

Partnership



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CCS attained the qualification issued by EU certification body

Recently, CCS (Greece) Ltd officially obtained the certification and authorization of the new EU Marine Equipment Directive 2014/90/EU and became the EU Notified Body (Notified Body Number: 2676). According to the EU Certification Directive, the EU related directive certification could only be carried out by a designated body registered within the EU territory. After obtaining the authorization of the European Union, CCS would be able to issue the MED certificates and granted the "wheel mark" for the (statutory) product of the EU flag ships.



Notified Body Number : 2676



Notified Body Number : 2676



CCS
CHINA CLASSIFICATION SOCIETY
中国船级社



安全、环保，
为客户和社会创造价值

Safety, environmental protection and creating value
for clients and society



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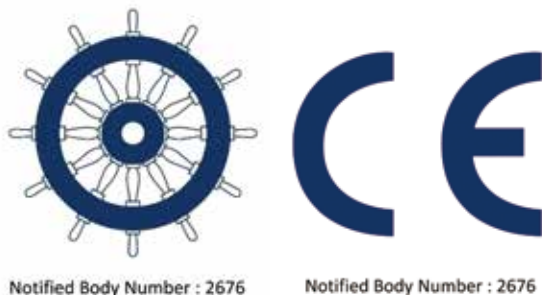
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CCS attained the qualification issued by EU certification body



Recently, CCS (Greece) Ltd. officially obtained the certification and authorization of the new EU Marine Equipment Directive 2014/90/EU and became the EU Notified Body (Notified Body Number: 2676). According to the EU Certification Directive, the EU related directive certification could only be carried out by a designated body registered within the EU territory. After obtaining the authorization of the European Union, CCS would be able to issue the MED certificates and granted the “wheel mark” for the (statutory)

product of the EU flag ships.

The wheel mark belonged to the EU compulsory certification marks. It was a form of the EU CE certification and the mandatory requirement for products by EU laws. Whether products produced by the enterprises within the EU territory or in other countries, they should obtain the certification by the designated bodies and affix the wheel mark if they were used to be in the EU flag ships to indicate that they complied with the requirements of the Marine Equipment Directive 2014/90/EU.

In addition, CCS (Greece) Ltd obtained the certification and authorization of the Recreational Craft Directive 94/25/EC on September 16, 2016. And the update authorization of the new EU recreational craft directive 2013/53/EU was also approved.

The acquisition of the qualification marked the promotion of CCS business scope and service capability as well as further internationalization. CCS provided new option for marine equipment and recreational craft manufacturing enterprises in obtaining the EU certification.

CCS and HNA science and technology logistics group and other units jointly launched unmanned cargo ship development alliance

Recently, the preparatory meeting for “unmanned cargo transport development alliance”, jointly promoted by HNA Technology Logistics Group and launched by the six units at home and abroad was held in Shanghai. The meeting was organized by HNA Technology Logistics Group, leaders and experts from the ABS, DNV GL, Chinese ship and Marine Engineering Design Institute (708), Shanghai Marine Diesel Engine Research Institute (711) attended the preparatory meeting of alliance and the signing ceremony.

Mr. Li Weijian, vice chairman of HNA Technology Logistics Group stressed at the meeting, as a world-class shipping alliance, unmanned cargo transport development alliance is not only the organizer and leader of future shipping development, but founder and facilitator of technical product rules, the alliance will have a profound impact on the industry.

At the meeting, CCS expressed that it will work together with the industry to carry out unmanned cargo transport and related technology research, establish

unmanned ship standard, promote the revision of the regulations, and provide assessment, verification and inspection services for the industry. Zhu Kai, vice president of CCS reviewed the progress of unmanned ship research at home and abroad, introduced IMO and related international organization and the latest development of unmanned ship in the meeting. They believed that the unmanned cargo ship will be the structural innovation of application of new technology and logistics mode in shipping industry, the alliance will be the pioneer to explore the adaption of shipping and shipbuilding industry to rapid change of market and technology, and there will be broad prospects for the application of the outcome.

The formal establishment of the alliance will open and invite more scientific and technical research institutions, industry and end-users to participate, and develop cooperation in the areas of unmanned cargo transport development, ship manufacturing and operation. It is expected that the first unmanned cargo ship would be delivered in 2021, becoming the pioneer for the future shipping mode.

The “laboratory cooperation agreement” was signed between CCS and TüV Rheinland



Recently, the “laboratory cooperation agreement” was signed between China Classification Society (CCS) and TüV Rheinland in Beijing. Zhu Kai, vice president and chief engineer of CCS and Yang Jiajie vice president, who is on behalf of TüV Rheinland signed the cooperation agreement.

As an international leading technology service provider, TüV Rheinland has worldwide service network, with its business involving six service categories including industry, transportation, product, life science, education and consulting, management system. As one of the world’s leading classification societies, CCS has a global inspection and service network and a wide range of international customers. Adhering to the mission of “safety, environmental protection, creating value for clients and society”, CCS serves for shipping, shipbuilding, marine equipment, marine resources development, marine scientific research, industrial project supervision, system certification, government policies and regulations, energy conservation and other industries and fields, and continuously expand new green and intelligent technology.

The cooperation agreement will further consolidate and strengthen cooperation basis between the two sides, through unscheduled technical exchanges and seminars, the two sides will constantly improve the level of cooperation, and provide more convenient and high-quality product inspection and testing services for customers, seize opportunities to jointly promote the development of each other.

The advanced livestock cargo ship surveyed by CCS was successfully delivered

Recently, YANGTZE HARMONY, the first livestock cargo ship which is designed by domestic shipowner independently and has independent intellectual property rights was successfully delivered. The ship is livestock ship type with advanced design and environmental protection, CCS is responsible for the ship survey work, and signed and issued the “Livestock Carrier” additional classification certificate after completion of inspection.

“YANGTZE HARMONY” is a livestock ship converted from a 660 TEU container ship. The ship has advantages such as adaptability, suitable for goods and economy, and comply with the high standard requirement of Australian Maritime Safety Authority (AMSA) for livestock transport ship. In February this year, the ship accepted and successfully passed the AMSA safety inspection, and was fully

recognized by the AMSA inspector, and CCS’ inspection services have been fully recognized by the ship owners and shipyards.



The “Yangtze River Gold” series cruises received the Heat Pump System green additional class notation issued by CCS

Recently, 6 inland luxury river cruises, which belonged to the “the Yangtze River Gold” series of Chongqing Yangtze River Gold cruise Co., Ltd., won the China Classification Society (CCS) Heat Pump System green additional class notation.

“The Yangtze River gold” series of ship uses hot and cold water source heat pump to replace the traditional cold air conditioning unit, greatly reduces the energy consumption and reduce the environmental pollution, which is in line with the national development strategy of energy saving and emission reduction, and reflected the advanced nature of green environmental protection and comfort of a new generation of inland luxury cruise. The ship is the pioneer of application for domestic large size passenger ship.

As one of the important technical means of energy saving and emission reduction, the application of water source heat pump is an important part of energy saving and emission reduction project. From 2012 to 2014, CCS technical center, Shanghai Ship Design Institute, Tsinghua Tongfang artificial environment co., Ltd. jointly launched the heat pump technology application and research in the field of ship,

and carry out close cooperation with owners, design institutes, product factory and other relevant units, successfully completing the new environmental protection technology application project.

CCS has always been advocating the development and application of green technology. In 2013, CCS launched a “green ship inland standard”, to promote realization of the goal of low consumption, low emissions, low pollution, comfort under the premise of security, which fully reflects the CCS’ mission of “safety, environmental protection, creating value for customers”, and conduct the development concept of “innovation, coordination, green, open and sharing”.



CCS was approved to carry out ISO22000 food safety management system and HACCP system certification business

Recently, the “ISO22000 food safety management system (FSMS)” and “food safety hazard analysis and critical control point HACCP system certification business” of CCS certification company (CCSC) has received approval of Chinese national certification and Accreditation Administration (CNCA), formally launching the food industry management system certification business.

CCSC management system certification business scope covers China’s voluntary management system certification field to build a more perfect certification service system. We will provide customers with the overall certification program and service assurance depending on comprehensive technical capabilities.

CCSC management system certification business scope covers

the following: the first is the QMS quality management system, which includes Chinese grassroots organizations of the Communist Party of the quality management system; quality management system of engineering construction enterprises; international railway industry standard IRIS. The second is the environmental management system EMS. The third is occupational health and safety management system OHSMS. The fourth is the information security management system ISMS. The Fifth is the information technology service management system ITSMS. The sixth is the food safety management system FSMS. The seventh is the food safety hazard analysis and critical control point system HACCP. The eighth is the energy management system EnMS. The ninth is the road traffic safety management system RTSMS.

“Nanhai Rescue 102” deep sea rescue operation mother ship

Recently, China’s first deep-sea rescue ship “Nanhai Rescue 102” which was classed with CCS has been delivered and recruited by Nanhai Rescue Administration of MOT.

“Nanhai 102” is a large cruising rescue ship of 12000KW, it has the capability of screening location rescue in waters as deep as 6000m, and is China’s first professional rescue ship with the comprehensive capability of searching in air, water surface and under the water. The ship is 127 meters long, 16 meters wide, and with the full-load displacement of 7300tons. The highest speed of the ship can reach 20 knots, and its sustained navigation can reach 16000 miles. Nanhai Rescue 102 is of unlimited navigation and is designed for rough sea conditions of high wind and waves. It is installed with DP-2 dynamic location capability, the 10,000 meter super short baseline location system, helicopter hangar and other equipment, and can carry medium sized helicopters. It is capable of taking off and landing large-sized helicopters and fueling, rescuing and searching, and can perform rescue in the condition of 12 grade wind and waves. The ship has also been installed



the 6000m deep sea towing system, the 6000m automatic cable-free submarine appliances and other deep sea search and rescue equipment, and can provide reliable operation platform for underwater search. All these have made Nanhai 102 capable of the comprehensive deep sea rescue and salvage such as searching for ships in danger and lost air crafts

“Jianyang Chenghe” offshore engineering heavy-cargo carrier



This 130M offshore engineering heavy-cargo carrier is designed by ROJ Marine Engineering Co. Ltd. and built by Yangzijiang shipbuilding Co. Ltd. for Jianyang shipping Co. Ltd. The ship was subject to CCS construction survey and was classed with CCS.

The ship is 130m long, 28m wide, 7.8m deep, it is of unrestricted navigation. The deck cargo space is 3050m², 20t/m² deck load, and is installed with two sets of electric propulsion systems including diesel generator set, propulsion control system, frequency and voltage converter and electric motor.

It is worth mentioning that the ship has obtained the “Electrical Propulsion System” and “CLEAN” class notation.

“Offshore Oil 162” mobile test platform

“Offshore Oil 162” is the first mobile test platform of CNOOC Energy Development Co. Ltd., which has the functions of trial mining, oil and gas separation, storage and external transmission and it is the first time CCS grants the additional notation of Production Testing Unit and Process to domestic mobile platforms. Its successful delivery not only made up the blank of CNOOC in the field of technology, but also created new ideas for the development of offshore oil.

“Offshore Oil 162” is a four-legged jack-up integrated test and wellhead operation platform. The total length of the platform is 81.53 m and the total width is 37.73m with a working depth up to 40m. The maximum sewage oil capacity is 3055 cubic meters and the maximum lifting capacity of the wellhead operation equipment is 1580kN. This project adopts the model of “exploration + test production + development” which is of great significance to the marginal field development of offshore oil.



“Tian Ying Zuo ”64900 DWT crude oil carrier

This 64900DWT platform shuttle tanker is designed by MARIC and built by Shanhaiguan shipbuilding industry Co., Ltd. for Shanghai COSCO shipping marine oil transportation Co.,Ltd (Shanghai). The ship was subject to CCS construction survey and was classed with CCS.

The platform is 220m long, 32.26m wide, 20.06 deep, and is of unrestricted navigation. It has 12 cargo tanks, 2 slop tanks and meets the PSPC standard. It has a speed of 15.75 Knots and an endurance of up to 10000m, satisfying the second stage EEDI requirements. It’s general performance is excellent and all its technical indicators are fairly good. It can provide the crew with good living and working conditions with spacious and comfortable living cabins and it is safe, energy efficient, environment-friendly.



Semi-submerged ship“Zhen Hua 33”

This 50000 tons semi-submerged ship is built by Shanghai Zhenhua Heavy Industry Co., Ltd. (ZPMC). The ship was subject to CCS construction survey and was classed with CCS.

The ship is driven by diesel engine, and adopts DP2 dynamic positioning system. It is 227m long, 43m wide and has a semi submerged draft of 27m. It’s typical functions include: exploration of offshore oil and gas, large marine equipment transportation (e.g. large steel structure components, all kinds of platforms, offshore jackets, platform blocks, etc.), loading and transportation of large ships and naval ships. It can at the same time be loaded with 2 self-lifting drilling platforms, it can also be used for the rescue and salvage of military and civilian ships, equipment and aircraft as well as marine oil pollution prevention.



“Changle Princess” ro-ro passenger ship

The ship is a domestic Ro-Ro passenger ship which sails along Haikou, Sanya - Xisha route. It has a two-story vehicle deck on which there is ample superstructure, and it has its cabin located in the stern. The power set complies with the requirements of China Classification Society (CCS) Rules for Classification of Sea-going Steel Ships (2012) and its amendments. The ship is subject to CCS construction survey and is classed with CCS.

"Changle Princess" is a steel hull ship with double fixed pitch propeller, double streamlined suspension rudder, forward tilting

column and square stern which has bow thruster and fin stabilizer device. The propulsion device uses two main engines each of which drives a fixed pitch propeller through a reduction gearbox and drive shaft. The main engine and the reduction gear box are connected with high elastic coupling. The cabin is located in the rear of the ship and a control room is set in the cabin to monitor main mechanical and electrical equipment. The promoter is equipped with 2 medium-speed inline diesel engines with 2930kW rated power for each and a speed of 600r / min.



“NEWOCEAN 3”oil tanker

This 3000 ton oil tanker was built by Guangzhou Nansha Xinghua shipbuilding Co., Ltd. for Hong Kong Newsea Oil Company Ltd. The ship was subject to CCS construction survey, and was classed with CCS.

The ship is 46.60m long, 18.29m wide, 7.20m deep, with a gross tonnage of 1707GT, new weight of 819NT, and dead weight of 3080DWT, the power of its main engine is 746746KW*2. The ship is of Hong Kong flag. The whole ship is equipped with 9 cargo tanks, suitable for loading oil products with flash point above 60°C. The main arrangement include: double hull, single deck, forecastle and poop and an emergency exit in between. The ship is double engine, double screw and double rudder type.

The ship was delivered on December 16th, 2016, and has obtained the following class notations:

- ★ CSA; Oil Tanker; Double hull; F.P>60°C; R2;ESP;
- ★ CSM



“Jinglue” jack-up drilling platform

Recently, "Victory 90m" jack-up drilling platform "Jinglue" which is classed with CCS was successfully launched in YCRO, Yantai. The platform is completely designed, constructed and inspected in China with independent intellectual property rights. The platform has many advantages such as a large deck and reasonable equipment layout, and as a 300-foot enhanced platform it can be immediately put into use after construction without alteration.



“Victory 90m” jack-up drilling platform has a length of 64.2m, width of 62.m and molded depth of 8m and a operation depth of 91.4 m. The platform has three 127m long legs of truss and can drill to a depth of 9144m. The construction of the platform is a “double breakthrough” for Shengli Oilfield, which is reflected by: the offshore platform can drill as deep as 90m which is much deeper than its original 50m; and the structure of legs are advanced from cylindrical structure to truss. With a few upgrades, the platform has a drilling depth of 107m.

“Jun Yang 1” a new generation of Chinese flagship dredger

“Jun Yang 1” is the largest dredger in Asia, it is 170.20 m long, 12.2m deep and 31m wide. The ship can accommodate 45 people with a total capacity of 21028 cubic meters and digging depth of 90m and has a maximum speed of 16.5 knots. The ship has been inspected and classed by CCS.

The ship has the world's most advanced and powerful dredging automatic control and monitoring system, including more than 20 automatic control technologies such as dredging control system (DCS), dredging data recording system (DDRS), three-dimensional dredging track tracking and recording system (DTPS), dynamic positioning and dynamic tracking System (DP / DT), rake arm position measurement system (STPM), power load monitoring power management system (PMS), integrated monitoring system (SCADA) and all mud pumps are controlled by variable frequency automation technology.

“Jun Yang 1” has double propeller propulsion, dredging system which uses frequency conversion automation control which can adjust the motor running power for different conditions such as soil type or digging depth so as to reduce energy consumption. Two underwater mud pumps are also installed for each rake arm tubes and high pressure flushing devices are also installed for each rake heads which



endows them unique advantages in dredging and suction of hard dense sand compared with other drag suction dredger. The double harrows with overflow devices of “Jun Yang 1” are not only efficient, energy efficient, environmental friendly but also have multiple protections. The huge capacity of the tank has greatly enhanced the efficiency and economy of its transportation.

“LV SONG HAI” bulk carrier

This 38500DWT bulk ship is built by Shanhaiguan Shipbuilding Industry Co., Ltd. for COSCO shipping bulk Co., Ltd. “LV SONG HAI” is 182m long, 30m wide, 14.8m deep, 24186GT, 12855 NT, and main engine power of 6132 kW. It is of unrestricted navigation. The ship was subject to CCS construction survey and was classed with CCS.

The whole ship is equipped with 5 cargo tanks, which can carry dry bulk cargo, steel coil, packaged goods and some dangerous goods. It is mainly installed with: steel double skin and double bottom, single deck, forecabin and deck mast room, no bulbous bow, single engine, single screw and single rudder, BWT system and ship energy efficiency intelligent management system.

The ship obtained the following class notations:

★ CSA Bulk Carrier; Double Side Skin; CSR; BC-A(Holds Nos. 2&4 may be Empty); COMPASS (D,F); Grab(20); Ice Class B; PSPC(B,D); CM; Equipped with Container Securing Arrangements; Loading Computer (S, I, G); ESP; In-Water Survey; FTP; BWMP

★ CSM; AUT-0; SCM; PMS; BWMS; Clean; NEC II; GPR; EOM



“Lu Jining cargo 6937” canal LNG electric power propulsion container/bulk carrier



“Lu Jining cargo 6937” is an inland river open container / bulk carrier, developed by Dalian Yuchai Energy Co., Ltd., designed by the Yangtze River Ship Design Institute and plan approved by China Classification Society Wuhan plan approval center and it can operate in the Beijing-Hangzhou Grand Canal and the Yangtze River. It meets the river A, B, C-class navigation area requirements and can carry standard containers.

The generator uses LNG as power source and uses two 170kW motors to drive propulsion devices. The motor drives two conventional fixed pitch propellers through the gear box. The main deck is equipped with two 230kW LNG gas main generating units for the propulsion motor, the whole ship auxiliary power and the living electricity. All-electric remote control device is used in propulsion motor remote control to achieve speed, commutation and start and stop.

The ship uses the electric propulsion technology of high-speed rail and it is the first time to apply this new technology in ships. The electric propulsion technology is conducive to computer network management and in case the ship propulsion system fails, it can realize the remote “diagnosis” and accurately confirm the fault and maintenance plan which can greatly shorten maintenance time while improving operation efficiency for inland river ships. This technology will help realize the automatic control of the system, and comprehensively enhance the level of information, intelligence and automation. The ship has an endurance capacity of 600 kilometers and about 50 hours.

The major safety requirements for cruise design of *CCS Rules for Cruise Ships*

By Gu Yajuan



Considering the cruise technology which includes the equivalent substitution is in the continuous development, passengers' requirements for the recreation function of cruise also change, the rules for cruise ships develops at the same pace with the technology of international cruise, and will include new research results and improve and refine the existing technical requirements. In October 2016, CCS published the *Rules for Cruise Ships*, which came into force on January 1, 2017. In the design of cruise, the safety requirements is very important, which covers structural safety, fire-fighting safety, safe return to port, special design beyond the limit of the convention and built-in materials of cruise.

Firstly, the structural safety. The most significant feature for cruise is that it has more deck layers, and long span of

superstructure, the ship side has large and numerous openings; at the same time, cruise has a large longitudinal span space and vertical space; in order to pursuit the unique artistic effect, the superstructure is designed to the novel and strange modelling; in terms of the use of the material, the cruise often uses glass material. As a result, the effectiveness of the longitudinal strength become the uncertain factor, if the estimation for the effectiveness is insufficient, it will damage the structure because of the superstructure's strength is not enough; if the estimation for effectiveness is too conservative, the superstructure is too strong and the ship's gravity will be higher, it will have negative effect on the cruise's design. So how to control the dimension? In the structure design of the cruise, how to evaluate the effectiveness of the superstructure participated in longitudinal strength, truly reflect the stress condition of

each part of the ship hull is the key of the success or failure of the cruise's structure design. The technical measures that we take are: through the direct calculation of the whole ship, analyze the structural response when the superstructure bend at the ship girder, evaluate the yield and buckling strength of superstructure, and then make sure the effectiveness of superstructure which participated in the overall strength, which not only effectively avoids the structural damage because of low requirement for the superstructure, but also avoids danger caused by decrease of stability due to the increase of the empty vessel's weight and higher gravity because of high requirement for superstructure.

At the same time, around the eternal theme of cruise safety, the *Rules for Cruise Ships* added the requirements of residual strength on the basis of passenger ship's structure strength requirements, to make sure when the ship hull happen collision or grounding and other accidents, even the water flows into the part of cabins, the ship also has the ability of preventing the break of the ship hull girder, further enhance the safety of the hull structure.

Secondly, the fire-fighting safety. Almost every ship has a large space, such as the atrium, theme restaurant, theater, etc. in the large space, one the fire event occurred, the smoke will rise. In the process, the temperature will cool, when the smoke rise to a certain height, then will reach the thermal equilibrium, and now the smoke will not rise, while spread to a horizontal direction. Therefore, the fire detection and fire control in the large space are the key point in the fire control of the cruise's design. In order to ensure the effective detection, in the large space, we should consider the selection, installation and layout of the fire detection system, avoid the temperature drop, concentration decrease, lead to the fire detector cannot be triggered in the process of hot smoke rise. Aimed at the

special function of the space in the cruise, the *Rules for Cruise Ships* put forward related requirements for the fire control, fire detection and extinguish. For example, the Rules stipulate the cruise must adopt effective smoke control measures (such as setting smoke hanging wall, etc.) in the large space and flat large space to avoid the smoke cannot reach the top and unable to discharge because the temperature drop in the process of hot smoke rise.

Thirdly, the requirements for safe return to port (SRTP). SOLAS convention stipulate that the passenger ships which the length is more than 120m or set 3 or more main vertical area should meet the requirements of SRTP. SRTP includes the requirements in 3 aspects: firstly, the availability for the important system after flooding (SOLAS convention articleII-1/8-1); secondly, when the ship occurred the accident which does not beyond the accident limitation, it can return to the port safely by its own power, because the lifeboat is not more safety than the ship (the articleII-2/21); thirdly, once the ship cause the accident which beyond the accident limitation, the important should maintain the operation, to support the passenger ship to return to the port safely by its own power. The important systems include: propulsion system, steering and steering control system, navigation system, fuel supply system, the internal and external communication system, fire control management, fixed fire extinguishing systems, fire and smoke detection system, bilge water and bilge pump system, power operation watertight and half watertight door, feed water detection system and security area. When any one of the main vertical area cannot be used because of the fire, the layout and division of the fire control management and five important systems which include the internal and external communication system, bilge pump system, the escape route, collection station, and the lighting system of the life-saving equipment station

should ensure to run at least 3 hours.

SRTP put forward high requirements on design redundancy to a great extent. Take propulsion system as an example, the design target is to ensure ship's return to the port depending on its own power. The engine room is divided to multiple engine rooms with the corresponding "A" level, every engine room, gear box is located in each engine room. The centralized control room is also set in the engine room, it is protected by the fixed fire extinguishing system, but the focus is different, one is focus on the control, monitoring and alarm of the main propulsion and main power station, the other is focus on SRTP. In addition, the safety area should be set up on the board. The safety area can provide sanitation, water, food, medical alternative space, wind and rain shelter, cooling measures, lighting, ventilation and other basic services to all the crew, to ensure the health of the passengers and crew.

The Rules for Cruise Ships also added: for the length less than 120m, and is equipped with 3 or less main vertical area, it should meet the requirements of redundant propulsion system which has PR-2 additional notations in *CCS Rules for Classification of Sea-going Steel Ships*.

Fourthly, the special design beyond the limits of the convention. The cruise design is limited by the convention in many ways. For example, SOLAS convention set rules for the length of the cruise's main vertical area, the rules limited the length and the area of the cabin and public area; again, for example, SOLAS convention set rules for the survival equipment and the time of embarkation, the large number of lifeboats on the cruise lead to the loss of the layout space of the cabin and decrease the number of the balcony room. At this point, alternative design becomes the effective way to solve the problem. For the design of fire control and lifesaving which exceed the requirements of SOLAS convention, the Rules for

Cruise Ships stipulated specifically the method of alternative design and layout. Adopting the alternative design method can help designers to realize more flexible design plan which is different from the requirements of the convention, at the same time achieve the safety risks level which is not less than the current rules of the convention. Based on this, CCS established the detailed alternative design process and approval procedures, wrote the approval guidelines for equivalent and alternative design, and mastered the computer numerical simulation means to simulate the spread of the smoke and personnel evacuation behavior. However, when use computer numerical simulation means to simulate the spread of the smoke, we must build a basic database about combustion characteristic and smoke toxicity of various materials. At this point, CCS is working with the industry to build this basic database, put the advanced design method into the design of the domestic cruise, make designers have a broader space.

Fifthly, the built-in material of the cruise. For domestic cruise, the built-in material is the key factor of the cruise design. The fire prevention ability is the primary concern aspect of the built-in materials, CCS will provide the green channel for relevant manufacturers on product testing, survey and certification, make the built-in product which meet the requirements of the convention on the cruise. At the same time, we must strictly control the weight of the built-in material, because the built-in material occupies a great proportion in the weight of the cruise's superstructure, it will lead to the empty ship's gravity height being out of control if not enough attention is given, and then lead to another major safety problem-- the hidden danger of stability. In addition, CCS also pay attention to the bad effects of indoor air pollutants caused by built-in materials on tourists' health, and stipulate limitations of the release quantity for 5 categories air pollutants

The main points of CCS *Technical Rules for Carbon Emissions Verification of Ships of Shipping Enterprises*

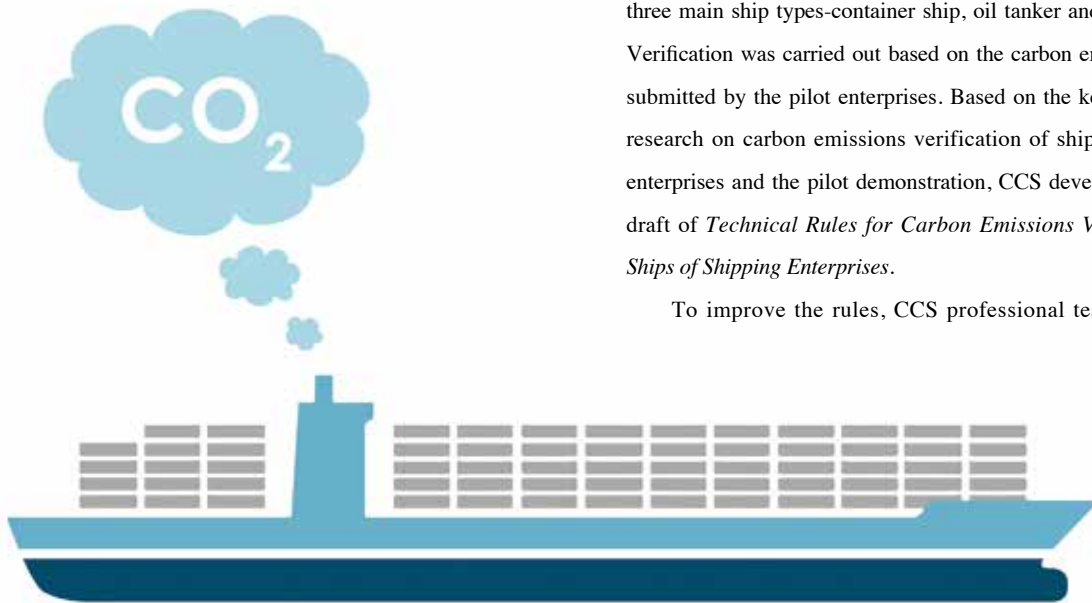
By Li Yuanyuan & Li Dayi

In October 2016, IMO approved the global marine fuel consumption data collection mechanism, EU requires that from January 1, 2018, ships entering and leaving the EU waters must monitor and report greenhouse gas emissions, also, Chinese government and the administration issued the policy and requirements of energy-saving and the greenhouse gas control, put forward to step up the construction of the 3 level of national, local and enterprise greenhouse gas emissions accounting systems, with key enterprises directly submitting greenhouse gas emissions and the formulation of energy consumption data.

In order to adapt to the international and national

requirements for shipping industry carbon emissions verification, CCS formed a professional team to further study the MRV related requirements for emission of national and international shipping industry ships, and selected the ration of enterprise carbon emissions data verification technologies, data sampling technology to check data uncertainty, and other key problems around shipping enterprises to carry out the key research. In order to ensure the practicability, pilot demonstration work has been carried out for the typical shipping enterprise's ship carbon emissions verification. The pilot demonstration considers 3 international shipping pilot enterprises-COSCO SHIPPING Development Co., Ltd., Nanjing Tanker Corporation and COSCO Bulk Carrier Co., Ltd., and the three main ship types-container ship, oil tanker and bulk carrier. Verification was carried out based on the carbon emission report submitted by the pilot enterprises. Based on the key technology research on carbon emissions verification of ships of shipping enterprises and the pilot demonstration, CCS developed the first draft of *Technical Rules for Carbon Emissions Verification of Ships of Shipping Enterprises*.

To improve the rules, CCS professional team discussed



and modified many times, and seek the advice of more than 20 shipping units and more than 30 experts through e-mail, seminars, on-site review and other ways, and then form the draft for approval. The *Technical Rules for Carbon Emissions Verification of Ships of Shipping Enterprises* officially came into force on March 15, 2017. The rules apply to the external verification of carbon emissions of shipping enterprises. At present, the external verification includes two contents: on one hand, it applies to the petrochemical, chemical industry, building materials, steel, non-ferrous, papermaking, electric power, aviation and other key industries that will be covered by “the first stage of national carbon emission trading market”, which is specified in the *Notice of Practically Carrying out the Initiation of National Carbon Emissions Trading Market* issued by the National Development and Reform Commission, the main participation body will take into account the legal entity or independent accounting unit with comprehensive energy consumption of 10,000 tons of standard coal ”in any one year between 2013 and 2015; on the other hand, it applies to ships which is more than 5,000 gross tons emitting CO₂ while navigating between the last port to the port under the jurisdiction of the member states, and from the port under the jurisdiction of the member states to the next port, as well as between the ports under the jurisdiction of the member states” as specified in the *Monitoring, Reporting and Verification of CO₂ from Shipping and the amendment of the regulation of 2009/16/EC* published by European parliament and the European council in 2015. It does not apply to warships, naval auxiliaries, fishing boats, or fish products processing ships, simply structured wooden boats, non-powered ship, government ships for non-commercial purpose.

The rules define the submission and approval of the range of application and monitoring plan for carbon verification activities, planning, implementation, verification report writing and review, document of compliance and other work content and process in the process of carbon verification; control the potential risks of boundary selection, sampling plan, risk assessment, activity data

acquisition, processing, quantitative carbon emissions, report and verification techniques, to ensure the emissions data after the verification is true, accurate, and meet the propose of verification.

The overall structure of the rules adopts the form of “general-specific”, chapter 1 general rules stipulate the basic concept and programmatic requirements of the verification work; from chapter 2 to chapter 6 stipulate the specific implementation requirements of verification work. Among them, “chapter 2 monitoring plan” aims to the requirements of the contents of monitoring plan, resource guarantee, modification of the monitoring plan. The monitoring plan does not need the periodic review when the scene does not update. From “chapter 3 verification plan” to “chapter 6 document of compliance” is an integrity verification of four links, the four links reflect the development concept of “P-D-C-A”, which promote the improvement and accuracy of enterprise’s carbon verification work through the annual periodic review.

In order to facilitate the development of carbon emissions verification work, CCS further researched and developed the software of “ship carbon emissions data verification management system for shipping enterprise”. This software forms the big database through continuously adopting data from the terminal of energy consumption, using the carbon emissions data statistics, threshold analysis calculation and other algorithm for big data analysis, output the specific index and information of the specific ship type in the specific time through calculation, realize threshold, calculation results import, report automatically generated and other functions.

Through the application of this software, it can carry out interactive verification between the traditional verification technology and the developed data verification management system, realize the error data rules of ship emissions through the data verification management system, realize the function of identifying unreasonable data, and the verification of authenticity and rationality for carbon emission activity data to improve the verification efficiency.

CCS published *Guidelines for Survey of Fixed Anchorage Oil Storage Vessel*

By Xin Jicheng



According to the application characteristics of oil tankers in operation (VLCC, etc.) used as oil storage vessel, China Classification Society (CCS) published *Guidelines for Survey of Fixed Anchorage Oil Storage Vessel* in March 2017, which formulated related technical rules and survey requirements. The main contents include 3 aspects: firstly, defining the application range, additional notation, drawing requirements, statutory requirements; secondly, defining survey and certification requirements, it can consider the application of using underwater survey instead of dock survey, based on the current condition and the last survey condition of oil storage vessel; thirdly, the technical requirements of ship hull, outfitting, turbine, electrical and classification, and the requirements of ship to ship transfer. This guideline provides classification survey guidance for double hull oil tanker laid off as fixed anchorage floating oil storage vessel, and provides implementation standards for

shipowners, shipyards, design units and related parties.

In 2016, the global oil consumption ability has become increasingly saturated, the onshore oil storage space starts to tight, the main oil country of consumption turn their eyes to the sea. Compared with the mode of newbuilding of onshore oil storage facilities, the mode of offshore oil storage facilities has the advantage of low initial investment, short construction cycle, relative flexible configuration, less effect on the surrounding environment. With the continuous low oil price around the world in the future, the new design concept of offshore oil storage will have a broad market prospects. At present, the old idle tanker is one of the main sources of offshore oil storage vessel.

The lack of related rules and technical standards become the biggest obstacle in the process of the promotion of offshore oil storage mode. Compared with the tanker operating in ocean waters, the offshore oil tanker storage vessel is usually arranged on the coastal anchorage off the shore of no more than 20 miles,

and the depth of water is usually less than 50 meters, the offshore environmental conditions are relatively good, the risk of safety and pollution prevention is relatively small, so it is not necessary to require the relatively same safety and environmental standards as tankers and FPSO. However, compared with the idle tanker, the fixed anchorage oil storage vessel store the dangerous goods whose the flash point is lower than 60°C in the long-term, it also need the ship to ship crude oil transfer in practice, once accident occurs, it is easy to cause pollution of the sea. From this perspective, the safety and pollution prevention standard of fire prevention, explosion prevention and crude oil transfer for fixed anchorage oil storage vessel should at least be equivalent with tanker; while compared with the offshore terminals which has good condition of winds and waves, the wind waves flow condition of the anchorage on sea is relatively worse, which decides that the technical standards of offshore oil storage vessel on anchoring and offshore mooring need to be checked again according to the actual wind flow condition of the sea area, the standards are usually higher than the tankers. Existing offshore oil transfer system and ship mooring equipment of tankers may carry out a proper modification to meet the practical requirements of offshore oil storage.

According to the requirements of the guideline, the oil storage vessel which is off the coast of no more than 20 miles need to meet the related requirements of the IS Code 2008 (chapter 2 and chapter 3-3.2) on intact stability, in terms of the damaged stability, it should meet the provisions of oil tanker's damaged stability in MARPOL 73/78 (annex I article 28), the approval of the two kinds of stability need to consider the adverse impact on stability when the ship is under the condition of mooring. And the requirements of fixed anchorage oil storage vessel load line, structural strength, engineering equipment, electrical equipment and fire safety is basically same as tankers, in terms of ship grounding, aimed to the operation characteristics of the fixed anchorage oil storage vessel, introduced the grounding requirements of *CCS Classification Rules for Offshore*

Floating Units (chapter 6 article 1.4.3). According to the operation characteristics of ship to ship (STS) of offshore oil storage vessel, CCS refers to the many provisions and standard of craft equipment, mooring equipment, security equipment, lighting equipment, communications equipment and management system, which has an important guiding significance for the crude oil tanker engaged in oil storage on the fixed anchorage.

In the *Guidelines for Survey of Fixed Anchorage Oil Storage Vessel*, CCS provides personalized survey and service plan according to the operation characteristics of fixed anchorage oil storage vessel. The survey cycle, project and range of fixed anchorage oil storage vessel is basically the same as tankers, the main difference lies in the way of external survey of the ship bottom. As for the normal oil tanker, if the age is more than 15 years, the bottom survey is not allowed to adopt underwater survey instead of the dock survey, which means these ships must finish the bottom external survey in the shipyard. However, for the oil storage vessel which shipped at the anchorage for a long time, it has low possibility of bottom's damage, and IMO has a unified explanation that FPSO and FSO do not need to carry out ESP survey plan in MARPOL annex 1.2. therefore, for the ship age more than 15 years, CCS formulated personalized rules on the bottom external survey. For this type of ships, when the shipowner put forward the application of using underwater survey instead of dock survey, CCS will consider whether to accept this application based on the condition of this oil storage vessel and the last survey records, usually, as long as the ship hull has good condition in last survey and it does not have accidents before the survey, adopting underwater survey instead of dock survey is likely to be accepted. But in order to ensure the safety of ship navigation, the oil storage vessel also need to accept a thorough ship bottom external survey before they recover the normal sailing.

In general, *CCS Guidelines for Survey of Fixed Anchorage Oil Storage Vessel* provides technical basis for the double hull oil vessel engaged in offshore oil storage business in the future.

Study on wave load of river navigation ship

By Liu Guangming & Chen Jue



At present, bulk cargo and containers are mainly transported to the Yangtze River from the hinterland by means of two ways: the first is the mode of three-way transport, which firstly use super large ships transferred cargoes to coastal hub ports, then use ocean-going ships to reach the ports of low reaches of Yangtze river, the last use inland ships to reach the ports along the rivers. The second is the two-way transport mode, which uses the super large ships to transfer cargoes to coastal hub port (such as the Zhoushan Ningbo port), and then use the river-sea ships to reach the wharfs along the river.

Compared with the three-way transportation, the two-way has obvious economic and social benefits due to one less cargo transshipment. However,

because of the river-sea ship being built according to the specification of seagoing ship design, whose wave load base is on the reduction of forecast value of the North Atlantic environmental data, which affects the economy of river-sea ship. Judging from practical situation, the specific route water area from Zhoushan to the Yangtze River is less than the coastal area, and its wind conditions are better than the coastal area. Therefore, deep study of wave load of specific route ship can provide input for structural strength assessment, and thus can improve the economy of the river-sea ships.

For the problem of structural safety, the formulation of external load, structural response and strength criterion are three

indispensable and interrelated important aspects. At present, the evaluation of ship strength is based on the principle of "load first", which means that in the structure design the every possible dynamic load acting on the hull and the local structure must be determined, including their maximum value and the appropriate combination of each load component. Only based on this, we can further discuss how to choose the appropriate analysis of internal force and establish acceptable strength standard. Therefore, every classification society pays more and more attention to the determination of various loads on ship hull and local structure.

According to the requirements of establishing "Zhoushan river-sea transport service center", Chinese Classification Society (CCS) adopted the target type standard (GBS) concept and methodology, used the technical route combining "theoretical analysis, numerical prediction and experimental verification, collected typical point wave data of navigable waters, combined with the design life of the ship, and finally obtained the parameters such as scatter diagram, probability exceedance and etc. which after treatment and analysis

according to relating theory.

In terms of navigation route of river-sea ships, environmental data and representation, according to operation information provided by port and maritime sectors, currently, there are two main navigational routes of Ningbo-Zhoushan waters, traditionally known as the inside route and middle route: inside route (red line), is for ships below 20 thousand dwt; middle route (Orange Line), is for ships between 20 to 50 thousand dwt.

To use direct calculation method to predict the wave loads of ships in the period of use needs to grasp the long term statistics of ship waves in the navigable waters. According to the data provided by the East China Sea forecast center of the State Oceanic Administration and the Meteorological Bureau of Zhoushan, we have collected wind and wave data of 12 observation points from the Yangtze river to Zhoushan, Ningbo for many years. Therefore, the collected wave data can be used to represent the characteristics of the wind and water in a particular course in Zhoushan Ningbo waters.

In terms of ship type parameters, on the one hand is the scale and scale ratio, on the other hand is the profile characteristics. The scale ratio is determined according to the requirements of the specification and the actual construction of the ship; and the maximum 180m in ship length can meet the requirements of river-sea shipping under the

condition of inland navigation.

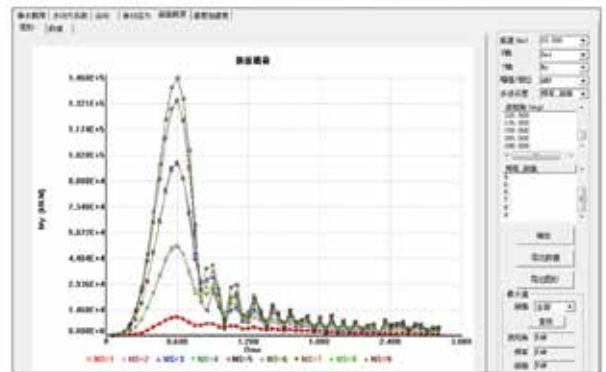
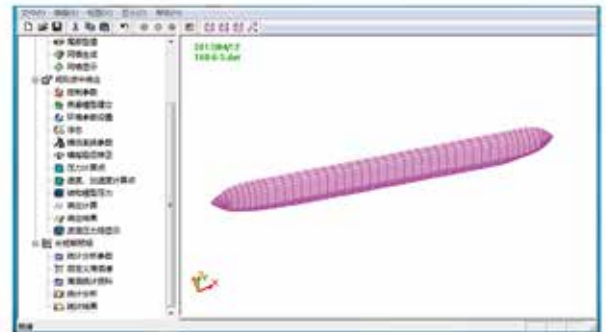
In the selection of prediction parameters, the first is the wave dispersion map, the second is the wave spectrum, the third is probability exceed, and the fourth is the forecast and analysis of load.

This study carried out by CCS followed the principle of “load first”, based on actual wave data from Ningbo-Zhoushan to the mouth of the Yangtze River, and got the wave load of river-sea direct ships through prediction, which has good engineering application value. Compared with the river-sea ships built according to the “sea rules”, the special route river-sea ship which according to CCS study can reduce the structural weight and improve ship carrying capacity, and has good engineering application value.

Compared with river-sea ships designed and built according to the “sea rules”, the bulk carries and containers developed and designed according to CCS’ rule can reduce structural weight and improve the ship load; on the premise of ensuring safety, the ship can load as many as possible, run fast but low energy

consumption. Under the cost pressure of current shipping market, the transportation advantages will effectively guarantee the maximum interests of the owners, at the same time, it can meet the requirements of national energy saving policy with its good economic value, which has achieved the market expectations and won recognition from industry.

At present, river-sea commercial ro-ro ships, cold chain ships and other ships have become a new demand. Later, on the basis of the above route researches, ship type and shipping route will be further expanded according to the market demand to develop series of river-sea ship types.





3D Stability System COMPASS-iStability

By Chen Zhibiao & Chen Qingren

COMPASS is a CCS computation software brand for ships, which is divided into CSR ships, sea-going ships, offshore installations, inland-water ships and other business areas. COMPASS-Inland is made for inland-water ships which has subsystems for ship stability, longitudinal strength and so on. COMPASS-iStability as a subsystem for calculating ship stability, its predecessor is the Ship Hydrostatic Calculation and Stability Criterion Program.

Before the year of 2017, Ship Hydrostatic Calculation and Stability Criterion Program was used on inland-river ship for stability calculation and criterion check by almost all the domestic customers, which made a great contribution to water

safety of inland-water ships. With the rapid development of IT, the program became unadapted in some aspects like the compatibility of operating system, and also because of the “genetic defect” of the original program that it uses 2D technology, CCS decided to use the new 3D technology to update the program, researching and developing to the new generation of stability calculation criterion system, COMPASS-iStability.

The prominent feature of the system is the use of 3D interaction and command stream technology in modeling to replace table of offsets and the use of 3D-mesh integral to replace the plane approximate integral, so that the stability modeling and calculation both broke through the limit of hull shape. The

following special designs in modeling are also very welcome and expected by the users: supporting Undo/Redo is a mechanism currently known as unprecedented among professional ship computing programs at home and abroad, while AutoCAD/Office has long been achieved and has been generally accepted and expected by users; supporting picking up and capturing; supporting the ship's unique coordinate expression of frame/longitudinal; supporting the reference expressions; supporting the automatic update and linkage of reference objects, which is also very expected by users.

Compared to the previous computing system, what better user experience can the new computing system bring to us? The first is the 3D visualization of ships, which means what you see is what you get; the second is 3D solution replaces 2D approximation calculation to get more accurate results; the third is to make multi-stern, bulb ball, turtleback, rise of bow and stern and other tricky special boat shapes become regular; the fourth is to make floating dock, triple-hulled vessel and other new or special types of ship that were unsupported become feasible; the fifth is that through the release and application of the system, CCS will greatly improve its core technology competitiveness in the field of ship performance computing.

COMPASS-iStability has been developed and officially released. As shown in Figure 1, it can achieve calculation of hydrostatic force, hold capacity, intact stability, damage stability, permitting height of barycenter and tilt test and provide three optional criterion including Technical Rules on Statutory Survey for Inland-Water Ships 2011, the 2015 amendment and the 2016 amendment.

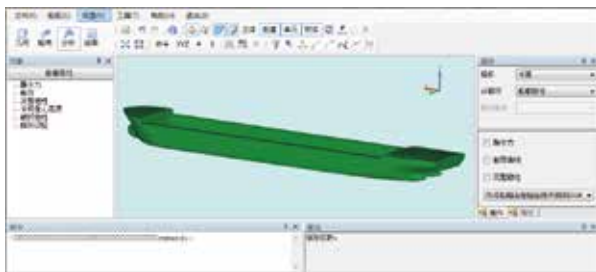


Figure 1 COMPASS-iStability interface

COMPASS-iStability

CCS 3D Stability System

The system realizes 3D in three aspects: model expression, human-computer interaction and calculation algorithm, and provides two kinds of modeling methods which are graphic 3D interactive modeling and command stream rapid modeling in order to meet different requirements of users such as beginners and advanced users. Meanwhile, the use of new 3D-mesh computing algorithm lets the system break through the restrictions of hull line from both modeling and calculation and makes it better adapt to the design and development and the safety criterion of unconventional /special shapes like bulb bow and double tail for ship types including slotted dredger, multi-hull ship, floating dock and so on.

Through the tests of regular bodies like cuboid, cylinder and sphere, as well as 16 ship tests of bulk carrier, container ship, cargo ship, passenger ship, engineering ship (the calculation results were compared with the Ship Hydrostatic Calculation and Stability Criterion Program and NAPA), the reliability of the COMPASS-iStability calculation system was verified.

At present, the system has been applied in more than 100 units (groups) throughout the country. Its friendliness and advancement have been recognized by the industry. It is widely used in ship design and research, plan approval and survey and college teaching in the vast majority of the country's navigable waters like Yangtze River, Pearl River, Amur River, Beijing-Hangzhou Grand Canal, the Yellow River and the Minjiang River. Huazhong University of Science and Technology, Wuhan University of Technology, Wuhan Institute of Shipbuilding Technology, Wuxi Institute of Communications Technology, Jiaxing Nanyang Polytechnic Institute and other colleges and universities have taken the system as practical training platform for college teaching.

In the aspect of 3D modeling functional design, the hull modeling in the stability calculation is very critical. The quality and accuracy of the model are closely related to the calculation results. In addition to 3D graphic interactive visualization, the system in the modeling also achieved the following special designs: the first is supporting Undo/Redo, which is a function urgently needed by users but unsupported in almost all the current ship engineering programs, and it makes users to operate more easily without worries about misoperation; the second is supporting two modeling methods, one is command stream rapid modeling like NAPA and Ansys, and the other is operation panel interactive modeling such as Patran, and they can cater to modeling requirements from different user groups; the third is supporting picking up of image objects and capturing of feature points; the fourth is supporting the shipping industry's unique coordinate expression of frame/longitudinal for x coordinate component of coordinate point; the fifth is supporting the reference expressions to express coordinate point or component; the sixth is supporting associative reference of points and lines and automatic linkage.

COMPASS-iStability realizes 3D in three aspects: model expression, human-computer interaction and stability calculation algorithm, and provides two kinds of modeling methods which

are graphic 3D interactive modeling and command stream rapid modeling in order to meet different requirements of users such as beginners and advanced users. Meanwhile, it broke through the restrictions of hull line and made it better adapt to the design and development of unconventional /special shapes like bulb bow and double tail for ship types including slotted dredger, multi-hull ship, floating dock, semi-submerged ship and so on.

The R&D of the system marks the upgrading of China's inland river ship stability calculation software from 2D to 3D, and its comprehensive and extensive application in the industry will effectively improve our technical capacity and overall level in the field of professional stability calculation and help provide better protection services for the inland water navigation safety.

We hope that through the joint efforts of CCS professional team in the field and the industry, the full application of the system in all kinds of field from the college teaching practice to the actual ship design, plan approval and survey and operational safety assessment, and the continuous exchange, feedback, upgrade the expansion during the applying process, the system will become a world-renowned stability calculation software brand, so as to comprehensively enhance the overall level and technical competitiveness of China's ship design and building industry.



ccs 3D Stability System



CCS launched offshore wind power project certification and consulting service

By Tang Guangyin & Li Hongtao

Developing offshore wind power is a concrete measure to implement the clean energy development strategy and the green “China Strategy” which responds to the call of the nation. During the 13th Five-Year Plan, there will be a large number of offshore wind farms being constructed and installed and put into operation, the offshore wind power farm will develop in a “fast track” manner. The development construction and operation of offshore wind farm involves a lot of activities at sea, its construction development and accelerated operation will affect the marine navigation environment, safety of life at sea and marine environment protection, at the same time, it will also put forward higher requirements for maritime safety supervision.

China Classification Society (CCS) has rich experience and leading position in China on offshore engineering classification, third party survey and risk control, and actively involves in offshore wind power industry. Since 2000, CCS has provided certification and consulting services of wind turbine and the

lower supporting structure for offshore wind power industry, which covers the whole field and the whole life cycle of offshore wind power. In recent years, CCS has made great efforts to safeguard safe and healthy development of offshore wind power, including carrying out actively research on the regulation and standard of offshore wind power safety management, providing technical support for national administrative departments, developing jointly “study on safety management and policy for offshore wind power installation” with the maritime administration, putting forward the *Regulation for Safety Management of Offshore Wind Power Facilities (proposal)* and the *Regulations for Safety Management of Offshore Wind Power Facilities (proposal)*, taking part in the formulation of the Regulation for Offshore Wind Power Farm of Ministry of Housing and Urban-Rural Development of the People’s Republic of China. At the same time, with regard to the technical difficulties and hot points in the development of current offshore wind power farm, CCS actively cooperated with the industry,

provided professional and comprehensive technical support and consulting technical services for the customers including the government departments, power company owners, offshore wind turbine manufacturers and contractors in the development project of offshore wind power farm.

Based on the characteristics of offshore wind power, CCS launched the system of “offshore wind power certification and consulting service”, providing service to offshore wind power owners, offshore wind power design institutes, the contractors of offshore wind power farm development project, offshore wind power equipment manufacturers and other related parties. The services include: whole life cycle third party certification and consulting service system for offshore wind power farm project from design, construction, installation to maintenance during operation; provide certification, recheck, load evaluation, strength calculation, anchorage calculation, stability check and other technical consulting services for offshore wind power farm facilities which includes offshore wind power turbine support structure, maritime booster station and construction ship machine of offshore wind power.

After a series of exploration and practice, CCS found out a set of specific assessment and certification process which is suitable for the practice of national offshore wind power project

(see below). Based on specific offshore wind power project, it not only can provide the overall whole life cycle project certification service, but also can provide specific design evaluation, independent recheck, wind power analysis and management, and on-site inspection, witness and other services on one of the links of the project.

Offshore wind power developers, designers, the engineering contractors and the equipment suppliers, all of them can obtain the maximized benefits from the services provided by CCS. Firstly, CCS can provide the whole life cycle quality control and risk management and control service for the project to offshore wind power owners, ensure the safety of the development process of the project; secondly, CCS can provide professional technical consulting services and optimization suggestions for the designers, provide strong technical support to designers’ decision; thirdly, CCS provide professional assessment and verification service for offshore construction company to minimize the construction risks; fourthly, CCS can provide certification and recheck services for offshore wind power equipment manufacturers to improve competitiveness in project tendering.

At present, this service has gained a good application. In the project of offshore wind power farm development, CCS provides professional and full technical support and consulting technical

services for the customers including the government departments, power company owners, offshore wind turbine manufacturers and contractors. CCS has provided certification, independent recheck, assessment consultation, training and other services for China Longyuan Power Group Co., Ltd. and its subordinate enterprise, Jiangsu Longyuan Zhenhua Offshore Engineering Co., Ltd., China Three Gorges New Energy Co., Ltd., Shanghai Electric and United Power.

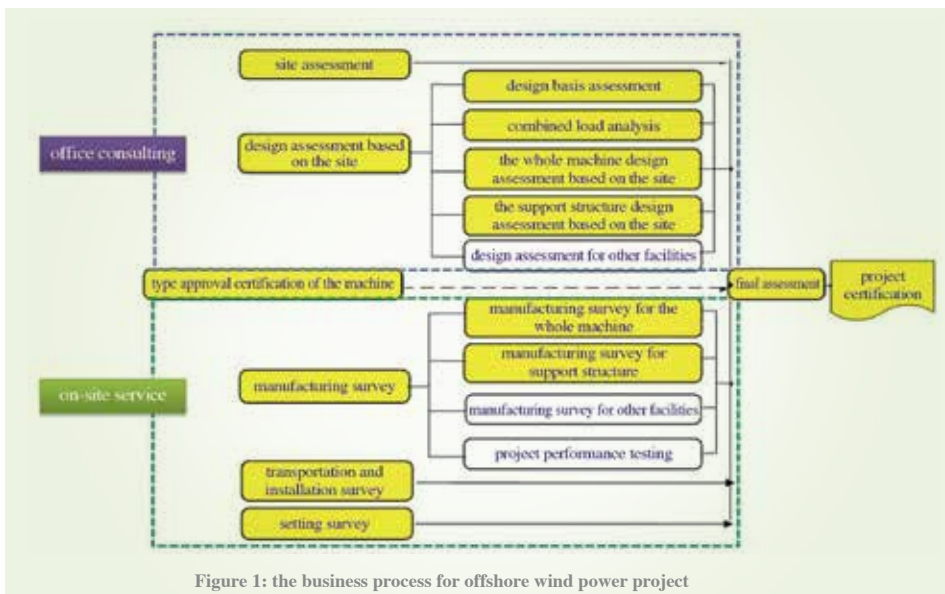


Figure 1: the business process for offshore wind power project



CCS expand photovoltaic industry technical service

By Huo jizhao

In December 2016, at the construction site of photovoltaic power station of Tibet Development and Investment Group at an altitude of 4700 meters in Tibet Gamba County, China, after two months of construction, 76,000 pieces of the type JAP6-60-265/4BB photovoltaic performance polycrystalline silicon components, the quality assurance of the production process were provided by CCSC, were installed completely. This marks a solid step forward in the development strategy of Tibet Development and Investment Group. It also indicates that CCSC is carrying out in an orderly manner the technical support to Tibet Development and Investment Group and has achieved a good beginning.

In recent years, with the national policy support and inflow

of a large amount of financial capital, by the end of 2016, the photovoltaic machine have reached at 77.42 million kW, with 34.54 million kW being newly installed, and has become one of the main source of clean energy. At the same time, in the process of rapid expansion, due to lack of standard regulation and effective management in terms of design, production, manufacturing and construction process, the quality problem of the whole photovoltaic industry chain is becoming increasingly obvious, the earnings of power station cannot be guaranteed. Under this background, CCSC is actively developing technical services covering the overall photovoltaic industry and the life cycle of power station, providing support for the healthy development of the photovoltaic industry.

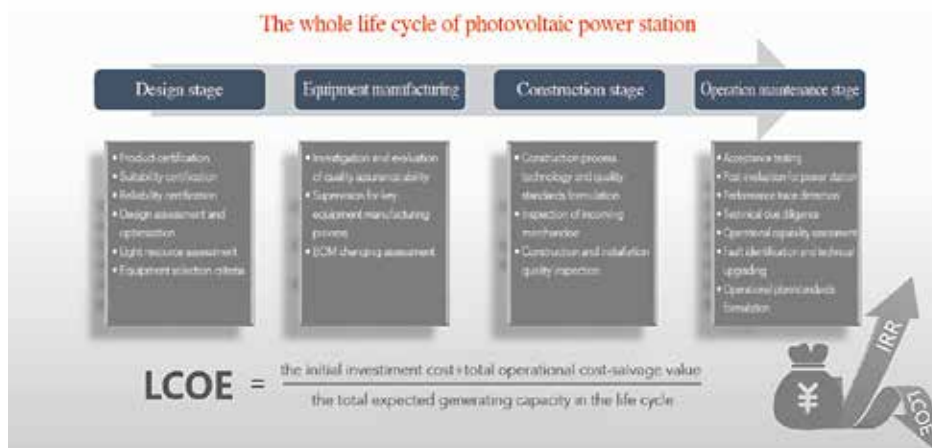
Tibet Development and Investment Group is a state-owned enterprise which is directly under the People's Government of Tibet Autonomous Region, with clean energy development as its main development direction. Gamba's 20MWp photovoltaic power station is the first photovoltaic demonstration project. In the process of the project startup and implementation, due to lack of construction experience, it urgently needed the professional third party institution as a technical support unit. After several times of technical communication and information exchange, CCSC emerged from numerous third party institutions and finally became the technical support unit for Tibet Development and Investment Group's photovoltaic industry to provide the comprehensive technical services including quality assurance of production process, incoming merchandise inspection and acceptance inspection of the power station upon grid connection.

The Gamba project is designed as a high performance photovoltaic power station, with each indicator being in accordance with the technical requirements of the "photovoltaic leader". In view of this, CCSC formed technical service team, carried out quality assurance capability assessment for the component manufacturers before the implementation of the project, and put forward the improvement scheme and requirements according to the assessment result to ensure the manufacturers' continuous capability to produce high performance photovoltaic components. In the process of

component manufacturing, the service team noticed that the solder joint is too early and this leads to virtual welding of the component cell before laminating, so they isolated the problem component in time, and found the reason of the earlier solder joint with manufacturers. Through adjusting the parameters of the production equipment, production was back to normal, and the construction schedule of the project was guaranteed. After 23 days' hard working in factory, all sorts of problems were solved in the process of component production, 76,000 pieces of photovoltaic components were finally completed which meet the quality requirements, and transported to the site of Gamba project. They sample checked and then installed the components to control the quality status of the components. At present, the 110 kV lines of Gamba project is under construction, after the interconnection, the service team will take a test for the power station to evaluate comprehensively the quality of the equipment, power station performance and construction quality and provide reliable support for the owner's decision.

It is learned that Tibet Development and Investment Group will continue to accelerate the photovoltaic project and construction in 2017, and they planned to complete 200MWp photovoltaic project construction grid connection work in this year. Through the Gamba project, CCSC shows a good technical service level, Tibet Development and Investment Group will continue to carry out further cooperation with CCSC on the

200MWp photovoltaic project. In the next few years, Tibet Development and Investment Group will build 500MW scenery storage system, CCSC will continue to provide technical support to Tibet Development and Investment Group in the healthy development of new energy.



Lin Li liquid cargo ship technical innovation team

By Pan Luyi



This is a front-line ship survey team composed of 15 experts, with 5 of them having PhD degree, 11 having master degree and 12 having bachelor degree. 12 of them are senior engineers. The professional structure, educational background structure and age structure of this innovation team are relatively reasonable. In the last 2 years, this team has conducted and participated in 23 researches of national ministries and commissions as well as of CCS, established 5 standards and guidelines, developed 10 softwares and completed ship design approvals

and optimization for 7 ships, having provided important technical support for China ship survey and ship building industry.

In April of 2015, Shanghai rules and research institute of CCS established this innovation team composed of two-generation high-competent talents led by Lin Li, to make full use of demonstration and leading role of model workers, group together the technical personnel and achieve the group effect of “more excellent talents”. Two years later, this team is becoming an important research power of CCS to explore liquid cargo ship technologies,

establish expert team and build first-rate international classification society

Lin Li, graduated with a master degree from SJTU and joined CCS in 1999. She has since been working in the front-line of structural analysis of liquid cargo ship, plan approval review and standard research. As a top-level expert in liquid cargo ship survey, Lin Li witnessed the development of CCS in liquid cargo ship field. She was the one responsible for “Hebei innovation project”, the first single-hull oil tanker converting to an ore carrier in the world; the first VLCC project in

China of single CCS class, and establishment of CCS rule for bulk chemical ships. Recently, Lin Li is working on the audit capability construction of the large size LNG developed by China on its own.

Lin Li has been recognized by the community and has been successively awarded the titles of “Top ten excellent ship surveyors of CCS”, “National Youth Modal Worker of transportation industry”, “National model worker of transportation industry”, “National May 1st Labor medal winner” and “People Touching transportation industry in 2015”. The team of Lin Li has been awarded “Model window of national transportation civilization”, “Worker vanguard of national transportation construction system” and “National youth civilization”. However, personal ability is limited, Lin Li has received these honors as the representative of the technical team. In order to strengthen team work, CCS used model worker team to materialize the long-existing liquid cargo ship technical force.

The liquid cargo ship was chosen as the research direction for the team is due to the important space it all along has in international energy artery. Oil tankers, chemical tankers, LNG/LPG ships, floating oil storage equipment all play major role in transportation on sea. With implementation of “One Belt and One Road strategy”, “establishing Chinese liquid cargo fleet and serving maritime Silk Road” became important strategic mission of CCS. Over the last dozens of years, CCS has accumulated rich experience in large oil tanker audit and classification. The technical breakthrough made

in 300 thousand ton VLCC made it possible for CCS to control the technical highland of liquid cargo ship field. The innovation team was established under this circumstance.

The team has been focusing on technical difficulties and important points since establishment, and has conquered major projects and achieved fruitful achievements.

The project of “key technical research of large chemical carriers” established a complete technical requirement system of bulk chemical carriers, and has formed rules, direct calculation and information retrieval package of good fitness. These achievements follow the tendency of large-scale chemical ships, such as special coating chemical ships and stainless steel chemical ships of 150 meters and above, as well as IMO Typechemical ships with partial longitudinal bulkhead. The project provides complete direct calculation, fatigue strength assessment, refined

analysis and evaluation of heavily stressed positions, sloshing assessment; information retrieval package of good fitness can be used to retrieve goods which met requirements of IBC standards, according to ship’s general arrangement, structure and equipment; the project provides corresponding suggestions to meet industry requirements and to help customers to understand stipulations of oil companies and chemical companies. The technical achievements can be used on 38 thousand ton stainless steel chemical carriers and 80 thousand ton special coating chemical carriers.

The project of “key technical research of new liquefied gas carriers” established a complete technical standard for A,B,C type liquefied gas carriers with independent liquid cargo cabin and thin film type liquefied natural gas carriers. The project provides advanced technical services, such as strength requirement



of independent liquefied gas tank according to IGC standard, crack growth and leakage analysis of B type rhombic independent cabin, new technical requirements of key node strength and fatigue evaluation of VLEG catamaran and Y type liquefied gas tank, integral finite element analysis, sloshing analysis and spectral-based fatigue analysis of thin film type liquefied natural gas carriers, bundled software. The project provides comprehensive and excellent standard and rule services for A/B/C type liquefied gas carriers with independent liquid cargo cabin(including VLGC,VLEG and B type liquefied gas carriers with rhombic independent cabin) thin film liquefied natural gas carriers(6 types), C type LNG carriers with independent cabin(8 types), A type LNG carriers with independent cabin(VLGC).

The innovation team has taken part in a cooperative project of sloshing technical research of liquid cargo ships led by Netherlands maritime institute on behalf of CCS. Sloshing has always been the technical problem of liquid cargo carriers, such as LNG carriers and chemical carriers. Liquid will slosh fiercely in transit, which has serious impact on ship safety. The team cooperated with domestic scientific research institutions and established CCS sloshing technical standard by means of theoretical analysis, experimental analysis and numerical simulation. Comprehensive sloshing evaluation for oil tankers, chemical carriers and liquefied gas carriers is useful to sloshing control and operation efficiency improvement. From 2015, the team took part in the cooperative project of sloshing technical

research initiated by Netherlands maritime institute and French natural gas engineering company. This is conducive for CCS to grasp European advanced research techniques and mechanisms. It also sets an example to carry out scientific research together with the government and the industry in the future.

The special project of ultra-large ship wave-induced vibration and flutter also deserves to be mentioned. With scaling-up of ships, wave-induced vibration and flutter exert influence on ship structural strength that can not be neglected. The team conducted researches and established assessment guideline, standard and software that provide calculation prediction of 3d non-linear hydrodynamic load, hull fatigue strength assessment under effects of wave-induced vibration and flutter, beam ultimate strength assessment under effect of flutter, further technical solutions for ultra-large ships. Operation safety of ultra-large ships can be improved.

The key projects of the team have been approved by customers and filled in gaps of CCS and related field within the nation and have achieved a series of innovation outcome, making notable contribution to Chinese maritime industry.

The team is a powerful force to solve problems and also a “fast track” to cultivate talents. At the same time of continuous emergence of scientific achievement, the team has become the cradle for leaders of technology. Through the clustering of expert technical platform, several top level experts specialized in different fields have emerged within a short period of time.

Gu Yajuan is responsible for compiling the

standard of large-scale liquid cargo carrier energy efficiency research; Zheng Gang is conducting researches on hydrodynamic load of large LNG carriers and other ships with high added value; Song Xia is conducting researches of fatigue nodes of MIIT large liquid cargo carriers; Wang Qilin is in charge of full scale ship validation of HSSR oil tanker and contributes to development of the first verification software that is suitable for HCST standard; Pan Ying is in charge of structural optimization and node analysis of large oil tankers.

To inherit the craftsman spirit of the experts, the team is implementing “apprenticeship system”. Lin Li(model leading marine surveyor)-Pan Luyi/Zhang Hua, Hong Yinig(leading marine surveyor)-Fu Xihua, Zheng Gang-He Songjun have formed groups. In this way, young technicians can learn from the excellent skills and the attitude of pursuing for excellence of the masters. Many young“Lin Li style”experts have emerged in fields of large chemical carriers, LNG ships and ship wave load prediction and have become well-known in the industry.

By means of inheritance, young technicians grow rapidly. Many of them have attended international and domestic meetings as well as technical research and development to show their talents.

Over the two years since the establishment of Lin Li liquid cargo ship team, the team has played a leading role in key projects of national ministries and commissions as well as of CCS. It is becoming the think tank, innovation source, project research force, talent incubator and the direction indicator of Shanghai Rules and Research Institutes of CCS.