Our Mission

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

Quality & Environmental Policy

It is the policy of ABS to be responsive to the individual and collective needs of our clients as well as those of the public at large, to provide quality services in support of our mission, and to provide our services consistent with international standards developed to avoid, reduce or control pollution to the environment.

All of our client commitments, supporting actions, and services delivered must be recognized as expressions of Quality. We pledge to monitor our performance as an on-going activity and to strive for continuous improvement.

We commit to operate consistent with applicable environmental legislation and regulations and to provide a framework for establishing and reviewing environmental objectives and targets.
# Classification, Certification & Related Services for Floating Production Installations

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Setting Standards of Excellence
in the Classification & Certification of Floating Production Installations
ABS offers a comprehensive range of classification and related services to designers, builders, owners and operators of floating production installations (FPIs). The principal elements of the ABS Offshore program, with particular emphasis on production units, are summarized in this handbook. More complete details can be obtained from the nearest ABS office. A comprehensive library of ABS Offshore Rules and Guides can be found on the ABS website, www.eagle.org within the Rules & Guides section under the Resources tab. These technical documents are available for free download.

Introduction

ABS provided the first classification services to the offshore industry in 1958 and has remained at the forefront of setting offshore industry standards and technical guidance ever since. Currently, ABS is the market leader in classification of all FPIs worldwide including floating production, storage and offloading (FPSO) units, spars, tension-leg platforms (TLPs) and semisubmersible production systems.

With a long history of service excellence, ABS is able to provide a wealth of technical knowledge and practical experience at all relevant stages of a floating production installation project. ABS engineers and surveyors will work closely with the designer, owner and the selected shipyard, as appropriate, to verify conformance with the ABS Rules and applicable regulatory standards. Our global approach to project management provides our clients with a consistent and effective administration of even the largest, multinational offshore projects.

Classification is a life cycle approach to the design, construction and operation of a floating production unit. After delivery, maintenance of classification requires periodic surveys to verify that the installation remains in compliance with the ABS Rules for floating production installations.

A global network of ABS engineers, surveyors and operational support staff, delivers efficient, practical and responsive service in support of our clients and their ABS-classed production unit fleet.

ABS maintains relationships with all of the principal flag Administrations, providing a rapid and efficient interface that can significantly accelerate regulatory compliance.
Floating Production Units – the ABS Advantage

The ABS experience, technology and services outlined in the following pages demonstrate our commitment to being the preferred provider of classification services to the offshore industry and, in particular, to the production unit sector.

Our Commitment

Our Mission is to promote the security of life and property and preserve the natural environment. We pursue this mission primarily through the development and verification of compliance with technical standards that encourage robust designs and the provision of solutions-oriented survey services. Floating production units built and maintained to these standards may be accepted into and retained in ABS class. We are committed to providing superior technical and survey services that assist our clients in conforming to these standards. Our commitment starts at the earliest stages of your project.

Our Staff

The ABS organization includes more than 5,000 engineers, surveyors and operational support staff, located throughout the world. ABS maintains engineering offices in Houston, Rio de Janeiro, London, Singapore, Yokohama, Busan and Shanghai to facilitate the design review of floating production units. Our experienced professionals provide technical support and assistance to clients from the initial design concept, through the design approval process, during construction and throughout the entire service life of a floating production installation.

Our Offshore Floating Production Installations

ABS issued its first requirements for offshore hydrocarbon processing in the Guide for Building and Classing Industrial Systems in 1984. Since then, ABS has supported the industry through the development of Rules including: Rules for Building and Classing Offshore Installations, Rules for Building and Classing Floating Production Installations and Rules for Building and Classing Facilities on Offshore Installations. Collectively, these Rules address the requirements for fixed and floating hydrocarbon production units. The Rules include specific requirements for TLPs, spars, FPSOs and production semisubmersibles. Industry representatives from energy and operating companies, engineering, construction and design firms and academia participate in the ABS committees to provide input for the enhancement of ABS standards for floating production units.
**FPSOs**

ABS has a strong presence worldwide in 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. ABS can address the technical assessment of non-ship-shaped FPSOs such as barge-shaped or cylindrical units in addition to the conventional ship-shaped examples.

**Semisubmersibles**

Semisubmersibles, also known as column-stabilized units and deep draft semisubmersibles, are frequently chosen by operators for their deepwater field operations. When oil fields were first developed in offshore locations, drilling semisubmersibles were converted for use as combined drilling and production platforms. These vessels offered very stable and cost-effective platforms. As the offshore industry has progressed into deeper water and harsh environments, purpose-built production semisubmersible platforms have been designed.

**TLPs**

ABS has been involved with TLP technology from the outset and has been instrumental in helping develop appropriate class standards and regulatory guidelines. ABS has classed TLPs in various versions including the conventional four column installation as well as smaller mini-TLPs.

**Spars**

Since classing the first spar installed in the Gulf of Mexico, ABS has worked with the industry to improve the spar concept. Three generations of spar design improvements have enhanced the value of spars for deepwater developments. Increases in structural efficiency have led to optimization of steel resulting in the availability of additional deck loads. ABS has classed all three generations of spars: classic or caisson, truss and cell.

**Pipelines & Risers**

Deepwater exploration has resulted in increasingly complex designs for subsea pipelines and risers supporting FPIs. ABS classes these complex and frequently novel design installations based on applicable Rules and industry standards. ABS surveyors, deployed at fabrication and installation sites throughout the world, verify that the pipeline and risers are fabricated and installed in accordance with the approved designs and sound industry practice.
New & Novel Floating Production Concepts

ABS has provided its Approval in Principle or AIP to numerous floating production concepts designed to produce oil or natural gas. ABS’ evaluation of a floating production installation is based upon the application of prescriptive requirements and advanced risk analysis to verify compliance with accepted safety standards.

ABS takes a collaborative approach toward addressing offshore technology issues by working in close cooperation with governments, universities and the industry. Research and development partnerships are formed whenever possible with shipyards, design agencies and other organizations to advance offshore technology innovation.

We can assist with preliminary planning and advice, including pre-sanctioned front-end engineering and design (FEED) phases, through onsite meetings and review of the design. By involving class at this very early stage, before detailed plans are drawn or concepts selected, ABS can provide you with a technical evaluation of the basic design concept being proposed including, when required, approval in principle. ABS’ evaluation may be based upon the application of prescriptive requirements together with a series of overall risk analyses and special studies.
Our Production Unit Industry Leadership

ABS has been providing classification services to the offshore industry longer than any other class society. We have provided these services to assist clients in meeting the many technical challenges that have arisen including the first certification and classification for a floating production unit. Other ABS offshore industry firsts include:

- Issued first classification guidance for building and classing floating production installations
- Classed first FPSO in US waters
- Classed first production spar
- Classed first LPG FSO
- Classed first floating storage unit in Gulf of Mexico
- Classed first TLP
- Issued first classification guidance for the application of ergonomics to marine systems
- Issued first classification guidance on the application of synthetic ropes for offshore mooring
- Classed first LPG FPSO
- Classed first ice-class FSO in the Caspian Sea
- Issued basic design approval for a mono-column floater, production, storage and offloading unit
- Classed first deepwater hybrid production installation in the Gulf of Mexico
- Issued the Offshore Structure Assessment Program to assist designers of semisubmersibles, TLPs and spars with meeting classification requirements

Our Fees

ABS services can be tailored to an owners' production systems' profile and operational and management requirements. These approaches include Master Service Agreements and Five-Year Survey Fee packages as appropriate.
A Multi-Level Approach to Service

ABS service delivery consists of three categories, tailored to meet the specific needs of all owners and operators of floating production installations.

Category I: Classification & Statutory Services
The range of services associated with the issuance and maintenance of the classification and required statutory certificates including coastal State requirements for all major offshore operational areas. Owners may then choose to select from the range of additional products and services offered in Categories II and III.

Category II: Optional Notations & Class-Related Services
Several valuable, optional, class-related services are provided by ABS including elements as diverse as training and advanced structural analysis. This category also includes additional notations that may be used by the owner to demonstrate that the unit has been designed or is being operated in accordance with standards beyond those required under Category I for routine classification and statutory certification.

Category III: Services Provided by ABS Group
Several additional optional products and services are provided by ABS Group, an affiliated company of ABS.
Category I

Required Classification & Statutory Services

These services have been designed to assist an owner or builder to design, construct and deliver a floating production installation that can be considered for acceptance into ABS class as conforming to the applicable ABS Rules and statutory regulations. These services also assist an owner or operator to maintain the unit to ABS class requirements throughout its operational life as determined by successful completion of periodic and damage surveys.

When ABS is authorized to act on behalf of the flag State or coastal State, these services also include the applicable statutory inspections.

Required Classification and Statutory Services comprise six parts:
1. Class Notations
2. Design Analysis, Plan Review & Approval
3. Project Management & Vendor Equipment Coordination
4. Surveys During Construction, Conversion or Major Modification
5. Surveys After Construction
6. Statutory Inspections
Class Notations

ABS, in cooperation with the owner and the shipyard, will identify at the outset the class notations that will be applied to the floating production installation. The notations attest to the capabilities of the unit and identify the class Rules and requirements that will be applied throughout the class process. The floating production installation notations will include one or more of the following:

The Maltese Cross (‡) symbol is assigned to a floating production unit for which the hull construction and the manufacture of its machinery and components have been carried out under ABS survey. The Maltese Cross will be omitted for units accepted into ABS class but not built under ABS review and survey.

A1 is a classification symbol that, together with the Maltese Cross, indicates compliance with the hull requirements of the applicable ABS Rules, or their equivalent, and survey by ABS during construction of the unit. The symbols ‡A1 will be followed by the appropriate main class notation that identifies the type of unit.

In accordance with the ABS floating production installation requirements, the main ABS class notation for a unit would be either:

- Floating Production, Storage and Offloading System (hull type)
- Floating Production (and Offloading) System (hull type)
- Floating Storage and Offloading System (hull type)

The service notation will be appended by one of the following to indicate the hull type:

- (Ship-Type)
- (Column-Stabilized)
- (TLP)
- (SPAR)

Additionally for ship-type units, as the unit is intended for site-specific applications, the intended site is indicated in the notation. For example:

- Newbuild Units (S), Site
- Conversions (CI), Site

Fatigue life for ship-type floating production installations is also documented as part of the class notation.

OHCM is assigned to ship-type installations designed and reviewed to the ABS Rules for Building and Classing Floating Production Installations that comply with the requirements of the Offshore Hull Construction Monitoring Program.
Design Analysis, Plan Review & Approval

ABS has developed Rules and Guides for floating production installations. The requirements contained in these Rules and Guides are for design, construction and survey after construction of the floating installation (including hull structure, equipment and marine machinery), the position mooring system and the hydrocarbon production facilities.

Floating installations include ship-type, column-stabilized-type, tension leg platforms, spar installations as well as existing vessels converted to FPIs. The requirements for optional notations for disconnectable floating installations, dynamic positioning systems and import/export systems are also provided.

Classification of these units can include:

- Hull structure
- Topsides
- Processing equipment
- Mooring systems
- Topsides utility and safety systems
- Accommodations
- Offloading systems
- Topsides power generation
- Platform layout
- Marine utility and safety systems

Production unit designs intended to be built to ABS class undergo various technical reviews as well as structural analysis by ABS engineering staff. These reviews include:

- **Hull Structural Analysis**
  ABS reviews material selection, welding procedures, scantlings, overall strength, local strength and yielding, buckling and fatigue for compliance with the applicable Rule requirements.

- **Machinery Systems**
  ABS focuses on piping and electrical systems, firefighting and safety systems as well as areas considered hazardous or specialized for floating production units.
Plan Review

ABS provides responsive, professional, technical services to the designers, builders and owners of floating production installations. These services are offered through a network of local engineering offices that have been strategically placed in the major offshore centers to facilitate the design review of the many production units ordered to ABS class.

Our engineering staff can work with the designer from the earliest conceptual stage of a floating production project, providing advice on the application of the ABS Rules and the relevant statutory and coastal State regulations.

ABS has developed and routinely applies technologically-advanced methods that address global performance of floating structures. We apply first principles structural analysis to offshore installations including global and local strength, fatigue and yielding, buckling and ultimate strength. ABS also considers the application of composite materials on offshore installations.

Design review frequently includes:
- First principles structural analysis
- Stability analysis
- Marine systems – electrical and mechanical
- Hydrocarbon production systems
- Mooring systems
- Foundation analysis verification
- Composite materials on offshore installations
- Seakeeping analysis
- Sea load assessments for complex sea states
- Statutory review and certification – flag and coastal State

Safety review may include:
- General arrangements
- Gas dispersion and thermal radiation
- Structural fire protection
- Active firefighting systems
- Fire, gas and smoke detection systems
- Means of egress
- Lifesaving appliances
- Abandonment
ABS Eagle Engineering Manager

ABS has implemented the advanced, secure, electronic ABS Eagle Engineering Manager plan review system. ABS Eagle Engineering Manager provides online, web-based interaction between the unit’s design team and the ABS engineers undertaking plan review. Using Engineering Manager, all plans are handled electronically from submittal to return.

Teams of ABS specialists in different engineering disciplines and different regions of the world can all work on the design review simultaneously. The number and identity of the reviewing engineers can be restricted and their actions are fully traceable as part of the system’s built-in security safeguards.

The ABS Eagle Engineering Manager system allows the submitter for each drawing or information package to control the distribution of the comments and drawings or documents to any of the involved parties including the owner and the shipbuilder. Compared to the traditional paper-based plan review process, the system offers faster overall review time and improves the lines of communication between ABS and the designers and vendors to quickly resolve questions or Rule interpretations.

ABS Eagle FPSO

The ABS Eagle FPSO software addresses structural requirements for newbuild ship-type FPSOs and FSOs and for single and double hull tanker conversions to FPSOs and FSOs. Environmental loads, operational loading conditions, high and low cycle fatigue, hull girder ultimate strength, structural loads and the interface between the hull and topsides production facilities are considered. These requirements apply FPSO-specific loading conditions and prescribed strength assessment procedures for both newbuilds and conversions. 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 due to the many loading and offloading cycles.

As a module of the ABS Eagle FPSO program, the site-specific environmental analysis system (SEAS) provides a seamless interface transferring the wave generated loads into the structural verification software. For FPSO and FSO conversion projects, SEAS may be used in conjunction with the ABS proprietary wave database to determine the effect of the vessel’s trading history on the remaining fatigue life.
Project Management & Vendor Equipment Coordination

Offshore floating production construction and conversion projects are frequently large, multinational efforts requiring diligent coordination. The ABS project manager, supported by the vendor equipment coordinator, provides a single point-of-contact for both our clients and their vendors on major offshore projects. The vendor equipment coordinator, working with the large number of vendors and sub-vendors, will facilitate the delivery of vendor-supplied equipment with the appropriate supporting approved documentation.

Surveys During Construction, Conversion or Major Modification

Drawing from its global network of experienced offshore surveyors, ABS assigns appropriate personnel to each newbuilding floating production project, conversion or major modification, wherever in the world construction is to be undertaken. These surveyors will verify that construction is in accordance with the Rules, approved plans and statutory requirements. They will work closely with both the shipyard and the owner to assist in reconciling questions of interpretation.

The principal activities and services carried out by a surveyor during new construction include:

- Verify compliance with approved drawings
- Confirm materials, fit-up and welding
- Examine nondestructive testing
- Witness structural integrity testing
- Verify machinery testing
- Attend system commissioning
- Certify vendor-supplied equipment and material certification
- Confirm qualification of welders and welding procedures
Verifying compliance with approved drawings means approved plans are followed by the builder using approved material and components, proper installation techniques, good workmanship practices and with adherence to the Rules. Surveyors are also involved at various levels with the building, installation and testing of the structure and principal mechanical and electrical systems.

Major system testing or commissioning requirements include:

- Bilge and ballast system
- Ventilation including dampers and shutdowns
- Electrical installations both main and emergency
- Fuel and lube oil systems
- Emergency shutdown systems
- Mooring and/or position-keeping systems
- Structural fire protection
- Firefighting systems, fixed and portable
- Fire and gas detection and associated alarm systems
- Internal communication systems
- Drain systems

Machinery testing in accordance with the Rules includes testing at the point of manufacture and the final assembly at the shipyard. Where required by the Rules, field surveyors will attend and/or audit manufacturing and construction at vendor shops and fabrication yards. Surveyors will attend and/or audit steel mills, engine manufacturers and foundries producing castings and equipment to verify that these are produced to the specifications contained in the applicable ABS Rules.

**Major Modification Services**

ABS has assisted floating installation contractors to keep pace with the technical challenges imposed by advances in production unit technology. This has often led to the modification of existing units to enhance capabilities and increase production by adding processing equipment and tiebacks to additional fields. Whatever the modification, ABS is familiar with the implications of these changes to the unit and can verify the modifications conform to the applicable classification and statutory standards. ABS offshore surveyors can verify that such modifications are carried out in conformance with the applicable Rules and standards.
Dockside Commissioning, Offshore Installation & Start-up

Commissioning of individual systems at dockside is a standard step in finishing a floating production installation. The attending surveyor will confirm the results of dockside commissioning activities. The ABS surveyor will verify the installation of mooring components offshore in accordance with the installation plan in advance of the unit’s arrival. Once the floating production unit arrives onsite, the surveyor will verify that the unit is moored and connected according to approved procedures. Final commissioning and start-up activities will be completed on board. Once start-up activities have been satisfactorily completed, the surveyor may issue the interim class certificate.

Acceptance into Class

When all outstanding issues are resolved, the unit is presented to the ABS Classification Committee. The committee, comprised of ABS members drawn from the marine, offshore and insurance industries and including a representative of the US Coast Guard and ABS officers, assesses the unit’s compliance with the Rules based on their collective experience and recommendations from the ABS staff. When accepted by the committee, the unit receives its full-term certification.

The unit’s classification information, characteristics and other particulars are then entered into the ABS Record, the electronic register of vessels classed by ABS. The ABS Record is maintained and updated on the ABS website. Additional optional class notations may be recorded for each of these units. These are discussed in the Category II section.
Surveys After Construction

ABS Rules require that every classed unit be subject to periodic surveys throughout its service life to verify that it is maintained in accordance with the applicable classification standards. This imposes a requirement for the unit to be subject to a series of periodic surveys – Annual, Intermediate, Special and Drydocking.

- **Special Periodic Survey**
  All surveys to satisfy the special survey requirements are to be completed within the window of the fourth and fifth annual survey and the work is to be completed within 15 months.

- **Special Continuous Survey**
  A system of continuous surveys may be used to satisfy the special survey requirements. All of the requirements of the particular special survey must be completed within the five-year cycle. Continuous surveys can be established for both hull and machinery.

- **Risk-based Inspection**
  The adoption of risk-based inspection (RBI) principles can assist in focusing attention on elements critical to the operation. Risk-based inspection is a tool that enables a more effective application of inspection resources to those areas of a system where there is maximum benefit to be gained.

ABS has developed the *Guide for Surveys Using Risk-Based Inspection for the Offshore Industry* to provide guidance for owners, operators, maintenance managers and inspectors regarding the key elements of a suitable RBI program to be used in lieu of traditional maintenance of class surveys.

ABS also recognizes the operational and contractual requirements of floating production installations and therefore accepts underwater inspection in lieu of drydocking (UWILD) subject to approved planning documents.
ABS Eagle Survey Manager

To help the floating production unit owner, operator or manager plan for the required periodic surveys in an efficient, cost-effective and informed manner, ABS provides the operator with access to the advanced, web-based ABS Eagle Survey Manager program.

The Survey Manager system has been in use for several years (formerly under the ABS SafeNet name) and has been subject to frequent enhancement and expansion. Positive user feedback gives us the confidence to consider the Survey Manager system to be the most advanced, useful and easy-to-use system currently available to floating production unit operators to monitor the classification status of their units.

Survey Manager efficiently manages the class and statutory data for an owner's entire ABS-classed fleet in a web-based electronic format. Owners have access to the data from multiple locations – in the office, on board a unit or from remote sites such as a repair yard.

Survey Manager includes a record of the tank condition; historical records of survey dates, locations and surveys carried out; a record of outstanding recommendations, both open and closed; and a system to integrate survey activities and review the status with the ABS planned maintenance module.

Owners and operators are able to select the interval to receive messages regarding upcoming and overdue surveys. Multicolored timelines of survey due dates significantly diminish the need to view individual listings of survey items such as hull, machinery and equipment.

ABS Eagle Survey Manager provides a wide range of informational and support services to the operator in real time at an office or on board the unit. Services include:

- A fleet summary and complete status of class surveys for each ABS-classed FPI
- Status of statutory surveys and certificates issued by ABS on behalf of the flag Administration
- Timeline presentations of the class and statutory surveys completed in the previous three years, surveys in progress and surveys scheduled for the next five years including identification of grace periods
• Principal particulars of each floating production installation
• FPI attendance history with links to related ABS reports
• An online certificate list and file containing copies of ABS-issued class and statutory certificates currently on board the floating production unit
• Fleet level tools for budgeting within user-defined periods (such as drydockings)
• Status indication of surveys completed, often before the surveyor leaves the unit
• Automated onboard issuance of class and statutory certificates
• An owner administration module to enable the creation of an unlimited number of new users and to select the production unit or fleet that each individual user will view
• Tools for survey planning and survey guidance including floating production unit specific templates for the preparation of enhanced survey plans
• Electronic booking of survey attendance and optional email progress notifications

**Damage, Failure & Repair Surveys**

When the hull or machinery suffers damage or failure, ABS should be notified. ABS will determine if attendance is required and if necessary arrange for a surveyor to attend the unit as promptly as possible. The attending surveyor will verify that the unit remains in, or is returned to, a condition that is in conformance with the applicable Rules.

**Statutory Inspections**

ABS is recognized by the leading international flag States and coastal States and has been delegated authority to act as a Recognized Organization on behalf of more than 120 governments. ABS carries out these responsibilities during the design stage, verifying that the design complies with the statutory requirements of the selected Administration as contained in the various international and national maritime codes and conventions including:

• Stability
• Load Line
• Watertight subdivision
• Safety construction and safety equipment
• Firefighting
• Lifesaving regulations
The maritime codes and conventions could include the Marine Pollution Prevention (MARPOL), Tonnage, Load Line and Anti-Fouling System (AFS) Conventions and the ISM and ISPS Codes where applicable. In addition to the national or international tonnage certificates, ABS can issue Panama and Suez Canal tonnage certificates on behalf of those authorities. Once in service, when authorized by the flag State, ABS will conduct the applicable periodic statutory inspections and issue the relevant certificates.

Every nation can implement its own requirements for a floating production unit to operate in its waters, known as coastal State requirements. ABS can assist a production unit owner in verifying the unit meets certain coastal State requirements as applicable.

**ISM Code Compliance**

As a Recognized Organization for many flag States, ABS is authorized to act on their behalf in performing audits and issuing certificates required by the International Management Code for the Safe Operation of Ships and for Pollution Prevention (the International Safety Management – ISM Code). These include both the audits of the MODU operator leading to the Document of Compliance (DOC) certificate and the audit of the unit which, when successfully completed, will result in the issuance of the Safety Management Certificate (SMC) to that unit. ABS maintains a global pool of qualified ISM auditors able to respond promptly to client needs.

**ISPS Code Compliance**

A large number of flag States have authorized ABS to act on their behalf as a Recognized Security Organization. In this capacity ABS can approve security plans, perform security audits of MODUs and issue International Ship Security Certificates on behalf of those flag States. The ABS Guide for Ship Security (SEC) Notation has been made available to assist operators in achieving compliance with the statutory security requirements of the International Ship and Port Facility Security (ISPS) Code and in obtaining the ABS SEC notation. ABS maintains a global pool of qualified ISPS auditors able to respond promptly to client needs.
Category II

Optional Notations & Class-Related Services

To further assist owners of floating production installations, ABS offers a range of optional services and notations, from structural analyses to standards that address the habitability of the onboard living conditions, to enhance the safety of the unit and the quality, environmental and health standards relating to its operation.

Category II services comprise nine parts:
1. Optional Notations
2. Technical & Engineering Services
3. Fleet Management Systems
4. Hull Integrity Management Programs
5. Machinery Maintenance Services
6. Integrated Management Systems Certification
7. Rapid Response Damage Assessment
8. Training Services
9. Information Services
Optional Notations for Floating Production Installations

Floating production units can receive several optional ABS notations. Conformance with the standards required for the award of these optional notations allows an owner to demonstrate that a particular unit has been built or is being operated to internationally recognized standards that exceed those required solely for the issuance of the main class notation or for conformance with mandatory statutory requirements. Optional notations for FPIs include:

- **ACC or ACCU** – ACC is assigned to a self-propelled FPI having the means to control and monitor the propulsion machinery space from a continuously manned centralized control and monitoring station installed within or adjacent to the propulsion machinery space. This notation may be enhanced for unattended operation, or ACCU, indicating the means to control and monitor the propulsion machinery space is provided from the navigation bridge and from a centralized control and monitoring station installed within or adjacent to the propulsion machinery space.

- **AMCC or AMCCU** – AMCC is assigned to the automatic or remote control and monitoring systems for non-propulsion related machinery and systems provided that the applicable requirements of the ABS Guide for Automation or Remote Control and Monitoring for Machinery and Systems (other than Propulsion) on Offshore Installations are satisfied. AMCCU is assigned when the machinery spaces and systems can be periodically unmanned and monitored remotely.

- **AMS** – is assigned to floating production installations that are self-propelled for which the machinery, boilers and systems are found satisfactory with regard to ABS requirements.

- **CCO** – is assigned to a unit designed, equipped and intended to operate in low temperatures that complies with the ABS Guide for Vessels Operating in Low Temperature Environments.
• **CRC** – signifies that the unit’s cranes are designed and constructed in accordance with Chapter 2 of the *ABS Guide for the Certification of Lifting Appliances*. A Register of Lifting Appliances attesting to compliance with the requirements of the Guide will be issued at the request of the owner or builder upon satisfactory completion of plan review, in-plant survey, installation and testing of the crane to the satisfaction of the attending surveyor.

• **(Disconnectable)** – is assigned to a floating installation system with means of disengaging the unit from its mooring and riser systems in severe weather or to seek refuge under its own power for a specified design environmental condition. This notation can be modified with the inclusion of *-R (from site to designated port)* indicating that the unit is restricted to a specific service area in proximity to its operating site location.

• **DLA** – is assigned to vessels which have been evaluated using an enhanced structural analysis procedure and criteria for calculating and evaluating the behavior of hull structures under dynamic loading approach.

• **DPS-0, DPS-1, DPS-2 or DPS-3** – indicates that a unit is fitted with a system of thrusters, positioning instruments and control systems capable of automatically maintaining the position and heading at sea without external aid within a specified operating envelope under specified maximum environmental conditions. The assigned numeral (0, 1, 2 or 3) indicates the degree of redundancy.

• **ENVIRO-OS** or **ENVIRO-OS+** – is assigned to an offshore floating installation denoting adherence to enhanced standards for environmental protection. The standards are contained in the *ABS Guide for the Environmental Protection Notation for Offshore Units, Floating Installations and Liftboats*. They include procedures and requirements for ballast water and sewage management, anti-fouling applications, airborne pollutant discharges, fuel oil and the use of exhaust gas cleaning systems, refrigerants and the Green Passport for ship recycling.
• **GP** – is applicable to new and existing units that have had the unit’s details and Part 1 of the Inventory of their Green Passport prepared and certified to the requirements of the ABS Guide for the Class Notation Green Passport (GP).

• **HAB, HAB+ or HAB++** – is assigned to a unit complying with the criteria for crew accommodations and the ambient environment (i.e., vibration, noise, indoor climate and lighting) provided in the ABS Guide for Crew Habitability on Offshore Installations. For HAB+ and HAB++, installations must meet more stringent vibration and indoor climate criteria with the aim of increasing crew comfort.

• **HELIDK or HELIDK(SRF)** – HELIDK is assigned to units with a helicopter deck intended for landing with no provision for storage or refueling as per criteria included in the ABS Guide for the Class Notation Helicopter Decks and Facilities. HELIDK(SRF) is assigned to units with a helicopter deck and a helicopter facility for storage and/or refueling.

• **HIMP** – signifies that the unit is enrolled in the Hull Inspection and Maintenance Program in accordance with the ABS Guide for Hull Inspection and Maintenance Program.

• **HSQEE, HSQE, HSQEEn, HSEEn, HSEn, HSE, HSQ, SEEn, SEn, SQ, SE, S** – indicates the unit complies with the relevant criteria for health, safety, quality, environmental and/or energy management systems in the ABS Guide for Marine Health, Safety, Quality, Environmental and Energy Management.

• **Ice Class** – is assigned to a unit that complies with the designated ABS Rules for Building and Classing Steel Vessels, Part 6 Optional Items and Systems or the ABS Guide for Building and Classing Vessels Intended for Navigation in Polar Waters based on the operating area and ice conditions.

• **IMP-EXP** – is assigned to units when the import and export systems are built in compliance with the requirements in the Rules for Building and Classing Floating Production Installations. ABS also has Rules and notations that specifically address the design and survey requirements for pipelines and risers.
MLC-ACCOM – is assigned to a unit complying with the criteria contained in the ABS Guide for Compliance with the ILO Maritime Labour Convention, 2006 Title 3 Requirements for crew accommodations and the associated ambient environmental characteristics (i.e., vibration, noise, indoor climate and lighting).

RCM – followed by the applicable qualifier such as (MACH) indicates the unit complies with the ABS Guide for Survey Based on Reliability-Centered Maintenance as it applies to the unit's auxiliary systems.

SEC – indicates the unit complies with the ABS Guide for Ship Security (SEC) Notation.

SFA – is assigned to units where spectral fatigue analysis is performed in accordance with criteria established in, for example, the ABS Guide for Spectral-Based Fatigue Analysis for Floating Production, Storage and Offloading (FPSO) Installations.

UWILD – underwater parts of the FPI are to be examined at prescribed intervals. This examination may be conducted without the need to drydock the unit where an underwater inspection plan has been submitted and approved in accordance with the requirements contained in the ABS Rules for Building and Classing Floating Production Installations.
Technical & Engineering Services

During the early stage of FPI development, ABS personnel can be available to discuss areas of concern with the client's design team. Called preliminary planning and advice (PPA), this service will provide subject matter knowledgeable personnel to discuss the developing design with respect to conformance with class and statutory requirements.

PPA frequently proceeds to approval in principle (AIP). AIP allows a client to submit design documents for subsystems, systems or for the full facilities for review by ABS. The depth of the design review by ABS is determined by the maturity of the design. The ABS review will focus on compliance with class and statutory requirements and note any nonconformances identified for resolution at a later stage of design.

As the design continues to mature, clients frequently request a basic design approval by ABS. This basic design approval is based on the full floating production unit and will continue to focus on compliance with class and statutory conformance. During this review, ABS will generate comments on any areas of nonconformance identified. Resolution of these comments can be done within the context of the basic design approval or may be held over for resolution during the detailed design review phase.

PPA, AIP and basic design approval are not requirements of ABS class. These early stage engineering support efforts are offered to our clients to assist in the development of the design and minimize rework that could result from a noncompliant design. These early stage engineering support efforts precede detailed engineering design review required for classification or certification addressed in Category I.
Engineering Analysis

ABS personnel are available to provide a wide range of additional engineering-related analyses during the design evaluation and plan review phases of a floating production project. Depending on the size and type of FPI, specialized global and local strength, fatigue and mooring analyses such as non-linear stiffness or behavior or minimum tension requirements can be conducted. ABS can also provide structural analyses such as dynamic loading approach and spectral-based fatigue analysis.

The following ABS analytical software may be applicable:

- ABS Eagle OSAP (for non-ship-shaped)
- ABS Eagle DLA/SFA FOS (for ship-shaped)

ABS Eagle OSAP

The latest version of the ABS Eagle Offshore Structure Assessment Program (OSAP) allows designers of production units to check the compliance of their designs more easily with ABS class requirements. The software streamlines the complex design code check process by assisting users in determining environmental loads, transferring hydrodynamic loads to the structural model and extracting structural analysis results from a user-selected finite element analysis program. OSAP serves as a data processing hub that connects the hydrodynamic and structural analysis software and passes the analysis results on to its design code check function.
ABS Eagle DLA/SFA FOS

A detailed evaluation of the FPI structure can be carried out using the dynamic loading approach. This ABS-developed, first principles approach evaluates hull structure strength to withstand the principal failure modes of buckling, yielding and fatigue. Central to this methodology is the use of a program based on seakeeping theory for calculating the loads and responses for a range of wave directions and loading conditions. The dynamic loads are then applied to a three-dimensional (3-D) finite element model of the unit to assess the adequacy of the structure.

In addition, this procedure can also be used for the application of the spectral fatigue analysis method for the evaluation of structural fatigue strength. SFA is a rational analysis procedure for evaluating fatigue life related to possible local cracking of ship structures. The spectral-based method for evaluating fatigue strength due to the wave-induced responses is well established and has been extensively documented.

To streamline these procedures, ABS has integrated the proven analysis of both DLA and SFA into this ABS Eagle software addressing floating offshore structures (FOS). Using a self-generated or user-supplied finite element model, the program can perform a thorough DLA and SFA analysis of a unit’s structure – 3-D seakeeping, short and long-term statistical analysis, finite element analysis, strength evaluations and fatigue assessments are fully integrated.

Floating production unit designs that successfully undergo an ABS DLA/SFA evaluation will be awarded optional notations denoting the application of this methodology, DLA, as well as a notation indicating the unit’s designed fatigue life in a site-specific environment, e.g. SFA(30).
ABS Eagle Rule Manager

To further simplify the application of the relevant ABS Rules and statutory regulations at the design stage, ABS has developed the advanced, web-based ABS Eagle Rule Manager. This application allows the designer and owner to easily and quickly identify and access relevant ABS Rules and statutory requirements for the unit. The built-in search capability allows the owner, shipyard or designer to specify the scantling length, contract date, delivery date, class notations and other criteria which, in turn, highlights the relevant ABS Rule text and the IMO requirements for that specific project.

Advanced input parameters can be used to narrow the search criteria to the Rule requirements applicable to a specific system, component, structural element, item of equipment, notation or survey. Hyperlinks embedded within the text provide the user with immediate window access to other related sections of the Rules. The user can also generate check sheets that can be used to verify that applicable Rule requirements have been addressed during the design and construction phases of a project.
Asset Management Systems

Floating production operators are adopting maintenance procedures that promote the lifecycle integrity of a unit. To assist them, ABS Nautical Systems offers a variety of programs that provide a framework for maintaining the structural and mechanical condition of a unit.

NS5 Enterprise

ABS Nautical Systems is a leading provider of asset management software for the marine and offshore industries. Marketed as a suite of products called NS5 Enterprise, the software modules can function on a standalone basis or as a fully integrated management solution that addresses the principle elements of a floating production installation’s daily operational functions.

Designed for the needs of the offshore industry, this software system allows the operator to better manage routine structural and mechanical inspection and maintenance; manage inventory and personnel records; control HSQE documentation; and conduct root cause analyses.

NS5 Enterprise can efficiently handle tasks ranging from regulatory compliance to payroll to planned maintenance and quality programs. The modules share information, eliminating the need for repetitive data entry, and allow the user to move rapidly from one module to another. Through the use of NS5 Enterprise, improved efficiencies, increased productivity and reduced costs can be realized. The integrated architecture makes adding modules simple. Each module is valuable on its own but the complete suite provides the most powerful, single-source asset management tool available.

NS5 Enterprise is an easy-to-use Windows-based system with full replication capability. Solutions are available in the following categories:

- Maintenance Management
- Supply Chain Management
- Workforce Management
- Safety Management
- Environmental Management

Information on the full capabilities of the modules available and how the NS5 Enterprise asset management software can improve operating efficiency can be found at www.eagle.org, within the Software section.
Hull Integrity Management Programs

The ABS Guide for Hull Inspection and Maintenance Program addresses requirements for developing a hull maintenance management system. Vessels enrolled in this program will be eligible for the class notation HIMP, which will be entered in the ABS Record. ABS has developed hull integrity management software to assist owners and operators in taking an active role in inspecting and maintaining their vessels.

NS5 Enterprise Hull Inspection

The Hull Inspection module within the NS5 Enterprise asset management software suite is a browser-based tool that efficiently schedules hull inspections, targets critical areas within the hull's structure and identify specific areas for ongoing monitoring. The tool contains a built-in dashboard for high level reporting and analyses, maintains a record and history of inspections and records the condition of the hull with an easy to understand traffic light status in a two-dimensional spatial model.

ABS Hull Maintenance

As a standalone system, ABS Hull Maintenance provides a sophisticated, advanced management and information program that can be used to track the condition of the unit's structure throughout its service life. The program allows for increased functionality via management of condition data in a virtual 3-D environment and handles the execution and management of inspections easily.

With features such as the navigation and visualization of the hull condition in a 3-D model, the ABS Hull Maintenance program automates repair planning and cost estimation, imports and exports gauging plans and trends the future condition of structural components using built-in calculation utilities.

Users can store gauging, coating and anode information, damages and repair data and the photos and sketches associated with these events. The actual condition of any part of the structure can be assessed at any time from the stored data and condition and then used to predict remaining life before a renewal limit is reached. A report on structural diminution for any part of the unit can be generated automatically. Repair costs can also be generated for user-specified scenarios.

The benefits of the hull maintenance system include:

- Displays a compartment extract from the hull model giving the user the ability to see compartment data and highlight specific sections for more detailed review
- Stores multiple file types such as documents/reports, photos, sketches, video, etc., of structural members linked directly to each section for detailed visual and technical assessment
- Tracks multiple anomalous conditions such as damages, fractures, buckling, grooving and pitting
• Holds a life history of gauging information to facilitate analysis of past structural degradation and anticipated future degradation using built-in trending tools
• Compares actual condition data against as-approved or Rules scantlings for gauging evaluation as per prescribed renewal criteria
• Tracks coating application and condition through the lifetime of the unit and stores the location and condition of anodes
• Generates coating material estimates including cost for user-defined scenarios
• Highlights wastage levels and areas of substantial corrosion using color coding of the various hull structures in the model
• Generates steel weight, cost data and bill of materials for isolated repairs or different repair scenarios

Enhanced Monitoring System

The maintenance management of a floating production installation can be enhanced through the use of a unit-specific manual created by ABS upon request. It shows pictorially the critical areas in the structure identified in the plan approval process and the areas known to be susceptible to damage from both industry and historical experience.

The aim of this optional program is to help operators extend the service life of their existing floating production fleet in a rational and cost-effective manner. This enhanced monitoring provides a clear presentation of the current and enhanced inspection criteria for each installation design. This data can be integrated into an operator’s electronic working tracking system and used to develop asset maintenance plans.

Although the enhanced monitoring suggests higher criteria, it is not a mandatory program and the ABS class survey requirements are unchanged by this service. Enhanced monitoring can help the operator to zero-in on traditional, installation-specific problem areas.
Hull Condition Monitoring

Some owners may elect to monitor the hull stress levels throughout the unit’s service life. A series of strain gauges, accelerometers, alarms and recording devices can provide an early warning system to avoid overstressing the hull structure, allowing the unit’s operators to monitor how the unit is performing relative to its design limits and how the unit responds to changes in heading. This approach can provide a warning on green seas, excessive unit motions and hull girder stress. The system can be integrated with a data recorder allowing for the collection of a wide variety of technical information.

The approaches covered by the ABS Guide for Hull Condition Monitoring Systems extend from simple one-motion monitoring systems to sophisticated data recorders covering a multitude of hull, systems and machinery parameters. The reason for fitting hull monitoring systems is to acquire, display and/or record information and then use the information as a basis for making decisions that will improve operational efficiency and/or safety.

The overall hull condition monitoring process is one of: data measurement; data collection and conditioning; data processing and evaluation; and results presentation and storage. At the request of the owner or shipyard, a hull condition monitoring system which complies with the requirements of the hull condition monitoring Guide will be given a notation HM1, HM2, HM3, as appropriate, followed by the applicable qualifier such as Green Seas Warning, Unit Motion, Hull Girder Stress, Local Load Monitoring, Fatigue Monitor, Voyage Data Recorder (VDR) or Enhanced VDR.
Machinery Maintenance Services

Floating production installation operators are adopting maintenance procedures that promote the life cycle integrity of the unit. To assist them, ABS offers a variety of programs that provide a framework for maintaining the mechanical condition of the unit while leveraging the operator’s maintenance program to support the class maintenance of the unit.

Preventive Maintenance

Planned maintenance and condition-based maintenance are two approaches utilized within the preventive maintenance program to assist owners with maintaining machinery on units. Often these techniques are used concurrently. By applying either, or a combination of the following preventive maintenance approaches, credit can be given towards the requirements of the Continuous Survey of Machinery.

- Planned Maintenance
  Planned maintenance involves the setting of formal schedules for maintenance and overhaul of machinery. Running time or calendar time may be used for establishing a schedule. Such schedules are generally established by the machinery manufacturer and include lubrication servicing; filter, bearing and seal replacements; as well as major overhauls.
• **Condition-Based Maintenance with Condition Monitoring**

With a condition-based maintenance program, the frequency of planned maintenance tasks can be more dynamically-driven based on the results obtained from condition monitoring tasks. The use of condition monitoring techniques promotes cost-effective maintenance by reducing the number of breakdowns and extending operating periods beyond those of time-based programs. Maintenance is undertaken as a result of the knowledge of the condition of the equipment. This results in better utilization of resources, the controlled replacement of wearing components and reduces the incidence of unplanned breakdown maintenance. Many maintenance procedures include condition monitoring, e.g. checking and recording of vibration levels, pressure, temperature, load current, running hours, lubricating oil analysis data and fuel consumption. Intelligent use of this equipment condition data gives benefits such as eliminating the need to open up machinery, saving on human resources and expenditure on spare parts and reducing downtime and associated costs.

**Reliability-Centered Maintenance**

As a logical evolution of machinery maintenance program development, the application of reliability-centered maintenance (RCM) allows maintenance programs to be evaluated in a risk-based approach that provides the most value to an owner or operator. RCM analysis allows an owner to optimize maintenance programs by first identifying functional failures within machinery systems that have the highest risk and then proactively determining the optimum maintenance tasks and strategies that mitigate such potential failures to an acceptable level. In this way, maintenance programs are created which focus on critical components and proper maintenance strategies.

By applying RCM principles, maintenance strategies are evaluated and applied in a rational and systematic manner. ABS can assist the owner in gaining approval for its own RCM program for maintenance of class or by further assisting in preparing and implementing an effective RCM program for the machinery on the unit. The ABS Guidance Notes on Reliability-Centered Maintenance provide the maintenance theory and philosophy of RCM. In addition, the ABS Guide for Survey Based on Reliability-Centered Maintenance contains the RCM program requirements for obtaining a special RCM notation.
Integrated Management Systems Certification

In addition to facilitating the certification of a floating production installation to the applicable classification and statutory regulatory requirements, ABS offers owners and operators additional services that allow them to demonstrate their adoption of specific health, safety and environmental standards. Attaining certification to these optional ABS standards provides evidence that the unit is being operated to the highest standards available to the industry. The ABS Guide for Marine Health, Safety, Quality, Environmental and Energy Management provides operators with an integrated management system model for safe operation and for demonstrating operational excellence.

The requirements of this Guide have been largely derived from accepted management system principles reflected in the International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code), the latest standards for Quality Management Systems (ISO 9001), Environmental Management Systems (ISO 14001), Energy Management Systems (ISO 50001) and the Specification for Occupational Health and Safety Management Systems (OHSAS 18001). These standards have been marinized as appropriate for greater relevance to the practical operation of marine facilities.

Rapid Response Damage Assessment

Coastal states are showing an increased intolerance towards offshore incidents that result in pollution. Proactive owners mitigate the potential risks associated with an incident by enrolling in a Rapid Response Damage Assessment (RRDA) program. The ABS RRDA program provides 24-hour, 365 days per year emergency support services to owners and operators with assets enrolled in the program. Currently the program covers more than 2,000 oceangoing vessels and offshore units. Emergency analysis for structural strength and residual stability post-incident is provided quickly to determine how critical the situation is based on reported conditions and to assist stakeholders to develop an appropriate mitigation strategy.
Training Services

ABS offers focused client seminars and training services for owners and operators of floating production units. Through the ABS Academy more than 150 specialized training courses are available to address design, construction and operational maintenance issues for marine and offshore assets. Classes are conducted in academies located in Piraeus, Singapore, Dubai, Houston, Rio de Janeiro and Busan. Topics associated with floating production installations include:

- Offshore Rules & Regulations for Floating Production Installations
- Classification & Statutory Requirements for Floating Production Installations
- Classification of Offshore LNG FPSOs
- Fundamentals of Structures for FPSOs/FPOs
- Fundamentals of Structures for Column-Stabilized Units
- Fundamentals of Engineering Systems for Floating Offshore Installations
- Fire & Lifesaving Safety for Floating Offshore Installations
- Dynamic Positioning Systems Installations
- Welding, Inspections & Nondestructive Examination
- Risk Assessment, Incident Investigation & Root Cause Analysis
- Reliability Centered Maintenance (RCM) for Operators

ABS Academy offers a range of courses addressing implementing and auditing management systems to recognized industry standards. Courses can be customized and delivered at a client's facility. For more information, visit the ABS Academy section on www.eagle.org.

Information Services

It is important for owners to stay informed of the constant flow of new regulatory and classification requirements. Through its participation in IMO as either a member of the IACS delegation or the US delegation, ABS is able to provide its owners with in-depth coverage and insight into these changes. Frequent regulatory updates are also posted to the ABS website and ABS owners receive a variety of informational newsletters and publications designed to assist their understanding of the issues. ABS Rules and current regulatory information can also be accessed on the ABS website at anytime.
Category III

Services Provided by ABS Group

ABS Group, an affiliated company of ABS, offers a broad range of risk-based and certification-related services that have been designed to assist drilling unit operators to manage their projects and facilities more efficiently. These services are independent of the classification approval process and range from the identification of potential hazards in conceptual designs, through detailed evaluation and certification during construction, to assistance in addressing operational issues such as life extension of mature systems, incident investigation and the development of risk-based inspection and reliability-centered maintenance programs.

Category III services comprise four parts:
1. Engineering Services
2. Risk & Reliability Services
3. Asset Integrity Management
4. Project Management, Inspection & Auditing Services
Engineering Services

ABS Group is a leader in the application of advanced technology, analysis and modeling to complex engineering projects. Its technical staff is focused on preparing solutions that maximize client efficiencies and minimize the cost of operation without increasing exposure to risk. The services provided are applicable at every stage of an offshore drilling unit project including:

- Conceptual design evaluation and comparative risk assessment
- Independent third-party design review and analysis to verify compliance with relevant international, national or industry standards
- Full risk analysis of the unit and the intended operation
- Comprehensive asset integrity management programs
- Decommissioning studies

Stability

Assessment of the intact and damaged stability of offshore drilling units can be undertaken by the ABS Group staff. Related tasks include preparation of trim and stability booklets for a wide range of operating conditions.

Mooring/Tendon Dynamics & Statics

ABS Group has considerable experience in the analysis of shallow water catenary moorings and deepwater synthetic moorings. Recent experience includes analysis of single-point moorings, spread moorings and DP-assisted moorings. Specific tasks include:

- Predictions of static (steady) offsets of a mooring system
- Dynamic response predictions of moored vessels: frequency and time-domain
- Dynamic directional stability of vessels at single-point moorings
- Mooring line strength and anchor holding capacity evaluations
Fracture Mechanics Assessments
ABS Group can apply fracture mechanics to assist a MODU operator to develop more focused inspection programs. Defect assessments are conducted in accordance with BS7910 and API-579 on structures with existing defects and on new structures.

Materials & Corrosion Engineering
Balancing corrosion control procedures with initial costs, inspection and long-term maintenance is the key to correct implementation and lower cost operation throughout a unit’s life cycle. ABS Group’s materials and corrosion engineering services cover:

- Initial assessment and inspection
- Recommendations for detailed testing and analysis
- Recommendations and specifications for repair/refurbishment strategies
- Maintenance, inspection and monitoring schedules
- Serviceable life estimates

Mechanical & Electrical System Review
ABS Group engineers can carry out hardware equipment and system verification on electrical and instrumentation systems, mechanical and rotating machinery and fire protection systems. Engineering review and analysis of electrical distribution systems, emergency shutdown systems, automation and remote control systems and programmable logic and control systems are also available.
Risk & Reliability Services

MODU operators should be aware of, and seek to mitigate, the risks associated with their operations. ABS Group’s risk and reliability experience covers a broad spectrum of services for the MODU operator including hazard identification, explosion and fire evaluations, natural disaster assessment, consequence modeling, incident investigation, auditing, safety and environmental management program development, reliability and business interruption analysis, risk assessment, risk mitigation and risk management. ABS Group can assist clients to lower risks to a level that is as low as reasonably practicable (ALARP). Risk assessments can be undertaken for all aspects of a facility from drilling operations to marine and safety systems, to the unit’s structural integrity and the selection of the mooring arrangement. Risk studies that take into account both man-made and natural hazards can also be carried out on associated systems such as subsea equipment (blowout preventers), risers and pipeline end manifolds (PLEMs).

Hazard Identification

To help identify hazards, ABS Group can apply techniques such as:

- Hazard and Operability Studies (HAZOP)
- Hazard Identification Studies (HAZID)
- Hazard Checklists
- Failure Modes, Effects and Criticality Analyses (FMECA)
- Hazard Registers

Quantitative & Qualitative Risk Assessments

ABS Group can undertake both quantitative and qualitative risk assessments for a MODU operator. In quantitative risk assessments, the systematic identification and evaluation of the likely frequency and consequences of possible hazards associated with a unit and its operations are the principal inputs into the risk management decision-making process. When it is inappropriate to perform a quantitative study, coarse or qualitative risk calculations may be sufficient and more effective.
Fire & Blast Engineering

Fire and explosions are major hazards on offshore units and they form a major element of HSE studies. ABS Group combines a wide range of commercial and proprietary software tools for its fire and blast studies with access to real world test range and shock tube facilities to deliver:

- Blast overpressure prediction
- Ultimate strength and collapse analysis
- Strengthening remedial measures evaluation
- Blast wall and protective structure design and assessment
- Equipment survivability under blast and blast-induced shock
- Jet and pool fire modeling

Evacuation Modeling

Proprietary software permits modeling by ABS Group of individual and group behaviors within a unit’s layout and takes account of interaction with fire and smoke spread models. Services include computer-modeled escape design optimization, escape calculations to IMO Resolution 757 and the sizing and positioning of escape routes.
Asset Integrity Management

ABS Group is a recognized leader in asset integrity management (AIM) for the offshore industry. AIM can be viewed as a comprehensive strategy, combining technical and managerial elements, to maximize the installation's uptime and optimize profits through the implementation of advanced yet practical methodologies including risk and reliability.

ABS Group has extensive experience in the use of key data such as gauging and nondestructive evaluation to provide predictive problem solving scenarios. Developed methods and template formats assist in focusing inspection programs to the most likely/actual critical and problem areas for structures and process equipment. Once in service, the emphasis of the AIM program moves to an auditing function of both the hardware and the management systems that govern the unit's operation. Risk-based inspection programs focus survey scrutiny in the most effective manner. As the asset ages, a successful AIM program will also frame the development and implementation of an effective life-extension strategy.

ABS Group can conduct mechanical integrity assessments, damage assessments, condition assessments, extended design life studies, re-qualification, environmental assessments, life cycle cost calculations and decommissioning assessments. It can develop in-service inspection plans for an operator's assets that take account of critical areas (fatigue sensitive, hot spots, construction anomalies and defects, etc.), operational issues, risk, cost and regulatory compliance.
Project Management, Inspection & Auditing Services
ABS Group provides floating production unit owners and operators with a total project management approach encompassing effective cost control, schedule tracking, progress measurement, management of change, estimating, trending and analysis and management reporting.

Construction Management Support
ABS Group personnel are available to support construction projects as an owner's representative, offering experience with material and equipment testing, knowledge of fabrication techniques and procedures, machinery installation and nondestructive examination. These services are available during construction, trials, delivery, start-up and commissioning and include source inspection services, verification of welding procedures and welder performance qualifications, mill test report reviews, monitoring of contractor's QA/QC systems, material and dimensional control, monitoring of material preparation, witnessing performance testing and witnessing of contractor's acceptance tests.

Condition Surveys
ABS Group can provide pre-purchase condition surveys, damage surveys, condition and valuation surveys and floating structure surveys for floating production installations.

Quality Assurance & Security Compliance
ABS Group offers certification and compliance to internationally recognized safety, quality, environmental, energy and security management systems. Services include both consultation on establishing a program and required periodic audits and reviews of the quality or security system, process instructions and procedures to verify compliance. These services include development and preparation of manuals meeting ISM, ISO 9001, QS 9000, ISO 14001, ISO 50001 and ISPS Code requirements.
Classification & Certification Services

For more information on the classification and statutory certification services provided by ABS, please contact the ABS office nearest you. A full listing of ABS offices with contact information can be found on the ABS website at www.eagle.org

For further information on the products and services provided by ABS Nautical Services please contact the ABS Nautical Systems office nearest you. A full listing of the offices can be found on the ABS website at www.eagle.org within the Software section.

Related Services

General inquiries regarding products and services provided by ABS Group can be sent to info@abs-group.com or please refer to the website to contact representatives at www.abs-group.com