Making sense of risk
Risk engineering
Asia Pacific

Shipyard risk assessment and JH143 surveys

Liberty
Specialty Markets

Shipyard risk assessment & JH143 surveys

Liberty Technical Bulletins help our clients manage business and operational risks. The Bulletin is written for Shipyard and Owner management teams and focuses on the various component areas of the JH143 survey, and the way this information is evaluated by our risk engineers and underwriters.

Aerial view of a major building and repair yard

Newbuild vessel on slipway prior to launch

In the first decade of the 21st Century, the shipbuilding industry underwent a boom which continued well past the beginning of the global financial crisis. Changes in the world economy played a part not just in determining the number and type of ships to be built, but where they were to be built.

Nowhere has the shift in global manufacturing been more pronounced than in shipbuilding. Where once most of the world's merchant tonnage was constructed in Europe and the United States, the center of world shipbuilding began shifting to Japan in the 1960s, moving into Korea in the following decade, and finally to China, which has become the world's leading shipbuilder.

As all of these changes were taking place, the complexity and value of the ships that builder's risk underwriters were insuring was also increasing. All of these circumstances came together when the market was hit by a series of significant builder's risk losses, mostly due to fire.

At one point, underwriters had been exposed to losses totalling approximately US$ 740 million against premiums of approximately US$ 140 million. This state of affairs was unsustainable, and the problem was discussed and addressed by the Joint Hull Committee of Lloyd's in 2003.

The committee identified a number of areas that could contribute to the occurrence and magnitude of a loss, and developed a survey warranty which required that a risk assessment survey be carried out of a given yard either prior to the binding of a policy or as a condition. In line with Joint Hull committee practice, these surveys became known as "JH143" surveys.

A JH143 survey is intended to provide underwriters with a thorough understanding of the nature of the risk they are insuring, and to provide

meaningful risk management and reduction guidance to the yards. JH143 surveys evaluate a yard in terms of the following areas:

- Environmental and Geographical Risks
- General Site Conditions & Housekeeping
- Site Safety
- Yard equipment
- Theft & Personnel
- Emergency Response Plans
- Fire-Fighting Systems
- Permit to Work Systems
- Atmospheric Monitoring and Control of Industrial Gases
- Launching and Sea Trials
- Processes and Procedures
- Quality Assurance/ Quality Control
- Management of subcontractors
- Casualty History

In each area, the attending surveyor meets with the yard and owner project teams and gathers information. A through physical survey of the site is then conducted to evaluate the effectiveness of production and safety systems. A letter grade is then assigned to each subject area, which are then combined into a single average letter grade for the whole yard.

The letter grade enables an underwriter to determine with a reasonable degree of certainty the existing level of risk and the specific actions needed to keep their exposure within reasonable boundaries. (Builder's Risk policies do not respond to construction delays, which are normally addressed contractually.)

A shipyard's risk exposure can be broadly divided into two categories:

- Those to which the yard is exposed; and
- Those to which the vessel under construction is exposed.

The JH143 survey examines these areas, management systems and prior history when developing the risk profile and final grade for the yard.

Yard Risks

Environmental and Geographical Exposures

The location of a yard is driven by a number of factors, including the cost of land, proximity to the coast and trade routes, ease of access and distance from industrial support and supply infrastructure. While it may be beneficial to site a yard far up a river, a difficult transit will deter shipowners. In any event, yards located along major rivers can be vulnerable to flooding or storm surges.

Some regions are vulnerable to earthquakes, volcanic activity, tropical storms or tsunamis and these also need to be considered. Recent examples of losses resulting from this type of risk include yards damaged during the March, 2011 tsunami in Japan.

General Site Conditions and Housekeeping

When infrastructure is properly maintained, materials are stored in an orderly manner, and waste is regularly and properly disposed of, a safe and healthy work environment results. This in turn leads to a more productive, quality oriented workforce. A key indicator of good housekeeping is the storage and handling of hazardous materials and waste.

An orderly storage area

An example of poor waste management

Well organized waste reception and disposal facilities are essential to shipyard safety

Site Safety

This component of the JH143 is closely related to the previous section. A successful enterprise needs to develop and nurture a safety culture throughout the organization. Workers need to be provided with personal protective equipment, such as safety glasses, safety boots, hardhats and safety harnesses. But it is not enough to merely provide equipment. Training in proper use must also be provided.

A safety culture has a number of advantages; a safe workforce is more likely to produce a quality product, with less time being devoted to work slowdowns and lost time injuries (LTI). Unsafe conditions also lead to poor morale and resentment, which in turn cause poor quality and increase the likelihood of claims.

When injuries do occur, facilities should be provided for rapid response and treatment, such as on-site clinics and ambulances. The nature of the industrial injuries which can occur in a shipyard should be discussed with local hospitals, and contingency plans put in place to manage them.

Worker safety signage

Regular inspection and certification of scaffolding is essential for worker safety

Yard Equipment

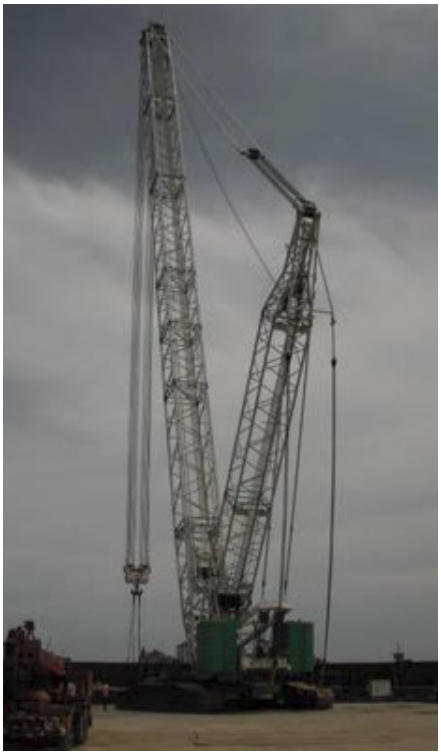
For any project, whether or not the yard owns, or can obtain the equipment necessary to complete it successfully is a key consideration. The type and amount of equipment available is important, and so is the maintenance.

A surveyor carrying out a JH143 survey will review the yard's equipment list, and assess the material condition of the equipment. Key points will include a review of preventive maintenance systems, and a check of the inspection and certification program for lifting gear and rigging equipment.


Colour coded rigging is regularly inspected


Shipyards utilise many different types of lifting gear

Welding machines


Mobile crane

Theft and Personnel

The loss of key materials and equipment in a shipbuilding project can cause serious delays. If special tools are needed to complete a job, the impact of their non-availability can extend far beyond the actual job itself.

Finally, the key to any successful project is personnel. A stable, well-trained and motivated work force is one of the best loss prevention measures available.

Vessel Risks

Heavy industrial installations such as shipyards are always exposed to potential losses due to the very nature of their work. By far the greatest threat to a yard and the vessels inside it is fire. Two of the key areas addressed by a JH143 survey are emergency response plans and fire fighting.

Emergency Response Systems

Effective risk engineering requires the appreciation of the risks at hand and the development of coordinated response systems to address them. These risks can vary from location to location, notably in the case of environmental risks. An example of a common environmental risk in Asia is typhoon preparedness. Others, such as fire, are common to all shipyards.

A key aspect of the JH143 survey is the review and evaluation of these plans. Actions of the yard staff must be identified, and also a thoughtful consideration of the point at which outside assistance must be summoned. Well-designed plans address coordination with outside sources and provide up to date points of contact. Regular review and exercises can identify shortcomings, and offer the opportunity for revision.

While emergency response systems will not always eliminate the consequences of a casualty, those consequences can often be significantly reduced.

Fire Fighting Systems

Fire represents the greatest threat to any vessel under construction and the yard where it is being built. The faster a fire can be identified and fought, the less damage will result.

Ideally, fire fighting systems should have more than one water source; in normal circumstances, water can be provided from a municipal or city water main. However, in the event of a power failure or natural disaster, the city fire main may be disrupted or cut off. For this reason, an independent supply (such as from the sea or adjacent river) should be provided, along with independent pumps powered either by Diesel engines or emergency generators.

Fire engine

Fire hose station and water tank

Some shipyards have their own fire stations, complete with fire trucks and trained personnel. Ideally, the fire trucks should have the capability of taking an independent suction from the sea.

Fire mains have hydrants placed at intervals along their length. The hydrants can either be used to feed hoses for use against fires ashore or in workshops, or can be used to supply manifolds on board a ship. Maintaining pressurized fire hoses with ample water supplies on board the vessel enables the workforce to respond to a fire rapidly.

Fire extinguishers alone are not sufficient to fight an industrial fire, though they can provide prompt response to small, localized fires. When welding or burning operations (hot work) are carried out, a firewatch should be posted in the immediate vicinity. Their only task is to remove flammable materials from the hot work area, monitor the environment, and take immediate action should a fire break out.

Permit to Work Systems

Certain activities, such as hot work, confined space entry, erecting and working on scaffolding, and electrical work are inherently more dangerous than others. Managing the risk they pose requires careful implementation and monitoring of safe working procedures.

Permits to work require workers and supervisors to review all hazardous tasks in accordance with established procedures and to take action to minimize the hazard. The system also provides a means of documenting and tracking the actions taken, and communicating the activities to others working on the vessel in a systematic manner.

Atmospheric Monitoring and Control of Industrial Gases

Shipbuilding (and repair) involve creating and working in enclosed spaces. Where natural ventilation is limited or non-existent, forced ventilation must be provided to ensure that spaces are safe for men and for hot work when it is required. The determination of whether or not a space is safe is not based on guesswork; there are standards which must be applied to make this determination.

The accumulation of flammable or toxic gases in a space can lead to asphyxiated workers or, in the presence of an ignition source, an explosion. Regular monitoring in accordance with established procedures can prevent such losses.

Industrial gases are used in yards to supply cutting and welding torches and are also used in testing and commissioning regimes. Ensuring that these gases are used when and where they are needed requires careful management. Poorly maintained equipment or lack of safety fittings (such as flashback arrestors) can result in damage or injury.

The hoses used to supply gases used in welding and cutting operations need to be manufactured for that purpose. Substitution of hoses not designed for welding gases can lead to failures, leaks and fire. It is also important that hoses are properly colour coded and fitted with correct fittings to ensure that oxygen hoses are fitted to oxygen tanks and gas hoses to gas tanks.

Flashback arrestor fitted to an acetylene line

Gas cylinder pressure regulator

Safety caps are essential to the safe handling of gas cylinders

Launching and Sea Trials

Launching is a key event in the life of any ship. There are a number of different launching methods, including sideways launching, slipway launching, floating out from drydocks, and using air bags. Each method has its own particular risks that must be adequately addressed by the yard's launching procedures.

For example, slipway launches use gravity to carry the ship into the water; but the vessel's momentum must be checked and controlled so that the vessel can be taken in hand by tugs rather than running aground on the opposite bank. This method also requires a ship design that can withstand the stresses imposed by the transition from the slip to the water.

Float out from a graving dock

Slipway launch

Management System

The builder must prove that the new ship can meet its contractual performance requirements at sea during sea trials. During this period, all propulsion, steering and navigation equipment are proven in real world operations.

The JH143 survey process includes a review of how the shipyard manages both the launching procedures and the standards for sea trials.

Air bag launch


Side launch

Processes and Procedures

For a number of activities that a yard carries out, an evaluation of the way they conduct them out is necessary. Examples include many of the functional areas outlined above, including safety, equipment maintenance, and work processes. The evaluation of these processes and procedures provides an underwriter with a better understanding of his exposures in a given yard.

An underwriter cannot evaluate a complex industrial activity such as shipbuilding without looking at systems and observing first-hand how they function in the field. The JH 143 process not only provides underwriters with insight into their risks, but the recommendations that come out of the survey can help a shipyard improve their entire operation, leading to greater customer satisfaction and with it, a good reputation in a highly competitive marketplace.

Quality Assurance and Quality Control

These two closely related terms are often confused. Quality Assurance is a set of activities designed to ensure that a given process will meet its objectives. Quality Control is a set of activities designed to evaluate a developed work product. Rather than relying on a worker's subjective experience, these formal procedures ensure that a consistent product which meets customer and regulatory standards are met every time.

Certification of QA/QC processes by a third party to an ISO standard is an indicator of a yard's commitment to quality, but it is by no means the only indicator. A key part of the JH 143 process is an evaluation of the yard's QA/QC processes, not only by reviewing documentation, but also by first-hand observation of a yard's work in the field, and by conversations with owner's teams and regulatory bodies.


QA/QC Systems ensure blocks fit together and welds are strong



Quality Vessels are the result of good quality management

Subcontractor Management

Few shipyards rely solely on their own workforce to complete a project. Maintaining a fully staffed shipyard at all times is prohibitively expensive, so most rely on subcontractors in a variety of crafts to meet their commitments.

Effective subcontractor management requires rigorous vetting and close supervision by the yard's core staff. Attending surveyors review the engagement procedures, with an eye to how consistently they are applied. An examination of the ratio of shipyard employees to subcontractors can provide a useful indicator of how likely the yard is to maintain control over the work and produce a quality product.

Casualty History

The fact that a yard may have a history of casualties does not necessarily deter an underwriter from providing coverage. The JH143 process provides a yard with the opportunity to demonstrate their response to a casualty to candidate underwriters.

If, in the wake of a casualty, the yard investigates the causes, and then implements solutions to prevent a re-occurrence, this can have a positive effect on the evaluation of the yard's systems and give the underwriters confidence in the risk.

At Liberty Specialty Markets we seek to provide our clients with "engineered risk" services, which utilizes the best background information and experience to provide solutions which meet their needs. When it comes to Builder's Risk insurance, Liberty is determined to be a global market leader.