CHALLENGES OF MANAGING SHIPYARD PROJECTS

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SUMMARY

Shipyard projects involving ship construction, repair, conversion and modification, along with the associated design processes, involve a wide variety of contracts. Almost always multiple contracts are part of each shipyard project. Disputes often arise when potential risks within the accomplishment of the project were not adequately addressed within the project's contracts. Also, inconsistencies between related contracts often are the core reason for disputes. The management of projects under such circumstances constitutes a significant challenge to the success of the project. This paper identifies many of those potential risks to assist in addressing them in the contracts before the project commences.

1. INTRODUCTION

In the arena of planning and managing shipyard projects, there are multiple challenges for each of the parties that will be engaged in such a project. Some of those challenges are quite obvious, showing themselves directly to the faces of the parties developing the contracts that will be central to the project. However, a greater number of the challenges are not so obvious, quietly lurking behind the scenes, waiting to pounce on the contracting parties as soon as one of them makes a contractual mis-step. The ensuing counter-productive disputes are regrettable, more so since the disputes were probably avoidable if the contract's drafters had understood the risk and anticipated the possible development of such a dispute.

Accordingly, this paper sets out to describe many of the challenges that could be addressed in advance during formation of the contracts pertaining to shipyard projects. There are no universal solutions to mitigate the potential problems that can arise if the challenges are not addressed in the contract. Thus, this paper is limited to describing such challenges, thereby giving guidance to the teams developing the contracts for shipyard projects, including input from those who are or will be on project management teams, as to how to mitigate those challenges.

One of the key secondary points of this paper is to emphasise how important it is for all persons involved in managing their firm's role in the execution of the project's workscope to read the relevant portions of the contract, since often the challenges have been addressed therein. But lack of knowing what the contract says about a specific form of challenge is the mis-step that will initiate a counter-productive dispute.

In addition to the content of this paper, the referenced documents collectively provide detailed descriptions and reasoning for the mechanisms that can be considered to minimise the likelihood of the development of disputes that would otherwise arise if the challenges are overlooked during contract drafting.

2. MULTIPLE CONTRACTS IN PROJECTS

The foundation of any shipyard project is an assembly of multiple contracts, each of which has to be managed by the various contracting parties. The parties have to ensure the availability of the resources necessary to properly manage each of those contracts in order to avoid disputes, delays, cost overruns and unexpected compromises in form, function and capability of the ships.

The challenges of managing shipyard projects begin with understanding the role of contracts in the projects that will lead to the construction, conversion, modification or repair of a ship at a shipyard. From the outset of the project, each organisation that will be involved in the

Table 1. Typical Contracts for Shipyard Projects

SHIP OWNER and …
- Design Consultancy for Contract Design
- Construction Financing Organisation
- Long-Term Mortgage Financing Organisation
- Shipyard for Ship Construction, Conversion, Repair
- Equipment Vendors for Supply of Specialised Equipment
- Specialist Contractors for Equipment Installation
- Owner's Construction Management Agency
- Legal Services for Contracting

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DESIGN CONSULTANCY and …
- Classification Agency (prior to shipbuilding contract)
- Model Testing Facility
- Specialist Design Subcontractors

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SHIPYARD and …
- Classification Agency (after shipbuilding contract is executed)
- Design Consultancy for Detailed Design
- Materials Suppliers
- Equipment Suppliers
- Subcontractors for Production Work
- Legal Services for Contracting

project has to have an understanding that there will be multiple contracts involved in each project -- unless it is as simple as a quick turnover ship repair project. For anything which is more complex, multiple contracts will have to be developed and managed. The typical array of contracts for shipbuilding include those listed in **Table 1**. (Purchase Orders are a form of contract.)

This table of typical contracts for shipyard projects sets the stage for one of the most significant challenges. Namely, each of those contracts have to be compatible and synchronised with all of the other ones. For example, the owner's contracts for procurement of specialised equipment that will be installed by the shipyard (i.e., owner-furnished equipment) has to have vendor delivery dates to the shipyard that are consistent with the project schedule that the shipyard is producing in accordance with the owner's contract with the shipyard.

3. PURPOSE AND ELEMENTS OF CONTRACTS

The purpose of a shipbuilding contract is to define the entirety of the temporary relationship between the contractor and the ship owner. Essentially, the contract in its entirety establishes the rights, responsibilities, rules of conduct and assignment of risks between the two parties pertaining to all foreseeable technical, cost and schedule matters as well as questions or disputes that may arise between the parties (Fisher, 2003).

The fundamental purpose of a contract should be a focal point during the contract's development. More particularly, that fundamental purpose includes: (i) define the relationship between the parties, (ii) define the rights, responsibilities and obligations of each of the parties, (iii) define the deliverables (including payments) that are to be transferred between the parties, (iv) define the schedules controlling the transfers of each deliverable, and (v) provide sufficient information to each party to ensure it can schedule the resources to timely accomplish the fulfillment of its many contractual obligations.

The Contract Agreement is often, mistakenly, referred to as the Contract. The entire set of elements/documents listed in Table 2 constitutes the Contract; the Contract Agreement is only one part of it, albeit the key part of it. No one element is of lesser importance. All of the rights, responsibilities and obligations described in all of the elements of the contract have to be concurrently observed and achieved by both parties.

A clause, paragraph or sentence in any of the elements of the contract does not apply solely to one party. Rather, every clause, paragraph or sentence creates rights, responsibilities and obligations for both parties. For example, when a contractor submits the updated schedule to the owner, the owner's staff has to recognise that the contractor has nominated a date for receipt of owner-furnished equipment. Since that date was not established

Table 2. Typical Elements of a Contract

• Contract Agreement
• Terms and Conditions
• Referenced Government Clauses
• Insurance and Bonding Requirements
• Contract Technical Specifications
• Contract Design Drawings (or Plans)
• Contract Guidance or Referenced Plans
• Classification Requirements
• Flag State Regulations - required
• Flag State Standards – voluntarily added
• International Regulations (SOLAS, etc.)
• Referenced Technical Standards
• Referenced Vendor/Manufacturer Plans
• Other Stakeholder Requirements

prior to contract execution, the contractor was thereby given the right to nominate the date it wanted to receive that equipment. The owner's reciprocal obligation upon receipt of the updated schedule is to examine the schedule and identify those nominated dates with which the owner and its vendor may have to comply. This is the starting point for negotiations as to the impact, if any, if receipt is later than the nominated date.

Often the development of contracts is viewed as a routine matter –- routine because the contracting parties previously have been involved in other comparable contacts. However, external events may be having impacts on the appropriateness of prior contracts. Those external events include changes of technology, regulations, laws and political relationships. Recent or growing backlogs of equipment and supplies often require modifications to prior contracts. Those modifications are necessary in order to assure that the new contract incorporates the changes to external factors that have been occurring. Examples of such changes are: choice of fuel; electric propulsion (partial or complete); recycling content when scrapping; avoidance of hazard-producing materials; minimisation of crew size; increased automation; self-docking (no tugs); and more stringent habitability standards; among other possibilities.

4. INTERNAL COMPATIBILITY OF ALL REQUIREMENTS

When a vessel owner contracts with a shipyard for vessel conversion or new construction, there is an underlying legally binding representation being made by the owner. Namely, the owner is representing that, in the technical package prepared by the owner, all of the elements and components of the package are completely compatible with one another. That is, the shipyard can rely on the representation that all the bits and pieces of the owner's technical package and the other contract documents are consistent with all of the other bits and pieces. When it is discovered that such implied representation has not been fully achieved, the cost and schedule consequences of correcting that incompatibility likely are the owner's responsibility.

Accordingly, significant professional efforts have to be applied before an owner's technical package is presented to bidding shipyards. Ship owners' representatives must ensure, during preparation of the owner's bid package for ship construction and conversion, that each element of information and requirements within the package is wholly compatible with all of the others. When an owner is anxious to receive bids from shipyards, this pre-bid process is often neglected, thereby creating a number of risks that may emerge during the shipyard's execution of the project.

5. CONTRACTING STRATEGIES

Well-designed ships often become poorly executed shipbuilding projects due to lack of a comprehensive contracting strategy. The contracting strategy should take into account the resource limitations of potential shipbuilders and a realistic view of the ongoing capabilities of the ship-owning organisation and its entire set of consultants. The success of a project is just as dependent on good contracting strategy as it is on good ship design. These elements of contracting strategies have to be embedded in the contract itself, creating corresponding rights, responsibilities and timely obligations for each party.

The reality of recent shipbuilding and ship conversion projects is that many shipbuilders do not have substantial in-house engineering and design capabilities. When faced with such obligations, they subcontract them out as best they can manage. This means, then, that there are multiple layers of contract between the ship owner's staff on one hand, and the team that is translating the owner's design concepts into configurations, equipment selections and details, on the other. Thus, whenever trade-offs occur during design development, whether large or small, they are made out of sight of the owner. A well-developed contracting strategy can be developed to avoid that situation and thereby improve the value of the final product without increasing costs.

It has also been observed, more often than expected, that ship owners may undertake to provide detailed information pertaining to owner-provided equipment but fail to do so on a timely basis. This may lead to project delays and extra costs. Again, an appropriate contracting strategy developed for the particular project will go far to eliminate those risks.

Contractual overruns of both schedule and costs have occurred when shipyards want the structural design completed rapidly to enable physical work to commence (and thus cash flow) while the design team has not yet finished the remainder of the design. This leads to unnecessary design compromises or considerable rework later when it is realised (for example) that the structural layout and design should have taken into account the space-consuming distributive systems of ventilation ducts, major piping runs and cable trays.

6. OVERLOOKED CONTRACT RISKS

Many of the contract agreements for shipyard projects are formed with the assistance of legal professionals. With their help, the resulting contract agreement addresses the responsibilities of the parties, the financial relationships, the insurance requirements, the allocation of financial damages if the need arises, among all the other matters typically addressed with the assistance of legal professionals.

Later, once the contract has been executed, the day-to-day management of the project by the shipyard is in the hands of the engineering, production and testing departments, assisted by purchasing and sub-contractors. On the ship owner's side, the day-to-day management of the project has been put into the hands of experienced port engineers, owners' representatives and construction supervisors, assisted by engineering staff (or outside engineering support).

This typical process often creates the likelihood of considerable risks. The problem is that the contract agreement has been formed with the assistance of legal professionals. But the persons who are managing the project day-to-day have little experience in reading the contract. The shipyard's estimators did not read the details of risk assignment – they merely read the technical specifications and looked at the contract drawings. The production department does not read the details of non-hardware deliverables that are to be transmitted to the owner during the construction process. The testing department does not read the full set of test and trial procedures that the owner has required. These 'information gaps' create considerable risk that some costly aspects and schedule-extending aspects of the contract have been overlooked. Accordingly, those costs and delays are not covered by the shipyard's cost proposals, and the shipyard is exposed to damages for delay of the ship delivery.

Similarly, on the ship owner's side, the persons managing the execution of the project do not thoroughly understand that their team has as many obligations to fulfill as does the shipyard's team. Whenever a shipyard fulfills one of its many, many obligations requiring information to be passed from shipyard to owner during project execution, the owner has a reciprocal obligation. The fulfillment of each of the ship owner's obligations also has to be timely, per the contract. For example, when detail drawings are transmitted from shipyard to owner for owner's review, the owner's team has a limited time to send its comments and remarks to the shipyard if those comments are to be incorporated into the final version of the detail drawing (Fisher, 1991).

Both teams need to have in advance lists of the numerous documents and communications they expect to receive from the other team. These lists comprise a check-list to ensure that the communications are timely provided and

received. In the absence of such check lists, many of those contractually-required communications are missed or very late, creating unexpected situations that are identified too late to be effectively corrected (Fisher, 1995).

Also, when a ship owner is providing specialised equipment for installation into the ship, the owner's team has to provide the vendor's associated design, installation and testing information to the shipyard on a timely basis. Too often, the delay in obtaining that information and providing it to the shipyard results in extra costs and possibly schedule extensions. The owner's team should have read the details of the contract well in advance to understand the requirements for the timely delivery of such owner-furnished equipment and the associated information.

That is, often there is a serious gap between the skills used to form the contracts and the skills used to manage the execution of the contract. This is true for both the shipyard and the ship owner. Thus, besides addressing the availability of resources to manage the contracts, the contracts have to be thoroughly read and understood by all the persons involved in managing the execution of the contract, starting at the commencement of the project. In the many shipyards, project managers have been elevated from production or engineering supervisory positions. While this is reasonable from a practical perspective, the project managers have to receive supplemental instruction and education as to how to translate the lawyerly language of contract agreements into practical procedures during project execution.

7. DESIGNERS' RISKS

Typically, the first contract within a shipyard project is between the prospective ship owner and a design consultancy. The owner approaches the consultancy with the requirements for the ship, the mission capabilities, and the desire to have it built rapidly and at low cost. Already we are beginning to see conflict of interest here, because the consultants do not want to be under pressure to do it rapidly since that will tend to lead to compromises in design, lack of thorough research and analysis of design alternatives. Nevertheless, the design consultancy and the shipowner come to an agreement which is formalised through a design services contract.

When a design organisation commences a project, they are usually doing so because there is a contract with the party that will be using that design to procure a vessel or complete some desired work on a vessel. That is, a contract of some form is the mechanism that is used to engage the services of a design organisation; and later a different contract will be the mechanism that is used to obtain the product (ship or conversion) that is based on that design. Inasmuch as there has to be complete compatibility between the design and the two contracts, it is important that design organisations understand what objectives have to be achieved in order to be, not only technically appropriate, but contractually appropriate.

Vessel designers must consider their obligations in addition to technical preparation of the design. The design is being undertaken because there's a contract (consultancy / owner). Later, the design will be implemented through a different contract (owner / shipyard). There may also be other intervening contracts. In some cases, due to the contractual arrangements, the initial designer may start to lose control of the design. The shipbuilder will be interpreting the ship designer's contribution to the contract -- the plans and specifications -- in accordance with the shipyard's definition of first-class marine practice. Since that definition includes the use of least-cost solutions, the designer will have lost control of the design through the contracting process unless the specifications and plans give the shipyard little choice in those areas that are important to the ship owner. Contracts are the mechanism to control the implementation and use of the initial design, so its important for the designers to understand how their design is going to be compatible with the contracts (Fisher, 2012).

Table 3. Designers' Challenges and Risks (examples)

• Multiple contracts, all consistent with one another, are needed to achieve implementation of a vessel design.
• The consultancy's specifications and plans have to be complete and suitable for use in contracts.
• The specifications and plans have to be suitable for quantitative translations during the shipbuilder's estimating and bidding process.
• The specifications and plans will be the basis for binding answers to many questions during execution of the shipbuilding contract.
• The designers have to ensure that the specifications and plans are wholly compatible and consistent with all the other elements of the shipbuilding contract.
• The ship designers will have responsibility, along with others on the ship owner's team, to timely provide information responses to all communications received from the shipbuilder.
• All information flow between the owner's team and the shipyard has to be planned by addressing content, form, format, timing and intended use of the information.
• Intellectual property rights have to be addressed before the transmittal of any design information.
• First class marine practice is not interpreted the same way by owner and shipyards.
• There has to be tight coordination between design organisations when several different ones are concurrently working to develop the detail design.
• The recommendation to incorporate a 'better' design feature must be based on a clearly defined criterion of what makes it better.
• A designer's responsibility has to include anticipated growth of the ship in future years.

One of the challenges of that design services contract is the definition of what the contract deliverables will be and, of course the schedule for those deliverables. Will

consultancy services continue during the vessel construction, or will the design be handed over to the owner and thereafter the consultancy no role in the project? Which party owns the intellectual property rights of the consultancy's design deliverables? These questions and many more have to be answered and agreed-upon in a way which is mutually acknowledged by the parties. Otherwise at some later time a dispute may arise as to whether the design consultants have control of the fulfillment of their design (i.e., detail design) and if it has to continue providing support services to the owner during ship construction (Fisher, 2018).

Normally ship designers are keen to learn how to improve their technical design procedures, and to identify concepts and ideas that can be incorporated into future designs for improvement in a vessel's capabilities. However, there are multiple non-technical aspects of a vessel designer's role as part of the process of going from conceptual design to delivery of the vessel and modification of the vessel many years into its lifetime. Those considerations present challenges and risks to the design consultancy, which challenges have to be appreciated by the owner's team, as well. Table 3 summarises a partial list of those designer challenges.

8. SHIP OWNERS' CHALLENGES

When ship owning organisations begin planning a major shipyard project (construction, conversion, mid-life refit, or repair), the planning process should commence by initially focusing on the pre-contract elements of the project. An excellent technical plan and an outstanding ship design will not guarantee a successful project if the rights, responsibilities and obligations of the parties are not well defined in the Contract Documents and effectively managed. For example, the absence of advance arrangements by the owner's team for a visa for an overseas technical representative caused a ship to remain out of service for several months. This minor oversight led to a major impact. (Remember that a ship is owned to provide a service; not to decorate the wharf of a shipyard.)

Owners have to be careful to avoid a fundamental mismatch between the technical requirements of the contract and the current capabilities of the shipyard. A shipyard's historic accomplishments may be less meaningful when there has been a turnover of project and supervisory personnel or when the shipyard has experienced a lengthy loss of continuous workload. Also, the condition of an existing ship being modified may not have been adequately assessed before the owner's team prepared the specification, later resulting in considerable contract growth.

9. SHIPYARDS' CHALLENGES

Similarly, when shipyards are considering taking on a new project, they have to be careful about the assumptions being made when "translating" the owner's bid package into a fixed price within a fixed schedule. There are potentially numerous pitfalls awaiting the over-anxious or over-confident shipyard. Shipyards anxious to maintain revenue streams may take inappropriate risks, leading to financial difficulties and sometimes an inability to complete the project. New building projects often are based on expected, but not yet routine, technological accomplishments. The shipyard may become obligated to purchase equipment with longer lead times than anticipated. The shipyard may not be familiar with the installation and testing requirements of the newer technologies (especially electronics) required by the owner.

There are many opportunities for shipyards to incur far greater costs than anticipated or included in the fixed price, fixed schedule contracts. A shipyard's insufficient budget allowance for collecting and using data during a project can be disastrous to the bottom line. For example, by neglecting to monitor steel temperatures when applying external coatings to a new VLCC, new coatings had to be applied twice over the entire hull after removing defectively applied coatings.

10. MOST COMMON CAUSES OF PROBLEMS

Ship-owning organisations rarely provide sufficient resources and lead time to prepare the technical specifications and drawings that are central to the project. As a consequence, either (a) the owner's organisation finishes defining what it wants from the project after the project has already commenced at the shipyard, or (b) the shipyard and the owner find that the relevant conditions aboard the ship are far different from those assumed when preparing the repair or conversion specification, or (c) the owner's organisation changes its mind about what it wants after the project has commenced (Fisher, 2004). Also, owner-furnished equipment ("OFE") is almost always a basis of unexpected costs and schedule impacts.

Shipyards, too, often set themselves up for problems and costly challenges when they bid a job with insufficient investigation and analysis of the bid package (specifications, drawings and the draft contract). Often the estimators give unrealistically low values of labor hours and other cost components because they are thinking too competitively, or they are not familiar with the new-technology aspects of the project. The purpose of the estimate is to give shipyard management the most likely number of engineering and production hours, subcontract costs and material costs. Shipyard management will then make the competitiveness versus risk assessment to determine its bid. However, if the estimators already shaved their numbers to be competitive, management's bid will be skewed too low to be profitable.

Also, when shipyards bid for work that is different from other recently completed jobs, they tend to think there are only small differences that they will be able to work out in process, not realising that the subtle differences in vessel

design will have major productivity and cost impacts. Further, when commercial shipyards bid for work from a public entity, they almost always significantly underestimate the massive amount of documentation and owner oversight that will become a very costly and delaying component of the project, unlike that of most commercial jobs.

11. ORDER OF TECHNICAL CHALLENGES

Nearly every shipyard project today is essentially an undertaking of cables and the equipment to which they are attached. The installation, connection and testing of cables and connected equipment for electronics, control, alarm, and monitoring, as well a power distribution, are the single biggest challenge of any such project. HVAC system installation and testing are the second biggest challenge. Following those two challenges are piping systems and mechanical systems. The next lower level of challenge is for outfitting. Development of the ship's structure, while large in manpower, is far simpler and less challenging than those other categories. The challenges of painting and coating are on par with the challenges of structure.

When detailed electrical design falls behind schedule, it is a bad omen for the project. When cable installation falls behind schedule, it portends costly and schedule-impacting challenges to the project. Thus, it is essential that both owners and shipyards aggressively address all of the tasks associated with the installation of any types of cables and the equipment to which they are attached: cable schedules, ordering, sequence of cable installation, component installation, individual testing, sub-system testing, system tests and ship trials. Also, don't ignore the possibility of electromagnetic interference between power cables and signal cables.

12. IDENTIFYING ALL CONTRACT DELIVERABLES

In ship conversion and construction contracts, the owner routinely expects the shipyard/contractor to provide numerous "deliverables" in addition to the ship itself and spare parts. Analyses of many "difficult" or conflicted ship conversion and new building contracts have revealed that ship owners often do not adequately address and define all of the expected deliverables, leading to conflicts or disputes with shipyards/contractors.

These deliverables may be any of: detail or working drawings, engineering analyses/reports, test agendas and reports, megger readings, condition-found reports, updated schedules, purchasing technical specifications, equipment selection reports, regulatory approvals, classification approvals, tonnage certificates, regulatory certifications, tank tables, weight reports, trim and stability reports, equipment and/or system manuals, placards, and as-built drawings, among others. Some of these deliverables are expected to be on paper only; others may be expected as electronic files, too (Fisher, 2018).

Ship owners need to appreciate that a shipyard incurs considerable, real costs to achieve production of all of those non-hardware deliverables. If the owner wants to avoid surprises and/or disputes, the necessity of the shipyard's development of those deliverables must be clearly addressed in the bid package. Without clear requirements for those deliverables in the bid package, bidding shipyards may not create adequate budgetary allowance to develop them. The owner then risks getting an incomplete or insufficient set of deliverables, or none at all in particular categories.

Qualified and appropriately experienced consultants should be used to review draft contracts (agreements, specifications, plans) for completeness and consistency as well as to eliminate ambiguities. One of the categories of items to be focused upon is identification, in the bid package and the contract, of all deliverables, including documentation, data and tangible items.

13. AMATEUR CONTRACTS: A CAUSE OF DISASTER

Ship construction, conversion and repair contracts developed by persons who lack substantial experience with the marine industry are the ones most likely to result in contractual disasters, in which the owner and shipyard clash over responsibilities, costs, schedule and vessel performance. The shipbuilding industry has encountered such contracts on a much-more frequent basis than might be imagined. These are contracts developed by persons who routinely deal with civil construction contracts or aeronautical/space contracts. Also, often a government transportation organisation (roads, bridges, buses) contracts for a ferry using the same form of contract it uses for roads and bridges. That makes such contracts 'amateur" relative to the special considerations that have to go into ship construction contracts.

The use of such amateur contracts almost always results in major disputes, requiring the assistance of "disaster-relief" professionals in the form of consultants experienced in "stabilising" the contractual performance of the parties to avoid post-delivery litigation. If contractual relations have deteriorated too severely, however, these amateur contracts may become the focus of post-delivery litigation, requiring both the specialised consultants as well as attorneys. It would have been far more cost-effective to use professionals skilled in shipbuilding contracts to develop the contract, rather than saving some costs at the commencement of the project and paying many times over for that mistake later.

14. GOOD SHIPBUILDING PRACTICE -- OBLIGATIONS FOR BOTH PARTIES

Many contracts for projects being executed in a shipyard include the requirement that all engineering services provided, all materials supplied and all workmanship accomplished are consistent with "Good Shipbuilding

Practice" ("GSP") or "First Class Marine Practice" or similar lofty-sounding principles. Owner's representatives often use that contractual requirement as a basis for pushing the shipyard to enhance the quality of workmanship, to modify initially offered design details, or to purchase alternative (i.e., more-costly) items of equipment or material. Many shipowners' representatives consider that obligation to be one-sided; that is, they perceive that it creates obligations for the contractor but not for the owner. That one-sided perception is, in fact, quite erroneous, and often is the underlying cause of disputes that arise during contract execution.

To appreciate the extent to which both parties to a contract are bound by the tenets of Good Shipbuilding Practice, a clear understanding of that principle is necessary. The several major elements of Good Shipbuilding Practice are shown in Table 4.

Table 4. Good Shipbuilding Practice

- The owner's Bid Package contains sufficient information for the contractor's quantitative translation for the amounts of resources sufficient to accomplish necessary engineering, purchasing, production and testing as unambiguously defined therein, with minimal assumptions having to be made.
- The Contract Documents include a clear definition as to where the owner's design definition rights end and the contractor's obligation to detail the design for production begins.
- The owner provides timely acceptances of drawings and equipment selections made by contractor (if required by the contract) and performs timely inspections based on the contractually defined standards of acceptability.
- The parties promote joint identification and cooperative resolution of problems arising from vendors, suppliers, errors, omissions and inconsistencies.
- The contractor timely accomplishes fulfillment of all contractually required objectives, including non-hardware deliverables, consistent with the contractually defined standards.
- The owner's team similarly accomplishes timely fulfillment of all its contractually-required responses to communications from the contractor.
- Purchaser accepts the vessel, or its modifications, as contractually defined (not as wished-for by its representatives).

In multiple instances, owner's representatives improperly have made demands of contractors beyond the written Specifications, asserting that the contractor had to fulfill those demands in order to comply with the contractor's obligation to use Good Shipbuilding Practice. This has occurred even though compliance with those demands has resulted in the contractor incurring extra costs and/or schedule impacts that the contractor claimed to be the responsibility of the owner.

The use of GSP is a procedural goal of nearly every shipbuilding contract. Since its use is one of the goals of shipbuilding contracts that are executed by two parties (purchaser and contractor), it is appreciated that both parties have expectations of benefits arising from its use. Also, however, when the elements of GSP are examined, it is realised that the development of GSP is dependent on a contribution by both parties through achievement or fulfillment of their respective obligations and responsibilities. That is, the achievement of GSP is not solely the responsibility of only one of the parties.

Accordingly, it can be appreciated that GSP begins during the formation of the shipbuilding contract. It starts with the purchaser developing a well-defined objective of the shipbuilding process, using specifications and plans if it is not a standard design vessel offered by the shipbuilder. Typically, not all details of the vessel that have to be developed for its construction are described by either design or performance specifications and drawings at the time of contract formation; those details have to be developed after the contract is executed. During contract formation the Purchaser has the opportunity to decide which party will be responsible to develop those details. Then, after contract execution, both parties must keep in mind the assignment of rights and responsibilities regarding the development of those details.

The owner's team's GSP-based obligations continue through the contract execution, requiring the owner to respond promptly to questions, to resolving ambiguities, and to recognising that the contract establishes both obligations and rights of both parties.

Although these Owner GSP-based obligations do not serve to reduce the Contractor's GSP-based obligations, the Owner's representatives have to remain mindful that the persons who prepared the technical requirements for the Owner ceded certain detail design development rights and equipment selection rights to the Contractor, for which minimum-cost solutions are an expectable goal of the Contractor. The costs and/or schedule impacts of such Owner-directed variations from those Contractor-selected solutions are a proper basis for contractual modification.

15. THE SCOPE OF THE CONTRACT DESIGN

The Contract Specifications and Contract Plans define the unique features of the vessel and other non-unique features that are not already addressed by the appropriate regulatory requirements and classification rules. Numerous details that are not already defined in the Contract Specifications and Contract Plans will have to be developed by the contractor after the contract is executed. The authority to make those additional decisions as to the form of the numerous details was passed from the owner to the contractor when the contract was executed. The owner's naval architects and marine engineers who are developing the Contract Specifications and Contract Plans must keep in mind that they will have yielded to the contractor the right

to make those decisions. The completeness, use, obligations and rights pertaining to "guidance" plans also should be contractually defined (Fisher, 2019).
Thus, if the exact form of any lesser details is important to the owner, the Contract Specifications and Contract Plans should describe them to an appropriate level of detail. If such details are not already incorporated into the Contract Specifications and Contract Plans, generally the owner will have to accept the contractor's solution to those details. The owner's staff should bear in mind that it is most likely the contractor will be seeking minimum-cost solutions to those technical details when working under a fixed-price contract.

Accordingly, it is realised that the owner has to decide in advance what features and details are to be defined and described by the contract documents, giving the contractor little room for variation from them, and which other features and details can be determined by the contractor. Once the contract is executed, the purchaser cannot unilaterally revoke the authority given the contractor to make decisions regarding those otherwise ill-defined features and details.

Also, of course, when making those decisions, the purchaser has to keep in mind that, under fixed-price contracts, the contractor will inevitably seek minimum-cost solutions that are otherwise consistent with the contractual requirements. This means that in developing a fixed-price bid for the vessel, the content of the owner-developed specifications and plans have to be amenable to being quantitatively translated into the expected cost components that the successful bidder will encounter.

A purchaser should not rely on requirements such as "first class marine practice" or "best marine practice" or other ill-defined phrases in order to ensure quality of material selection or quality of workmanship. Highly subjective requirements, phrased as those, are not conducive to quantitative estimating, and thus cannot be included in the price of the shipbuilding contract.

It should be remembered that, in soliciting bids or requesting pricing from a potential contractor, the purchaser is seeking quantities; quantities of production hours, material costs, subcontractor costs, facility and equipment costs, and schedule days. Accordingly, all aspects of the contract specifications and contract plans must be suitable for translation into such quantities. Broad concepts are not directly translatable into quantification prior to accomplishment of most of the remaining design development, and thus do not constitute well-defined specifications.

Accordingly, it is appreciated that for the fixed price and fixed schedule of the contract, the purchaser is entitled to receive only that which was quantitatively translatable from the specifications and plans. When the specifications require the contractor to comply with certain standards or incorporate features required by contractually identified standards or regulations, the contractor has to factor in the costs to achieve compliance with those contractual requirements, as well. But for the fixed price and fixed schedule, the purchaser is not entitled to receive the benefits of features, standards, methods or performance capabilities that are not unambiguously defined in the contract documents.

Nevertheless, in numerous contractual situations the contractor has been directed by the owner's representatives to provide features that were not quantitatively knowable at the time of bidding. Also, contractors are often directed to utilise the owner's more-expensive interpretations of contractual requirements instead of the lesser-cost solutions that the contractor incorporated into its bid for items that were ambiguously defined in the bid package.

16. A SHIP OWNER'S REPRESENTATIVE'S AUTHORITY

During the performance of a project at a shipyard, the vessel owner's team is likely to be called upon to make decisions in at least four areas: (a) technical content and workscope, including optional and necessary changes to the workscope; (b) project schedule; (c) project cost including timing of progress payments; and (d) legal issues. The extent to which the owner's on-site project team has the authority to make such decisions in each of those four areas varies considerably within the industry.

Often, some decisions are needed in a relatively short time in order to keep the project running more-or-less smoothly. This is especially relevant for ship repair and conversion. Some other decisions are not time critical until the project is about to be concluded. The maritime industry has experienced a wide variation of the assignment of those responsibilities to the on-site staff by the vessel's owner's senior management.

Many government contracts are subject to bifurcated project management in order to comply with the applicable government procurement regulations. Some government organisations allow the on-site technical staff to make only technical and schedule decisions, but the cost negotiations and cost decision-making are made by a separate set of contract specialists. A variation on that is to allow the government's on-site technical team the authority to make cost decisions that do not exceed a pre-defined limit.

In distinction to that arrangement, many commercial organisations give the owner's on-site team the authority to make all decisions that do not affect the project schedule or project cost more than some ill-defined but generous limits.

Of course, there are many other variations of the type and extent of authority given to the owner's on-site team. For example, typically for naval combatant vessels, technical

decisions affecting what that navy considers "configuration management" can be made only by the home office naval engineering staff; not by any on-site staff.
The assignment of the scope of authority that is given to a vessel owner's on-site staff has to be clearly communicated to that staff prior to the commencement of a shipyard project. The persons being assigned to that role should ensure that there is a clear understanding of any limits on their authority before they get to the shipyard to commence oversight of the project. The shipyard that is accomplishing the project would be wise to inquire of the extent of the authority wielded by the on-site staff in order to understand the expected durations of decisions when needed.

Some vessel owners appoint an outside organisation's project manager to oversee the project at the shipyard, with that appointed project manager requesting changes and amendments to the workscope as needed. But, as a negotiating mechanism, when it comes time to get paid by the owner's organisation, the owner's organisation states that it never authorised the appointed project manager to request that extra workscope. This places the shipyard in a challenging position when it comes time to get final payment. Shipyards can address that commercial risk in advance by getting the contract to clearly state that the owner's organisation will bear all responsibility to pay for work that is requested in writing by the outside project management appointed by the owner's organisation.

During a conversion or repair project, it is typical for a shipyard to submit to the owner inspection-condition reports as defined by the contract. At times, the shipyard also requests change orders to address problem reports identifying unexpected conditions aboard the vessel or delays in receipt of owner-furnished equipment. From the outset of a project, the shipyard needs to know what turn-around times from the owner (in the form of notices to proceed) it can rely on in response to those shipyard submittals. Those times are often identified within the contract or negotiated at the project kick-off meetings. When dealing with government organisations, however, it is common to see the owner (i.e., governmental organisation) unable to achieve timely turn-arounds due to the need to get approvals from multiple sub-organisations (Fisher, 2006).

The many variations of decision-making authority that a vessel owner's on-site team may have indicates that there is no industry standard that can be cited as the expected basis of assignment of authority for content or timing. Any assumptions made by either the owner's on-site staff or by the shipyard as to the assignment of such authority constitutes a risk of mis-understanding that may later affect project execution. For these reasons, among others, it is best practice to minimise business and technical risks by having these matters addressed in writing prior to commencement of the project work.

17. THE FALSE "ATTRACTIVENESS" OF PROJECT MISMANAGEMENT

Project mismanagement is not the same as poor project management. It is the substitution of hopes and prayers in place of solid analyses and thorough engineering. Thus, it creates risks with consequences that can be fatal to the execution of a shipyard project. Simply stated, mismanagement of any one topic, no matter how small, can completely destroy the economic benefits of the project for either or both the owner and the contractor (Fisher, 2020).

Initially, mismanagement is erroneously disguised as a problem-solving opportunity. Poor project management means that the project will eventually be achieved but at greater cost and longer schedule than otherwise accomplishable. But mismanagement takes the project in the wrong direction, introducing seriously flawed decision-making, which later necessitates either a reversal of direction or far greater cost and schedule corrections. Mismanagement masks itself as a decision to help resolve a project's problem. But in reality, it is not a decision; it is only an expression of hope, such as, *"This should work out satisfactorily, I think."*

Project mismanagement usually starts when an organisation offers a very attractive solution to a problem that has arisen in an area beyond its original purview. It appears that the problem will be resolved if the project managers simply re-assign responsibility for resolving the problem to a different entity than originally had that responsibility. This usually is a very attractive proposition — it is thought that the problem simply will go away if the project managers assign responsibility to the entity that is offering to resolve the problem, albeit at some additional cost. When project management is already stressed out by multiple problems, the opportunity to see one of those problems easily resolved is welcome relief. It is offered as a clean, efficient, effortless means of resolving the problem that has arisen in the project. However, often it doesn't work out that well. In the haste to get the problem resolved, the 'problem solver' is retained without thorough analysis of that organisation's experience and capabilities. That is, optimism is not a substitute for research and planning.

18. RESOLVING DISPUTES QUICKLY AND COST EFFECTIVELY

When ship owners' inspectors examine the work accomplished, materials supplied and schedule achieved by a contracting shipyard, disputes may arise focusing on the issue of whether the contractual obligations have been satisfied. The most cost-effective resolution of such disputes is a management-to-management discussion, but sometimes that is not sufficient. At that point, a quick, cost-effective non-binding mechanism can be used to perhaps get the parties to come to an appropriate resolution.

Of course, those management-to-management discussions should start by remembering the universal answer to every question that arises during execution of a shipyard project, namely, "Let's read the contract and see what is says about this particular subject."

If that does not resolve the dispute, the next mechanism is to bring in a third party whose opinion can be respected by both parties but is not binding on either. Following joint discussions with both parties and a review of the contract, the independent third party advises that, if a recommendation had to be made, it would be in favor of [shipyard or owner] for reasons that are then explained by the independent person, strictly relative to the contract. (This also applies to subcontract situations.)

While that recommendation is not binding, it forecasts the more-likely outcome if the issue went to trial or arbitration. At that point, the parties may be able to come to an agreement that may not meet the initial demands of the parties.

Two very important bits of advice, however, regarding the selection of that independent third party: First, do not select a person who has had ties to either organisation (there may be some residual favoritism or adversity). Second, do not select a classification person, because classification personnel are not used to reading contracts developed by other parties; they read their own Rules and make determinations if proposed technical items reasonably comply with their own interpretation of those Rules. In this situation, the independent third party is being asked to opine relative to a strict reading of the contract. This is not a criticism of classification personnel – they perform their duties per their terms of reference, namely, the classification organisation's Rules. But in this instance, the third party should be one who has expertise in reading and understanding the contract, not classification Rules.

19. FINAL CONSIDERATIONS

The above discussions cover too much scope to be summarised. Instead, the following points are offered to assist the reader in remembering some of the more-subtle points of these discussions.

- Optimism is not a substitute for research and planning.
- Mismanagement of any one topic, no matter how small, can completely destroy the economic benefits of the project for either or both the owner and the contractor.
- Remember the purpose of a contract.
- Success is dependent on having appropriate staff.
- Resources have to be given adequate time to achieve their professional standards (haste makes waste).
- Excellent designs get compromised by insufficient contracting strategies.
- A test is a test – something might go wrong. Plan accordingly.
- Hope and prayer are never an adequate substitute for thorough engineering analyses.
- Nearly every shipyard project today is essentially an undertaking of cables and the equipment to which they are attached. For many ships, everything else is to support those systems.

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