

An Owner's Management of Ship Construction Contracts

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Presented at *Newbuild 2000*
The Royal Institution of Naval Architects
London, October 24-25, 1995.

Abstract

This presentation identifies many of the functions that must be fulfilled by representatives of ship owners during the process of acquiring new vessels. Many aspects of this presentation are also applicable to ship conversion and repair. The items discussed below, while not constituting all of the owner's contract management functions that must be addressed, include ones that are frequently either overlooked or insufficiently fulfilled, potentially leading to disputes between the contracting parties. Besides creating the risk of contract disputes, insufficient fulfillment of these contract-related functions exposes the owner to receiving an unsatisfactory, late or over-budget newly-built, converted or repaired vessel. The vessel may be unsatisfactory for reasons of impaired quality, maintainability, performance characteristics or operating limitations relative to those anticipated by the contract documents. The perspective of this paper is not a theoretical approach to contract management, but is based on numerous analyses of contractual problems and disputes experienced by ship owners in North America and Australia.

1.0 Introduction

The transfer of substantial sums of money from a prospective ship owner to a shipyard, while accomplished several hundred times annually on a world-wide basis, is approached with great trepidation by an owner. While looking ahead to the question of whether the vessel will be profitable or even earn a satisfactory rate of return, he must also look to the near term and wonder if the vessel being acquired is sufficiently in accordance with the identified needs. Even if there are no significant contract changes during the completion of the design development and the physical construction, the path from contract signing to vessel delivery is strewn with many obstacles, each of which could seriously impact the quality, completeness, cost and/or timeliness of the vessel which the owner ultimately receives.

1.1 First Class Marine Practice: A ship owner must be constantly mindful of the practical definition of "first class marine practice" or such other comparable terms that may be in the contract. The owner likely

believes that such general phrases will assure production of a long-life, low-maintenance vessel. Regrettably, however, the ship owner's interpretation of such ambiguously worded phrases does not prevail in a practical sense. Rather, the shipbuilder's more practical interpretation of such phrases is the one which will prevail in fixed-price shipbuilding contracts.

A shipyard's definition of "first class marine practice" consists of four components. While the four of them, taken together, may appear to be cynically expressed, it can be appreciated that, from a contractual perspective, the shipyard is right on target when it follows these four components of first class marine practice: (a) the workmanship and materials provided by the shipyard satisfy a literal interpretation of the contract specifications and plans; (b) the workmanship and vessel are completed in accordance with the appropriate schedule; (c) the workmanship and materials outlast the warranty given to the owner by the shipyard; and (d) whenever there is the least ambiguity, the "solution" employed by the shipyard is a least-cost solution or least-cost resolution to the perceived opportunity.

1.2 The Counterbalance: The shipyard's legitimate objective is to maximise its profit in a fixed price contract by minimising its costs. The owner must provide an appropriate counterbalance to that objective. Accordingly, the owner is compelled to monitor all aspects of the shipyard's selection of materials and workmanship to ensure the owner gets the product for which he has bargained. The primary mechanism used by an owner to assure that the product -- the ship -- has the intrinsic value that is anticipated is to prepare a tight and complete set of contract specifications and contract plans under a cohesive contract agreement, supplemented by the appropriate terms and conditions.

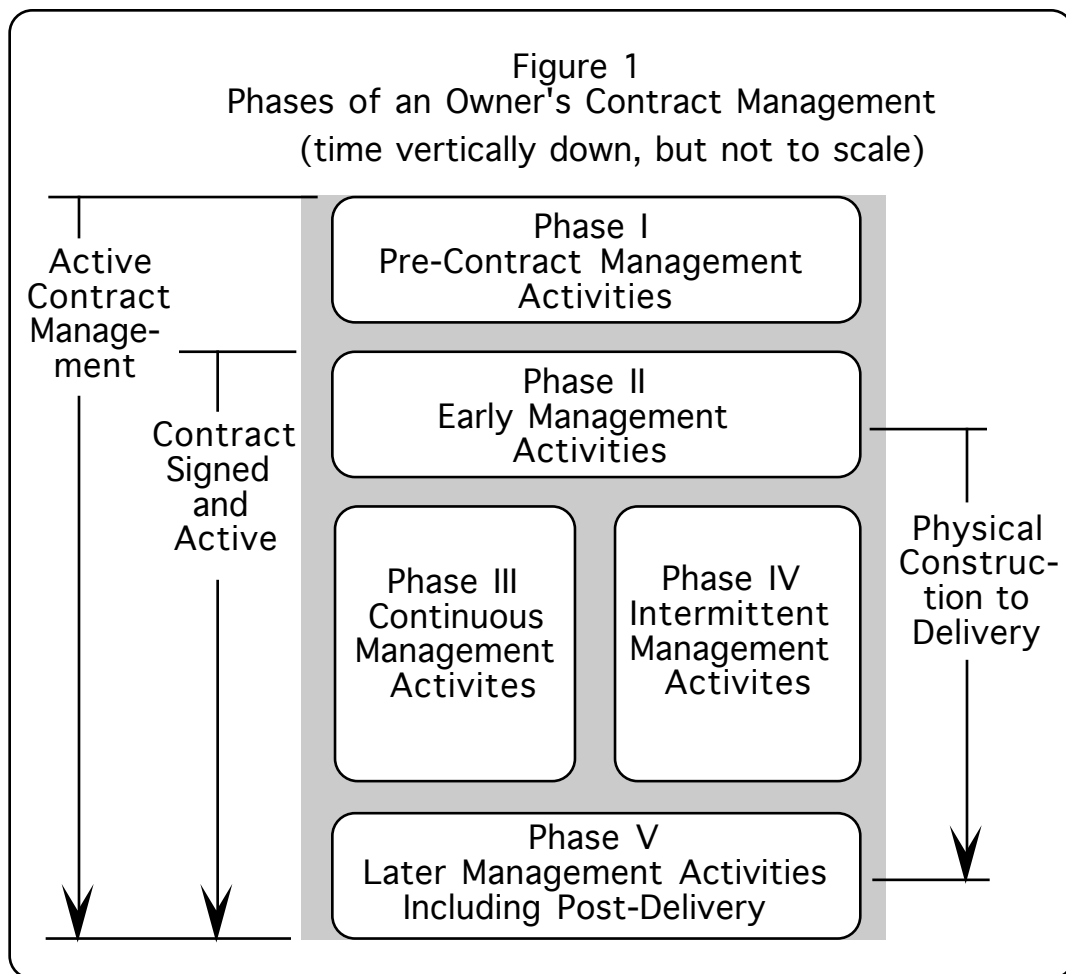
By developing complete and unambiguous contract specifications and plans, the owner is trying to give the shipyard limited options as to selection of materials or quality of workmanship. By including the technical stipulations of regulatory requirements and classification standards that are to be satisfied, the owner adds another level of controls on the shipyard's workmanship and selection of materials.

1.3 Control Opportunities: Despite all these mechanisms to ensure, or attempt to ensure, the quality and timeliness of the product that the shipyard will deliver to the owner, the shipyard will challenge them to enhance achievement of its objective -- profitability. However, a practical examination of many shipbuilding contracts reveals additional opportunities for the ship owner to assert control over the construction process, through the procedures that are already provided in the contract itself. In order to take advantage of these opportunities that are contractually defined, an owner must have the organisation and determination to utilise these

opportunities, and must also commit the managerial resources to achieve that objective.

These objectives of a ship owner are nothing new to the industry. For generations of vessel constructions, owners have ensured that such opportunities are included in the contracts. This paper does not suggest that any of the management functions described below are new, are different from those already available, or constitute new burdens on the shipyards. Rather, by clearly defining all of these functions and opportunities that a ship owner already has during ship construction, an owner's organisation can be in a better position to utilise those opportunities to obtain the intended value in the vessel being constructed. The degree to which an owner utilises these mechanisms will vary for each combination of owner and shipyard.

1.4 Five Phases: An owner's management of ship construction contracts falls into five general phases, although there is some overlap of specific functions among them. From a chronological perspective, the five phases of contract management activities are illustrated in Figure 1.



In the following sections, certain managerial opportunities and obligations that are available to an owner are discussed. The specific functions discussed below, which do not necessarily constitute the entire set of such functions, have been selected because past failures to pursue them adequately has been the source of significant problems and disputes experienced by ship owners in a number of individual contracts. The selection is consistent with the axiom that we must learn from the mistakes of others since we cannot live long enough to make -- and learn from -- all the mistakes ourselves.

2.0 Pre-Contract Management Activities

The first principle of contract management for ship construction, conversion, repair and design is this: Contract management commences the moment a contract is contemplated, not after the contract is signed.¹ This becomes self-evident when it is appreciated that, in preparing or negotiating a contract, a ship owner seeks to include in the contract the mechanisms by which the owner's contract management staff can monitor and control, to the maximum reasonable extent, the performance of the contract, without standing in the shoes of the shipyard itself. Thus, the owner's complete set

Figure 2
Pre-Contract Management Activities
(not including technical developments)

Develop Owner's Contract Management Organization

Review Spec'ns to Remove Ambiguities, Assign Responsibilities

Develop Specification for Schedule Reporting

Review Specifications for Tests & Trials Requirements

Coordinate Specifications with Contract Plans

Coordinate Agreement with Specifications & Plans

Identify All Contractually-Anticipated Communications

Develop Deliverables Control Spreadsheet

¹ - From the program notebook for the training program, *Fundamentals of Contract Management for Ship Construction, Repair and Design*. Fisher Maritime

of procedural objectives -- not merely the acquisition of a piece of hardware -- become translated into the contract documents. To achieve that goal, the process of understanding the owner's objectives and translating them into the contract documents is a major aspect of pre-contract management activities. The major activities of this phase of contract management by the owner's staff, all of which occur prior to contract signing, are summarised in Figure 2, but do not include the technical development of the contract specifications and plans except as noted in the text below, and do not include the development of the agreement, terms and conditions.

2.1 Organisation: development and structuring of owner's contract management organisation. The owner's contract management staff will have to address numerous forms of communications that arise during contract performance, including functional and reporting relationships pertaining to the prime contract and all secondary contracts associated with the project. The parties with whom such communications will be necessary include the shipyard management, shipyard engineering, shipyard planning, shipyard production, regulatory authority, classification organisation, suppliers and vendors of owner-furnished information and equipment, and technical service representatives, among others. The owner's contract management staff should nominate particular individuals to monitor and control the communications with each of those organisations and sub-organisations. Of course, one person could be responsible for more than one line of communications. Insufficient attention to any of those lines of communication increases the risk of having to exercise "management by crisis" instead of management by planning.

2.2 Specifications - General: review of specifications² to maximise owner's and shipyard's mutuality of interpretation. Although the specifications likely will have been developed by the owner's naval architect, a more objective review of them is necessary. The naval architect that developed the specifications is too close to them to see in them any ill-defined technical responsibilities and/or any ambiguous or incomplete aspects of specifications which may require clarifications. The review of the specifications by the owner's contract management staff should be done while trying to take the perspective of a bidding shipyard which has the objective of getting the full contract price while expending the fewest resources. A review from that perspective will enable the owner's staff to correct most of those potentially troublesome aspects of the specifications.

2.3 Specifications - Schedule: development of a section or sub-section of the specifications pertaining to the shipyard's schedule

² - For the purposes of these discussions, it is assumed that the contract plans are identified as a sub-set of the contract specifications, and are thus included in all discussions pertaining to the specifications.

development and schedule-reporting. The owner's contract management staff must decide, prior to contract development, on the extent to which it wants to be kept apprised of the shipyard's schedule and changes to that schedule. This will establish the shipyard's commitments, vis-a-vis schedule, that are sufficient for the owner's project monitoring. Some commercial owners include but three sentences³ pertaining to schedule, while other organisations include up to eight pages of single-spaced typing to dictate to the shipyard what schedule features are to be implemented. Depending on the anticipated shipyard's experience with contracts of a similar nature, and taking into account the owner's confidence in the shipyard to control and monitor the project, this part of the specification may be as short as the footnoted example or may be significantly longer. In general it does not make much sense to expect the shipyard to implement a scheduling mechanism with which it is unfamiliar. But if the specifications don't address the schedule at all, the owner may not be in a position to oversee the shipyard's schedule performance.

2.4 Specifications - Tests & Trials: identification of all tests and trials as needed by the owner. The achievement of tests and trials is not just a matter of ascertaining the vessel's speed and cargo capacity, but includes verifying to a reasonable extent the performance, reliability and durability of all systems and components installed or modified by the shipyard. Without adequate proof of performance of each component and system, the owner risks post-delivery costs and out-of-service time while correcting deficiencies, or even risks settling for second-best over the life of the vessel. Although the owner's naval architect will address these matters in the development of the specification, the experience of the owner's operating and port engineers will be a valuable addition to defining what tests and trials have to be satisfied before vessel delivery is achieved. However, the identification of such tests and trials has to be included in the specifications, or they may not be the responsibility of the shipyard.

2.5 Specifications - Downward Review: coordination between specifications and contract plans to maximise consistency between those elements of the contract documents. Although not a common occurrence, when the descriptive contract specifications do not agree with the graphic contract plans, the owner is left in an undesirable position of having to either accept a least-cost solution implemented by the shipyard, or an expensive contract change to achieve what was intended all along. Late

³ - The three sentences address: (1) the shipyard shall develop and regularly update a schedule that enables the shipyard to control and monitor the project; (2) the schedule shall encompass all activities pertaining to the contract, including engineering, procurement, production, subcontracts, tests and trials; and (3) the shipyard shall share all of its schedules, updates and schedule information with the owner.

changes in the specifications or in the plans can often create such inconsistencies. As a form of insurance, the owner should invest the pre-contract resources to ensure that there is complete consistency between the descriptive specifications and the contract plans. This can be done through any of several mechanisms, but usually the owner's staff can accomplish this if they are temporarily relieved of their normal duties while performing this downward review. It also provides the technical participants of the owner's contract management staff with their necessary familiarisation with the specifications and plans.

2.6 Specifications - Upward Review: coordination between agreement and specifications to maximise consistency between those elements of the contract. Occasionally the agreement part of the contract documents can undermine the intentions of the specifications. For example, an agreement might state that the shipyard is not responsible for any engineering calculations except as to structural strength and scantlings. At the same time, the specifications state that the pipe diameters and pump characteristics for a particular system have to be verified by the shipyard to assure a certain throughput rate. If both of those co-exist, it is likely that the intentions of the naval architects who wrote the specifications will not be realised. Accordingly, the owner's contract management staff must ensure, prior to contract signing, that the draft agreement and the draft specifications are fully coordinated.

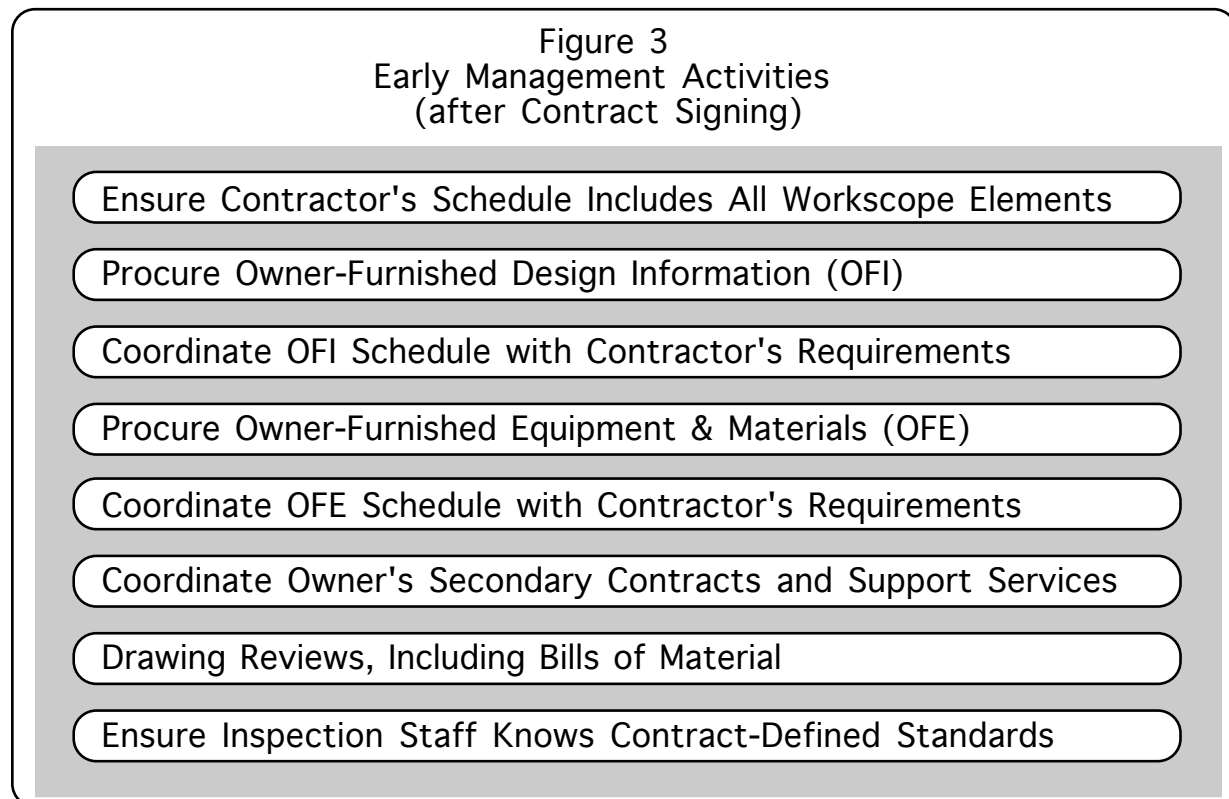
2.7 Communications: review of contract documents to identify all contractually anticipated communications. Nearly every time either the shipyard or the owner fulfills a contractual obligation, there will be a communication evidencing compliance with that contractual obligation. For example, every time a drawing is transmitted for owner's review, a cover letter accompanies it; and with every set of comments sent back by the owner, a cover letter is also sent. Also, every time there is a call-out for inspection, that call-out constitutes a communication. There will be numerous other forms of communications, as well. The number of pieces of paper that will be exchanged in ship construction constituting official contract communications will vary from about 1,000 to perhaps nearly 10,000, depending on the nature of the project. The owner's contract management staff must be prepared to handle that onslaught of paper as well as the unofficial communications. Prior to contract signing, the contract management staff can develop lists of anticipated communications, and ensure that the staff's organisation (per §2.1, above) identifies someone to monitor and oversee each of the types and categories of communications.

2.8 Deliverables Control Spreadsheets: development of computer-based, revisable, detailed lists of contract deliverables. Upon reading the entirety of the contract (agreement, terms and conditions, specifications, plans), a considerable number of contract deliverables will be identified. Some of them are short term items, such as an updated weight control

report, results of a hydro test on piping, or an updated schedule. Others will be long term items, such as spare parts or the final trim and stability booklet. If such hardware and non-hardware items are required by the contract documents to be timely delivered from the shipyard to the owner, then the cost of them is already included in the contract price. Accordingly, the owner should ensure that all items for which payment is included in the contract price are, in fact, timely delivered by the shipyard. The development, in advance of contracting, of revisable lists of those deliverables is the appropriate mechanism with which to keep track of the timely accomplishment of those deliveries.

3.0 Early Management Activities

The major activities of this phase of contract management by the owner's staff, all of which occur after contract signing, are summarised in Figure 3. Many of these activities are commenced well before physical construction begins, or in the event of a conversion, they will commence before the vessel arrives at the shipyard.



3.1 Schedule: review of shipyard's proposed schedule. This review of the schedule (likely a critical path network) is to ensure that all elements of the workscope are properly included (completion of design, engineering, procurement, production, subcontracts, tests & trials). It has been observed

that, in their haste to develop a more complete schedule once the contract has been signed, sometimes the shipyard does not have all the information it needs to include all the activities of its subcontractors and to schedule the receipt of certain vendor equipment. Because a shipyard often starts the contract without having all of the necessary resources already available for the contract work, the planning continues to lag, rather than lead, the engineering, procurement and sometimes the production work. In its haste to keep moving toward production, some activities which were omitted from early versions of the schedule either remain off the schedule, or are put onto it after the fact. The owner's staff must push the shipyard to produce, early in the contract, a complete schedule. Likely, the contract will require such an early, complete schedule by the shipyard, which requirement the owner's staff should enforce to the maximum reasonable extent.

3.2 OFI Procurement: procurement of owner-furnished information (OFI), for purposes of design development, as required by contract. In the event that the contract requires the owner to provide any additional information once the contract has been signed, the owner's staff must ensure the completion of that requirement. Failing that commitment, the shipyard may have an excuse for extra costs, delayed delivery or both. One of the problems that may arise is that the extent of the OFI is less detailed than the shipyard expected. Another form of problem arises from the basic need for OFI, namely, that the owner doesn't trust the shipyard to develop the details in a particular area, but didn't give the persons developing the contract specifications and plans sufficient time to develop it, either. Moreover, along the way of developing such OFI, the owner allows the OFI to go through several alterations or evolutions before finally being issued to the shipyard, inevitably late and in a different form or to a different extent than anticipated by the shipyard. The cure to these problems is both simple and difficult to achieve: eliminate the need for OFI by completing all design evolution before contracting.

3.3 OFI Schedule: coordination with shipyard for timely delivery of owner-furnished information (OFI). A recurring problem associated with OFI is the timeliness of its delivery from the owner to the shipyard. This is exacerbated in those instances when the OFI experiences several developmental evolutions before being finalised. Some contracts identify the dates by which the required OFI is deliverable to the shipyard; many do not. When there is no firm OFI delivery date, it is an encumbrance on the owner to work with the shipyard to achieve a mutually satisfactory delivery date for the OFI. Reference to the shipyard's schedule will assist in determining what is a real 'need' date, as distinct from a 'wish' date. Often the OFI is associated with owner-furnished equipment (OFE), but not always. Even if the OFI is associated with OFE, the date by which the shipyard may need the OFI could be prior to the date by which the OFE itself has to be on hand for placement aboard the vessel.

3.4 OFE Procurement: procurement of owner-furnished equipment (OFE) and materials. Some contracts include a requirement for the owner to provide OFE for various reasons, such as long-lead time, on-hand stocks, or special manufacturing requirements. In numerous contract disputes, those centering on the OFE are disproportionately common. Some contract disputes focus on the form in which the OFE arrives at the shipyard. The parties to the contract should ensure a common understanding as to the expected form of the OFE upon arrival. The essential matter for the owner's contract management staff is that the procurement and delivery of OFE by the owner needs to be treated with the same diligence and commitment as the shipyard is expected to take with regard to the ship. Failure to give OFE procurement and delivery adequate commitment is an invitation to extra costs and delays. As with OFI, the avoidance of such potential disputes is both simple and difficult to achieve: eliminate the need for OFE by having the shipyard supply all equipment and materials. Sometimes, however, that is impossible to achieve.

3.5 OFE Schedule: coordination with shipyard for timely delivery of owner-furnished equipment (OFE) and materials. As with OFI, a recurring problem associated with OFE is the timeliness of its delivery from the owner to the shipyard. Some contracts identify the dates by which the required OFE is deliverable to the shipyard; many do not. When there is no firm OFE delivery date, it is an encumbrance on the owner to work with the shipyard to achieve a mutually satisfactory delivery date for the OFE. Reference to the shipyard's schedule will assist in determining what is a real 'need' date, as distinct from a 'wish' date. When the owner's staff reviews the shipyard's schedule, the scheduled dates of arrival of OFE, whether explicit or implied, must be checked against the owner's expectations as to when the OFE will be delivered. If there is an incompatibility between the dates on the schedule and the owner's accomplishable dates, immediate discussions to resolve that inconsistency are strongly recommended.

3.6 Secondary Contracts: management of owner's secondary contracts for design, technical services and support services. In addition to separately contracting for OFI and OFE, the owner may have separate, secondary contracts for other services. These may be for technical representatives of vendors, for supervision of the installation of OFE, for independent review of shipyard working drawings, or other functions being undertaken by the owner through secondary contracts. Regardless of the size and content of those secondary contracts, the success of the overall project is just as dependent on their timely completion as it is on the shipyard's work; they cannot be ignored or given insufficient attention. Accordingly, the owner's contract management staff must regard these secondary contracts with the same level of attention as the primary contract with the shipyard.

3.7 Drawings: receipt and review of shipyard's working drawings and preparation of comments as appropriate. First, it should be noted that it is

preferable for the contract to define the shipyard's working drawings to include bills of material where applicable. This will assist the owner's staff in ensuring the shipyard has interpreted the specifications as the owner intended. Second, the owner's staff must always be mindful that the shipyard needs to receive timely comments on the working drawings (assuming the contract requires the shipyard to submit them to the owner prior to the associated production work). Failure of the owner's staff to provide comments on a timely basis may be equivalent to not commenting at all. The time that the owner has to provide such comments is usually identified in the contract. If not, the parties have to negotiate a mutually acceptable time for the owner to return such comments. There are numerous other issues and sub-issues associated with the owner's reviews of drawings, including the relationships with classification organizations and regulatory bodies. This topic is more fully discussed in Ref. [3].

3.8 Standards: ensure owner's inspection staff knows the contractually-defined standards for inspection of shipyard work. A common source of disputes is the lack of agreement as to what standards are being used to accept or reject the workmanship and materials supplied by the shipyard. Too often the owner's inspectors reject workmanship or materials based on their personal but undefined standards, with which the shipyard takes exception. Once the production work has commenced is too late to identify the standards that will be used to measure the acceptability of the work. The standards have to be ones that the shipyard knows in advance will be the ones used to make that determination. Accordingly, the standards have to be either defined in the contract or have to be recognised industry standards; not the personal standard of the owner's inspectors.

4.0 Continuous Management Activities

The continuous and/or recurring activities of this phase of contract management by the owner's staff are summarised in Figure 4. There may be some other routine, continuous or recurring activities, but the ones discussed below have been identified as a potential source of disputes in prior analyses.

4.1 Classification: oversight and review of shipyard's communications with classification organisation. It is expected that the contract will define which party is responsible for obtaining classification approvals for the vessel. The extent to which the owner can oversee or review communications between the shipyard and the classification organisation is also usually defined the contract. In the event that matter is not addressed by the contract, the two parties must agree as to what documents the owner can review, and when they should be made available for review. The preferred situation, which is common, is to have the owner copied on all classification communications sent or received by the shipyard within a day or two of

Figure 4
Continuous Management Activities

Oversight of Classification / Contractor Communications

Oversight of Regulatory Authority / Contractor Communications

Review Updates of CPN Schedule for New/Revised Activities

Progress Monitoring vis-a-vis Contractor's Schedule

Progress Meetings with Contractor -- Follow-Up Commitments

Progress Payments -- Linked to Physical Progress & Deliverables

Conduct Inspections, Witness Testing -- Components & Systems

actual transmission or receipt. The purpose of having the owner monitor those communications is to assist in identifying whether alleged changes brought about by the classification process are the responsibility of the shipyard or the owner. It will also assist in ensuring that there will be no last-minute 'glitches' in obtaining full classification due to lack of communication between the owner, the shipyard and the classification organisation.

4.2 Regulatory Authority: oversight and review of shipyard's communications with regulatory authority. The contractual treatment of the role of the regulatory authority is expected to be the same as that for the classification organisation. This encompasses identification of which party has to achieve approvals of the regulatory authority, and also the owner's oversight of communications between the shipyard and the regulatory authority. A significant difference between the management of relations and communications with the regulatory authority, on one hand, and the classification organisation, on the other, is the matter of for whom they are working. Whereas the classification organisation works for the party that has contracted with it and is paying it, the regulatory authority works only for itself. Accordingly, obtaining schedule commitments from a regulatory authority is more difficult than obtaining them from a classification organisation. The owner's staff must be mindful that the shipyard may be reluctant to commit production resources on new technologies or new designs without full approval by the regulatory authority, unless the owner will indemnify the shipyard for any costs of rework if the approvals require such rework.

4.3 Critical Path Network: review of shipyard's updates of the critical path network to ensure incorporation of contract changes and work requirements. As likely there will be changes in the contract workscope and/or changes in the work requirements, there will have to be corresponding changes in the critical path network (CPN). Besides changes in the contract workscope, sometimes the change which necessitates changes in the CPN will not be a contract change, but a change in the shipyard's work requirements or work sequence. For example, these may be delays in installing equipment due to late vendor delivery, delays in some elements of production due to late or delayed approvals by classification or regulatory authority, or delays due to significant rework in a particular area. The changes in the network may be a combination of added schedule activities, changed durations of schedule activities, and changes in the network logic. If the owner's staff is serious about monitoring the shipyard's schedule, that staff should verify that all such changes are reflected in the updated CPN's.

4.4 Progress Monitoring: on-site monitoring of the shipyard's performance vis-a-vis its latest planned schedule. This owner's management function verifies that the actual start/finish dates have been used to update the CPN. Fundamental to this aspect of the owner's contract management is the matter of why the contract requires the shipyard to provide the owner with updated schedules. If the owner, in developing the contract, felt the need to include the provision of schedule updates as a contractual requirement, there is no benefit obtained unless the updated schedules are meaningful. Too often a shipyard updates its schedule by renaming 'planned' dates as 'actual' dates when such renaming is not simply justified. For the same reasons an owner wishes to see correctly updated schedules, the owner has to commit resources to validate or verify the shipyard's updating of its schedule. Such validation need not cover 100% of all schedule activities, but should address at least all major schedule activities and all critical or near-critical schedule activities.

4.5 Progress Meetings: leadership at regular progress meetings with the shipyard and follow-up to ensure all obligations by both parties arising therefrom, or confirmed therein, are timely satisfied. The type of problem that arises in association with progress meetings are the commitments that are made at these meetings without adequate research and thought as to whether those commitments can be achieved. Both owners and shipyards commit these inappropriate actions from time to time. This then sets the stage for arguments starting with, "We relied on your commitment to ..." For example, an owner's staff might orally approve a substitution requested by the shipyard at the meeting, only to later realise it was a mistake to approve it. The solution is to actively participate in the progress meetings, but without making commitments that are not adequately researched or thought out. In all instances, the safest course of action is to

first determine if the contract documents already answer any raised questions.

4.6 Progress Payments: review of shipyard's progress invoices to ensure that all invoiced amounts have been earned. Every contract has nearly-unique progress payment clauses. Some are erroneously based on merely the passage of time. The 'better' ones are based on measurable progress in engineering development, material procurement, physical construction and completion of the non-hardware deliverables (such as technical reports, manuals and as-built drawings). Once the progress payment mechanism is established by the contract, the owner's staff should ensure that it is applied as fairly as possible, neither rewarding the shipyard for incomplete work, nor punishing the shipyard by trying to withhold extra amounts until contract completion. The hazard of withholding too much is that it may impede the shipyard's cash flow and foster a disharmonious relationship. The hazard of paying too much too soon is that the shipyard may not have sufficient cash to complete the vessel without cutting a lot of corners.

4.7 Inspections: using contractually-defined inspection standards, inspect work in progress and completed items. This should be a straight-forward function of the owner's staff, but often becomes entangled due to lack of clarity of purpose. The purpose of inspections by the owner's staff is not to be confused, mixed with, or substituted for inspections by classification, by regulatory authority, or by the shipyard's own quality assurance (QA) staff. Each of the four different inspecting organisations have different purposes and different perspectives. The owner's staff should ensure that it does not allow the shipyard to push it into becoming a substitute for the shipyard's QA staff. When the owner's inspection staff cedes its responsibilities and rights to any of those other inspecting organisations, the intended quality, maintenance and operating characteristics of the inspected item may be compromised.

5.0 Intermittent Management Activities

The intermittent or non-routinely recurring activities of this phase of contract management by the owner's staff are summarised in Figure 5. There may be some other intermittent or non-routinely recurring activities, but the ones discussed below have been identified as a potential source of disputes in prior analyses.

Figure 5
Intermittent Management Activities

Review Technical & Cost Aspects of Proposed Changes

Analyze Schedule Impact & Extensions of Proposed Changes

Negotiate Contract Changes -- Only If Unavoidable

Update Contract to Reflect Changes (Dwgs, Spec'ns, Dates)

Monitor Potential Contractor and Force Majeure Delays

Monitor Contractor's Need for Rework (Cost & Schedule)

5.1 Change Specifications: development or review of technical aspects of proposed changes and owner's estimate of cost of changes. This, too, should be a straight-forward function of the owner's staff. The problem that arises, however, is that when the owner requests a change proposal by the shipyard, the owner knows what is wanted, but doesn't communicate it to the shipyard with sufficient definition. Then, when the owner's organisation sees the shipyard's proposal, the owner assumes the shipyard will interpret the ambiguities and lack of definition the same as the owner intended, but didn't state. Of course, for cost reasons, that won't happen, leading to a potential dispute. Also, the owner's cost estimate, to be realistic, must consider all the production functions that need to be fulfilled by the shipyard in order to achieve the end product of the requested change, not merely the obvious functions. Lack of realism in the owner's cost estimate of the change fosters a disharmonious relationship, with its accompanying undesirable potential consequences.

5.2 Extensions: review of contract extensions requested by the shipyard in association with potential changes. There are three major possibilities with regard to extensions of the delivery date associated with a change requested by the owner. The first is that the shipyard will request an extension based on a detailed CPN analysis -- this is not common. The second is that the shipyard will state that there will be no impact on delivery date -- this is common, but often unrealistic. The third is that there will be an impact on delivery date, but the shipyard hasn't yet figured out what that delay will be although the owner is being requested to agree to the change -- this is dangerous for the owner. The shipyard's justification for a delay or schedule impact may also be legitimately based on resource constraints, rather than a CPN analysis, if the contract doesn't circumvent that by requiring the shipyard to accept growth work without a schedule impact. The

"no schedule impact" statements regarding changes are unrealistic when there are numerous small changes that, individually, look as though they should not have an impact. But collectively, when there are dozens of small changes, likely there will be a schedule impact. The owner can only remain silent in those situations, but be prepared to give an inch or two in later negotiations.

5.3 Change Negotiation: negotiation of proposed changes after review and acceptance by technical staff. Treatises have been written on negotiating techniques, and a number of consultants provide generic courses on negotiation practices. The important factors for ship owners, distilled from those treatises and courses, is that the owner should have a combination of targets and maximum acceptable cost and schedule impacts in mind before commencing negotiations. The owner should be prepared to have the vessel completed without the change if the two sides are far apart on the cost and/or schedule impact. Unless the owner is interested in hiring consultants and lawyers after the ship is in the owner's control, the practice of directing a shipyard to perform a change when there is no agreement on price and/or schedule impact should be avoided.

5.4 Contract: maintenance of up-dated contract including changes to price, technical specifications, contract drawings and delivery date. This appears to be a simple administrative matter that does not involve higher authority of the owner's contract management staff. But unless firm direction is given by the owner's senior staff, this is sometimes overlooked. The cumulative effect on price, schedule, weight, stability and performance characteristics, among other factors, must be maintained and considered before agreeing to any further changes that may alter those parameters. The cumulative effect of agreed-upon changes may also impact future progress payments to an extent that surprises the owner, if such accounting is not maintained up-to-date.

5.5 Delays: review of shipyard's requests for force majeure delays and oversight of other potential causes of delay. Any requested force majeure delays must be measured against the wording of the corresponding contract clause. For example, the clause may excuse delays due to unusually severe weather, thus implying that usual severe weather does not qualify. Vendor delays and subcontractor failures may or may not be the basis for allowable force majeure delays per the contract. Even if they are allowable, the shipyard will have to demonstrate that it took timely action to mitigate the consequences of such delays or failures. If the alleged delay is due to late OFI or OFE, the owner will have to assess whether there is only a cost impact, if any, or if there is also a schedule impact. The owner's contract management staff cannot remain passive with regard to such delay analyses, since an excused delay will lead to added costs and/or reduced revenues being realised by the owner.

5.6 Rework: Identification of types, areas and timing of the shipyard's own rework necessitated by its own errors. Rework adds to the shipyard's costs, and sometimes impacts the vessel's delivery schedule. When any rework is more than inconsequential, although the shipyard may attempt to hide its occurrence, the owner's inspection staff should call it to the attention of the owner's senior contract management. This is necessary since it will be important to post-delivery negotiations. Any area that incurs significant rework should be subject to very close inspection by the owner's inspectors. The owner's staff should make its own assessment of the schedule impact of significant rework, and should ensure that it is reflected on the shipyard's next updated schedule.

6.0 Later Management Activities

The later activities of this phase of contract management by the owner's staff are summarised in Figure 6. Some of them continue after the ship has been delivered, since the contract does not self-terminate until all contract funds have been exchanged, until all warranty issues have been satisfied, and until any outstanding disputes have been resolved. For individual contracts and/or individual styles of contract management, there may be other later contract management activities, as well.

Figure 6
Late Management Activities
(including post-delivery activities)

Develop Inspection Deficiency Reports for Nearly-Complete Work

Approve Agendas for, then Oversight of, Tests & Trials

Prepare Acceptances of Inspections, Tests, Trials, Reports

Compartment Close-Outs After Completion of All Work

Review Non-Hardware Deliverables Prepared by Contractor

Review As-Built Drawings for Conformity to Changes

Approve Spare Parts Lists and Arrange for Timely Arrival

Develop Documentation for Delivery, Including Three Lists

Manage Warranty Items Per Contract Procedures

6.1 Deficiencies: development of inspection deficiency reports for transmittal to shipyard and follow-up to ensure correction of cited deficiencies. Whenever work is presented to the owner's inspection staff as being final or subject to being closed-in so further inspections cannot be readily accomplished, that work should be subject to in inspection deficiency report (IDR) if warranted. The owner's staff should not plan on relying on the shipyard's memory that the shipyard has to go back to that item to correct it, since exercising that 'memory' will result in a cost to the shipyard. An item that merits an IDR, if not corrected, likely will impact the vessel's quality, maintainability, performance characteristics or operating limitations relative to those anticipated by the contract documents. Accordingly, the owner's staff cannot risk having such necessary corrections overlooked in the haste to finish the vessel.

6.2 Tests & Trials: review of draft agendas for tests and trials, oversight of tests and trials, review of final reports on tests and trials. These matters are the proof of the shipyard's mettle. "Hanging steel," fabricating piping, pulling cables, even installing equipment, are all skills that many shipyards can accomplish at reasonable costs and within reasonable schedules. Presumably the owner has selected this particular shipyard because of some belief that the "finish" of the vessel will be accomplished with skill -- and the various tests and trials are the proof of the quality of that "finish" of the shipyard's product. The owner should be mindful that the number, type and extent of tests and trials are limited to those anticipated by the contract or by documented industry standards. A greater scope of tests and trials can be accomplished only by a mutually-agreed contract change. But the shipyard should not be allowed to cut corners on the tests and trials, or on the preparation for the tests and trials that are well-defined responsibilities of the shipyard.

6.3 Acceptances: preparation of notices of acceptance of inspections, tests and trials, reports, and conveyance of the acceptance to shipyard. Because these items occur toward the end of the vessel construction, conversion or repair project, often there is a sense of urgency about them, especially if the delivery is going to be later than expected. The correction of deficiencies that prevent tests and trials from going ahead are often allowed to be implemented as expedient, short-term corrections, but then everyone "forgets" that the long-term correction was never made. Going into this aspect of the contract work, all persons should be aware that the last 5-10 percent of the work -- preparation for, and conduct of, tests and trials -- takes a disproportionate amount of time. The owner's staff must be mindful that the shipyard wants to deliver the ship as rapidly as possible for the sake of cash flow, as well as to stop expending resources on the ship. However, the owner's staff must be mindful that tests, trials and reports can be rejected only if they fail to meet the standards of the contract or well-defined industry standards.

6.4 Compartment Close-Outs: final close-out inspection of each compartment upon presentation by shipyard and conveyance of the acceptance or deficiencies to shipyard. A compartment close-out inspection ensures that all inspection deficiency reports affecting each compartment have been "cleared" and that the shipyard has satisfactorily withdrawn all of its equipment from each compartment. For this purpose, a compartment includes the working spaces, accommodations, passageways, holds, tanks and void spaces. One fairly common problem is that shipyards have a tendency to present many compartments for close-out inspection on the two or three days before ship delivery. The owner has to negotiate with the shipyard, if not already addressed by the contract documents, for a more-even presentation of the compartments for close-out inspections. Otherwise, the inspection staff is overwhelmed, and cannot fulfill its functions satisfactorily.

6.5 As-Built Drawings: review of as-built drawings, provided by shipyard, to ensure consistency with field-changes incurred during physical construction. It has been observed that shipyards may stamp "as built" onto the latest version of the working drawings that were produced by the shipyard's engineering/drafting department. Of course, such drawings are not truly "as-built" when there have been field changes due to interferences or due to the production department deciding that there are easier, less-costly ways to accomplish its work. Sometimes, relative to those drawings, valves appear on the opposite sides of bulkheads, small diameter piping runs through a different part of a compartment, a pipe take-down joint without a splash shield is above a cable tray instead of below it, or HVAC ducting runs below a beam (reducing clear headroom) instead of through a reinforced opening in the beam. In order for the working drawings to be converted to true "as-built" drawings, the shipyard's drafting department must send persons onto the finished vessel, and then modify the drawings. Since this expends resources, the shipyard hopes the owner will accept the working drawings as "close enough." The owner must make decisions whether to accept that situation with ship maintainability and ship safety in mind. However, insisting that the shipyard achieve 100% conformance in the as-built drawings may be akin to asking for a perpetual motion machine -- its just not going to happen. Thus, selective enforcement may be more realistic. If sister-ships are constructed, the number of inconsistencies between the actual sister ships and the lead-ship's as-built drawings is even greater than for the lead ship. Accordingly, the resources necessary to obtain true as-built drawings for sister ships may be greater than that for the lead ship. Moreover, the owner should not mistakenly rely on the classification organisation to ensure that the drawings represent true as-built conditions, since that organisation confirms the as-built drawing only for selected aspects of the vessel.

6.6 Non-Hardware Deliverables: review of draft technical reports and manuals, including signs and placards, preparation of comments to shipyard, review of final reports and manuals. Other than the as-built drawings discussed above, these are the non-hardware deliverables that are the shipyard's contractual responsibility. The owner's contract management staff has to be aware that these items may have significant costs associated with them, thereby causing the shipyard to minimise the resources it commits to completing them. This tendency by shipyards is especially prevalent when the non-hardware deliverables are being developed just as the shipyard has run out of funds to complete the project profitably. Accordingly, the owner should ensure that contractually defined progress payments associated with these non-hardware items are meaningful sums, and not trivial sums for which the shipyard may allow itself to be placed in partial default, in which case the shipyard is relieved of having to provide these important items with only a minor reduction in earned payments.

6.7 Spare Parts: development of approved spares lists and communications with shipyard to ensure timely arrival of spares. Often, contracts for new construction require a shipyard to provide a list of recommended spares, and the owner then defines which spares are to be purchased at the owner's expense. Because the type and quantity of spares cannot be definitively established prior to that procedure, the cost of the spares is extra to the contract, but the administrative and handling costs already are included in the contract price. A problem that may arise is the late transmittal by the shipyard to the owner of the list of recommended spares. That lateness may then impact the completion of tests and trials if the spares are needed during their performance. The owner may then be forced into a compromised position on the completion of tests and trials. Moreover, the owner may be in the uncomfortable position of taking delivery of the vessel without the full complement of spares. The owner has to actively manage this aspect of the contract, pushing the shipyard to accomplish acquisition of the spares on a timely basis.

6.8 Delivery: development of draft vessel delivery documentation including three essential lists, and inventorying/filming of status of ship at time of delivery. The development of several aspects of the delivery documents is routinely left in the hands of the lawyers. However, the owner's contract manager must ensure that the documents include three lists that originate with the list of IDR's -- inspection deficiency reports. Specifically, the IDR's that are outstanding (have not been closed-out) are divided into three lists. The first is the list of outstanding IDR's which the shipyard and owner have agreed will not be closed-out, but for which a credit-adjustment in contract price will be made. The second list is the group of outstanding IDR's that the shipyard has agreed it will correct during the first half of the warranty period, to which the owner has consented but will withhold certain sums until those IDR's are closed-out. The third list is the

group of IDR's that are in dispute: the owner states that they are incompletenesses or deficiencies, while the shipyard states they are not. The owner may withhold certain sums associated with that third list, which is subject to resolution in post-delivery negotiations or, if that is not accomplishable, in arbitration or litigation.

6.9 Warranty: accumulation of warranty items identified by operational staff, manage warranty issues, transmittal of reports to shipyard and follow-up to ensure correction of cited warranty items. The procedures, rights and responsibilities of the parties set forth in the warranty clauses of the contract documents must be followed for timing, notifications, corrections of defects, costs, and withheld sums, if any. Although the vessel is being operated distant from the owner's contract management staff, there must be good communications pertaining to these items between the owner's contract manager and the vessel operating staff, on one hand, and between the owner's contract manager and the shipyard, on the other. The management of warranty matters places a burden on the owner's contract management staff, since the onus is on the owner's staff to prove that the matter is a valid warranty matter and that it is handled on a timely basis.

7.0 Conclusion

One of the principles of contract management for ship construction, conversion and repair is, "Both parties to a contract must be active participants during performance; passive contract management is taxed; active contract management is rewarded." That principle summarises the objective of active contract management by the owner -- to avoid being "taxed" by unexpected changes and short-cuts being undertaken by the shipyard to reduce costs, disappointing technical interpretations by the shipyard, and possible schedule delays due to inadequate communications between the parties.

Most of the areas of contract management in which the owner may have the opportunity to be active, rather than passive, have been discussed above. As shown in Figures 2 through 6, there are over 35 such managerial areas. It may not be feasible for an owner to be fully active in all those areas at the appropriate times. However, the decision to remain somewhat passive in any areas should be made only after assessing the risks of doing so. By giving consideration at the outset of a contract to the functions that must be fulfilled by the owner during ship construction, a vessel owner's contract management staff can better perceive and control the potential impact of its contract management decisions on the shipyard's contract compliance and performance.