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Shipyards

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Inserve have carried out three type of shipyard survey for URS:

- JH143 – builders risk surveys
- Surveys in respect of ship repairer's liability
- Surveys where a high value yacht has entered a repair facility which doesn't have sufficient liability insurance in place to meet the value of the yacht or has otherwise limited or waived liability.

JH 143 builder's risk surveys:

Following a number of high value, high profile losses around 2002 / 2004, a joint hull sub committee was set-up to look at ways of improving the effectiveness of shipyard surveys. Prior to this, surveys were being carried out but not to any set standard or format.

The new approach is intended to be more risk based rather than condition based, but still has various shortfalls in my opinion.

The wording devised by the joint hull sub committee is shown below:

SHIPYARD RISK ASSESSMENT

It is a condition precedent to liability under this policy that:

1. *a shipyard and/or project risk assessment is carried out by*

   _____[1]

   on or before _ _/_ _/_ _ [2] ;

2. *any recommendations made by the surveyor are carried out within the surveyor's timescales;*

3. *there is continued compliance with such recommendations throughout the period of the policy.*

The Shipyard Risk Assessment shall include review and testing of the safety management, quality assurance and quality control of shipyard systems and procedures. It shall include but not be limited to:

- *Geographical and Environmental Risks*
- *General Site Condition*
- *Processes and Procedures*
- *Quality Assurance/Quality Control of the production process*
- *General Housekeeping*
- *Management of Subcontractors*
- *Permit to Work Systems*
- *Emergency Response Plan*
- *Fire Fighting Capability*
- *Shipyard Equipment*
- *Atmospheric Monitoring & Control of Industrial Gases*
- *Launching & Sea Trials*
- *Site Safety*
- *Casualty History*

Underwriters shall be entitled to require supplementary surveys to be carried out during the course of the construction of an individual vessel to monitor compliance with earlier recommendations and to assess the safety management, quality assurance and quality control of the individual vessel project.

Any recommendations shall be provided to the Assured on completion of the initial survey

[1] *Name of Surveyor to be inserted*
[2] *Date to be inserted*

and after any follow up surveys, which may be required at the surveyor's or underwriters' discretion.

The cost of surveys will be borne by Underwriters, but any expenses incurred to comply with the surveyor's recommendations will be at the expense of the Assured.

Underwriters shall be entitled to receive a copy of any recommendations and/or reports directly from the surveyor.

The new format gave guidance but also remained flexible in how the surveyor approached each aspect of the survey and reported upon it. Some surveyors developed a risk assessment matrix and graded the risks accordingly. Others concentrated more on some areas than others, such as holding fire drills during a survey.

In my view, the JH143 was a positive step forward, but there are limitations brought about by the following:

- The survey is often carried out at the early stages of construction, sometimes when blocks are being prefabricated but before assembly has started in the building dock. So it is difficult to assess the quality of construction and reliance is placed upon the yard's track record, types of ships built previously and how successful they were.
- The survey considers the yard and the facilities, workforce etc but does not encourage the surveyor to focus on the actual project being constructed, if the project plan is feasible, flow of materials and equipment etc.
- The surveyor is not always able to re-attend throughout the project period, the survey warranty might require an attendance within 30 days of commencement of the policy, but ongoing reviews as the project develops and risks change are not always possible.
- So it tends to be a snapshot of the yard and the project under construction than an ongoing evaluation of the risks. Experience tells us that problems often arise in the latter stages of construction when the hull value has increased, and it is these periods which need close scrutiny.

Problem areas:

- Fires remain the biggest area of risk for insurers. I believe this is in all classes of marine insurance. Not enough attention is given to fire risks throughout the industry.
- Often the project plan doesn't ensure that all hot work is complete before combustible materials and liquids are placed on board. Hot work continues in the presence of combustibles, and the separation of the two is not sufficient.
- All fire safety measures should be completed before combustibles are present but often fire detection and extinguishing systems have not been completed by that stage.

- Whenever cranes are used to lift modules into place and to assemble component parts of a ship, there is a risk of damage from crane and lifting gear failures. This is difficult to deal with as often the lifting equipment has been reasonably well maintained and there is no immediately obvious reason why there should be a failure. It seems to be a risk inherent with the industry and not easy to deal with. Somebody might use the incorrect sized sling or wire. There might be a damage to the wire or sling which is not seen prior to use. Regular inspections and colour coding can miss these.
- Watertight integrity is a problem, as vessels are launched as soon as possible to make room in the dock or on the slipway for the next project, yet the vessel which has been launched might not be watertight, probably doesn't have sufficient watertight bulkheads which are fully intact, and for passenger vessels in particular, the watertight doors are not active and in some cases not even fitted at all. We would prefer to see the project plan structured in such a way that when the vessel goes afloat for the first time, the watertight integrity is as it should be when in service, but this is often not the case.
- The project plan should allow for the flow of material such that when major parts and items of equipment arrive on site they are promptly installed in the vessel and not left lying around ashore, in the yard, or sometimes stowed in the cargo hold waiting for the opportunity to be fitted. These periods of storage in a construction environment often lead to damage.
- The installation of main engine(s) and the propeller shaft(s) are an art. The alignment of the main engine, gearbox, shafting through to the propeller is made when the ship is still in the building dock. The alignment has to take into account the movement of the hull when the vessel goes afloat. This is something which is not easily calculated and relies a lot on experience. Modern designs whereby engine rooms are situated as far as possible towards the aft of the vessel in order to maximise cargo carrying capacity, lead to a short stubby propeller shaft which is less tolerant of inaccuracies in alignment.
- Ships are constructed by yards which do not necessarily have the personnel who are qualified to operate the ships that they build. Construction can be entirely satisfactory but the ship will still be under the ownership of the yard when systems are commissioned and sea trials are carried out. This can be a difficult period unless the yard employs the necessary experts for commissioning and trials.
- In recent years the electronic systems have become a huge part of the project and there remains a general lack of expertise in this area. Ships have always been a challenge where automation is concerned. Pneumatic systems suffered from moisture and corrosion. Electronic systems suffer from vibration and humidity. Hydraulics are always problematical.
- Most shipyards rely heavily on sub contractors, and there are always grey areas at the interface of the project between the yard and contractors. Contractors may be additional personnel employed at the yard on an ad hoc basis, they may be companies installing their own equipment via the yard such as switchboard manufacturers, or they might be outside contractors such as foundries and other specialist suppliers of particular ship parts, cast steel stern frames, rudder tiller arms etc.
- Launching is always an interesting point in the construction of a ship. Going

afloat for the first time is a sudden test of stability, although with merchant ships this is not so much of a problem but with passenger ships and yachts, it is common to find that internal weights have not been correctly calculated and they can be launched in a perilous state.

- Once afloat, the watertight integrity of the vessel should be maintained but often the construction process means that watertight bulkheads are open for access, and any ingress of water would result in progressive flooding. Ideally bilge pumping and other systems for the removal of water should be active, but this is often not the case.
- Painting is one of the biggest aspects of construction. When building a large tanker, the cost of coating the external hull, the internal ballast tanks and the internal cargo tanks plus the other internal and external areas represents a major portion of the cost.
- Paint application is a difficult science and considering the cost, it is often an area where owners try to make savings and the results can be an early coating failure and subsequent damage.
- This is exacerbated in certain parts of the world where a slippage in the construction schedule can result in huge differences in temperature and humidity.
- Sea trials are carried out under the responsibility of the yard, and using yard personnel. The vessel is still effectively owned by the yard at this stage until the point of delivery. The yard may try to achieve performance results which meet the contract requirements but are not actually met in practice and they may do this using various means such as shallow water correction factors etc. Sea trials can also result in collisions, groundings etc under the supervision of a yard “captain” who doesn’t actually have the necessary qualifications to take a ship to sea.
- Something to be aware of are yards which move from repair to new construction. Repair yards do not necessarily have the resources to manufacture ships using block construction without significant investment in equipment and manpower.

Additional considerations:

- Delay in delivery insurance, not often agreed by insurers without a proven track record but which can give rise to problems where a yard moves into an area which they have no previous experience such as gas tankers etc.
- Some builders risk policies are extended to cover guarantee and warranty issues during the warranty period of the vessel which typically covers the first 12 months of the life of the vessel.
- All sorts of problems can arise during this period and it can be difficult to differentiate between those problems arising solely from a shortcoming in design or manufacture and those problems arising from the way on which the vessel has been operated and maintained.
- Some policies have been modified to include a “fear of a loss”, i.e. the yard thinks it might not have got everything quite right and suspects that there might be problems in the future which could have an impact on them. This “fear of a loss” extension might be for 12 months or more.

- We are aware of some yards trying to extend their insurance to cover parts in transit, particularly high value parts such as engines, diesel engines and gas turbines which are not available locally and have to be shipped in. China is particular, but any developing shipbuilding nation, does not have the engine manufacturing facilities sufficient to meet their needs, so they have to import major items of machinery from developed nations.
- Beware of Chinese shipyards in general.

Examples:

A shipyard contracted with an owner to construct a chemical carrier out of the same basic hull as a parcel tanker having a double bottom. Safety considerations resulted in the chemical tanks having cofferdams around them, but the tanks were of the same depth as in the parcel tanker. Whereas the parcel tanker had tanks which vented to the atmosphere, the chemical tanker had a closed containment system. Also, the specific gravity of one of the chemicals carried was over twice that of the products carried in the parcel tanker. The combination of higher static head (due to greater specific gravity) and inadvertent over-pressurization of the tank from the closed venting system caused the vertical floors in the double bottom under the tank to collapse. That occurred despite having the structural design approved by one of the major classification societies.

A vessel was designed using metric units, including model tests and development of the lines of the hull. The vessel was built using imperial units. The lines plan developed in metric units had a linear scale of 1:100. The lines plan used by the shipyard had a scale of 1/8th inch to a foot, that is, a linear scale of 1:96.
The vessel was well under construction when it was discovered that the sum of the weights exceeded the planned displacement by about 12-13 percent -- representing the difference between 1:96 and 1:100 linear scales, converted to volumes. Consequently, the vessel carries substantially less cargo than originally intended, with a resultant loss of revenue for the owner over the vessel's entire life.

A shipyard, constructing a large tanker, was contractually required to coat all of the vessel's ballast tanks with two layers of epoxy coating. The planned master construction schedule indicated the coatings would be applied in early spring, with mean daytime temperatures of about 40ºF (4ºC). At that temperature, the first layer of epoxy coating would ordinarily require over 96 hours to cure sufficiently for the application of the second layer. As the shipyard wanted to apply the coatings on successive days, the shipyard requested the coating manufacturer to add an "accelerator" to the coatings, so they would cure in 24 hours in an environment of about 40ºF (4ºC). Due to slippage in the fabrication of the steel, the coatings were not applied until early summer, with average daytime temperatures of about 65ºF (18ºC). Because the "accelerator" was already added, the first layer of epoxy in the ballast tanks over-cured before the second layer was applied. Large areas of the second layer slid off the first layer as the second layer cured. Subsequently, it was necessary to sandblast and re-coat the ballast tanks in their entirety at a cost of several million dollars in direct costs, plus about one million dollars was repaid to the owner due to the consequential late delivery of the vessel.

A shipyard, facing a potential lack of new building contracts, negotiated a contract to construct a moderately high speed cargo vessel. Anxious to keep the yard's workers occupied, to minimize the impact of delay on other projects, and to keep cash flowing in, they began to "cut steel" before all designing and planning had been completed. An analysis of potential stern vibration had not been completed when the stern's design was finalized to ensure continuing work for the yard's production staff. During sea trials, the hydrodynamically-induced vibration was so severe the ship could not achieve the design trial speed due to the potential of shaking it apart. The ship was re-sold for conversion to a slower-speed trade, with the shipyard (and its underwriter) absorbing the considerable loss.

An operator of over twenty short-haul passenger and vehicle ferries was seeking to construct several new ferries. A consulting firm prepared bid specifications, which were sent to a number of shipyards for preparation of their bids. One of the yards that requested and received an opportunity to bid on the vessels was a small ship repair yard, never having constructed anything more sophisticated than a deck barge. In its bid, that shipyard indicated that, if awarded the contract, it would construct a new, modern shipyard in which it would construct the ferries.
That ship repairer/builder was the low bidder. Consequently, it was awarded the contract, and commenced to construct the modern shipyard while commencing the construction of the ferries.
The first few ferries were delivered late, accompanied by a claim by the shipyard for an additional twenty-five percent of the contract fee due to delay, disruption, acceleration, change orders and over-inspection allegedly caused by owner's representatives. Upon delivery of the vessels, the owner had to invest another fifteen percent of contract price to correct construction deficiencies. Essentially a non-existent shipyard was awarded the contract based on being the low bidder. The shipyard was constructed as ferry construction commenced. The actual direct cost to the owner for procuring the ferries was approximately fifteen percent over the contract price due to the necessity of correcting construction deficiencies. The availability of the vessels for service was 2-8 months later than contract dates due to the combination of (i) late delivery by the yard and (ii) time to make those corrections to construction deficiencies.

Ship repairer’s liability insurance

There isn’t the same degree of formality as there is with the JH 143. Unless underwriters have their own requirements, such as Navigators, then surveyors do their own thing. An example of the Navigators criteria is shown below:

General

- *Introduction and history*
- *Scope of operations, number of man hours worked, number of vessels worked or handled, throughput figures,*
- *Premises, size, neighbours, third party exposures etc.*
- *Buildings, age, construction, condition etc.*
- *Lifting / handling equipment, age, condition, inspection, maintenance/testing,*

adverse weather procedures, whether owned or leased (and who liable)

- *Owned craft, tugs, work boards, floating drydocks, age, condition, trading, crew etc.*
- *Security procedures, perimeter fencing, gate control, pass system, staff training, co-ordination with local police/customs/coastguard etc.*
- *Safety – procedures and culture.*
- *Risk management/loss prevention, systems and procedures.*
- *Fire protection, equipment, procedures, training, fire risks.*
- *Smoking policy*
- *Services – electricity, gas, water, fire main, compressed air, etc.*
- *Pollution control, vessels, storage tanks, bunds, integrity.*
- *Employees, nationalities, whether employed or contract, labour relations, working conditions, training.*
- *Working hours, work patterns, shifts.*
- *Management experience, focus/attitude, business planning, investment, shareholders etc.*
- *Computer systems, back-up, virus protection*
- *Trading conditions, standard contract, hold harmless or indemnities given etc.*
- *Estimated maximum loss*
- *Special perils, exposure to earthquake, flood, windstorm, aircraft etc.*
- *Comments on past losses*
- *Observations and recommendations*

Issues specific to shipyards

- *Gas freeing procedures, controls, tank entry, training.*
- *Hot work, procedures, controls, training*
- *Permit to work system in general.*
- *Subcontractors, control and management of them. Does the yard give the shipowner authority to appoint their own contractors?*
- *Onshore exposure, extent of non-marine fabrication*
- *Order book, status, backlog,*
- *Condition of building docks and floating docks*
- *Pollution risks, disposal of residue and rubbish, paint, blasting materials,*
- *Stability assessment of floating docks and assessment of docking plans and docking calculations.*
- *Contracts with sub contractors and suppliers.*
- *Tariff rates, tariff booklet.*
- *Use of personal protective equipment*
- *Staging/scaffolding*
- *Dock (floating) exposure/collision risk*

There are additional considerations for ports and terminals.

In a ship repairer's liability situation the main risks are:

- Ships have been trading up to the point they enter the yard, and will have fuel and oil on board as well as other combustible materials, paint, cargo residues etc. Tankers will need to be tank cleaned and gas freed, but care still has to be taken to ensure that all lines have been flushed through, no residues exist.
- The yard will probably not be familiar with the vessel, and may be seeing it for the first time. Unusual machinery or structural aspects, hatch covers etc can give rise to problems.
- Yards rely heavily on sub contracted labour and there need to be strict controls in place to ensure the contractors follow the correct procedures and their work is to a satisfactory standard.
- Once a ship enters a yard, the crew tend to switch off and assume that the yard are responsible, when this is not necessarily the case. The captain and senior officers and the ship's safety officer should be continuously aware of the work which is under way, and should be walking around checking and supervising the yard personnel, signing off when jobs are completed, attending progress meetings, safety meetings etc.
- Fires from hot work are the biggest concern, and it is commonly found that there is insufficient attention given to the location of the hot work and the presence of combustibles.
- Damage caused during docking and undocking is common, particularly with floating drydocks. Dock block arrangements, docking plans and stability calculations are important. Movements of weights on board, ballasting and deballasting all have to be carefully controlled.

High value yachts / low value yards

Yacht repair yards are sometimes well established, professional yards with a good track record. However, there exist a lot of yacht repairers which are little more than a marketing organisation. Once a repair contract has been secured, they will rent a drydock facility and bring in contractors as required. There is sometimes just a small number of permanent core staff, say 10%, and heavy reliance on contractors.

Control over the sub contractors and quality control of the work carried out becomes the main focus for the yard and often, quality and safety standards are poor. Yards that work in this way dislike increasing the number of core staff, and generally do not have sufficient QA/HSE staff available.

Contractors may not have their own insurances in place to cover them for poor workmanship.

There is little accountability and no ongoing long term relationship to encourage contractors to uphold standards in the hope of future employment.

The contractual relationships between the yard and the sub contractor and between the yard and the yacht, are of interest. Proper repair specifications are rarely drawn up by the yacht, a lot of work is put in hand with the yard on a verbal basis only. The yard does not have the opportunity or the resources to plan in advance, jobs are carried out very much on a last minute basis once the yacht has arrived at the yard and some initial payment has been made to the yard.

Often the yard will limit their liability contractually and will not have sufficient insurance in place should they cause a serious damage to the yacht, fire etc.

Behind the glossy exterior, standards of work and the quality of repairs can be very poor. Yacht yards rarely employ contractors who are particularly skilled with yacht type repairs, they tend to be general mechanics, technicians, welders etc. Skilled yacht workers are difficult to find and more expensive.

Large yachts often lack adequate technical support within the owner / manager organisation, and repair supervision can sometimes be left to the captain and crew, who may not have the necessary skills to oversee the work of the yard.

Poor quality work can go unnoticed until something fails.

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