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Breaking the Chains of Tradition and Fantasy - A Revolutionary Approach to the Constraints on Productivity

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IIA-2

ABSTRACT

Productivity improvement is becoming an ever more crucial agenda item for the U.S. Shipbuilding Industry. Initiatives to improve productivity in U.S. shipyards have traditionally taken the form of piecemeal efforts to increase capability and capacity through technological upgrades of production methods, facilities, tooling, and machinery. In spite of the fact that those initiatives have been successful in eliminating many of the physical constraints of productivity, a broadening productivity gap with foreign competitors places U.S. shipbuilding in a noncompetitive position in the international commercial market.

The continuing failure of technological initiatives to narrow the productivity gap does more than suggest that additional measures need to be taken. It strongly indicates the presence of productivity constraints which exist beyond the realm of technology. In fact, one of the most valuable opportunities currently available to U.S. shipbuilders may exist in the realization that many of the constraints limiting productivity in shipbuilding are actually self-imposed, arising from traditional management and organizational policies which run counter to the new and changing realities of modern industry.

INTRODUCTION

At the 1990 Ship Production Symposium in Milwaukee, Professor Ernst G. Frankel, Massachusetts Institute of Technology, presented a paper entitled, "The Path to U.S. Shipbuilding Excellence -- Remaking the U.S. into a World Class Competitive Shipbuilding Nation." Based on a critical assessment of the status of U.S. shipbuilding in perspective of the international commercial market, the salient message was a call for "radical change in the way U.S. shipbuilding is organized, managed, operated, and does business." To reinforce the rationale and urgency

of that message, it would be useful to review selected portions of Professor Frankel's presentation:

"Lack of access to or availability of technology is therefore not the reason for the continued lack of improvements in U.S. shipbuilding competitiveness and productivity. Labor productivity in terms of manhours per unit of output is only 40% of that achieved in Japan, and 82% of that of Korean yards. U.S. shipyard overhead costs, which include administration, inventory, underutilization, and other costs, are significantly higher than those of comparable yards abroad even though most U.S. yards have access to advanced manufacturing management technology..."

"It requires learning from the past and designing for the future, and focusing on shipbuilding as an integral manufacturing system. Piecewise technology adoption to solve narrow or parochial problems so prevalent in the recent past have often caused new and sometimes more serious problems. This approach must be replaced by new collaborative methods in which product and process technology is developed and effectively used by cooperation among clients, shipbuilders, workers, suppliers, and government or regulators. This will require breaking down of barriers of mistrust which invariably led to adversarial relationships between clients and shipbuilders; shipbuilders and suppliers; shipbuilders and regulators; and, shipbuilding management and workers."

"Most essential is the improvement of U.S. productivity...Productivity in U.S. yards is affected by several historic, institutional, and structural factors...The different causes

and their contribution to low yard productivity and competitiveness (or high cost of production) are:

1. casual labor practices and high labor turnover;
2. ineffective marketing, customer communications, long shipbuilding lead time, and customer control over design and certain procurements;
3. ineffective, nonresponsive, hierarchical organization and management structure;
4. comparatively low level of education and training of workers, staff, and management;
5. lack of effective operational integration and intra labor as well as labor-management communications and cooperation;
6. inadequate yardwide strategic planning of technological change or piecewise technology introduction
7. ineffective procurement and inventory management
8. lack of total quality management
9. restrictive union practices, such as work rules, seniority systems, and opposition to technological change, or changes in work procedures;
10. lack of effective design/production integration or design for producibility;
11. short horizon management;
12. lack of discipline, loyalty, and commitment by staff and workers."

THE PRIMAL SCENARIO

Professor Frankel's words prompt questions such as, How does work really get done in U.S. shipyards? Do ships get built as a result of a shipyard's formal systems, or in spite of them? The standard company answer would probably be that the engineering function designs the ship; the planning function defines and schedules the entire construction process; the procurement function prices and purchases the material; the warehousing function receives and stores the material; the production functions build the ship; the human resources function acquires and maintains the workforce; the quality assurance function assures quality workmanship and compliance to contract specifications; the contracts administration function interfaces with the customer; the marketing function bids new contracts; the data processing function supplies all functions with needed information; the facilities

function maintains buildings, machinery, and equipment; and the accounting function monitors the performance of all other functions.

At the peak of the organization, the executive command and control center directs a hierarchy of management and supervisory personnel engaged in deploying workers and holding them accountable for cost and schedule performance. It should be noted that several variations of organizational structure have evolved in other industries, but U.S. shipyards have essentially remained oriented toward a military hierarchy of centralized functions with vertical chains of command.

On the surface, everything appears to be neat and orderly. With all functions effectively pigeonholed and even some standard operating procedures in place, employees should have a clear idea of what they have to do and when, where, and how they must do it. Below the surface, however, a differing view of reality displays a disjointed manufacturing process lurching out of control as emergent fires burst into flame. Witness the Primal Scenario...

The engineering staff is rushing to pump out drawings that have fallen behind schedule. Why? The reasons are now being brainstormed by engineering department managers and supervisors in a hastily called meeting to prepare for an anticipated executive inquisition. The brainstorming concludes with the following results:

1. Insufficient manpower because of the executive hiring freeze on all support departments;
2. A continuous stream of customer change requests;
3. Late VFI (vendor-furnished-information) due to the material procurement department being behind schedule;
4. A design subcontractor who developed drawings in the wrong sequence;
5. CAD (computer aided design) operators that are not yet fully trained; and,
6. Some troublesome technical specifications that somehow went unnoticed in the bidding process.

The good news is that a prior executive directive to dissolve the drawing review team to make more draftsmen available has enabled engineering to make rapid schedule recovery.

The same type of emergency session is occurring within the departmental walls of material procurement. The following strategy is being developed to appease executive management. Purchasing appears to be behind schedule because engineering has been late in developing technical

specifications and because vendors are generally becoming less and less responsive to the shipyard. The good news is that schedule performance is not as bad as it appears, because the schedule is wrong. Many material items are simply not needed as early as dated in the schedule. Even better news is that during the past year, several new vendors have been found with lower prices, therefore the shipyard is now realizing substantial savings in material cost. Permission is requested to hire three more expeditors to put additional pressure on vendors.

Strong executive displeasure with unfavorable cost and schedule performance in the production trades has been flowing down the chain of command for quite some time. Stricter measures have been taken to hold the trades more accountable for their performance. Accounting has issued a doomsday report to executive management. A top secret executive session will be held tomorrow and, this time, heads will roll. That news has placed production department heads and supervisors in varying states of frenzy and fear. How can we stay on schedule if drawings and material are late? Or worse, what if we have to rework half of what we accomplish because of drawing errors? Or worse yet, do they know that the cheap new material they've been buying lately more than triples our hours on some jobs? What good are meaningless schedule dates and work order estimates? Don't they realize what this mess does to morale? It's hard enough to get people to work when things are going right. Who's in charge of this place, anyway? Don't they see what's going on?

Production workers sense their bosses' frustration, but react with indifference. Long conditioned by the fact that their thoughts and ideas do not count for much in the shipyard, work has become an activity of "doing time" in order to earn money to finance the rest of their life. Their priorities are dominated strongly by activities and pursuits outside of the shipyard -- a place where the thoughts and ideas of working men and women still count for something. They feel little sense of loyalty to the shipyard, because the shipyard belongs to other people -- the people who own the business and the people who run the business.

The prevailing attitude of the workforce becomes one of: "Who cares? Why should anyone care? The more you do, the more they expect. If they fire me, they fire me...I was looking for a job when I found this one...It all pays the same..."

In viewing the stark and unpleasant Primal Scenario, the most telling setting is a shipyard celebration of the completion of a contract. The congratulatory and appreciative executive rhetoric

is sincere, but rings hollow as it falls upon the cynical ears of an alienated workforce. In the final analysis, who can blame them? They are only responding to the manner in which they are treated.

ESTABLISHING A FOCUS

In viewing the Primal Scenario in perspective of Professor Frankel's twelve causes of low productivity, a clear picture of the paralyzing dilemma which is plaguing U.S. shipyards begins to emerge. There seem to be so many problems of such magnitude that one hardly knows where to begin. The fact that other industries face the same dilemma is small consolation. The fact that a vast array of glistening new manufacturing strategies and integrative software systems is being offered by waves of highly-polished consultants only adds to the confusion.

Perhaps a good place to begin is to look a little more closely at the list of twelve causes. Are they actually causes? It seems fairly obvious that each item contributes to low productivity, but why do the twelve items, themselves, exist? What is causing them? The situation is much like a person who is not feeling well. Is that person ill because of the symptoms being experienced, or because of the ailment causing the symptoms?

If we redefine the twelve causes as being major contributing factors to low productivity, but symptomatic of a greater ill, what do the twelve symptoms have in common? Two commonalities appear to be interwoven among the twelve contributing factors:

1. All stem from ineffective management; and,
2. All adversely affect the entire workforce.

Consider Dr. W. Edwards Deming's assertion that, "The biggest problems that any company in the Western World faces are not its competitors... The biggest problems are self-inflicted, created right here at home by managements that are off course in the competitive world of today. Systems of management are in place in the Western World that for survival must be blasted out."

It would be reasonable to conclude that many, if not most, factors contributing to low productivity in shipbuilding are directly attributable to deficiencies in shipyard management, but is that such an astounding revelation? (Shipyard workers have known this for years.) To break new ground, we must delve deeper to focus upon the specific characteristics of ineffective management, characteristics which are revealed in the nature and origin of shipyard organizational policies which are blocking the path to shipbuilding excellence.

PROBING HALLOWED GROUND

U.S. shipyard executives do not have enough time to spend on the issue of low productivity. The politico-economic ramifications of market demand, capital availability, a shrinking supplier base, rapidly advancing technology, foreign subsidies, labor relations, and environmental regulations represent formidable challenges in strategic planning; but there is not enough time for strategic planning, either. Too much of a shipyard executive's schedule is required to direct the battle against the emergent fires of the Primal Scenario.

Even if more time were available, however, it would probably not be spent in devising ways and means of improving productivity. That responsibility has usually been delegated to middle management and line supervision, because of a traditional misconception that productivity improvement hinges primarily upon the elimination of *physical* constraints in the shipyard. Middle managers and supervisors often perform well in addressing the physical constraints of productivity *within their own departments*, but are powerless when confronted with constraints imbedded in organizational structure and policy -- the exclusive domain of executive management. Managers and supervisors do not often question organizational policy, because that simply is not the way to survive, much less advance, in an authoritarian hierarchy of command and control.

Managers and supervisors act in accordance with the criteria by which their performance is measured: the ability to take orders; the ability to effectively command their troops in the accomplishment of assigned objectives; and loyalty to their superior. Even if they were so inclined, they are far too busy on the front lines of the firefight to have the time for philosophical pursuits. Every effort is made to contain and conceal the emergent fires. Whatever the cost, unfavorable attention must not be drawn to their own area of responsibility or to their superior in the hierarchy of command.

The irony is that even though U.S. shipyard executives have not recognized the opportunities inherent in questioning and changing basic organizational policies, they have not hesitated to experiment randomly with change, itself. Quite a number of concepts and methods have been explored, including: quality circles, profit-sharing, pay for performance, management apprenticeships, quality of worklife, integrated business systems, participative management, performance measurement, functional work teams, cross-functional work teams, job enrichment, suggestion systems, increased training, and improved communications.

Also explored have been the "quality" approaches of SPC (Statistical Process Control) and TQM (Total Quality Management); the "top down -- bottom up" strategic planning approaches of MBO (Management By Objective) and MOR (Management by Objective for Results); and structural analysis and design techniques such as IDEF (Integrated Computer Aided Manufacturing Definition).

The problem is that, despite all that has been considered and tried, results have been disappointing, at best. No shipyard has been able to break out of the pack and lead the way to international competitive stature. What more is needed? What more can be tried? The answer to those questions is not comforting. No procedure, tool, or program, *in and of itself*, is capable of boosting U.S. shipbuilding productivity into international competitive stature. Very little improvement is possible until shipyard executives finally realize that the most powerful productivity constraints in U.S. shipbuilding exist in the form of destructive organizational policies *which on/y they can change*.

THE CONCEPT OF RADICAL CHANGE

The key words of Professor Frankel's message of a year ago are "radical change." The concept of radical change is easily misunderstood. Radical change does not necessarily require drastic or extreme action, but it always requires the freedom to question. Radical is defined by Webster as being "of or from the roots; going to the center, foundation, or source of something; fundamental and basic."

Consider the fact that battling the daily emergent fires of the Primal Scenario has become a traditional, self-perpetuating source of futility and frustration. It is war without end, because the fires are only symptoms of deeper problems which go unresolved. The good news is that there is a way to end that war. It begins with realizing that *the discovery of just one false assumption at the core of a business problem eliminates the symptoms by resolving the problem*.

Just how much radical change is occurring in the way U.S. shipyards are structured, organized, and managed? Perhaps more importantly, how many shipyard executives feel compelled to run the risk of challenging tradition in order to bring about radical change? Is it realized that nothing short of radical change is required? Is it realized that U.S. shipyards are being held in bondage by powerful, destructive forces of tradition and fantasy? Is it realized that those forces obtain their power only from our reluctance to question?

Tradition is defined by Webster as “an inherited, established, or customary pattern of thought, action, or behavior.” Fantasy is defined in the sense of illusion, “the state of being intellectually deceived or misled.” There is no inherent risk in following tradition, but there is substantial risk in the blind acceptance of tradition; especially if that tradition is based on the deceptive illusions arising from false assumptions.

It is very difficult to overcome the inertia and incumbency of tradition in an environment where it is not realized that all facets of a tradition are nothing but precipitates of earlier changes. It is extremely difficult for a creative thinker to survive in a repressive environment which *enforces* unquestioning acceptance of tradition, rather than *allowing* the vigorous pursuit of new knowledge. Perhaps, it should be realized by those who resist radical change in shipbuilding that the risk of following a tradition based on the illusions of false assumptions is far greater than the risk of creating radical change.

THE CHAINS OF TRADITION AND FANTASY

Hierarchical organizational structure has existed for thousands of years in types of organizations as diverse as government, religion, and industry. It is a logical structure of authority which traditionally has been used by the “few” at high levels of the pyramid to control the actions of the “many” at lower levels of the pyramid. The dawn of an industrial era demanding major advances in flexibility and adaptability, however, has caused the hierarchical structure to come under considerable scrutiny and criticism. Inherent tendencies toward the centralization of authority and the distortion of information as it is communicated either up or down through the levels, have been recognized to be critical flaws resulting in functional rigidity, unresponsiveness, and inefficiency.

The Impotency Of Centralized Authority

Valuable lessons for industry are borne out in the successes and failures of contrasting types and styles of governments. Perhaps the most important lesson is the essential weakness of centralized authority. What do democracies, monarchies, and dictatorships, whether fascist, socialist or communist, all have in common? All are governmental hierarchies based on politico-economic doctrines which seek to control people and material wealth. They differ in many respects, but the most important distinction is in the assumption each makes as to the ability of people to make wise and just decisions. Democracies take the view that people are generally able to make wise and just decisions, and thus place

significant power in the hands of the governed. Monarchies and dictatorships take the opposing view and centralize power within a ruling elite.

The essential weakness of centralized authority is seen in the following downward spirals of logic, which apply to all types of government, including American democracy. The fundamental pattern that will be revealed is: as authority becomes more centralized, emerging factors of rigidity, unresponsiveness and inefficiency cause the need for even greater control.

The more decisions that a government makes for its people, the greater the need for a bureaucracy to communicate and enforce those decisions. The greater the bureaucracy, the less responsive a government becomes to the needs of its people. The less responsive a government becomes to the needs of its people, the more dissatisfied the people become. The more dissatisfied the people become, the greater the need for governmental control.

The more decisions that a government makes for its people, the fewer decisions that people can make for themselves. The fewer decisions that people make for themselves, the more dependent they become upon the government. The more dependent the people become, the less able and productive they become. The less able and productive the people become, the more dissatisfied they become. The more dissatisfied the people become, the greater the need for governmental control.

History has repeatedly shown that the pursuit of centralized power and authority is directly opposed to efficiency and effectiveness in government hierarchies. Can there be any basis for believing that the same logic does not apply to industrial hierarchies? Consider the lack of control so evident in our shipbuilding process. Consider the morale of workers in our shipyards. Consider how frequently the observation is made that the quality and capability of the workforce has severely declined.

Those conditions stem from the false assumption that all decisions regarding shipyard operations should be made by the ruling elite, consisting of shipyard executives, managers, and supervisors. What is not realized is that such an approach to attaining more control actually results in more inefficiency and less control. Also what is not realized, especially by executives, is that the shipyard they are trying to manage, often does not even resemble the shipyard which actually exists.

The Origins Of Distortion

Wise decisions require accurate information. It stands to reason that the more levels of bureaucracy in an organizational structure, the

more chance there is for information to be distorted as each level reinterprets the information that it receives. That creates a problem for shipyard executive management located at the end of the receiving line, but an even greater problem is caused by the fact that a typical U.S. shipyard has applied the concept of centralization to each of its major functions. The grim result is the existence of mini-empires with distinct *territories* to defend, thus ample incentive to distort management information.

The vertical chains of command within centralized shipyard functions create a situation which demands a type of misdirected loyalty that can be devastating to the company, as a whole. It is a policy which rewards allegiance to one's function and one's superior in the chain of command and severely punishes any breach of that allegiance. In situations where what is best for the department is not in the best interest of the company, such a policy acts to suppress accurate information while encouraging inaccurate information. The valuable employee attributes of honesty and genuine concern for the company become twisted into the undesirable traits of a trouble-making maverick who is not a "team player" in the department.

By far the most prevalent cause of distorted information, however, is the tendency of executive management to react to unfavorable cost and schedule performance by exerting additional pressure on the command and control structure. That is done by enforcing stricter discipline in an attempt to hold managers and supervisors "accountable" for the performance of their departments. Somehow, it is assumed that it is possible, and even desirable, to hold employees accountable. Two problems exist with that assumption.

First, it is unfair to hold managers and supervisors accountable for performance which is frequently impaired by disruptive factors originating elsewhere in the shipyard and, therefore, beyond their control. That unfairness, coupled with the factor of inherent loyalty to department or function, elicits the predictable response of blame being directed toward other functions. Before long, blame is being directed everywhere, mounting tensions choke off communication and cooperation, the walls between departments stiffen, and departments become polarized.

Second, accountability is much like the subject of lower taxes -- it is always talked about, but it never seems to materialize. It is simply not possible to hold an employee accountable for anything. The person can be threatened, punished, or even dismissed, but such actions will

not produce accountability. Genuine accountability is self-generated. It arises from within an individual as a sense of responsibility toward the values held by that individual. Employees who take pride in the quality of their work and realize that it is in their best interest to care about the future of their employer *will hold themselves accountable*.

The Illusion of Control

Suppose that we postulate that it is in the best interest of a shipyard, as any business, to make more money now, as well as in the future. To best serve that end, what is the proper role of shipyard management? There is an interesting phrase in Webster's definition of the term "management" which reads, "judicious use of means to accomplish an end." The question is, what means should be used? The inadvisability of centralized command and control of shipyard operations is quite apparent. How then should management control shipyard operations and personnel?

The problem in answering that question stems from the fact that it is based on the false assumption that shipyard operations and personnel can and should be controlled by management. That false assumption has resulted in devastating management practices such as the traditional method employed by shipyard cost accounting to control financial performance. The highest priority in traditional cost accounting is to improve the bottom line through cost control. Though it seems prudent to try to control costs, all hints of wisdom vanish when cost control becomes shipyard management's highest priority.

The folly of such practice is illustrated by the fact that the potential for increased profit through cost reduction is limited to the amount of waste in current operating expense, but the potential for increased profit through expanded output, marketing, and sales of higher quality products is limited only by imagination. It is disturbing to realize that prudent, but misplaced, management priorities have often blocked the path to shipbuilding excellence by denying investment in vital research and development, process engineering, and marketing. It is truly regrettable that the same misplaced priorities have played a prominent role in devaluing a shipyard's most valuable resource -- its people.

As a line item on a ledger, labor is a cost of doing business. As a factor in the equation of greater productivity and profitability in shipbuilding, labor is the most important investment a shipyard can make. Traditional actions taken by U.S. shipyard management to control costs invariably focus on cutting the roll of

departments displaying excess labor capacity. Such actions disregard the fact that excess labor capacity may be a result of operations that are more productive than departments with insufficient labor capacity.

Why should workers strive to be productive if it means early unemployment? What sense of loyalty can a worker have for a company that appears to be more concerned about cutting costs than it is about the job security of its workers? Despite any rhetoric to the contrary, the actions of shipyard management repeatedly signal the message that a shipyard worker is regarded to be a highly expendable item -- not a highly valued investment.

The false assumption that shipyard operations can and should be controlled by management is a classic example of confusing ends with means. It is reasonable to want a shipbuilding process that is "under control," but it has been proven time after time that such a capability cannot result from stricter control measures. What will it take to elevate the role of shipyard management from the defensive posture of reactionary authoritarianism to the positive stance of creative leadership? What will it take to elevate the role of shipyard workers from that of expendable pawns to the status of world champions in shipbuilding excellence? Perhaps it is time to explore the rationale and means for freeing up operations and workers, rather than attempting to control them.

BREAKING FREE

There are many management theories available for shipyard executives in search of the elusive recipe for creative leadership in manufacturing excellence. Some theorists approach the issue from the perspective of management tools and systems development, some from the perspective of management configuration, and some from the perspective of organizational culture. Thus far, however, there appear to be no shortcuts and no reliable step-by-step instructions to guide U.S. shipyards to the attainment of international competitive stature.

Perhaps it would be wise to consider the thought that leadership in business really has little to do with *following* instructions, anyway. The price of leadership is the intellectual effort required in *creating* new and better ways of doing things. That intellectual effort accepts nothing at face value, but acts to strip away the sacred veils from traditional management values, structure, and policy. Current practices are questioned relentlessly until the false assumptions at the roots of complex business problems are finally exposed.

Such an intense, intellectual offensive appears to be the best, if not the only way for U.S. shipyards to break free from the stranglehold of authoritarian bureaucracy. Such an effort has the power to spawn rapid, revolutionary change because thought and action are focused on fundamentals rather than on acronyms and abstractions. The speed of advancement can only be constrained by whatever persistence is shown to defend the status quo against inquiry and change. That constraint is directly proportionate to the degree of ability, desire, and commitment of shipyard executives.

Revolution is not to be taken lightly, for it can destroy as well as create. The central theme for the intellectual revolution needed in U.S. shipbuilding must be the creation of a new working environment -- a dynamic workplace where all workers are treated as professionals requiring freedom from bureaucratic controls in order to perform their jobs effectively. There is no attempt to control or discipline workers. Management is focused solely on facilitating the flow of resources and operations. Shipyard operations are not viewed in terms of departmental functions, but in terms of interrelated manufacturing processes. Process engineering is not pursued solely in terms of systems development, but includes equal emphasis on the facilitation of human interaction.

The new environment must provide and maintain inviolate freedom for all workers to question and dissent without reprisal. As controls are relinquished, authority must be decentralized in accordance with the belief that influence and responsibility in decision-making should be based on technical competence and knowledge rather than on personal or political prerogative. The new environment must not be characterized by *formalized* programs of training, strategic planning, performance measurement, or company-wide systems integration. It must be characterized by the availability of resources and assistance to all workers in *their* quest to improve performance.

How would workers respond to such changes? There is strong reason to believe that such fundamental philosophical changes could combine to unleash astonishing productive power currently suppressed by the bureaucratic culture which has become the overriding tradition in American government and industry. Consider the words of Lawrence A. Bossidy, vice chairman of the board and executive officer of General Electric Company:

"The American worker is not docile. He refuses to sing company songs. He makes fun of pompous fools in high places -- but he possesses a curiosity, a free-form creativity, and an intensity of response when challenged

that in my view is absent in the regimented cultures and hierarchical corporate structures of most of our offshore competitors. After a decade of reading a seemingly interminable series of books on how to become Japanese, it is gradually dawning on us that what we must do in the '90s is become more American."

The future success of U.S. shipyards may be in direct proportion to the degree in which the individualism, creativity, and competitiveness of the American shipyard worker is liberated and encouraged to flourish. The problem is that shipyard workers have generally become cynical, distrustful, and alienated toward management. In both subtle and overt ways, workers have been robbed of their self-esteem, which has sapped their desire to excel and take pride in their accomplishments. In the worker's mind, management has become the adversary. It will take nothing short of a revolution in management values, structure, and policy to break free from the past and build a new environment based on mutual trust, respect, and loyalty.

EPILOGUE

The intent of this paper is not to cast blame upon shipyard executives for the productivity constraints in U.S. shipbuilding, but rather to raise questions, stir debate, and perhaps break some new ground in management philosophy. The enemy of U.S. shipbuilding has been identified as authoritarian bureaucracy. The action that has been proposed is an intellectual revolution based on a simple rule: When data is accurate and reasoning is sound, but the answer is still incorrect; there is only one avenue remaining. Check the premises, the assumptions upon which the equation or argument is based.

Can U.S. shipbuilding break free from the chains of powerful productivity constraints? Can the courage be found to relinquish traditional controls? Can the strength be found to question all that we have been conditioned to accept without question? Can the wisdom be found to realize that the power and human morality of democracy applies to business, as well as government? Can the compassion be found to vigorously market all shipyard products and services in order to keep workers employed? Can the vision be found to invest heavily in research and development of the finest integrated manufacturing processes in the world? The answer to all is, "Yes it can, and I hope it will."

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