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Classed by ABS, the FPSO Cidade de Paraty is capable of processing 120,000 b/d of oil and will operate under a 20-year charter contract in the Lula Nordeste pre-salt development area offshore Brazil (SBM Offshore)

Class is concentrating on extending FPSO service life

n the *Floating Production Systems Market Report to 2017*, analysts at Infield Systems predict that the number of floating production installations (FPIs) will rise significantly in the near term. According to the report, there will be 95 per cent more installations in 2017 than there were in 2008. This growth is being driven by the increase in activity to commercialise gas in remote areas coupled with a continuing focus on deepwater and ultra-deepwater developments.

ABS has been a part of offshore oil and gas from the industry's inception. It classed the first mobile offshore drilling unit in 1958 and today classes the full spectrum of floating production units. ABS provided classification services for the offshore industry's inaugural Buoyant demand means leading societies are focusing on safely prolonging the service life of FPSOs

floating production system in 1975 and for the first floating production, storage, and offloading (FPSO) unit in 1978. Today, ABS is the market leader in FPSO classification, with more than 40 per cent of the FPSOs working around the world classed with it.

Part of the organisation's involvement has been in developing guidance. ABS issued its first requirements for offshore hydrocarbon processing in 1984 in the *Guide for Building* *and Classing Industrial Systems*. Additional rules and guides for building and classing offshore installations, FPIs, and facilities on offshore installations developed since that time address requirements for fixed and floating hydrocarbon production units, including FPSOs.

"The majority of the operating offshore assets around the world today were initially designed for a typical service life of 20-25 years," says ABS director of engineering, Singapore, Gareth Burton. "Successful drilling programmes have created the need for new fields to be tied back to existing production facilities. And technology improvements introduced over the past two decades have increased production. These advances, coupled with relatively high oil prices, have created a situation in which offshore facilities are being expected to remain in operation beyond their design life."

When evaluating ways to extend production unit life, the hull is a major consideration. In the case of FPSOs the issue can be even more challenging because of the large number of onboard cargo tanks that must be inspected and maintained. Class works with owners and operators to verify that these structures meet certain rules and inspection and maintenance processes through routine surveys. FPSO hull structure specifications are provided in the ABS *Rules for Building and Classing Floating Production Installations*, and the ABS *Rules for Building and Classing Facilities on Offshore Installations* lists FPSO topsides requirements.

Offshore floating production construction and conversion projects typically require a major multinational effort. In the design review phase, Class assigns review engineers and surveyors to work closely with both shipyard and owner and verify that newbuild floating production projects, conversions, or major modifications are in accordance with the established technical standards, approved plans, and statutory requirements.

The principal activities and services carried out by the surveyor during construction include verifying compliance with approved drawings and machinery testing; confirming materials, fit-up and welding procedures; examining nondestructive testing; witnessing structural integrity testing; attending system commissioning; and certifying vendor-supplied equipment.

For the purpose of classing converted and newly built FPSOs, ABS has developed proprietary tools for the site-specific evaluation of dynamic load components, hull strength, and fatigue assessments and provides technical assessments for non-ship-shaped FPSOs.

"This software can be applied to evaluate structural requirements for newbuild shiptype FPSOs and FSOs [floating storage and offloading] and for single- and double-hull tanker conversions to FPSOs and FSOs," explains Mr Burton. "Environmental loads, operational loading conditions, high- and lowcycle fatigue, hull girder ultimate strength, structural loads, and the interface between the hull and topsides production facilities can also be assessed using the software. Realistic FPSO tank load patterns and appropriate load combination factors are used in the structure assessment of FPSOs since their site operations include variations in tank loadings resulting from the many loading and offloading cycles."

As a module of the FPSO software program, a site-specific environmental analysis system provides an interface transferring wavegenerated loads into the structural verification software. For FPSO and FSO conversion



Gareth Burton (ABS): The majority of offshore assets were designed for a service life of 20-25 years

projects, the environmental analysis system can be used in conjunction with a wave database to determine the effect of the unit's trading history on the remaining fatigue life.

Analysts at Douglas-Westwood forecast that US\$91 billion will be spent in the floating production and storage sector between 2013 and 2017. Deepwater and ultra-deepwater oil developments in Africa, Latin America and the Gulf of Mexico and shallow-water gas developments in Australasia are the primary growth drivers.

While Asia is set to receive the majority of FPIs in the next five years, Brazil is actively developing its prolific pre-salt fields, many of which will be produced with FPSOs. In its 2013-2017 Business & Management Plan, Petrobras announced that it will contract 15 FPSOs for deepwater development.

Helping to assess the remaining useable life of a trading vessel being converted to an FPSO is the key service for which Rina sees demand. According to Dino Cervetto, head of technical services, maintenance costs are very heavily influenced by the original assessment and make a major difference over the life of an FPSO. "We have our residual fatigue life notation," he explains. "It is given for the assessment, at the conversion design stage, of the working life of a vessel under particular conditions, taking into account the original vessel design life, the time spent in navigation and the conditions at the site of the FPSO. We see quite a lot of demand for that as operators position themselves to install new or change existing units of FPSOs."

Rina has recently helped with two changes of existing FPSO units, the most recent being the installation of the *Firenze* FPSO, in the Aquila Field in the South Adriatic Sea. The 90,000 dwt unit is the former double hull Aframax oil tanker *Betatank II*, built in 1989. It was converted into an FPSO by Dubai Drydocks World for Saipem and will operate in a water depth of about 850m.

Rina provided project management, inspection and testing, classification and statutory certification and compliance with national regulations and the European Commission's marine equipment and pressure equipment Directives.

The floater for the FSO Alba Marina in the Rospo Mare Field in the Central Adriatic Sea was also changed recently, with Rina assistance at many stages of the project. The 108,000 dwt unit is now in service. Rina provided classification, statutory certification on behalf of the Italian Government, supervision and plan approval activities for the conversion into an FSO and specialist studies for EPC tendering including mooring analysis, seakeeping and fatigue analysis. "We see increasing demand for mooring calculations," says Mr Cervetto. "Condition assessment of existing chains and reuse of existing moorings was of interest in this case and as FPSOs move into deeper water much more attention has to be given to mooring analysis. We are fully geared up for that now."

Mooring analysis was a key part of the replacement of the FSO *Leonis* in the Vega Field in the Sicilian Channel. The 84,000 dwt unit has articulated moorings with rigid arms. Rina provided supervision and plan approval activities for the conversion into an FSO and yoke construction, specialist mooring, seakeeping and fatigue studies in addition to classification and statutory certification and condition assessment of the associated single point mooring. **TST**

VesselsValue.com

Source for the table on this page: VesselsValue.com. Data as at 30 July 2013

AN OVERVIEW OF WHERE OWNER/OPERATORS ARE CHOOSING TO CLASS THEIR FPSOS				
Top 5 Class	no.	total dwt	total value (US\$ million)	average age
FPSO	204	35,255,500	2,742	25
ABS	88	16,484,600	1,252	29
DNV	54	7,783,100	697	22
BV	21	5,021,800	353	17
LRS	21	2,996,400	261	21
VN	9	1,181,800	83	27
Other	11	1,787,800	96	24
Grand Total	204	35,255,500	2,742	25