Taking delivery of a newbuilding vessel

Process of Taking delivery of a newbuilding vessel from the owner's representative perspective

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Abstract

This thesis follows the delivery and final stages of building process of a newbuilding vessel from a Finnish shipyard to a non-Finnish owner. The vessel is designed to operate on a congested short-sea transit line between two capital cities. The author was assigned to the shipyard to act as an inspector/surveyor on behalf of the shipowner to follow the shipbuilding to ensure the agreed quality and that all the regulations and requirements are followed as agreed on the shipbuilding contract and specification. To ensure the quality of works carried out, the author conducts technical inspections on fields of metal work and paintwork and other relevant fields that he is qualified for or needed. The author is also advising and/or inspecting on fields of fire protection, safety, documentation and vessel navigation equipment as well as supporting on other areas as interior construction quality and machinery spaces. In part of the author's duties at the shipyard is to prepare the shipboard documentation system (SMS), maintenance programs and development of emergency procedures by the time the vessel enters service. The author was assigned by the owner to be present at the shipyard until the completion of the vessel, after what he is considered to sail the vessel in rank of 2nd officer. The Thesis might help any other seagoing officer that might need to prepare a new or newly bought vessel to enter service and might give an insight at why shipbuilding tends to delay from the agreed schedules as well as provide an insight to the problems that might raise during the process.

Language: English
Key words: Surveyor, Newbuild, Shipyard, Taking delivery

Contents

1 Introduction

The aim of this thesis is to provide an insight to newbuilding process by the eyes of owner's representative surveyor. The author was chosen by the shipping company he works for to be a part of a team that surveys the building process and takes delivery of the vessel under monitoring. Together with project manager the newbuilding team consists of eight persons and are deployed at shipbuilding site until completion of the vessel. Each team member is focused on their area of expertise and is qualified enough to also help out other members in their inspections. The authors main focus of surveying at shipyard is metal- and paintwork, but he is also inspecting fire- and thermal insulation, deck machinery, hull openings and related machinery, navigational bridge build-up and navigational devices, documentation, life-saving appliances, tanks, voids, cargo gear, ship security measures and much more. The author is teamed-up with another senior deck officer to be able to monitor and inspect all the fields. Additionally, the two officers develop the ships ISM procedures, SMS documentation, develop maintenance plans, procedures and schedules, develop safety plans and instruction manuals for crew, ensure that all the latest regulations would be followed, develop loading-, stability- and cargo securing manuals in co-operation with the shipyard and much more. The newbuilding team in addition to two deck officers also consists of four engineers and project manager who has engineering background as well. Project manager controls most of the engineers daily duties, but generally all the engineers are specialized to their profession – one engineer assigned for all ventilation systems, one for all electrical instalments, future chief engineer and project manager follow all heavy machinery and engine documentation and are assisted by future first engineer who's main focus is various ships systems and piping. One interior specialist is also part of the team and at later stages would be joined by additional help to ensure correct furniture layout, design elements, screens ect.

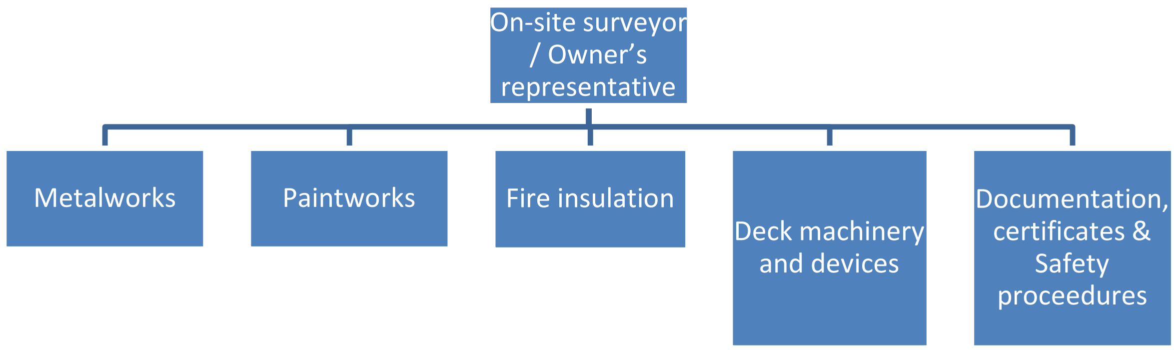

Figure 1: Areas assigned to author's supervision.

The author concentrates to metalworks, surface treatment and insulation in this thesis. Metalworks and surface treatment are something that every member of deck crew has been in contact with, and senior officers would be closely monitoring and directing. Fire insulation is a vital part of ships fire protection and forms the backbone of fire-safety plan and for that reason a brief overview is made on that subject as well.

Figure 2: Author inspecting bow door operation and work progress.

2 Metal works and surface protection

The owner’s representative has a tough job to ensure that the quality of works is up to the level of agreement. The building quality is something what determines the ships cost. The higher the quality the higher the building price. Overall vessels with higher build quality will hold its value longer and tends to pay off on the long run for the owner. One of the reasons why higher quality ships are economically more reasonable is the lower maintenance costs. That applies also to metal- and paintworks. According to one of the world’s leading paint manufacturers, corrosion costs up to 80 billion USD per year to shipping industry. Formation of corrosion is affected by three key factors – humidity, salinity and temperature. On marine environment the metal corrosion is accelerated mainly due to humidity. According to general knowledge, corrosion starts forming above 45-50% humidity rate. Higher humidity rate accelerates formation of corrosion. A vessel that has higher grade steel and better finished surface will not need as much care and paintjobs on the long run since it is more resistant to corrosion due to the surface being better protected against the three fore mentioned factors. Additionally, the better surface and higher quality paintwork gives the vessel other added values – such as beauty. Beauty is a relative term, but a passenger vessel is expected not only to transport people and goods, but also to offer comfort, well-being and positive memories. Even if the transported passengers are just commuting. Passengers value high standard metal and steel surface even if they don’t notice it themselves, but it’s the overall atmosphere that it creates. The owners of the newbuild vessel have agreed with the builder on building terms while signing the contract and metal and steel quality for each section is one of the major price setters for the newbuild. The shipyard workers who are hands-on constructing the vessel by welding the pieces together and painting it might not share this viewpoint. The quality of welds and metalwork will also ensure the structural strength of the vessel and determines its lifespan. The owner’s representative is surveying the vessel build and inspecting every step of completed works to ensure that the owner is getting maximum results for the paid sum and to eliminate any weaknesses already on root level. This also means dealing with various obstacles that arise during the build that the designer team has not thought of or providing solutions to dealing with the problems that might have been caused by the workers misunderstandings or negligence.

Figure 3: Side shell painting. Painting done in sectors. Area in background covered with top-layer while the aft area is stripe-coated. final inspection prior topcoat carried out. Note that filler has been used and left uncovered by primer on various spots on aft sector and the sector was not approved for top-layer painting.

The vessel that is taken delivery of is believed by the owner to be the best quality and up to owner's high standards to provide high-end passenger and cargo service for relatively long period of time. The vessel would service an international short-sea route with high congestion traffic. The ship at the hands of the operator would start sailings every day early in the morning and last arrival of the workday would be after midnight with cargo operations still to undergo. During the workday the vessel would have port stays just enough to unload and load the cargo and passengers. The operational area of the vessel would have hot summers, cold winters and everything in between. This on the other hand is the perfect climate for any metal and paint deficiencies to surface. To make the investment as efficient as possible the ship's crew is not expected to be engaged in any metalwork or painting works during the time between the dry dockings that would occur with five- or three-year intervals. Any such work would mean inconveniences for passengers, crew and might influence the ship's operation. The vessel would be operated on tight schedule without any lay days, expected by customers and owner to be perfect all the time. Taking the above-mentioned reasons into consideration it is a matter of great importance for the company to have the metal works and surface treatment done at the highest possible quality and standard since this determines the vessels metal surface and paintjob maintenance needs as the higher quality of works would be affecting the corrosion proofness of the vessel and that in term is also affecting the overall impression of the vessel and the company. As vital as the impression the vessel leaves for customers, investors and employees about the company, the company is also heavily interested of using the investment as effectively and sustainably as possible. That would mean that the workforce would be better used, and less manpower would be needed if more care is put into the work effort during the vessel build. That on the other hand means that it would be possible to offer higher salaries to people engaged in the operation of the vessel. Besides the better used manpower, the environment would also benefit from higher quality works since the world’s resources would be better and longer used. The vessels metal parts would need much less care – by that it is meant that if the metal surfaces are protected and not corroding it would not be necessary to chip or blast the old paint off, no need to change metal plates during the longer period of time and much less paint would be used during the ships lifespan to re-cover the areas that have undergone metal-works or to refresh the paint for esthetical reasons.

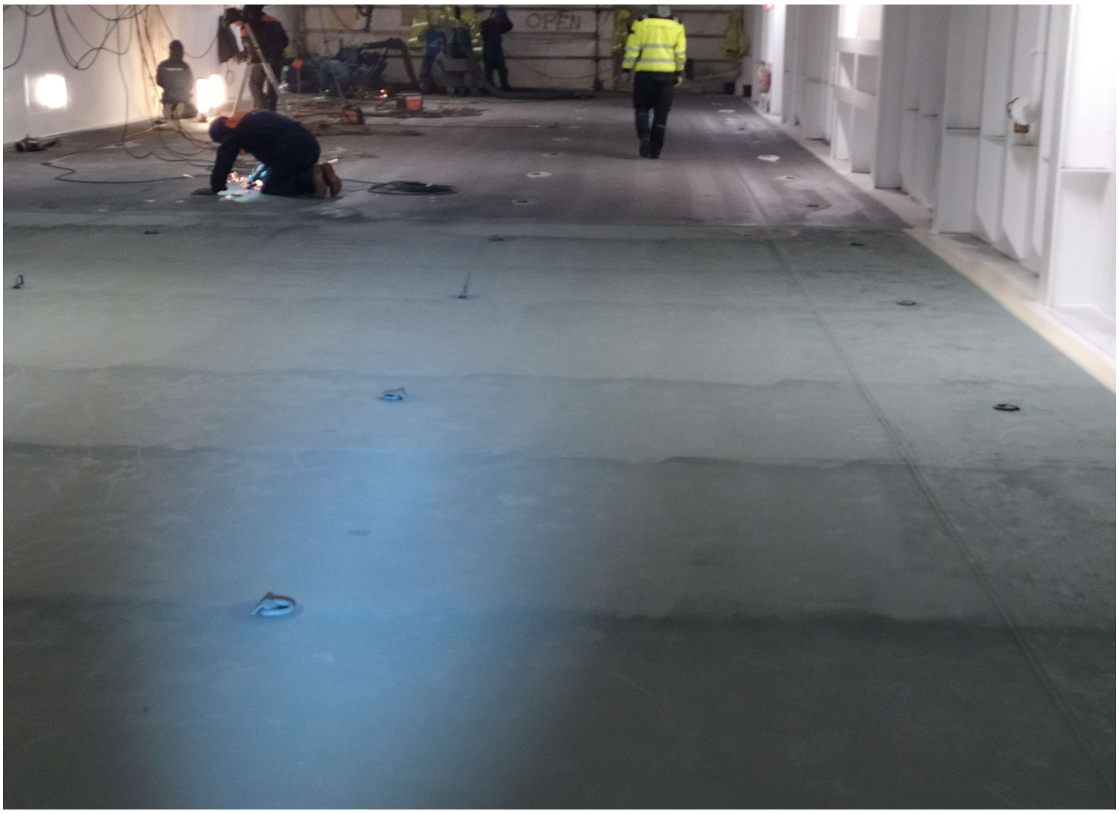

Figure 4: Zinc based stand-alone coat on car deck. Metalworks on-going on background. Note that the zinc coat has been sprayed poorly resulting excess or low DFT on overlapping areas. Based on 80-20 principle the area was accepted.

The shipyard is interested of maximising the profit by building the ship with agreed quality for the lowest possible expenses. This in term means that their schedule is tight as the manhours spent to manufacture the vessel would be their biggest expense and would increase the projects costs if deficiencies are needed to be redone. Owners' representative-surveyor is to make sure that all deficiencies would be found, and any shortcomings discovered would be handled properly leaving no marks of ever existing. On day-to-day basis many different inspections are held from metal- and paintwork to insulation and interior build quality that the owner's representative is invited to by the shipyard.

2.1 Metalwork

All metalwork related to this vessel would be carried out by following the finnish shipbuilding standard (SFS 8145). The SFS sets six quality grades for metalwork ranging from very rough metal and welds as first grade to highest quality where no deficiencies are allowed at all as sixth grade metalwork. Most of the uncovered passenger and non-technical areas on the vessel monitored are grade five or near-perfect metal class areas. Technical areas such as cargo decks or tanks are also grade five areas. Technical areas other than previously mentioned are usually grade four and in some exceptional cases grade three areas. All areas that would be covered by interior walls or ceilings are usually grade four or three. Grade five areas by Finnish SFS 8145 standard means that the metal surface is very thoroughly blast cleaned, all foreign bodies have been hundred percent removed, no spatters or cavities and all metal irregularities are removed.

Figure 5: Metal particles used for blasting. Freshly blasted area on background.

The surveyor would be interested primary that the ships metalwork would be long-lasting and strong to stand the test of time. In most cases the metalwork deficiencies are found from areas that have been welded, since the metal sheets are pre-inspected prior to construction but damages still occur. The most common issues with welds are spatter that would be around the weld and would damage the even metal surface and besides not being esthetical to see also most likely be the starting point of rusting and pinholes on the weld. Pinholes are quite dangerous since it is not known how big the air gap in the weld and is and it indicates structural welding weakness on that particular place. The pinhole should be grinded open, additional welding to be made and then newly added weld to be grinded even with the rest of the weld. After the heavy metal work the metal surface is blasted with grit, special sand, small metal particles or other material and all the flaws and deficiencies would be marked and eliminated.

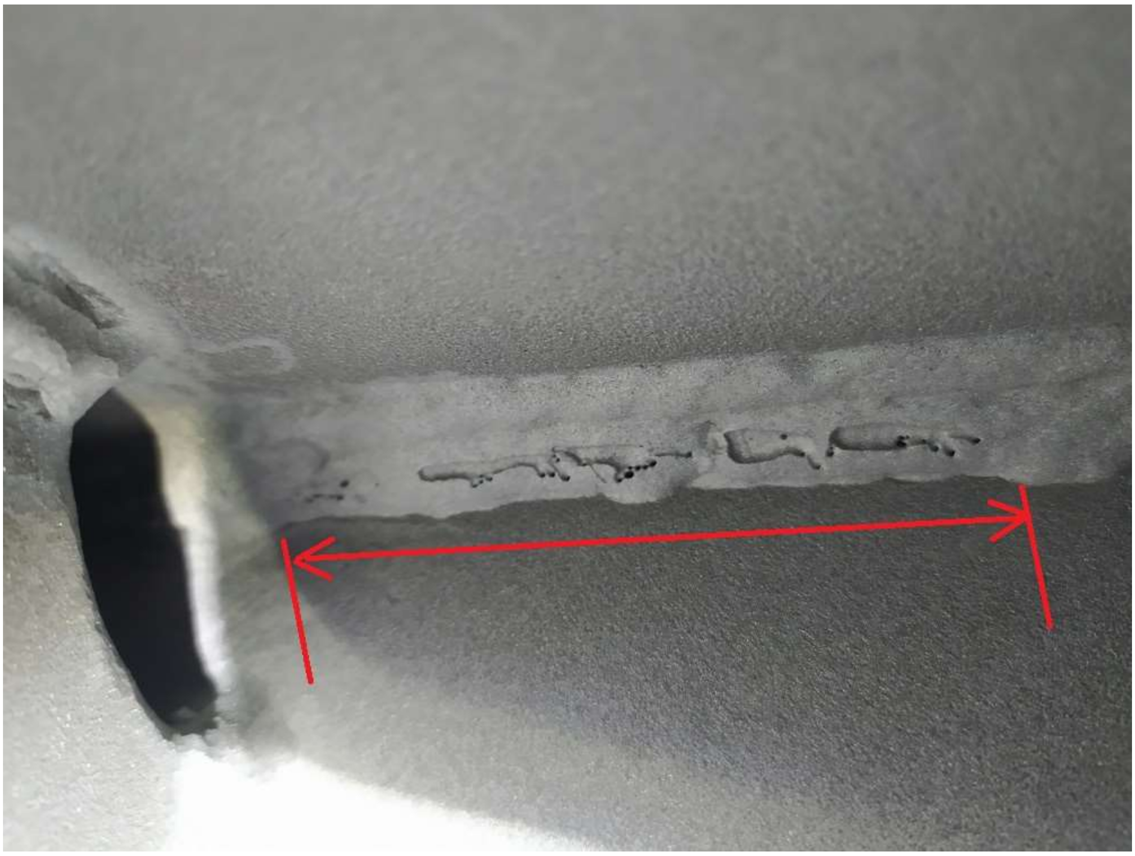

Figure 6: Example of poor welding quality. Pinholes revealed on freshly blasted area.

Figure 7: Example of poor welding quality. Pinholes and weld-spatter revealed on wire-brushed area.

Figure 8: Area covered with heavy rust found during metal inspection prior painting.

2.2 Surface protection

Metal surface blasted would have to be protected from corrosion and the best option is the area to be coated with paint. Prior to surface coat or topcoat paint that can be seen on finished products, the metal surface is coated with primer. Different types of areas are coated with different primers that suit for the environment of the area being treated. Using the right primer or base-layer that suits to the area where it would be used is essential for any paintwork. Correctly chosen primer binds the material together with the topcoat and ensures long-lasting protection. Some of the first layer coats or primers are even meant to be stand-alone coatings. This would mean that it would not need any other layer of paint to protect the surface from corrosion. These primer types are usually expensive to use and and even if used are mostly still used in combination with other layers of paint. Besides the type of coating, the thickness of coatings varies as well, depending on the level of protection needed and where the area is that is coated. On the vessel that we are monitoring Jotun Paints are used. Jotun is one of the world’s leading marine paint producers and has a huge variety of coating types to choose from. Usually, the paint manufacturer is chosen by the future owner when placing an order for the vessel and this paint manufacturer is used through-out the ship’s life cycle. Painting is surveyed additionally to owner’s representative also by paint manufacturer’s surveyor to make sure that their instructions are followed. It is also in paint producer interest that their surveyor is on site and making sure that all procedures are followed correctly, especially on big builds, since this is their reputation and best advertisement is good product that is used by happy clients that continue using their products. As per owner's decision different Jotun paints for primer and stand-alone coat on metal surface are used. The agreement of what coatings are used exactly and where is fixed on specification and quality documents that are part of shipbuilding agreement. The layer thickness or dry film thickness – DFT – is agreed on every layer of every area. On vessel under monitoring the 80-20 rule is followed. 80-20 rule means that DFT must not be less than 80% of the specified thickness and maximum 20% of specified area may have lesser DFT than specified. On tanks the criteria is 90-10. Layer thickness is measured with a special device. Paint thickness is measured in microns which is a metric unit where one micron is equivalent to one one-thousandth of a millimetre. The device should be tested and calibrated to ensure correct measurement data. Calibration is done by measuring factory provided films of determined thickness placed on metal plate or the metal plate alone and adjusting the measurement outcome accordingly.

Figure 9: Author measuring first layer film thickness on inspection

2.2.1 Stripe coating

Stripe-coat is a layer of paint that is applied manually with a brush to edges, corners and welds. It is used prior to coating the full area with primer or paint, so that the edges and welds would be coated with a sufficient level of film thickness to ensure corrosion protection. Stripe coating technique is used mainly on difficult access areas or on bulkheads and ceilings. To get the best result the applied stripe-coat would be sanded slightly to be even for not to be visible under full coat and to have better grip for full coat. If not sanded the sprayed full cover coat might start to drip and ruin the coat visually. The proper stripe-coating is essential to make the factory paint long-lasting and to keep the corrosion away. Most of the corrosion starts from edges, damages, welds, spatters. If the metal surface is cleared from damages and the weak spots protected with properly done stripe coat the ship would have a fresh look for long time and the owner’s costs for maintenance would be greatly decreased. The crew would not need to be involved on metal and paint works and both human and worlds resources would be more efficiently and better used.

Figure 10: Example of stripe coat. The corners, edges and welds are pre-coated prior spraying.

2.2.2 Primer

Primer stripe coat would be followed with a spray-painted full area primer coat. The primer coat is essential to cover all the metal surface and give it a long-lasting protection. When complete the thickness of the layer is measured with a DFT measuring device The primer coat is also inspected thoroughly for paint defects, since all defects would be visible at the final result. All defects would be marked during inspection and repaired by painting crew after what re-inspection would be carried out if necessary. In many cases the minor paint defects would be left without re-inspection since any defects on base layer would be visible during the final coat inspection. Although common practice is that photos would be requested about defect repairs to ensure that base layer had re-applied after repairs. On the vessel we're observing six different primers are used to cover various surfaces. Some of the primers used are 80% based on zinc epoxy that were developed for extremely salty environments and are believed to withstand the test of time for decades.

Figure 11: Primer covered bulkhead on cargo area. Top layer stripe coat also applied.

Figure 12: Top-coated outer bulkhead. Deck level is sprayed with zinc primer.

2.2.3 Top coat

Topcoat like the primer is first stripe coated to reach all the edges and corners and hard to access spots. Once the stripe coat is applied and dry all the edges of already applied stripe coat edges would be sanded even with the primer layer so it would not be visible under the full coat. Usually the final layer would form a layer of varnish on top and it gets slippery so dirt and other undesired subjects would not attach to painted surface. Slippery surface is also hard for paint to stick. To get the final layer of top coat stick to pre-applied stripe coat and to prevent the paint to start dripping it is slightly roughened. Final coat is then applied using spray-gun method with great care for the paint to have minimal defects. Erasing spot defects from topcoat would be difficult and would usually be visible afterwards. If defects are found the area of defects is usually repainted between nearest frames, ribs or welds in full instead spot repairs.

Figure 13: Final layer bulkheads and ceiling on cargo area. Ceiling insulated with fire insulation. Deck level still to be blasted and coated.

3 Insulation

3.1 Basic information of insulation

Insulation refers to an interface that restricts the movement of matter or energy. Insulation can be divided into moisture, heat, fire, electrical and sound insulation. On ships, thermal and fire insulation are the largest groups of insulation. On cruise ships almost the entire frame is thermally insulated. According to Lloyd’s Register the bulkheads of fire zones may be up to 48 m apart. These bulkheads reach from the bottom to the top cover and are fireproof.

Insulation is fastened by using steel pins and steel washers with maximum distance 300mm to the nearest pin. According to a work order, insulation pins are installed at the block phase before painting. Insulation pins allow insulation material to fit tight against the insulation medium and prevents the sagging of insulation. For insulation pins to work correctly these need to be designed for specific use and installed in the correct manner. Insulation material is fastened with washers and covered by plastic cups when needed.

3.2 Fire insulation

Fire insulation on ships is divided into A, B and C classes. The appropriate insulation for the structure is selected so that it meets safety regulations as per classification and marine regulation requirements. An A Class fire insulation structure means no fire spreading in the event of a fire on the opposite side of insulated surface. The average heat of the structure may rise above 140 ° C, and at no point above 180 ° C within a specified time. Additionally the insulating structure must be made of non-combustible materials as steel or similar. The time that the structure needs to last the heat, depends on the fire class of the structure. These times are listed to Table 1.

Fire class	Time
A-60	60 min
A-30	30 min
A-15	15 min
A-0	0 min

Table 1: A-class fire insulation

In Class B insulation, the average temperature must not exceed 140 ° C, and at no point, nowhere above 225 ° C and, like a class A bulkhead, shall be constructed non-combustible material. The heat resistance times of class B structures are in Table 2.

Fire class	Time
B-15	15 min
B-0	0 min

Table 2: B-class fire insulation

In aluminum structures, neither the temperature of the inner part of the A- nor B-class load-bearing structure may rise above 200 ° C above ambient temperature. This will prevent changes in the properties of materials. In practice, this means that aluminum structures must either be insulated on both sides or otherwise prevented direct contact of the fire with the structure. Class C means that the structure must be made of non-combustible materials.

3.2.1 Determination of fire class

The fire classification of a bulkhead, deck or other structure shall be determined by examining which areas the structure would separate as shown on figures 14 and 15. The areas are divided into 14 sections depending on their intended use.

1.	Control station
2.	Stairways
3.	Corridors
4.	Evacuation stations and external escape routes
5.	Open deck spaces
6.	Accommodation spaces of minor fire risk
7.	Accommodation spaces of moderate fire risk
8.	Accommodation spaces of greater fire risk
9.	Sanitary and similar spaces
10.	Tanks, voids and auxiliary machinery spaces having little or no fire risk
11.	Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk
12.	Machinery spaces and main galleys
13.	Store-rooms, workshops, pantries, etc.
14.	Other spaces in which flammable liquids are stowed

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	B-0[a]	A-0	A-0	A-0	A-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60
2		A-0[a]	A-0	A-0	A-0	A-0	A-15	A-15	A-0[c]	A-0	A-15	A-30	A-15	A-30
3			B-15	A-60	A-0	B-15	B-15	B-15	B-15	A-0	A-15	A-30	A-0	A-30
4					A-0	A-60[d]	A-60[d]	A-60[d]	A-0[d]	A-0	A-60[b]	A-60[b]	A-60[b]	A-60[b]
5					-	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
6						B-0	B-0	B-0	C	A-0	A-0	A-30	A-0	A-30
7							B-0	B-0	C	A-0	A-15	A-60	A-15	A-60
8								B-0	C	A-0	A-30	A-60	A-15	A-60
9									C	A-0	A-0	A-0	A-0	A-0
10										A-0[a]	A-0	A-0	A-0	A-0
11											A-0[a]	A-0	A-0	A-15
12												A-0[a]	A-0	A-60
13													A-0[a]	A-0
14														A-30

Table 3: Category of bulkhead separating spaces

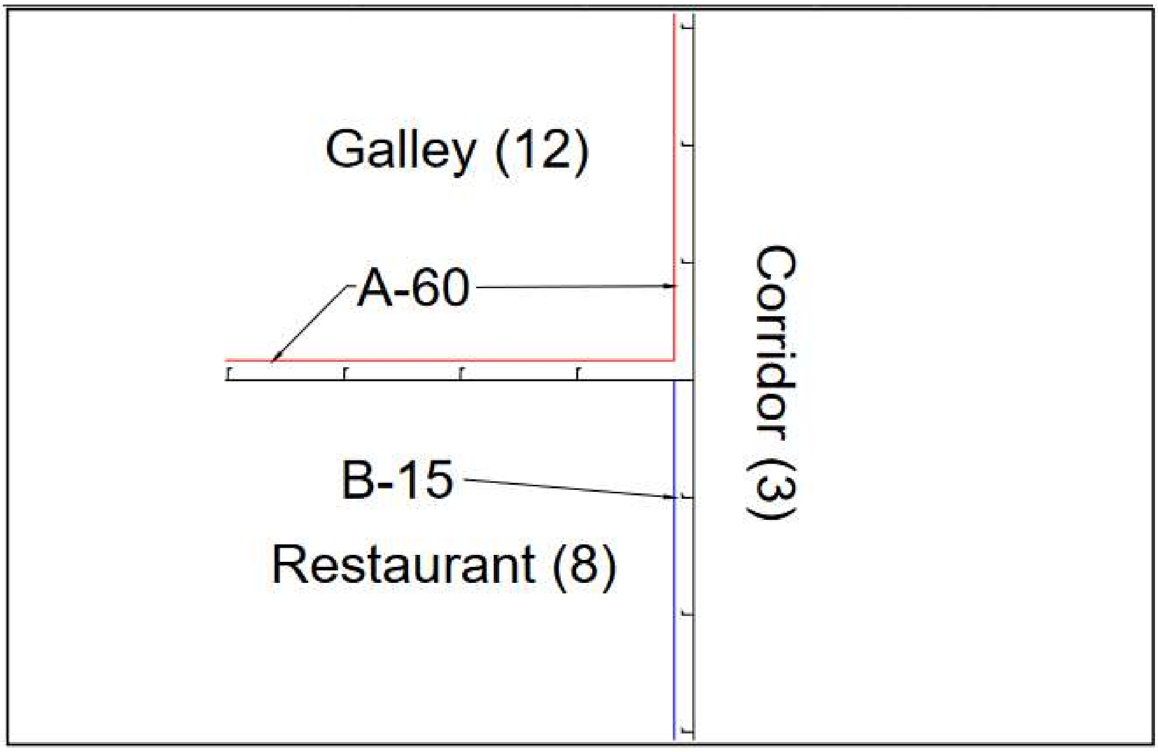

Figure 14: Bulkhead fire insulation

Above → Below↓	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	A-30	A-30	A-15	A-0	A-0	A-0	A-15	A-30	A-0	A-0	A-0	A-60	A-0	A-60
2	A-0	A-0	-	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-30	A-0	A-30
3	A-15	A-0	A-0[a]	A-60	A-0	A-0	A15	A-15	A-0	A-0	A-0	A-30	A-0	A-30
4	A-0	A-0	A-0	A-0	-	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
5	A-0	A-0	A-0	A-0	-	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
6	A-60	A-15	A-0	A-60	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
7	A-60	A-15	A-15	A-60	A-0	A-0	A-15	A-15	A-0	A-0	A-0	A-0	A-0	A-0
8	A-60	A-15	A-15	A-60	A-0	A-15	A-15	A-30	A-0	A-0	A-0	A-0	A-0	A-0
9	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
10	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0[a]	A-0	A-0	A-0	A-0
11	A-60	A-60	A-60	A-60	A-0	A-0	A-15	A-30	A-0	A-0	A-0[a]	A-0	A-0	A-30
12	A-60	A-60	A-60	A-60	A-0	A-60	A-60	A-60	A-0	A-0	A30	A-30[a]	A-0	A-60
13	A-60	A-30	A-15	A-60	A-0	A-15	A-30	A-30	A-0	A-0	A-0	A-0	A-0	A-0
14	A-60	A-60	A-60	A-60	A-0	A-30	A-60	A-60	A-0	A-0	A-0	A-0	A-0	A-0

Table 4: Category of deck separating the areas

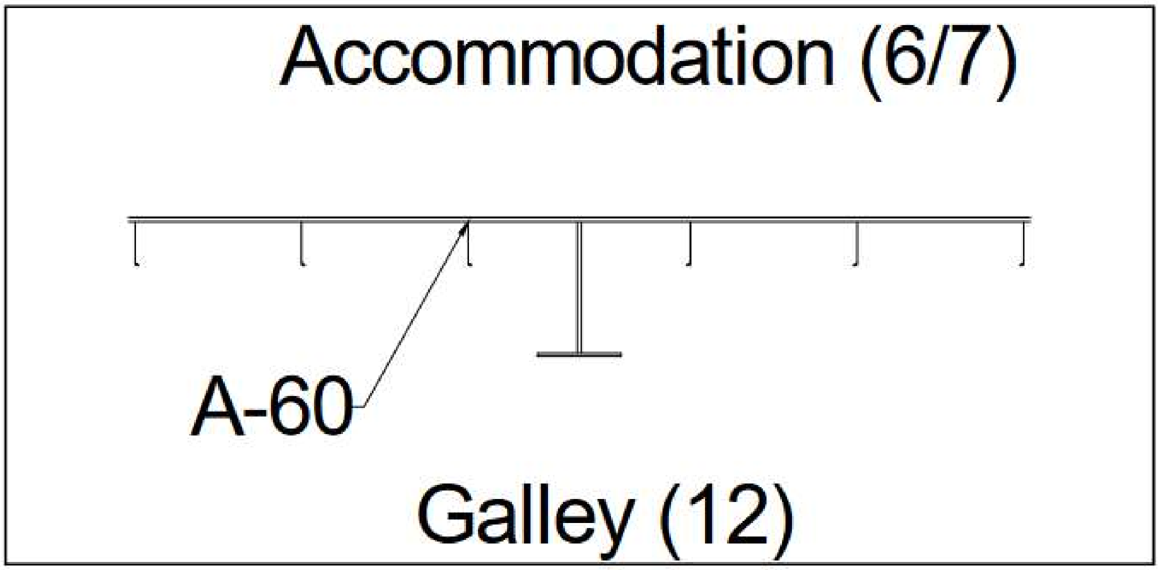

Figure 15: Determining the fire class of the deck

3.3 Thermal insulation

The purpose of thermal insulation is to prevent thermal energy either escape or enter the area. Thermal insulation is usually light in density. The amount of thermal insulation is affected by the type of ship and sailing area of the ship. On regular cargo ships, accommodation area alone is usually sufficient for thermal insulation, while on cruise vessels the insulation covers almost the entire ship from inside. Without insulation, the heat energy can flow freely into and through the hull away from the ship, or vice versa. The air inside the thermal insulation slows down energy transfer. Since the intensity of the heat flow depends on the temperature difference, it means that the greater the temperature difference inside the ship compared to the outside air, the thicker insulation or more efficient air conditioning is needed.

Areas where temperature is not important can be left uninsulated such as the bottom of the ship. However, the cover above the double bottom must be insulated against sea heat entering the ship in case of warm waters sailing or summer months on temperate climate. On car ferries, car decks and in cargo ships, holds may be left uninsulated if the cargo so permits.

Figure 16: Fire- and thermal insulation. Thermal insulation placed on top of fire insulation as additional layer on ships cargo area on outer bulkhead insulation.

3.4 Sound insulation

The purpose of the sound insulation is to prevent the spread of noise to other rooms. Generally soundproofed areas are engine rooms, air-conditioning facilities, restaurants, bars, nightclubs, gyms and similar facilities. Sound can be isolated in three ways - by scattering sound waves from surface materials forms, producing a counter-sound that cancels out the noise or prevent the spread of sound waves with the right kind of material. The sound can move through the hard structures of the ship. This is prevented by placing the structure on the surface materials with different densities such as rubber, wool, pulps or lead.

3.5 Protection of insulation

Insulation material can be protected with corrugated plate, straight plate or with plastic caps. Plating prevents insulation material from getting dirty or wet or the insulation material blown away by air. Corrugated plates on bulkheads would be fastened with screws to horizontal and vertical support frames. Frames should not have great distance in between to prevent the resonation. Plastic caps might be used on height of 2 meters due to sharp pins for safety reasons.

Figure 17: Insulation caps used to prevent injuries.
Note that insulation on the burned area must be removed, area re-painted prior re-instalment due to welding burns from welding works conducted on the other side of insulated bulkhead.

3.6 Insulation work process challenges

3.6.1 Steel surface and painting

Steel surface treatments prior insulation causes challenges for insulating teams. Metal blasting and grinding prior surface treatment damages insulation pin anchorage points to point of perish and the material resistance decreases. For this reason, insulation pins should be inspected and weak or missing pins re-installed prior painting works. Additionally the fairing of steel surfaces causes insulation pin anchorage point embrittlement due to high temperature of fairing process.

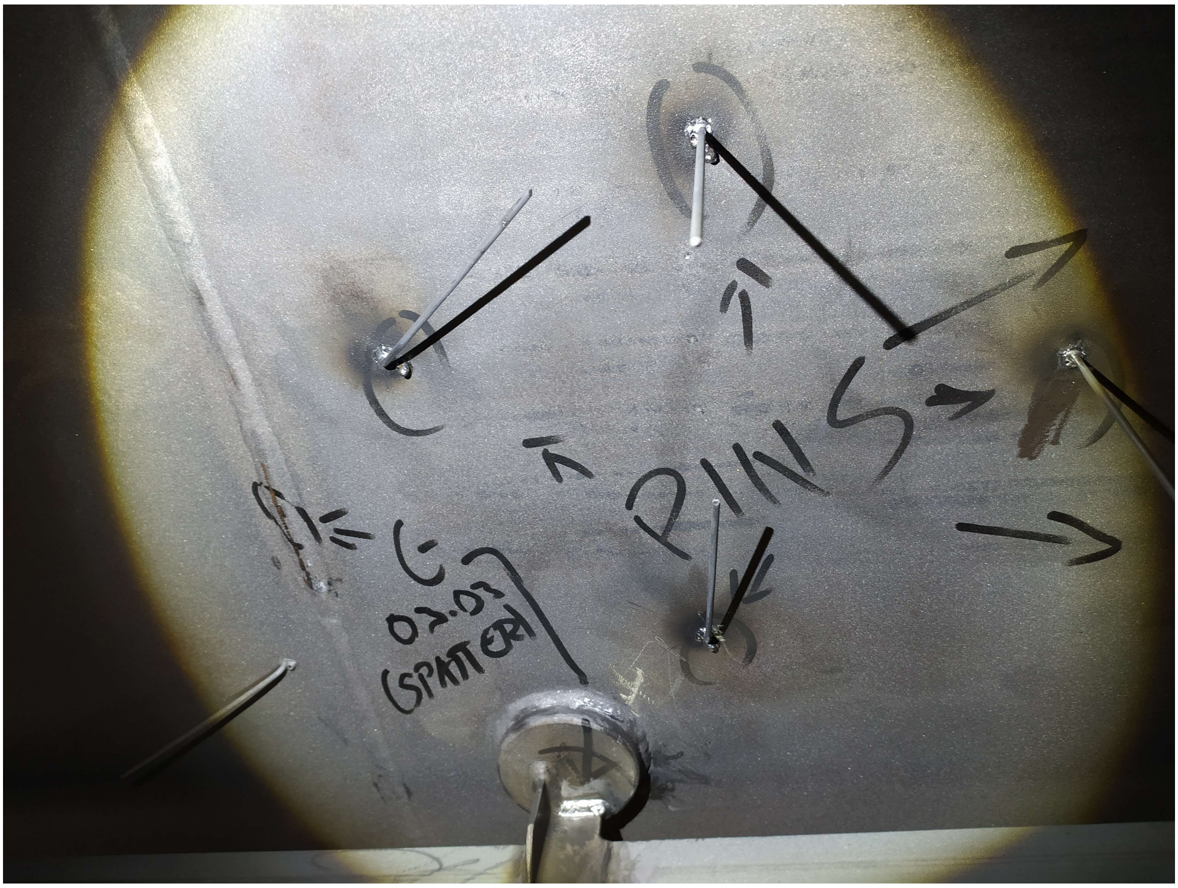

Figure 18: Missing insulation pins discovered by author during inspection re-installed. Note welding dust not cleaned after re-instalment of pins.

There are several non-destructive tests that can be carried out on stud-welded insulation pins. The quality inspector would inspect the quality visually or perform the “pull-out” test. In pull-out test the design load is applied to the pull testing device. This would involve a small portion of the actual base material to which the insulation pins would be welded. With this arrangement the load could be applied progressively and tested until the failure of stud.

3.6.2 Special category places

Insulation pins and washers should be stainless steel in special category spaces like car decks and outer decks, which would be exposed to the weather conditions, to salinity carried to car deck by vehicles or to the marine environment.

Figure 19: Missing insulation pin discovered by author during inspection of insulation.

Fixing the pins by stud welding, insulation pins and washers should be manufactured from a material compatible with the material to which pins and washers would be fixed. It is done by avoiding bimetallic (galvanic) corrosion between different metal components. By using the same material, the insulation pin would be suitable for the operating temperature range of the insulated medium.

3.6.3 Work order in shipyard

Work order planning in shipyard is challenging and delays or shortcomings on some areas might cause further delays on surrounding areas or even damage already completed area that would require repairs. When insulation permission is given to a certain area, the work on surface should be finished, but it might happen that still some outfitting works like cable tray- and pipeline supports instalment, or new penetrations, stiffeners etc might be occur to be necessary. Insulation might be severely damaged from it and repairs have to be done on the area which in term would result in delay.

Figure 20: Damaged insulation after apparent welding on upper deck.
The metal surface should be cleaned, re-coated and re-insulated.

Figure 21: Damaged insulation. Penetrations not done in proper stage result in additional works to restore condition of finished technical area. Penetrations need to be cleaned, coated and reinsulated.

4 Conclusion

The author was aiming to give an insight of owner's representative surveyor's everyday job at the shipyard during the building process and delivery of the newbuild vessel. Something that he knew little about prior to joining the owner's newbuilding team. Being present at the shipyard and monitoring the shipbuilding process has been an unique experience that has already changed the way the author sees any vessel. Looking back, the author wishes that he had prepared more by reading the technical scope and build quality plans, as well as handbooks and guidebooks for surveyors rather than depending solely on previous experience on ships and drydockings or faded knowledge about shipbuilding – an advice from author to readers that might find themselves from similar position. Nevertheless, the author is convinced that his presence in the shipyard has improved greatly the overall build quality of the vessel he is surveying. The author considers the outcome of the thesis near the aimed target and possibly an interesting piece for maritime professionals or seamen looking for shore based maritime sector jobs. The process of thesis writing during the loaded workdays at the shipyard gave another meaning to the draining days.

Figure 22: Navigational bridge cockpit under construction, taking shape.

List of tables

List of figures

References

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