

# MDC ADVISOR

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## Shipyards: Dealing With Disruption Claims

by: Rod Findlay  
MDC Project Manager

Shipyards building or repairing ships operate in a very complicated marketplace where costs are carefully monitored. Often *claims* are submitted requesting additional costs above the stated contract amount because problems beyond the shipyard's control resulted in *disruption* of their as-planned flow of work. All too often, the alleged problems follow a pattern that becomes apparent when analyzing such claims. Common allegations of disruption include excessive owner changes, delays in approving changes, late responses to inquiries and problems, defective design, late or defective information or equipment supplied by the owner, and over-inspection. Such allegations form the basis for requests for equitable adjustments, claims, and lawsuits. However, many claims overlook problems that may be the *responsibility of the shipyard* such as underbidding the costs, rework due to poor performance, management and planning inadequacies, detail design errors, procurement problems and labor difficulties.

### Changes

Changes to the bid scope of work may originate from several sources. Particularly in defense contracts, *changing technology* may require modifications to the original design. For example, advancements in electronics and communications may occur so rapidly that a three to six-year contract may involve several



changes due to technological advancements. Regulatory agencies may also generate *changes in requirements* as their improved standards normally apply at ship delivery. There are at least two important regulatory bodies unique to shipbuilding — the American Bureau of Shipping (ABS) and the United States Coast Guard (USCG) which regulates safety, ship design, the ocean environment and other maritime concerns. Their revised regulations are often the source of contract changes and disputes.

To deal with such changes, most ship construction and repair contracts contain clauses providing for the methods of pricing and implementing changes. Often the effects

that individual changes have on labor costs and productivity are negotiated and resolved as part of the normal contract administration. However, the shipyard may allege that the price adjustment for the labor productivity losses due to an individual change order (*local disruption*) is inadequate to compensate for the overall effect of numerous change orders (*cumulative disruption*). Shipyards may also claim that there were changes in excess of what could be reasonably expected, straining the available labor pool and putting the planned work flow into disarray. Even for ship repair projects where the contracts may anticipate growth of more than 100% due to "open and inspect" work, allegations

of productivity losses due to cumulative disruption are not unusual. (See *Primer* article on page three).

Another common dispute by shipyards relates to the time required to approve pending change orders. It is often claimed that *excessive time* to process changes results in disruption and labor inefficiencies not compensated by the change order price.

Several matters may entangle evaluation of changes: an extremely complicated change requiring a lengthy scoping effort; widely differing cost estimates between the shipyard and the owner; a large number of changes "in the loop" at once; disagreements over the impact of changes to the program schedule; and the need to increase the overall program budget or alter the ship delivery date.

#### **Design Problems**

Shipyards frequently argue that numerous changes and performance cost increases are the result of problems with the ship's design as provided by the owner. Shipyards may allege that the design contains errors, ambiguities, conflicts with other requirements, or fails to provide enough information or detail to allow adequate price or schedule analysis. Often in developing a new class of ships, the shipyard is engaged to design the first ship based upon the performance criteria established by the owner, and then to produce a specified number of units. The design developed by the original shipyard (the "lead shipyard") is then the basis for the contract documents for the construction of additional ships by a "follow-on" shipyard. It is not unusual for the follow-on shipyard to submit a claim for *defective design* developed by the lead shipyard although the lead shipyard constructed the first ships without a similar claim. In more than one instance, when the shipyard served as *both* the lead and follow-on, it submitted claims based upon deficiencies in its own design passed on as contract documents for the follow-on ships.

#### **Late Responses**

During performance of a new construction or repair contract, the shipyard may have inquiries concerning problems, details, and ambiguities

found in the contract documents. If the responses to the requests are not timely, the shipyard may allege that its performance was disrupted and its costs increased. *Timely responses* and an agreed to goal for response time may have prevented or reduced such costs.

#### **Over-Inspection**

New construction or repair work is subject to ongoing inspections and special reviews at stated milestones such as dock and builder's trials. A common complaint by shipyards is that the owner's inspectors imposed a *stricter standard* of inspection than required by contract or industry practice. Constant interruptions by inspectors and the processing of additional documents allegedly disrupt the productivity of the shipyard's work crews.

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#### **Late Owner Furnished Items**

Commonly in ship repair or new construction work, the owner agrees to furnish the shipyard with items of specialty equipment and related information. If the equipment is delivered late or defective, the shipyard may claim disruption and delay. Similar claims may arise, particularly in the design effort, if the relevant information is inadequate or tardy.

#### **Impact of Claimed Problems**

The impact of the possible disruptive events described above varies

both in scope and severity depending upon the timing of the event and the shipyard's program status. A shipyard with financial or scheduling difficulties may claim a full range of impacts. Loss of labor productivity may be claimed due to the following: required overtime and the associated inefficiency; dilution of effective management by the craft supervision; inability to obtain necessary craft talent; doing work out of the most effective sequence; congested work areas; and inability to use advanced outfitting techniques. The list of potential impacts on the productivity of the labor force includes several other theories, depending upon the project and the creativity of the shipyard.

#### **Costs and Damages**

A shipyard's calculation of the alleged costs and damages from disruptive events often *lacks exactness* and the itemization found in change order back-up. (See *Casenote* article on page 6). This may be due to the difficult nature of determining the impacts with scientific certainty and mathematical precision, or from the difficulty in determining costs with proper record keeping during construction. Frequently shipyards resort to the use of formulas and factors. For example, one publication that was originally intended to assist in *forward pricing* of change orders has been used by shipyards to calculate damages on post-contract claims. Entitled *Guidelines on Factors Influencing Cost for Forward Pricing Change Order Disruption, Delay and Cumulative Effects*, NAVSEA 0283, this publication was based on a study of the application of statistical methods for determining damages for a variety of disruptive events.\*\* Known in the industry as the *Factor Formula Method*, impacts are quantified by factors based on the type of ship, number of trades affected, number of compartments impacted and the timing of the change. Each alleged disruptive event is assigned a factor multiplied by the number of direct labor hours involved in the change order to obtain a price for the disruption.

To our knowledge, use of this approach has not been successful in litigation. There are at least three major problems with the use of such

factor formulas in claims and at trial. First, the factors are not based on the actual performance data for the particular contract, and may not be relevant to the specifics of the claimed impacts. Second, the statistical background for the factors may not be reliably established for litigation purposes. Finally, where agreements between the shipyard and the owner allow factors to be used for forward pricing change orders, the agreements often specifically prohibit the use of formulas in claims or litigation.

As an alternative to the factor formulas, labor efficiency variations may be determined by analyzing the detailed labor records for the contract during specific periods and in distinct locations. For example, labor productivity, measured by *labor costs/units produced*, can be compared for periods of time not subjected to disruptive events against periods affected by disruptive conditions. Difficulties in using this approach may arise if there are no distinct locations or time periods that are unimpacted to compare with the allegedly impacted periods. Other problems arise if there are too many disruptive events or inadequate records concerning the labor hours, activities, or the disruptive events.

#### Conclusion

The maritime industry is highly competitive and cost-conscious which may be the reason for the frequency of disruption claims. Because these disputes are common, they will likely be subject to increased scrutiny. In particular, the approaches used in calculating the alleged labor disruption losses may be challenged with increasing vigor. For both shipyards and owners, good record keeping is important to resolve labor productivity claims. ■

*\*\* To receive more information about NAVSEA Publication 0283, call Rod Findlay at (215) 656-2617, or write to him at MDC Systems, 1818 Market Street, 14th Floor, Philadelphia, PA 19103-3672.*

## CONTRACT PRIMER

### Shipyard Contracts: New Construction vs. Ship Repair

Contracts for the construction of new ships have many key differences from contracts for ship repair. The most obvious difference concerns the type of work (new versus repair) but other important differences exist concerning the nature and extent of changes, scheduling, engineering and contract claims. Attorneys and others involved in contract administration and dispute resolution need to understand these important differences.

#### Changes

Contracts for ship repairs are subject to extensive growth. The scope of work on repair contracts often includes a combination of detailed "upgrade" items and generally defined "open/inspect" work. The exact work content of the open and inspect items may not be known until the repairs have begun. Disputes may then arise concerning whether the items are included in the base contract. To price these items, repair contracts provide for unit prices and stipulated labor rates. For example, additional repairs may be priced by multiplying stipulated labor rates times the negotiated hours. Such provisions reduce pricing disputes.

In recent years new ship contracts have been awarded on the basis of a fixed price or fixed price with incentives, without anticipated additional hours and unit prices. However, change orders on new ship construction are frequently the result of technology advancements and regulatory revisions that occur during the design and construction period (See *Lead Article* on page one). Change order disputes often involve delays in approving and processing the changes that in turn may delay the new ship construction.

#### Schedules

The performance of both types of contracts involves expensive shipyard facilities and equipment that are often several times the facilities costs for building construction. One strategy to reduce the shipyard facilities cost is to reduce schedule durations by intensive staffing or subcontracted labor.

Ship repairs are often more labor intensive and of shorter duration than new ship construction. For example, many ship repair projects are done in less than 90 days with an expenditure of thousands of labor hours on a daily basis. Activity durations are labor critical, that is, the primary driver of ship repair schedules is craft loading. This may be why claimed damages in ship repair contracts tend to focus more upon labor disruption than delay costs.

Schedules for ship repairs generally have few logic ties, usually contract milestones such as complete machinery space, light-off electronics and weapon systems. Many activities take place aboard concurrently, and shipyards may allege that any changes or delays by the owner impact labor hours and time of performance. Another key scheduling challenge is to integrate the defined upgrade work with the unknown open and inspect items. In essence, ship repairs amount to work order scheduling, rather than project scheduling.

For new ship construction, the durations are longer and labor hours may be peaked for certain time frames and activities rather than maintained throughout performance. Repetition of production activities may be one key in reducing durations and labor hours. Shipyards often claim that owner disruption to repetitious activities both delays the completion date and increases the number of labor hours.

Network schedules are often maintained for new ship construction focusing upon both logical sequences and labor staffing. New ship construction milestones include keel laying, launching, and trials. Distinct tasks such as design activities, procurement, shop work, modular construction and outfitting are sequenced to allow effective schedule performance.

### Engineering

On new ship construction contracts, *detailed design* engineering is often not complete before the actual construction begins. A certain level of design may have been done by a naval architect on *performance criteria* or by the *lead shipyard* responsible for engineering and building the first in a class of ships. Subsequently more detail design engineering is often the contractual responsibility of the shipyard constructing the *follow-on ships*. This allows the shipyard to focus on producibility in the detail design to the specific shipyard as a way to reduce the costs of building the ship. Successful performance of new ship construction contracts may depend upon the adequate budgeting and availability of an experienced *design engineering* department to perform detail design. This is often a source of problems and disputes on new ship construction contracts.

On ship repair contracts, shipyards provide more *field engineering* than *design engineering*. Because the exact number of open/inspect items is not identified until the work has begun, an extensive field engineering effort may be required to coordinate and implement the necessary repairs. Disputes often arise concerning timely action and response to the discovered conditions.

### Modularization

For new ship construction, most shipyards "prefabricate" systems such as piping, HVAC ducts, outfitting steel or aluminum fabrications and electrical distribution. Many of these systems involve construction and outfitting of *modular units*. This may involve subassembly and modular assembly before on board final installation. Shop "throughput" is frequently critical for timely completion of new ship construction. Delays in the shop may be areas where shipyards contribute to program delays.

For ship repairs, use of modular units is limited due to the inability to install modules in the existing ship. However, *pallets* of work may be devised in shops for piping, sheet metal, and electrical items. Also, repair shipyards establish *process lines* in shops and designate areas of ships as *zones* for particular work (mechanical, electrical, etc.).

Otherwise modular ship units are not used for ship repair projects except in major upgrades where large portions of the ship are replaced.

### Conclusion

There is a difference between the types of claims and disputes on new ship and ship repair contracts. These may be the result of the kinds of changes, the extent of undefined work, schedules, performance time, engineering, and production techniques used in performing the work. Both types of contracts are often subject to claims and disputes, particularly when awarded on a fixed price basis. ■

### Casenote continued from page 6

sonable approximation of the damages according to the *jury verdict method*.

Because the shipyard had not tried to apportion delays between itself and the government, its claimed total costs were deemed unreasonable. Further, without adequate proof of delay or disruption there was no basis for the board to approximate the damages. The board stated that the "critical path is crucial to the calculation of delay damages" and noted that the shipyard "provided no critical path information, or made any attempt to show how the alleged delays impacted the overall job completion date." Implied in the board's decision is that if there were reliable proof of *causation* of delay and disruption, boards may attempt to *establish damages*. For example, a detail disruption analysis of areas impacted by the changes may have persuaded the board of causal link between the IDRs and the claimed damages. (See lead article).

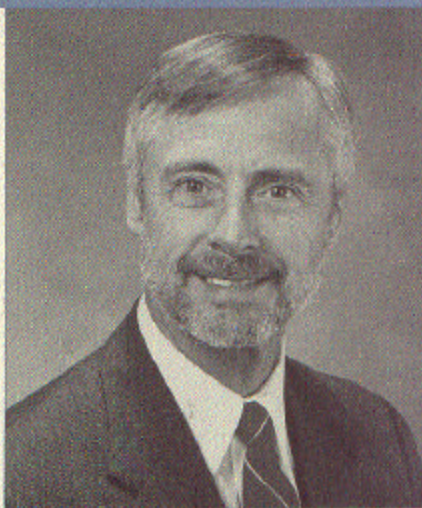
The *Southwest Marine* case is a clear indication to shipyards that it is not enough to rely on the issuance of numerous change orders to prove delay or disruption. Focus on *liability* to the exclusion of *causation* and *damages* will be fatal to recovery. ■

Comments concerning this casenote may be directed to Barry Bramble, MDC's vice president, at (215) 656-2609.

## Announcements

MDC Systems relocated its Philadelphia-area office to center-city Philadelphia at 1818 Market Street, 14th Floor, Philadelphia, PA 19103. We will be rejoining other Day & Zimmermann business units in Philadelphia, providing more synergy with the engineering and other professional staff.

MDC Systems provides assistance in analyzing and resolving disputes on a variety of contracts including shipbuilding, engineering, construction, manufacturing, procurement, defense and software. ■



Rod Findlay joined the professional staff of MDC as a Project Manager, specializing in the analysis of contract claims on shipbuilding, defense procurement, and ship overhaul and repair contracts. Rod has over thirty years experience in the shipbuilding industry in engineering, management, manufacturing and testing.

Rod's experience has been with both Government and commercial contracts and has a background in dealing with all the agencies that shipyards deal with including the U.S. Coast Guard and the American Bureau of Shipping. The direct involvement with Government and commercial owners has provided the requisite background to quickly assess the claims made by shipbuilders. ■



Harold A. Massa, P.E., was recently named president of MDC Systems, the construction management division of Day & Zimmermann International, Inc. Hal has been with DZII for fourteen years serving as the construction executive on several major projects and as the expert witness in significant construction litigation before federal courts and agency boards. He retired as a Lieutenant Colonel in the U. S. Army Corps of Engineers, and most recently was a senior vice president for D&Z Transportation Services. ■

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## Casenote

**Ship Repair Contracts: Proof of Delay and Disruption**

by Barry B. Bramble,  
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Appeal of Southwest Marine, Inc.,  
ASBCA No. 36854,  
95-1 BCA (CCH) ¶ 27,601 (1995).

A recent case before the Armed Services Board of Contract Appeals underscores the importance of providing proper proof of delay using critical path schedule analysis and detailed inefficiency assessments of disruption in ship repair litigation.

In *Southwest Marine*, the shipyard was awarded a Master Ship Repair Agreement for an amphibious cargo

ship, which included alterations and installation of various electronic systems. The work was to be done in only 53 days. During performance, the contractor submitted numerous Inspection Deficiency Reports (IDR) to identify alleged problems with the contract drawings, information or material furnished by the Navy. Many of the IDRs became the basis for bilateral modifications. The Navy issued 130 formal changes that increased the contract value by nearly 30% and extended the time of completion by sixteen days. However, the shipyard filed a claim for delay and disruption for approximately 20% of the original contract amount that was denied by the contracting officer.

In litigating its case before the board of contract appeals, the shipyard focused upon 67 IDRs, detailing the specifics of numerous problems, interferences and conditions to show liability. But causal links between the 67 IDRs and the alleged impacts of delay and disruption were not adequately demonstrated to the board. Proof of delay and disruption was

based primarily upon testimony about changed work sequences and the need to prepare IDRs. The shipyard did not provide critical path analysis, did not show that the Work Items in question were critical to the schedule or demonstrate how the problems impacted the overall completion date. No details were provided on how the problems resulted in lost labor productivity. In the claim, the shipyard estimated inefficiency at a 75% factor, but even this was not used at trial. In summary, injury or loss was not proved.

Further, the shipyard did not provide adequate proof of the amount of loss, or costs due to the alleged delays and disruptions. No contemporaneous cost records were kept and even after-the-fact reconstructions were not offered at trial.

Instead, the shipyard merely produced evidence that it had expended 80% more labor hours on certain tasks. The shipyard asked the board to calculate the damages on a total cost basis or to award a fair and rea-

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