger leisure facilities, with each part providing separately the specific requirements of different level. The Rules also provides Sanitation Ensurance Design Index(SEDI) and identifies the requirements of different level for passenger health and safety.

Casual Experience Design Index (CEDI) is an index to determine the leisure experience capability during design and construction stage, which includes 3 aspects: passenger space, comfort and passenger leisure facilities, each of which includes the specific requirements of level 3, 4 and 5.

In the aspect of space design, the size of the passenger space reflects the occupancy of resources on board, which includes three parameters of passenger per capita tonnage, per capita living area of passengers and the passenger and crew ratio. Their arrangement will determine the structure and fire-

fighting design and is the important parameter in the early design period. The reasonable configuration of the passenger space is another technical point of the cruise. When the cruise's tonnage and number of passengers have been determined, the passenger space, rooms and public places and leisure facilities will be determined and furnished according to the expected CEDI. Then each system will be rationally designed according to the expected comfort design. The study shows that per capita tonnage and the passenger and crew ratio are related to not only the luxury level of the cruise, but also the tonnage of the cruise, and that per capita living area of passengers has little to do with the tonnage but only to the luxury level of the cruise.

In the aspect of reduction of cabin vibration and noise, comfort level is another important factor affecting the experience of each passenger, and its influencing factors can be divided into three aspects: the noise, vibration and indoor climate. Vibration and noise is a basic aspect affecting the comfort while it is also a key point of the design of the cruise ships. Rules for Cruise Ships specifies the maximum vibration level, the maximum noise level, and the air sound insulation index that satisfy different CEDI rating indices in different passenger spaces on board. In the design stage, the vibration noise is predicted, but the real ship measurement results will prevail.

The study shows that the noise of most cabins comes from air conditioning or air conditioning system. As a result, the design of air conditioning and air conditioning systems is the determining factor of the noise within a cabin. So the chamber noise control technical research is being carried out, and the outcome will be compiled into the guidance for cruise cabin noise control.

In the aspect of indoor climate, the indoor climate, including temperature, humidity, air flow rate, the amount of fresh air and so on, is another important aspect affecting the cruise comfort. Special attention needs to be given in the design phase since it plays a decisive role in the arrangement of a ship and the configuration of space and crew. Rules for Cruise Ships specifies requirements for indoor temperature and relative humidity of different passenger spaces in different outdoor environments and limits the maximum air flow rate and the minimum fresh air volume. This has brought great trouble to the design of the air conditioning system: first, considering the complexity of the internal space (residential places, leisure and entertainment places, restaurants and shopping facilities, health care facilities and large space atrium, etc.) and the different air conditioning requirements for each place, the indoor environment calculation is quite huge; second, making a certain space of the cruise to meet the requirements of several parameters such as temperature, humidity, wind speed, ventilation and noise at the same time is quite difficult for design since these parameters are not synchronized, and some of them are even contradictory to each other; third, comparing with a hotel on land, the bulkhead structure of a cruise is easier to conduct heat and considering that a cruise is movable, the design of it should consider more external meteorological changes. Lastly, considering the strict requirements for control of weight and center of gravity of a cruise in addition to many restrictions, the layout of the system is very difficult.

In the aspect of passenger leisure facilities, the passenger leisure facilities include all aspects of entertainment on board. The design of each cruise reflects its own culture, style and characteristics, so the leisure equipment on board should satisfy the above needs. The weight of a cruise is difficult to control, which is mainly reflected by the difficulty of controlling the weight of the hotel part. This point has been repeatly stressed in this article. Reasonable layout of leisure facilities is very important, which is the key to the weight and cost control. As it is known to us all that the weight and cost of a swimming pool are significantly different from that of a badminton field. The Rules for Cruise Ships specifies leisure facilities of a cruise complying with different CEDI index, which are classified into two categories, i.e. mandatory and optional, in order to satisfy different cultures and styles for the design of cruises.

The major points of *Guidelines for Inspection of Offshore Wind Farm Facilities*

By Tang Guangyin & Li Hongtao

In order to adapt to the rapid growth of offshore wind power development, and to respond to the national call for "Green China" and support the healthy and safe development of offshore wind power in China, China Classification Society (CCS) published the "*Guidelines for Inspection of Offshore Wind Farm Facilities*" (hereinafter referred to as the Guidelines) in June 2017, based on the "whole life cycle" ideology for domestic offshore wind farm major facilities and taking into account the characteristics of the operation of various kinds of facilities in period of design, construction, installation and operation and maintenance. The Guidelines formulated technical rules and requirements for "whole life cycle " inspection of offshore wind farm related facilities.

The Guidelines include the requirements for inspection of major offshore wind farm facilities, covering the major inspection items for major facilities and various kinds of installations for offshore wind farm development, and stipulate in detail the inspection items and specific inspection requirements for the major types of offshore wind farm facilities, such as construction and periodical inspection of offshore wind turbine including wind turbine blade, gearbox, generator, converter, transformer, GIS and whole machine; inspection requirements and guidelines for under part support structure of offshore wind turbine power and wind tower, including: structure, fire fighting equipment, escape and life-saving, air navigation signs and signals; inspection requirements and guidance for offshore booster station

platform including: structure, fire fighting equipment, electrical and instrument equipment, mechanical equipment, life-saving equipment, radio communication equipment, pollution prevention equipment, lifting equipment, helicopter deck facilities, etc.

The domestic offshore wind farm industry has grown dramatically over the last 10 years since the first 1.5MW offshore experimental machine unit was installed in the Bohai Sea in 2007. By the end of the"12th Five-Year Plan", the total installed capacity of built offshore wind farm projects has reached 657.88MW, installed capacity of mesolittoral zone has reached 434.48MW, installed capacity of offshore fan has reached 223.4MW. China has become the fifth largest country after Britain, Denmark, Belgium and Germany in the field of offshore wind farm all around the world. Large amount of offshore wind farm facilities has become a beautiful landscape and a significant energy source in coastal areas.

It is glad to see that the rapid development of offshore wind farm has brought the clean energy, however, we should be clearly aware of the safety risks of the industry. In recent years, safety accidents happen occasionally in the period of offshore wind farm development and operation, of which maritime safety production accidents accounts for a large proportion, relating to offshore wind power facilities and offshore wind power construction ships. All these have caused great threat to maritime safety, especially the safety navigation environment, life and property and marine environment.

At present, offshore wind farm facility developed and constructed in China, including offshore wind turbine generator and support structure, offshore booster station platform all belong to typical fixed offshore structures. From the perspective of the history of the development of the world shipbuilding industry and offshore engineering, inspection throughout the period of design, construction, offshore installation and operation and maintenance is a very important measure to ensure the safety of offshore structure, and has formed a relatively perfect system and institution. This also provides a good base and reference for ensuring the safety of offshore wind farm and the implementation.

The guideline is based on rich experience and technological accumulation of CCS in the field of offshore fixed structures inspection. Based on the existing rules and standards and relevant inspection guidelines for offshore fixed platform and structures, taking into account the different characteristics of all kinds of offshore wind turbine facilities and the status quo of the domestic offshore wind power development industry, the Guideline put forward the technical regulations and inspection requirements for offshore wind farm, offshore wind turbine, offshore wind turbine support structure and offshore booster station platform.

Offshore wind turbine is not only one of the most important facilities in the offshore wind farm, but also the core assets .The Guideline put forward inspection regulations and requirements for the whole offshore wind power generator and the following components; wind turbine blade, gearbox, generator, converter, transformer, GIS, whole machine. At the same time, the requirements for the above not only includes inspection in construction period, but also inspection in operation and maintenance.

The structural support of offshore wind turbine includes tower to sustain offshore wind turbine, substructure and foundation. The inspection requirements for the supporting structure includes the major and necessary items to ensure the safety of supporting structure, such as fire fighting equipment, escape and rescue equipment, navigation aids and signal equipment

Offshore booster station is one of the key facilities of offshore wind farm, its function is to concentrate, step-up and transmit the electricity of the offshore wind turbine to land power grid by submarine cable, and at the same time realize the conversion operation between offshore wind turbine and voltage.

The official release of the Guideline indicates that the CCS "whole life cycle offshore wind farm facility" inspection service business has transformed from being single and independent which differentiates between products and stages to the service mode characterized by "across the board ", "whole life cycle " and "integration and unification" .

Introduction to the key points of the *Guidelines for Test and Inspection of Exhaust Gas Cleaning System of Ships*

By Xin Jicheng

At present, the ship design, shipbuilding and ship retrofitting industry in the world have little understanding of the exhaust gas cleaning system (EGC), it is easy that ships do not satisfy the requirements of the convention due to lack of understanding of the requirements of the convention. In order to avoid such incompliance in the international shipping and shipbuilding industry in the "new sulfur limitation era", China Classification Society (CCS) released three technical guidelines i.e. "*The Guidelines for Test and Inspection of Ship Exhaust Gas Cleaning System*", "*The Guideline for Design and Installation of Ship Exhaust Gas Cleaning System*", and "*The Guideline for Design of Ship Exhaust System*", which stipulated the technical standards in different stages of ship EGC design, installation, installation onboard and test etc. It provides practical technical guidelines for ships to meet the emission requirements of the "new sulfur limitation era".

Based on IMO technical requirements related to EGC equipment, the "*Guideline for Design and Installation of Ship Exhaust Gas Cleaning System*" takes into account the risk analysis and evaluation methods (e.g. IEC/ISO 31010) and provides detailed evaluation and analysis to the safety of marine EGC system, and identified the risk points which may exist in the process from product design to shipment.

"*The Guideline for Test and Inspection of Exhaust Gas Cleaning Systems of Ships*" is an inspection guideline for EGC system produced by ship EGC products manufacturers from product production to real ship test. According to the relevant requirements of IMO, and taking into account the EGC working principle and production characteristics of different types of ship, two different EGC system test and certification procedures for program A and program B have been developed.

Compared with the two guidelines above, the relevant regulations of the "*The Guidelines for Ship Exhaust System Preinstall*" are not aimed at the ships which have been installed or intend to install the EGC system in the stage of construction, but precisely matched those that currently have no plans to install the EGC system. As the supply capacity and price of low sulfur fuel in international fuel supply market remain variable in the future, it is difficult to predict whether this will lead to increase of fuel cost of ship operation.

However, the unique features of ship construction and EGC system determine that its pre-installation is more complicated than installation during ship construction. According to the characteristics of EGC system presetting on ships, CCS regulated specifically in the Guideline that ships which apply for EGC preset design not only should meet the need of the special geometry of the ship itself, but should fully consider the installation of the facilities and equipment and reserve enough space for maintenance. Only those ships that meet these requirements may be awarded the "EGC Ready" additional notation in accordance with the requirements of the applicant.

CCS awarded GTT Company NO96-L03+ containment system for LNG carriers principle approval certificate

By Fu Xihua

On April 26, 2017, China Classification Society (CCS), together with GTT and Hudong Zhonghua shipbuilding (Group) Co., Ltd. held the technology seminar on thin film containment system technology and thin film cabin LNG carrier in CCS Rules & Technology Center, Shanghai. CCS, GTT and Chinese Hudong Shipyard respectively gave subject speeches on the key technology of thin film cabin LNG ship, new type thin film containment system technology, LNG ship design and construction. On the seminar, CCS awarded the Aip certificate for the NO96-L03+ thin film system to GTT (Pic 1).

Figure 1 CCS awarded AiP certificates to GTT

The AiP audit CCS carried out to NO96-L03+ system of GTT covers the following technological areas: standard box finite element strength evaluation, insulation box link member strength evaluation, insulation box bending deformation test, strength test, standard box static compression strength test and NO96-L03+ system construction principle.

NO96-L03+ system developed by GTT is a new type of membrane containment system based on NO96-L03 system, which can effectively reduce the daily evaporation rate of large NO96-L03+ system LNG carriers to about 0.1%. As early as in 2014, CCS has completed AiP approval to NO96-L03 system design and awarded the AiP approval certificate to GTT. NO96-L03 is mainly composed of 3 layers of insulating layer.

The insulating layer of GTT NO96-LO3+ system and GTT NO96-L03 is same in thickness, and the difference is mainly in the standard area. NO96-L03+ intermediate insulation box uses polyurethane foam board box to replace plywood box of NO96-L03, and the strengthened use of polyurethane foam board has effectively enhanced the insulation temperature of the insulation layer. In the strengthened zone, the insulation material of NO96-L03+ is consistent with that of NO96-L03.

GTT NO96-L03+ mainly has the following several advantages: the first is to further reduce the daily evaporation rate of NO96 series film cabin system (BOR) to about 0.1%; the second is to reduce BOR with the same thickness of insulation box compared with NO96-L03 system; the third is to maintain all advantages of Yin tile steel; the fourth is to use the same density (130kg/m^3) bubble; the fifth is not to use middle layer insulation box in the standard area; the sixth is to use conventional NO96 insulation box in the perimeter and the corner area.

The insulation box of NO96-LO3+ system includes standard box, strengthening box, and super strengthening box etc., the layout area correspondingly becomes the standard area, strengthening area, and super strengthening area. The main differences are:

Firstly, the main insulation roof layer

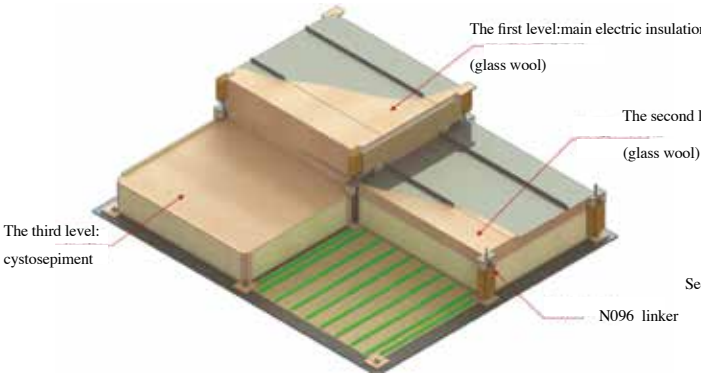


Figure 2 NO96-L03 isolation tank

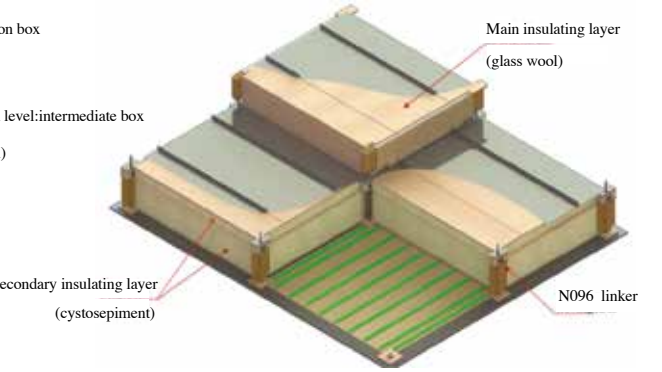


Figure 3 NO96-L03+ isolation tank

	NO96	NO96-LO3	NO96-LO3+
Main screen wall	The same，invar steel for 0.7mm		
Insulating box material	perlite	upper level：glass wool； middle level：glass wool； lower level：spume；	Upper level：glass wool； Middle level：spume； Lower level：spume；
Secondary screen wall	The same，invar steel for 0.7mm		
Thickness	aggregate thickness：530mm； thickness of major insulation box：230mm； thickness of secondary insulation box：300mm；	aggregate thickness：530mm； upper thickness：230mm； Middle thickness：92mm； Lower thickness：208mm；	aggregate thickness：530mm； upper thickness：230mm； Middle thickness：92mm； Lower thickness：208mm；
Standard size of isolation tank	The same，1200mm×1000mm		
Evaporation rate (large-scale LNG ship)	0.125%～0.13%	0.105%～0.11%	0.100%

of standard box is the plate as thick as 12mm, and the standard strengthening box and super strengthening box are of 12mm double plate; Secondly, the standard box has no interlayer, but standard strengthening box super strengthening box has the interlayer insulating box; Thirdly, the standard box, standard strengthening box is provided with a longitudinal reinforcing plate in the main insulation box, and super strengthening box is provided with longitudinal and transverse reinforcing plate; Fourthly, the main insulation thickness of the standard box and standard strengthening box is 9mm, and super strengthening box plate is 15mm thick; Fifthly, the thickness of standard box bottom insulation layer is 9mm, and standard strengthening box and super strengthening box bottom is 12mm thick.

China's LNG industry, especially the waterborne LNG industry chain is developing rapidly in recent years, and the demand for large LNG carriers has been increasing. The completion of CCS approval to GTT NO96-L03+ film cabin system, and the issue of approval certificate to the NO96-L03+ film AiP cabin design has laid the foundation to carry out GASA (General Approval Ship Application) approval and SA (Ship Approval and Registered) approval as the next step. It has a great significance to Chinese thin film cabin LNG ship industry. It will promote the NO96-L03+ thin films cabin's application in LNG tank and LNG tank fuel tank field, and will be helpful to realize the objective of real ship construction with the system for the first time in the world.

The outcome of research on structural strength of river-ocean transport ships

By Wang Na & He Feifei

The River-ocean direct transportation mode can avoid the transit shipment of goods between river and sea ports, reduce the cargo damage and loss and the impact on the environment, reduce transportation costs and shorten the transportation time and is therefore greatly favored by the cargo owners. However, the current river-ocean direct transport mode can not adapt to the characteristics of river-ocean direct navigation, and it is difficult to meet the new increasing requirements of energy saving and environmental protection. Therefore, CCS has actively carried out the wave load research, structural strength research, equipment optimization, typical ship type development work for river-ocean direct transport, and formulated the technical standards for river-ocean direct transport ships- "Provisional Regulation for Statutory Inspection of River-ocean Transport Ships for Specific Routes"and "Rules for Construction of River-ocean Transport Ships for Specific Routes" based on the research outcome. This paper will briefly introduce the outcome of research on the structural strength of river-ocean ships, and the main points of the hull structure section in the Rules for Construction of River-ocean Transport Ships on Special Routes.

Since the river-ocean direct transport ships are currently built according to the rules for ocean-going ships, its wave load is based on the discount of North Atlantic environmental data forecast value. It is therefore necessary to analyze the design wave load of river-ocean direct transport ships on special routes, and further make overall analysis of the structural strength of river-ocean direct transport ships. Structural strength study based on the wave condition of special routes becomes one of the main work of the series of study of the technical requirements for river-ocean direct transport ships.

I. The principle of formulating the structural strength technical requirements for river-ocean direct transport ships

In the research process of the structural strength technical requirements for the river-ocean direct transport ships on specific routes, within the scope the specific waters and specific ships, there are two principles as follows:

One principle is load first. According to the actual wave statistics of the particular sea area where the specific routes are located, the main elements of the wave load of the ships navigating in the particular parts are analyzed, which includes the hull girder bending moment, wave torque, wave force, hydrodynamic pressure amidships and vertical acceleration etc. These main wave load factors will serve as input information for structural strength studies. Judging from the actual situation, the special route from Zhoushan to Yangtze River is smaller than that along the coastal navigation area, and its storm conditions are slightly better than that area;

The other principle is to maintain the same safety level as required by CCS existing technical requirements. As a newly developed ship type, river-ocean direct transport ships do not have the actual conditions to adopt the traditional strength criterion. It would be a more scientific method to establish the strength balance system of river-ocean direct transport ships according to service experience and the ultimate design method.

2. The main points of structural technical requirements of the "Rules for Construction River-ocean Transport Ships on Specific Routes"

According to the conclusion of the

research, evaluation and analysis, the "Rules for Construction of River-ocean Transport Ships for Specific Routes", provides special regulations concerning the following technical requirements for the structural strength of river-ocean ships based on the technical requirements for coastal ships as specified in the "Rules for Construction of Sea-going Ships Navigating in Domestic Waters" .

Firstly, the application scope of the Rules for Construction of River-ocean Transport Ships for Specific Routes. According to the investigation of the matching ports and terminals, river-ocean direct transport ships for specific routes are limited by the logistics demand and berthing capacity, and the Rules will tentatively be applied to specific routes 1-1 and 1-2, and bulk carries and container ships between 65m and 150m in length.

Secondly, the structural mode of river-ocean direct transport ships. According to market demand, the river-ocean direct transport ships for specific routes are usually bulk carriers or container ships. At the same time, according to the actual demand of users, the ships can be designed as multi-purpose ships with double bottom and double sides;

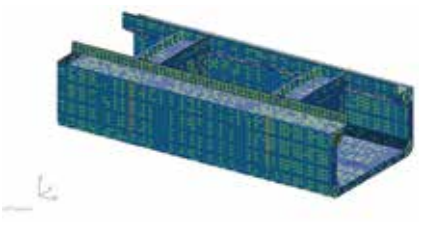


Figure 1 Finite element of bay section

Table 1 Comparison of technical requirements for typical ship's total strength

Item	Ship numbers	CCS requirements (coastal navigation areas)	The requirements of Rules for construction of river-ocean transport ships for specific routes	(3)/(2)
	(1)	(2)	(3)	(4)
basic section modulus, cm^2m	——	50738	46201	0.91
deck section modulus, cm^2m	48352	56618	48394	0.85
bottom section modulus, cm^2m	87264	72472	61944	0.85
section moment of inertia, cm^2m^2	427553	228320	207906	0.91
section area, cm^2	19754	20781	19754	0.95

Thirdly, the main scale ratio of river-ocean direct transport ships. According to the wave load level in the specific sea area for river-ocean ships, the main scale range of the river-ocean direct transport ship is determined based on the study of the longitudinal strength of the series ships and analysis of profile matching board;

Fourthly, the total longitudinal strength of river-ocean direct transport ships. The research on the longitudinal strength technical requirements of river-ocean direct transport ships mainly focuses on wave bending moment, wave shear force, minimum section modulus, minimum profile moment of inertia, wave torque, total strength criterion, etc. The introduction of total longitudinal strength technical requirements for the river-ocean direct transport ships for particular routes will be the main force to improve the economy of the river-ocean direct transport ships;

Fifthly, the local strength of river-ocean direct transport ships. According to the load first principle, the main research object of the local strength of the river-ocean direct transport ship structure for specific routes is the structural component related to the design load and the navigation area. In the *Rules for Construction of River-Ocean Ships for Specific Routes*, special requirements are given for the deck, outer plate, ship bottom components and side structures of ships.

Finally, based on the principle of load first, equivalent safety level, and according to the related research conclusion, the structure strength study of river-ocean direct transport ships meets the design requirements of river-ocean direct transport ships, reduces the ship weight, increase the loading capacity of the ships, improves the economy of river-ocean direct transport ships, and has a good engineering value.

CCS upgrading ship energy efficiency management service

By Li Wenrui

Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015 on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport came into force on 1 July 2015. The regulation applies to ships exceeding 5,000 gross tonnage on all voyages to, from and between EU ports and stipulates that the company shall submit a monitoring plan to a verifier for approval before 31 August 2017. From 1 January 2018, the start of the first monitoring period, the monitoring of the relevant data on carbon dioxide emissions from ships shall be carried out in accordance with the approved monitoring plan, and the monitoring period is a calendar year. Before 30 April of each year afterwards, the company shall submit to EU and the flag State competent authority an emission report certified by the certification authorities.

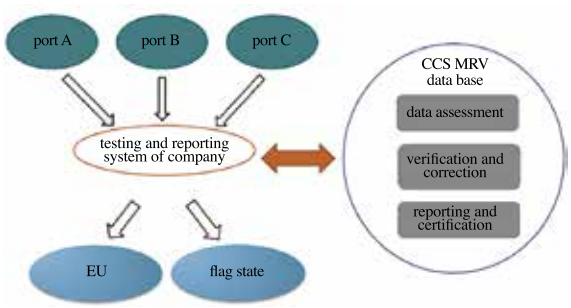
The International Maritime Organization (IMO) formally adopted the amendments to MARPOL Annex VI at the 70th session of Maritime Environmental Protection Committee (MEPC) in October 2016, adding the fuel consumption data collection system, which will come into force on 1 March 2018. The fuel consumption data collection system is applicable to all ships of 5,000 GT and above on international voyages, and the applicable ships shall add the second part—the ship fuel consumption data collection plan to the Ship Energy Efficiency Management Plan (SEEMP). Companies shall submit the SEEMP which includes the fuel consumption data collection plan before 31 December 2018 for approval by the competent authority of the flag State or the recognized organization. From 1 January 2019, the relevant fuel

consumption data shall be monitored in accordance with the Ship Energy Efficiency Management Plan. Before 1 June of each year afterwards, the emissions report should be verified by the flag State or recognized organization.

Considering the content, the EU regulation and amendments to MARPOL Annex VI came to effect at different times with similar requirements and the same purpose. However, the establishment of fuel consumption data collection system by IMO not only promotes the development of greenhouse gas emissions reduction in the shipping industry around the world, but also brings the monitoring, reporting and verification of the fuel consumption or carbon dioxide of the ship back to the industry. The ship management companies are responsible for the specific implementation and the flag state or recognized organizations carry out survey and certification.

Since 1 July 2015 when Regulation (EU) 2015/757 came into effect, the carbon dioxide emissions monitoring and reporting has been in substantive phase currently and has become the problem that is cared about and to be solved by the owners and the companies. To assist shipowners and companies to meet EU regulations and relevant requirements of the IMO, China Classification Society (CCS) carried out the pilot ship cooperation with Shanghai Ocean Shipping Co., Ltd.. From the company's existing management mode and the actual operation of the ship, CCS prepared Guidelines for Implementation of Monitoring, Reporting and Verification of Carbon Dioxide Emissions from Ships, which will play a guiding role in the preparation and implementation of monitoring, reporting and verification (MRV). The Guidelines summarizes and organizes EU regulations and the requirements of IMO in combination with the relevant authorization and implementation rules of operating MRV issued by EU, taking into account the requirements of ISO 14065 as in aspects of impartiality, complaints and information publish. There are ten parts in the Guidelines including the General, Content and Requirements of Monitoring Plan, Assessment of Monitoring Plan, Content and Requirements of Emissions Report, Verification of Emissions Report, Communication and Recording, Avoidance of the Conflict of Interest, Complaints and Appeals, Special Verification and the Template of Monitoring Plan.

CCS has upgraded the existing ship energy efficiency management system as a whole by adding monitoring, reporting and verification functions to ensure that the data for monitoring and reporting is true and reasonable and to reduce and avoid misrepresentation. The system is composed of data from the ship, the company and the classification society. Through the ship's theoretical data, historical data, data on the same type of ship, data comparison of the same route, the system can identify the abnormal data submitted by the ship, indicate the abnormal range and guarantee the quality of data. Meanwhile, the system can generate, archive and export emissions reports and meet the requirement for data exchange between IMO and EU. The system will help the company to reduce the cost of energy efficiency management, and also improve management efficiency and save manpower and time.



As an authorized organization by a number of flag states and a verifier accredited by the EU certification authority, CCS also provides service of approval of the monitoring plan and verification of emissions report for ships that are applicable.

CCS provides a package of technical service solutions for financial institutions

By Cao Jian

Ship financing has been the financial service sector featuring expertise, long cycle, high risk. Financial institutions in U.S. and European with long-time market experience have established the mode and service products suitable for them to carry out ship financing, through reliance on the relatively perfect maritime technology, information consultancy and services. However, ship financing business in China started late and there is still need to further improve the relevant supporting policies, laws and regulations, establish professional shipping finance consultancy, research institutions, and cultivate compound shipping finance talents, so that domestic financial institutions can carry out shipping financing in a better manner.

In the past, domestic financial institutions often analyzed related factors of project risk based on general corporate lending rules when they do ship financing, but for the shipping and shipbuilding industry, they should also consider the unique

characteristics which are different from other industries such as the professional knowledge and the cycle.

Based on the background above, China Classification Society (CCS) has seriously summed up the experience of long-term cooperation with banks, leasing companies, insurance and other financial institutions, given full play to its own technical advantages in the information integration of professional and technical advantages, launched a package of technical services for customers of financial institutions. At present, CCS has signed a series of strategic cooperation agreement with the National Development Bank, China import and export bank, ICBC leasing, Minsheng leasing, CMB China import and export credit insurance companies and other financial and insurance institutions, and provide quality and efficient service for customers in ship financing risk monitoring, risk evaluation and other aspects.

According to the demand of financial institutions in shipping financing to control ship asset risk and achieve value-added and value of ship assets, CCS provide the technical services as follows to the customers of financial institutions by combining the actual business situation of CCS:

First is the technical service during investigation before loan. In this phase, CCS can analyze the technical advancement of the client's project ship / offshore assets, in order to avoid the risk of asset disposal in the future, and achieve the customer's demand to preserve or increase the value of the ship / offshore assets.

Second is the technical service in the stage of management after loan. In the stage, for ships in operation, CCS can provide ship risk monitoring and information reporting service for customers who have ships classed with CCS, making customers to grasp the operation state information of fleet, so as to take timely measures to deal with the risk; for new shipbuilding project, CCS can help financial institutions to understand the shipbuilding schedule, know the major risk events which can affect ship construction schedule in the progress of ship construction. For rental ships, CCS can help customers to understand the actual situation of the ship, found the adverse factors that may affect the asset value, so as to realize the value of assets.

Third is the valuation of ship assets. According to the project ship information that commissioned and provided by the financial institutions, combined the evaluation of the market value of the base date, the ship's asset value is assessed, and the ship asset value assessment report was given.

In addition, CCS also can provide the following services: firstly, provide technical support for financial institutions with regard to the ship they intend to refit, put forward opinions or suggestions to the rationality and feasibility of the modified scheme and, provide the technical basis for the final decision of financial institutions; secondly, on behalf of the customer supervise project ship construction based on the financial institutions commission; thirdly, provide ship and marine engineering business training for its business personnel according to demand of financial institutions.

CCS will continue to focus on the needs of financial institutions, and constantly improve the service content, optimize the service to provide a better package of comprehensive, personalized and professional technical services for financial institutions from the client's perspective and the perspective of safeguarding the interests of customers.

The dream team of marine engineering technical service

By Gao Chang

CCS Marine Engineering Technology Center Technology Development Department was established in early 2015. It is committed to enhancing the service capabilities and level of CCS marine engineering technical service and has made remarkable achievements in service product development, calculation and evaluation consultancy, research projects and ship type design and certification. Since the establishment of the Technology Development Department, it has completed 55 calculation and evaluation projects, 26 ship type design and certification projects, 6 scientific research projects of Ministry of Industry and Information Technology, 3 projects of preparation of national standards and 7 research projects of CCS. The team is termed as the "dream team" of CCS offshore engineering technical service which is composed of 4 PhD and 11 masters, with the average age as 34 years old. Over the past two years, it has overcome obstacles and forged ahead on the way to build first class classification society under the leadership of the "captain", Li Hongtao.

Li Hongtao, an outstanding senior engineer, is the team leader. Since joining CCS in 2006, he has been working on the front line of classification and statutory survey and plan approval and offshore engineering research. He has presided and participated in more than 10 national major scientific research projects and has published more than 20 technical papers in OMAE, ISOPE and other international conferences and domestic and foreign core periodicals. Over the years, he has been specifically appointed as the member of the editorial board for magazines such as China Ocean Engineering and China Ocean Platform because of his influence and good reputation in the industry. In 2015, the title of offshore engineering industry expert was conferred on him by the Ministry of Industry and Information Technology. In 2016, the title of Youth Science and Technology excellence of the Ministry of Transport was conferred on him. The other members of the team have also gradually grown into young experts well-known in the industry.

In order to improve the influence of CCS in the offshore engineering industry and to build a first-class offshore engineering brand, the "dream team" has taken on the responsibility of developing new offshore engineering technical service products and has developed more than 10 service products, including the Marine Engineering Critical Assessment technology, offshore fixed platform upper equipment and system integrity assessment technology, offshore wind power facilities technical advice and services, drilling platform polar operations applicability assessment technology, large-

scale equipment offshore floating off key technology, jack-up platform pile depth and soil ultimate bearing capacity calculation study, semi- submersible platform air gap forecast and attack analysis. A number of achievements have filled the gaps in China and reached the international advanced level.

In 2016, the "dream team", together with Jiangsu Maritime Safety Administration carried out the research on offshore wind power plant safety management status and countermeasures. Based on the research outcome, they submitted to the Maritime Safety Administration the proposal to establish the project of "offshore wind power facilities statutory inspection technical rules" and got its approval. At the same time, they completed the formulation of CCS Guidelines for Inspection of Offshore Wind Farm Facilities, and has established the offshore wind power inspection mode and method with CCS characteristics. Through research and accumulation, the unique offshore wind power service ability has been formed, including technical consultancy, assessment and certification of station, fan foundation and wind tower. They have also completed design consultancy of Taiwan FORMASO offshore wind power project, Fujian rock-embedded single pile construction program and some other wind power consultancy projects such as the Nanri Island two-stage gravity foundation sea load calculation and evaluation projects. Their work has obtained the industry's recognition and praise.

In order to solve the problem of risk control for self-elevated deep water platform operation, the "dream team", based on the self-elevating platform brand engineering research project of the Ministry of Industry and Information Technology and the research project of HY941 operation puncture and flanking risk control of CNOOC, has carried on detailed research on the piercing and the side slip in the course of the ballast of deep water self-elevating platform and has formed a complete calculation method and the process to provide guidance for the actual operation of the platform. At the same time, based on the platform's leg capacity, the capacity of the lifting system and the wave attack bearing ability of the hull, it can produce the maximum sea conditions of volatility ballast, thus solve the problem that there is no theoretical basis for the platform when it is close to the surface of the sea. This research outcome can effectively reduce the risk of large deep water jack-up platform ballast puncture and received widespread attention in the industry. The technical papers written on the basis of the outcome were recorded by the 36th OMAE International Conference.

The "dream team" is a skilled elite team who dares to face challenges. The services it provides, such as emergency response support, review calculation and other services with characteristics are often urgent, difficult and involves heavy workload, which requires the team to have sufficient technical capability and fast response.

In September 3, 2016, the arch of the ship "Liaohe1", run by Bohai Equipment Liaohe Heavy Industry Co., Ltd deformed and water flooded into the fracture during operation at Jiangsu Dongtai 200MW offshore wind farm construction field. At the request of Nantong Maritime Safety Administration, CCS assisted in the investigation of the accident. The "dream team" was entrusted at the critical time to undertake structural strength analysis. A team consisted of strong technical talents such as Liu Song and Chai Junkai went to Nantong to carry out site research promptly and provided a rapid technical implementation plan. The team completed the accident platform structural strength analysis work in 5 weeks and provided a scientific and justified technical solution, providing support for decision-making by the competent authorities.

On February 2017, CNOOC NH8 semi-submersible platform was expected to go to the Kara Sea, Arctic in the summer and the assessment of the applicability of the platform was needed in the dock before setting off. When the Technology Development Department received the task, a special group composed of Liu Yuan, Deng Xianfeng and other core technical staff overcame difficulties of rule lacking and short repair period, and completed the assessment of the applicability of South China Sea 8 in 4 weeks which provided a strong support for the site inspection and certification. The successful completion of this mission is a meaningful attempt for the application of the ship's polar rules to offshore mobile platforms, laying a solid foundation for the establishment of CCS polar rules for offshore mobile platforms.