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China's yards confirm competitive capability

Chinese shipyards are taking on challenging projects and stepping into a new global role.

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Investing in engineering resources, safety systems and training, Chinese yards are fitting themselves out to compete on an international scale.

Founded in 1977, China Merchants Industry Holdings is one of 12 subsidiaries of China Merchants Group. China Merchants Heavy Industries (CMHI) in Jiangsu was the first mainland China yard to enter the offshore market in 1989, beginning offshore construction work in 2005.

DSIC delivered the ABS-classed *Noble Dave Beard* sixth-generation semisubmersible, shown here aboard the *Dockwise Mighty Servant 1* transport vessel in 2009. (Source: DSIC)

The yard focuses on detailed design with 3-D modeling capability that allows owners to "walk through" a model to identify and address issues before steel is cut. Design quality control and multiple levels of checks and validation have resulted in a process that has enabled 100% on-time delivery.

CMHI initially did repair work for jackups and semisubmersibles, gradually entering into conversions and newbuilds. The yard accommodates 12 rigs concurrently with the capacity to deliver eight rigs per year. Today nine jackups are in progress, including the first Gusto MSC CJ50 in China.

Dalian Shipbuilding Industry Co. (DSIC) was in business for 116 years before taking on its first jackup project in 1971. DSIC began building semisubmersible hulls and jackup living quarters in the 1990s and in 2001 set itself up as an offshore company. It began hull construction, including pontoons, upper decks and caissons, and eventually turned out six newbuild FPSO vessels, one of which was built for Conoco and classed by ABS. DSIC has produced more FPSO vessels than any other Chinese yard.

DSIC is improving capabilities through comprehensive offshore training, annually sending employees for university instruction that includes English and communication as well as specialized skills and a focus on new regulations and software. Locally, the yard looks to ABS and has sent more than 7,000 engineers through ABS courses. DSIC has established its own Design Research Institute, which does all of the engineering for offshore projects using patent designs from such companies as Friede & Goldman (F&G) and Gusto as well as its own multiple patents for jackups, semisubmersibles and drillships.

Reading the signs

Like CMHI, COSCO began as a repair yard, but predicting a surplus of such yards, management decided early on to refine its focus. COSCO hired hundreds of engineers, began recruiting project managers (PMs), and sought local instruction from ABS for a range of disciplines, including project management, production and quality control.

Managers realized that while investing in training was critical, it would be impossible to simply import technology, so they copied the Singapore PM/engineering model and modified it to work in China. There followed a recruiting strategy that brought in groups of expats to take top and middle management positions as well as engineering level roles.

Today 70% of COSCO's revenue comes from offshore work, and the yard continues to push the boundaries of its capabilities, building its first newbuild semisubmersible and carrying out multiple jackup projects as well as a number of FPSO vessel conversions. Its goal is to build on this experience to add even more deepwater projects.

Adding competencies

Established in 1992 as a port machinery manufacturer,

ZPMC took on its first offshore construction project in 2007. ZPMC differentiates itself by developing, designing and independently manufacturing components, including dynamic positioning thrusters, winches, jacking and skidding systems, and control system components. Its competitive edge is R&D, which accounts for 4% of revenue. The yard employs more than 2,000 engineers that specialize in marine and offshore design.

Through a 2010 collaboration agreement with F&G, ZPMC added new designs and gained access to technical support and additional engineering resources. The two organizations have jointly developed jackups, drillships and deepwater windfarm installation vessels.

The yard, which is known for its high-capacity cranes, is building a 2,000-mt fully revolving deep draft floating crane—the largest in the world. The yard plans to focus on high-end equipment for platforms, add to its equipment and component manufacturing, and enhance its equipment integration and commissioning competencies.

Establishing offshore expertise

Not all Chinese yards moved from marine capabilities to offshore construction. CIMC RAFFLES (CIMC) was an offshore yard from the beginning. Expanding into China from Singapore, CIMC established a presence in Yantai, which is home to the largest of the company's three R&D centers, housing nearly 1,000 engineers and experts including 60 specialists from Singapore, the U.S., the U.K., Norway, etc.

CIMC has a reputation for building high-specification semisubmersibles, winning more contracts for semisubmersibles than any other Chinese yard. Developing, building and delivering its own basic designs with intellectual property from the outset, CIMC has improved construction capabilities and invested heavily in engineering technology. Of 17 semis delivered or under construction, eight are designed with its own intellectual property. On its first semisubmersible project, CIMC worked with ABS to make sure the design would meet ABS class requirements and operational function when completed and collaborated with the classification society to research and develop key design, analysis and experimental technology including global sizing and performance and 3-D technology for rig design. In addition, the unique construction and mating made possible by the 20,000-ton TAISUN crane facilitates construction, reducing construction time and giving CIMC a distinct advantage over other yards.

The yard embraces an international concept of HSE, communicating safety messages in both English and Chinese, and invests heavily in education, looking to become a training center. Training in Yantai includes undergrad and postdoctoral interns from the U.K., the Netherlands, Singapore, Norway and local universities, and there are plans to include more international engineers and experts.

Part of the CSSC Group, Shanghai Waigaoqiao Shipbuilding (SWS), comprises three yards. Founded in 1999 and designed in a "U" shape for efficient construction, SWS can launch three vessels every 45 days. The yard has turned out jackups, semisubmersibles, drillships and FPSO vessels, including a 2-MMbbl FPSO unit for Conoco-Phillips nine years ago.

During the project, SWS gained experience from the 100 ConocoPhillips engineers in the yard, changing the yard's approach to one that required evidence-based proof for each construction step. Management improvements resulted in better quality assurance/quality control auditing and procedures that improved the yard's approach to subsequent projects, including a newbuild semisubmersible drilling unit.

Another critical change for SWS came from the realization that offshore clients invest in HSE and are willing to pay for safety. The yard certifies new hires and annually recertifies its workers. In addition to its other training programs, SWS invites ABS to carry out training in the local shipyard and sends workers as well to training at ABS offices. This focus on safety led to a 70% decrease in injuries in the yard from 2003 to 2014.

The top yards in China continue to invest in themselves, improving project management, adding to their knowledge base and competencies, and raising the bar for HSE. E&P