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THE PROBLEMS AND TRENDS IN THE SHIPBUILDING INDUSTRY

by

Mr. H. Gerrish Smith
President, National Council of American Shipbuilders

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I am very pleased to be here to tell your group what I know about the shipbuilding industry.

I assume that what you are most interested in knowing is what the shipbuilding facilities of the United States are today, both as to materiel and personnel, and also that you would probably like to know what the possibilities of expansion of that industry are in the event of a major emergency.

I will be very pleased to give you statistics on the shipbuilding industry which are matters of fact, but so far as expansion to take care of a major emergency is concerned I will give you my own personal opinions, based on my experience as a shipbuilder and on my participation in the War Shipbuilding Program.

The National Council of American Shipbuilders tries to keep up to date on the facts regarding the industry, and from time to time we canvass the industry as to its facilities at the time and as to how quickly it could put some additional facilities into operation if necessary to do so. It so happens that we have just completed a new survey of available shipbuilding ways in the United States for the construction of vessels of various sizes. That survey covered the Seaboard and the Great Lakes, and we have received reports from 23 seaboard yards that have facilities of such size that they might engage in the building of seagoing vessels. They have given us their facilities, which I have tabulated in a statement that I have here. I prepared several statements, of which I will be glad to leave you a copy, but which I wish to use only as a guide in my talk to you. The reports of those plants indicate the following

3 - Ways for the building of vessels from 100 to 200 feet. Now, of course, there are many more than that that might be made available in smaller yards for the smaller size and type of vesels, but not engaged in ship building at the present time.

9 - Ways for the building of vessels from 200 to 300 feet.

8 - Ways for the building of vessels from 300 to 400 feet.

21 - Ways for the building of vessels from 300 to 400 feet.

38 - Ways for the building of vessels of 500 feet and over.

That makes a total of 67 building ways entirely available at the present time that can build vessels of 300 feet or more in length, which we class as vessels of the seagoing type. In addition, there are on the Great Lakes 11 building ways at the present time that can build vessels of the maximum length required for service on the Lakes. As you know, however, it is impossible to get vessels beyond a moderate size out of the Great Lakes because of the lack of depth of water in the canals and in the St. Lawrence River to Montreal. The largest ship that can come out of the Lakes at the present time is about 260 feet long, 43 feet beam and 14 feet draft, or 3,800 tons gross. If the St. Lawrence Waterway were completed, it is estimated that 87% of all the vessels in the world could enter the Great Lakes.

As building ways that might be made quickly available that are not available at the present time, but which are ways that have been used but have been out of service for many years and would have to be quite extensively reconditioned, there are 30 additional, making a total, therefore, of 97 building ways, or, let us call it roughly one hundred — one hundred building ways that are now available, or could be quickly made available, for building vessels of the seagoing type.

As far as the Great Rivers are concerned, there are ample facilities on the Rivers for building vessels of all the types that can navigate those waters. Upon the completion of the present program of dredging and dams on the Great Rivers there will be no less than about 13,000 miles of navigable waters with channels from eight to ten feet deep in the various portions of these Rivers. The amount of tonnage built on the Great Rivers is extensive. The rivers are feeders to the sea, but river yards have not been building many vessels that we class as the seagoing type, except a few Government vessels that may be built on the Rivers and then go out for service elsewhere.

Since the World War the greater part of all ship building that has been carried on has been on the Atlantic Seaboard, from Maine to Virginia inclusive. The building on the Pacific Coast has been small in amount, and in recent years there has been very little building on the Lakes. I will come back to that in a few moments.

Closely associated with and forming an essential part of the shipbuilding industry is the shiprepair industry. There are at the present time ample facilities on the Seaboard, on the Great Lakes, and on the Great Rivers, for the repair of vessels of all types that enter our various ports. They are

very well distributed over the Atlantic Seaboard, the Gulf, the Pacific Coast, the Great Lakes, and the Rivers.

We abstracted from the American Bureau of Shipping some data with reference to available graving docks, marine railways, and floating dry docks, and there are, according to their records, a total of 318 docks and marine railways capable of handling vessels above 100 feet in length, distributed about as follows: On the North Atlantic 166, South Atlantic 66, Gulf Coast 31, and Pacific Coast 58. Of those, 160 will handle vessels up to 200 feet in length, an additional 74 will handle vessels up to 300 feet, an additional 29 up to 400 feet, an additional 32 up to 500 feet, and 23 of these facilities are ample to take care of ships 500 feet or more in length.

So far as construction in our shipyards obtains today, there are 45 seagoing vessels for the United States Navy under construction in the private shipyards, of which 17 are now occupying building ways, 15 are launched, and for 13 of which the ke ls are not yet laid. In the past year there have been contracts for 22 seagoing oil tankers for the carriage of oil in bulk placed by the private shipyards. Outside of the miscellaneous small craft, of which there is a great deal under construction but none of which occupies a building way for a very long time and which can be built mostly on very small ways, that is the only seagoing construction which has been under way within the past year.

During the past eight years, or since the passage of the Merchant Marine Act of 1928, about the only building of any consequence in the shipyards, aside from the naval vessels, has been 32 passenger and combination vessels built under the provisions of that Act, and about one dozen seagoing oil carriers. In the past 12 years there have been only four cargo vessels built in the United States. In the face of extensive building on the part of other nations, there has been practically zero construction of vessels of that type in this country.

If you want to get a picture of the shipbuilding and shiprepair facilities down to vessels of ten tons or greater, this fact may be interesting. that under the Shipbuilders' Code, which went into effect in 1933 and operated until the Act was declared unconstitutional, there were about 250 shipbuilding and shiprepair yards in the United States that were registered as capable of building vessels above ten tons. Now, that did not touch the boatbuilding industry at all. It made a distinction between what is known as "small boats" and what is known as "ships", in addition to which there are almost innumerable

shore shops for carrying on repairs to vessels, which we call "voyage repairs."

So far as shipyards are concerned, I think most of you are very familiar with them and what they really are. They cover a lot of territory, they have a lot of shops of different kinds, they must be equipped with both land and water facilities so that after the ships are overboard they can be berthed along side. The shops are equipped with much machinery, some of which is very heavy and of a very expensive type, and which takes considerable time to obtain.

The industry deals with a personnel that, aside from the office staffs, consists of various types of employees. There are no less than 25 regular trades engaged in the building of a ship, together with many other trades that may be called upon in small numbers for the building of ships of special types.

In addition, it is an industry that is constantly changing to a considerable extent. At the present time it is going through the most radical change with which it has been faced probably since the days of iron and steel ship building began, and this is the development of welding in place of riveting and calking, which requires the scrapping of a great deal of old equipment, doing away to a large extent with pneumatic tools, air compresses, and much of the machinery and paraphernalia that goes to make up the building of ships where pneumatic equipment has been so extensively used in riveting, drilling, and calking. It has brought about great quantities of new equipment, of course, to meet the new requirements, all of which, while they are extensive at the present time, is still in a process of development. There are being built at the present time ships up to 300 feet in length wholly welded, and there is in contemplation the building of a 20,000 ton ship almost wholly welded throughout. The Atlantic Refining Company are building such a ship, and they are extending the welding, if possible, throughout its entire construction.

Now we come to the matter of employment. In considering the matter of employment, we must take into account not only the private shipbuilding industry but the Navy yards of the United States, because they employ the same kind of people that are used in the shipyards. They build now approximately one-half of the naval vessels, and they repair all naval vessels. The demand upon the personnel, therefore, for work is the same as the demand by the private shipyards, so that in considering the employment in the industry it is necessary to take into

account those employed in Navy yards, and that is a factor that must be taken into account in any expansion of employment in the industry.

I have a few figures, that may be interesting, that were worked out in connection with our Shipbuilders' Code in 1933, which are as follows

Approximate Number in the Navy Yards, Private Shipyards, and the Repair Yards

1928.	65,000
1929	69,500
1930	75,000
1931.	71,000
1932.	61,500

In an analysis recently made by the National Council, the present employment of Navy yards and private yards combined is approximately 80,000. That means that, due to the large amount of naval construction under way and considerable revival in the bulding of small craft and in ship repairs, the industry at the present time is employing more men than at any previous time since the completion of the World War program.

On the average, there are, outside the shipyards, about as many people employed throughout the United States in the building of the equipment and materials and in the making of the materials required in ship building as there are employed within the shipyards themselves. That means, at the present time, that the industry, by and large, is giving employment to approximately 150,000 to 160,000 people -- I think it is safe to say 160,000.

I will now speak to you a moment about shipyard organizations. They require an elaborate office and yard staff. The detailed plans of ships, contrary to what those who are not familiar with ship building believe, are prepared by the ship builder. It is only the general arrangement plans, as a rule, that are sent out upon which a ship builder submits his bid, and then the plans are prepared by him to the utmost detail. In our naval vessels the number of plans extends, for an aeroplane carrier, I believe it is reported, as high as 2,000, and on a cruiser around 1,400 or 1,500, so you can figure out what the problem involved in preparing the designs for any new ship is. And, that is one of the bottle necks in the industry -- the availability of a sufficient design staff who have had the years of experience to know how to design. You cannot begin

construction in the yard until your plans are out and your material is ordered, and you cannot design those plans until you find men who have had the experience to do it. Some of the best designers have had 10, 15, 20, 25, or 30 years of experience in the game, and in any consideration of the shipbuilding problem they are vital to it.

As you can readily see, if you are going to build one ship from a set of plans you have to expend pretty nearly as much money on those plans as you would if you were going to build ten ships from the same plans, so that the problem confronting you gentlemen in quick preparation, or the ability to quickly produce, should include that factor to be taken into account. If you have ten ships of the same design you can get a large volume of work going and keep it going with, of course, a much less design staff than you can if you have three or four designs for those same ten ships. It is this problem of the designers that has presented the most serious problem to the ship builders in the last six or eight years in building up to our present employment in the construction of naval vessels and other vessels of several types.

So far as the yard staff is concerned, as I have stated, there are about 25 trades regularly employed in ship building, most of which are mechanical trades and highly skilled, and they require, in order to maintain an efficient organization, at all times a percentage in each and every one of those trades who are skilled in ship building and have had continuous ship building experience. The same as in any other industry, you can, of course, train men to do certain kinds of work. Unskilled and semi-skilled men you can draw from quite a large field. Such men can be taught the work they are to perform within a comparatively short time. When you come to the skilled trades there may be some men who are classed as skilled mechanics that you can draw from other industries, but there must be, as I have said, in every one of these trades a nucleus of ship builders who have had ship building experience, otherwise, you cannot expect either economical or expeditious production

Materials I shall refer briefly to materials at the present time. There is very little difficulty, outside of what is experienced in all industry, in obtaining materials in normal times. Inspection and specifications are more rigid from year to year, which means delays in meeting new requirements, but I would say that in normal times the material problem is only a natural problem that can be easily handled and offers no serious difficulties.

In my opinion the existing facilities of the industry are adequate to take care of any probable peace-time requirement. As I have stated, we have 100 building ways available, or that can be quickly made available. In building cargo ships you could produce at least two a year. I would guarantee, under the right working conditions, to produce more. And, if you average the vessels of other types they, perhaps, will take from a year to 15 months (perhaps not over 15 months) on the building ways. If you are building cargo vessels alone, therefore, you would have capacity for 200 a year, and on other vessels, if they were confined wholly to the building of vessels of other types, it might run from 75 to 100 a year. A major emergency, therefore, might require an extension of facilities, and I believe that the most efficient results where expansion is necessary can be accomplished by making use of existing organizations, freezing, so to speak, the essential personnel, both in design and in the shipyard trades.

The most disastrous effect on the industry during the World War was the taking of valued employees from one plant and starting up new yards without the approval of the yards from which they were drawn, with its consequent demoralizing effect upon existing organizations. I believe it is fundamental that each and every yard should, in the event of an emergency, immediately classify, or list, those men that are vital to its progress and that they should be retained, being transferred from one plant to another only upon the definite approval either of the industry or of whatever group is overseeing the operation of the yards at that time. It is only in that way that you can maintain the efficiency of the organization and prevent the demoralization that, except for the conditions that prevailed at the outbreak of the World War in 1917, would have been wholly disastrous. The real reason it was not wholly disastrous at that time was the fact that the world had been at war for nearly three years (two years and eight months), that in 1914 the number of shipyards was much less than it was in 1917. Great Britain and Norway placed orders in the United States for large numbers of vessels of 25 gross tons or over. That meant vessels that were then under construction in American shipyards. The industry had had a two year and eight months start in building up to the situation that existed on April 6, 1917. Except for that situation, I see no possibility of having delivered any nuuber of ships during the time that we were in the war. It is for that reason alone that we were in better shape than we otherwise would have been and it emphasizes, I think, the importance of what I mentioned a few moments ago — freezing in some way the essential personnel elements in the

industry so that they will be on the ground and ready and thus will continue to maintain an efficient organization. My belief is that in extending facilities (this is my personal feeling, shared by a good many with whom I have talked), it can best be done by restricting it wholly, if possible, if not, as far as it is practicable to do so, to an extension by existing shipbuilding and ship repair plants of either their facilities or establishment of new facilities under the jurisdiction of existing plants. What do you accomplish by doing so? You maintain, first, your essential design organization that can design for three or four plants at one location. You can take from your existing organization a skelton staff of men, who can best be spared, who are able to promptly develop the organization necessary to proceed with a new plant, and it does not make much difference whether the new plant is a mile away or ten miles away or five hundred miles away, you can maintain that same contact under present day conditions and you can carry on with one organization maintaining plants in several localities. I believe that is the only practicable way to expand, that any other method will result in inevitable demoralization and will take so long to get going that we might be in a serious situation, in fact in a major emergency, before we really got started if we proceed on any other basis. I look upon failure to proceed as above as one of the mistakes of the War program. I believe it was a very serious mistake, and in the instances where the suggestions that I have made were carried out we had quicker results and better results, in my opinion, than by the method of establishing mushroom shipyards, seizing men from organizations without permission, and attempting to establish quickly not only a plant but an entire personnel organization.

It is, of course, necessary to seek out labor markets and establish new facilities in places where there is labor to be obtained. It does not do to concentrate too much in one spot because you are transferring too much labor to localities where there may not be adequate housing facilities. That was experienced, too during the World War, and was one of the reasons, of course, for the fairly broad distribution of ship building, but existing organizations, where they extended their facilities, had the labor market in mind.

So far as an expansion of employment is concerned, this problem was met during the World War and it can, of course, be met again. During the World War the employment is reported

to have been 400,000 at its maximum directly engaged in shipyards and ship repairing, which means approximately 800,000 in the industry if you take into account the Allied industries throughout the country. For every one employed in April of 1917 there were developed about seven additional men before the war program was over. A great many of them were, of course, in no sense ship builders. They got along pretty well under the circumstances. They were developed into trades where it took a moderately short time for them to reach a degree of proficiency where they would do the job, and they built fairly good ships. Of course, it is not expected that they could be as good as peace-time ships built under a more experienced staff of mechanics.

I assume that War Department needs in a major emergency would be largely vessels of commercial type. I always have felt that if prior to the World War we had maintained a Merchant Marine, particularly in our foreign trade, of sea-going ships, we would have been spared much of the terrific expense that was involved in the War program, and I think it is a matter that is well worth keeping in mind for the future. If we build up and maintain our Merchant Marine we may be spared a lot of the difficulties that would otherwise confront us in the approach of an emergency.

It is appreciated that you gentlemen must have ships of various types to meet different services, but to the extent, as I stated, that you can limit those types to the minimum you will facilitate the quick production of ships, if such is necessary, in an emergency. You can also greatly facilitate speed in an emergency program by coordinating your specifications and your methods of inspection with that of other Government departments and of the various branches of the War Department itself. A simplification of those problems will lend speed, of course, to construction.

Just a word on pre-fabrication. That is another mistake that I think was made during the World War. It may have been necessary in particular instances but I can see no advantages whatever to be gained by pre-fabricating the steel for ships before it is shipped to a shipyard. It has to be shipped in irregular shapes, is slow in coming in, is liable to errors because of the continuous change in shape of a ship, and I think that it is a time loser and saves nothing in cost and that the best thing is to deliver your material into a yard to be fabricated by those who are to erect it. That will eliminate the greatest number of errors that might creep in as construction proceeds.

I recited to you the status of the industry at the time the United States entered the war in 1917. The history of the ship building program was pretty well presented by Mr. Charles Piez, who was the Director General of the United States Shipping Board Emergency Fleet Corporation during the War, and under whose jurisdiction all of the merchant ships that were built were constructed. Before retiring from the Fleet Corporation he made an elaborate report as to what was accomplished, which I presume you gentlemen have seen. At any rate, it is available to anybody who wishes to see it.

Under pressure, there were some very extraordinary results obtained in ship building during the War, but they are records, I think, that stand for little in connection with a new program -- that is - the length of time a ship is on the building ways, the very limited time in which, in special cases, ships were built from the time of laying the keel to delivery. Building records, of course, require first that designs should be complete and then that all material is available, fabricated in the shops, or prefabricated, before erection begins. There were records of a 12,000 ton ship being launched in 60 days, ships being completed in two or three months time from the laying of the keel, and in the case of one naval vessel in even less time, but to start from scratch it would be hopeless, of course, because you have to have time at the start to prepare plans and secure delivery of material.

Another very important factor, that is always in my mind, is that the merchant ship building in the United States alone is not adequate, and never has been except during the World War period, to maintain a highly efficient ship building organization of itself. The larger shipbuilding organizations have been developed and maintained for many years largely through their participation in the building of naval vessels. Naval building has always been a considerable program, even when appropriations were small, and it has always been an important factor in maintaining shipbuilding organizations. At the present time the building of Naval vessels is about fifty fifty, that is, one half building in Navy yards and one half in private shipyards. There are those in Congress who would urge the building of all naval vessels in Government Navy yards. Such a policy would be disastrous to the private shipbuilding industry if that industry is to be called upon to meet a major emergency. During the World War, it is well known, the Navy yards were largely engaged in the repair of their own vessels and they had to call upon the private yards not only for the building of the major part of such naval

vessels as were constructed during the war period but also for large volumes of repairs to naval vessels.

The recommendations of the Committee on Munitions of Congress of which Senator Nye was chairman were for one hundred per cent Navy yard building. The Committee has gone further by suggesting that the War Department should have dies and fixtures made in peace time and ready for use in private industry in the event of an emergency. Well, your experience shows you how far it would be possible to proceed on any such recommendation. The art of shipbuilding is changing so fast that it is impossible to prepare very far ahead the equipment necessary to be used in the building of ships, particularly smaller equipment such as dies and fixtures, and other devices necessary to produce small parts in great numbers in a hurry.

Finally, I offer this suggestion: that whatever your plans are for the future you must take into account this factor of a rapid change in the industry over a period of ten years. It is a change extensively in, as I have told you, methods of construction, and a change also in features of design that may be anticipated for the future. Any plans that may be laid today may not be suitable five or ten years from now and would have to be thoroughly revised.

I do not know whether or not you have ever called on the ship builders as to what they might do in connection with an expansion program. I think they would be glad to give you their ideas as to how to expand and how long it would take. The biggest problem that I see in expansion would be in securing equipment, but most of it is of a character that could be obtained in the time necessary to prepare, design, and secure material. The building way, of course, must carry with it cranes for operating and a considerable amount of other equipment. I think the ship builders, if called upon, would be glad to render any help they can in connection with this matter.

Colonel Jordan, I believe I have covered the ground adequately for the moment. If there are any questions you gentlemen wish to ask I will be very happy to try to answer them.

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Q. Mr. Smith, I believe you said that in 12 years we have constructed only four cargo vessels. Have you any information as to where that leaves us on cargo fleet?

A. Yes. It leaves us in a very bad state. Our cargo vessels at the present time, which constitute the greater part of our fleet in foreign trade, are 17 years old. The normal life of a ship is 20 years, so you can see that those vessels by age are practically obsolescent now, and as far as efficiency in operation is concerned they are wholly obsolescent. They cannot favorably compare with the more economical vessels of recent design of other nations. That, of course, is one of the pressing problems that is before the new Maritime Commission appointed under the Merchant Marine Act of 1936.

Colonel Jordan What is the future of the commercial vessels? Are you going to hope for any expansion in that, or are we going to continue to drop off and turn over our trade to foreigners?

A. It seems to me that Congress must have presumed, in passing the Act of 1936, that it wanted to maintain and build up its Merchant Marine. It is not a wholly satisfactory act, but if the Maritime Commission takes as its responsibility the maintaining and upbuilding of our shipping in foreign trade we will go ahead. This is a certainty the passage of that Act shows clearly that Congress still realizes the necessity of aid to our foreign operated ships, because of our higher costs of building and operation in the United States than prevail abroad.

Q. Would not building be considerably accelerated if our foreign trade was developed to the extent where it would help to have these industries pay their own way more or less and not depend entirely upon Government subsidies?

A. The more our foreign trade is developed, of course, and the more nearly full cargoes our ships can carry, the better their opportunity of conducting their business at profit. I am one of those that, under our existing standard of living in the United States and our prevailing wage scale, sees no possibility, until the other nations come to our standard or we go down to theirs, which we do not want to do, of ever building or ever operating as cheaply as the foreigner. Our labor rates in the shipyards are two and a quarter times what they are in Great Britain. The industry is of a type that is all special construction. It is not quantity production and cannot be

produced on the same basis as automobiles and sewing machines. You are, therefore, building to order each and every ship that is built and your relative costs closely approximate the relative labor costs, so I see no way of overcoming the big difference in labor costs except through some form of Government aid. The difference in building and operating costs of America's ships can be reduced as experience is gained in operation and as the business prospers but I doubt whether it can ever be wholly wiped out.

Q. In general have the machine tools of the industry modernized in the last few years, or would a war program call for considerable requirements in machine tools?

A. I think they have kept well up to date although because of the volume of building the demand for ships has been moderately small, but the industry knows what is being done abroad, and I think it is, as a whole well up to date. Machine tool builders are in a position to furnish the most up to date equipment at reasonably short notice.

Q. Could you give us an estimate of the man hours necessary for the preparation of the detailed plans and special feature of a modern size ship, say a 10 to 12,000 ton cargo ship?

A. Not having prepared any plans for ships of that size for some time I would hesitate to tell you what I think it would cost in dollars. I can give you figures on naval vessels that give some kind of an indication but that is not much of a guide for cargo vessels. I would think, off hand, that if you produced the designs of a cargo vessel at the cost of $50,000.00 you would be doing pretty well. If you convert that cost into man hours on the basis of an average rate of about 70¢ an hour and assuming eighty per cent of the cost is labor, the man hours would be about 60,000.

Q. When you said 1400 plans were necessary for merchant vessels, you meant shipyard plans did you not, and did not take in auxiliaries?

A. That is absolutely right. Each and every industry that furnishes equipment of any kind must likewise furnish its plans. The work is of a little different character than for the shipbuilder but nevertheless it requires designers with experience on any phase of the work of the auxiliary or allied industry manufacturer.

Q. If the shipbuilding industry is so easy to expand to take care of the war program, why was it so difficult to get a bid from the shipbuilding industry on the replacement of the Leviathan, and why were only two shipyards in the country able to undertake it?

A. I have some personal opinions on this subject that I do not care to express.

Colonel Jordan Good for you, sir.

Q. I would like to ask a question with regard to the procurement of materials under a war program. Normally the shipyard procures its own materials under the war program from any source, and they have developed sources from which they normally buy their material. Under the present industrial mobilization plan those facilities are going to be allocated and these shipyards are going to have to get materials from definite places, from allocation sources, and their supply services in the shipyards probably are not set up for operating that way. In what way should the materials be sent to them Should they be purchased by the Navy or by the Shipping Board, and turned over to them, or should the supply service of the shipyard still go to these allocated facilities?

A. I believe it would be better to make purchases through the shipyards, but if they are going to be from allocated sources I would think that one of the first things that should be done in the event of an emergency, and very probably it is possible, is to give the shipyards some idea beforehand what is going to happen so that they can be thinking about it. They may have to change somewhat their method of ordering, and the sooner they know about it and develop their methods of ordering, I would expect, the less confusion there would be in getting materials. By all means, I believe you would get quicker action by placing the responsibility on the yard that is going to use the material.

Q. What type of contract should this construction be made under without going to allocated facilities? Would you use a cost plus contract, a contract on express basis, or what kind of contract should be made for war construction purposes?

A. I do not see how you can make fixed price contracts. You would be confronted with the same difficulties that you were under at the outbreak of the World War. You would have no idea what labor rates were going to be and you could not make a fixed

price contract unless it would protect you. You might possibly make adjustable fixed price contracts to assure protection. I rather think that might be the better way. I think the straight cost plus contract is objectionable. I think a cost and fee contract is not bad. The cost and fee contract gives some definite knowledge of what is going to happen, and such a contract would take care of labor and material increases or decreases.

Q. Sir, I understood you to favor and stress the system of remote control for emergency expansion during war time. I mean, of course, the nucleus of the office of draftsmen, etc. remaining at the central plant. I am wondering whether or not such a system might have advantages for peace-time expansion, particularly when it appears that there will be a lot of ship building to be done to replace the old vessels now in use?

A. I do not favor remote control except as a necessity, but I said that remote control was not seriously objectionable. It could be handled if you have to have your plants located some distance one from another to take care of the labor market. Of course, I would like to see them near enough so that personal contact could be frequently established, but if you cannot do that you can still handle them by having your own nucleus of an organization set up at each plant and still have central control.

Q. Other things being equal, you would prefer having them together?

A. Certainly. That would be the best, but conditions might not make it possible.

Q. Is it probable that the modern merchant carrier will be of a Diesel type?

A. Of course, the battle is on at the present time in this country and all over the world between high temperatures with steam development and the Diesel Engine. In world ship construction the Diesels predominate in horsepower and in numbers of ships so built. In the United States, I think primarily because of the small amount of building of commercial vessels, the Diesel has developed much less rapidly than abroad. If you want to get the real answer to this problem you should get a Diesel expert and a boiler expert together and each will

try to convince you that his particular line of development is certainly going to be the best. It is a fact that world development in shipbuilding, outside the United States, has been more in Diesels than in other types. Lloyds Register of Shipping for the quarter ending September 30, 1936 shows 855,850 gross tons of steel steam vessels and 1,247,390 gross tons of steel motor vessels under construction throughout the world.

Colonel Jordan: Are you finding a shortage of skilled mechanics now, and, if so, what are you doing to replace them?

A. Training men, if we have to. There are shortages at times in some trades. In the last check up I made it was not serious but it has been a serious problem from time to time to obtain mechanics of a special grade. It is mostly in the highly skilled type that there is a shortage. There is always a shortage, where there is development, of men of that type, and you have to depend on training those who are less experienced but who have been in the business some time to do the more highly skilled jobs as fast as you can possibly do so.

Q. Is the Union situation out on the Pacific Coast going to have any influence on the shipbuilding industry?

A. Yes. It will undoubtedly affect the shipbuilding industry.

Q. It will?

A. I think so.

Q. Are you people taking any steps to battle that situation, sir?

A. It is constantly battled. They have done everything that can possibly be done to keep the employees satisfied. I think the employees do not wish to strike but they may be forced to do so by the major striking group.

Q. Are any steps being taken to get rid of this British subject who is running the United States?

A. Ask the Department of Justice. I cannot answer that.

Q. Mr. Smith, will you give us a comparison of the ships the foreign countries are now building, particularly Japan, on the combination types and the ships that we have?

A. I will say this the combination passenger and cargo vessels, and they are all combination vessels, built under the Merchant Marine Act of 1928, 32 in number, (I have stated this many times and it is unquestionably a fact) are in every respect the equals of the highest grade ships of similar types for similar services built anywhere in the world.

Q. What about the speed? Don't you feel that the ships they are producing have an ultimate view other than service?

A. You are speaking of Japan?

Q. Particularly Japan.

A. Undoubtedly she is building a large number of ships that run from 18 to 20 knots and her program for the next four years is the replacement of something like 400,000 tons of ships, also largely at those higher speeds, very few being below 16 knots, if any, according to the present reports.

Q. Are those ships you speak of being built by Japan Diesels, or half and half, or just what percentage?

A. It is both, but I cannot give you the percentage off hand. Any one of Lloyd's reports probably would show. I think the cargo ships have a substantial percentage of Diesels. I will get the figures for you. The report of Lloyds referred to above shows thirty-eight steam merchant vessels of 98,500 gross tons under construction in Japan and twenty motor vessels of 77,300 gross tons.

Q. Mr. Smith, going back to this question of expansion of shipyards again, we only got one bid on the submarines this last time from one shipbuilding yard in private industry and that one yard has only two ways and only capable of expansion to four ways. Now suppose we went into one program of 57, would the shipbuilding industry be able to expand to take care of that?

A. I do not see why not. The existing industry could certainly put in more ways in that immediate vicinity.

Q. Why, if they have the capacity, did we only get a bid from one yard, and that a small yard, on submarines?

A. I operated a yard for a good many years that built submarines, and my judgment is that the fellow that builds submarines without some experience to start with is taking a big chance. Submarine building is highly technical, it is highly detailed throughout, it is a special type, and it requires really a lot of experience to have the courage to build submarines. I would expect that you could find plants that would do it but with the small number of submarines built since the war there has not been any encouragement to put in the facilities or to buy the experience that you are bound to buy in the first one or two you build. If you are going to have a continuous, large program you would find others who would be glad enough to build them.

Q. But we have a continuous program and we got less bids last year than we have gotten previously. Bethlehem, as you say, has had experience in building submarines, and they did not bid.

A. It has few, if any, of the personnel now that were engaged in submarine building. They would have to rebuild an organization.

Colonel Jordan We are very fortunate in having with us this morning Admiral Land, the Chief Constructor of the Navy, and I would like very much to hear from him.

Admiral Land. I am concerned with Mr. Smith's statement concerning the conditions in the yards with regard to scrapping riveting equipment, whether it would be air compressors, drills and like tools. We have been, or at least we think we have been, in the forefront in advancing the art of ship welding. In naval vessels our specifications have demanded it. However, on the other hand, it is not a final and complete answer and we in our standard plans are quite ready to admit the following things that weight is saved by welding, that other advantages, without going into detail, are on the side of welding, that speed of construction, in an emergency, would be in favor of riveting from the standard standpoint of view, and while it may be practical in some years hence to build all welded ships, either naval or commercial, it would not be in line with the policy we would like to see followed by the commercial ship industry to

abandon their facilities for riveting ships. I rather doubt whether they will do that. I trust that Mr. Smith is only giving us tendencies rather than actualities. It is a very interesting picture he has given us, it checks very closely with the naval information that we have on the subject, and it is a subject of great interest not only to the War Department and the Navy Department and Congress but to the country as a whole. I have only one question. We hear a great deal about ship building expansion and expansion of ship building facilities based primarily on geographical reasons. The shipbuilding industry of the United States, so far as building is concerned, is concentrated in the East and Northeast. There are many advocates of increasing these shipbuilding facilities for geographical reasons. The West Coast during the war had shipbuilding facilities. I think we all admit that they have been very materially reduced since the war, and while the plants exist the efficient facilities are not in place at the present time, with one or two small exceptions. The point I wanted to raise is specifically (if Mr. Smith cares to answer it) what should we do from a national preparedness point of view in extending, when the time comes, the shipbuilding facilities to the South and Southwest?

A. If you refer to the Pacific Coast, of course, what you have out there now are the Bethlehem plants, Joe Moore's outfit, George Armes of General Engineering, and the plamt at Los Angeles that was under George Armes' outfit and in the North, the Todd Seattle, all of them mostly engaged in ship repairing since the war, together with mumerous smaller plants most of which have retained building facilities that can be revamped or added to, from a materiel standpoint, fairly quickly. I have always felt that it is imperative that there should be, from a national defense standpoint, some facilities on the West Coast. Of course, you have the personnel of the above plants and of the Navy Yards that have been continuously busy both in building and repairing on the West Coast. Mare Island and Puget Sound navy yards have a personnel from which you might spare a few, I suppose, if necessary to start active building in private yards, likewise men can be transferred from the East if necessary. There is a nucleus of building facilities in most of the private yards mentioned but they have not been kept up to the extent that they have in the yards in the East. I believe much of the major equipment such as heavy tools is still there.

With reference to what I stated about scrapping equipment, the probability is that your heavy tools, like heavy punches and tools of that character, would not be scrapped but what most certainly will be scrapped, and if it isn't scrapped

it will scrap itself through obsolescence, is your pneumatic equipment, and it certainly decreases the demand upon the suppliers of pneumatic equipment of the country and whether they could promptly react in an emergency and replace that equipment if it is necessary to continue riveting instead of welding I do not know, but I presume that they might.

Colonel Jordan Admiral Robert, would you care to say something, sir, to the Class? We would be very glad to hear from you.

Admiral Robert I do not think I have anything other than to stress the point raised by Admiral Land with reference to the scrapping of the facilities for the rapid building of ships through riveting. We have, as he has told you, gone very extensively to welding, and I very much fear that in our attempt to save weight and to advance the design through the medium of welding we are going to almost forget how to rivet ships. The building of a welded ship requires a great deal of room, it requires time because the welding must be done in proper sequence, otherwise we are going to lock up strains in our ship. We are struggling with that problem all the time now and we have been struggling with it for some ten years. I rather feel that some of even our big shipyards are more or less forgetting about this question of rapid construction. If we were called on in an emergency to build ships, throw them together in a hurry, I do not believe we could do it with the welding process entirely, or follow the welding process to the extent at which we now follow it in our warship designs at any rate, so I think we should always keep that in mind. We -- I say we -- I mean those of us who are thinking about national defense, about emergencies -- what would happen today if we were suddenly thrown into a national emergency that would require very rapid construction? I would like to hear from Mr. Smith a little further on that subject, how he feels about it and what he thinks is being done now and what he feels is the remedy.

M. Well, of course, what is being done is a study, but you group of gentlemen have ideas as to what you are going to need in the future. I think the ship builders themselves devote practically all their thoughts to vessels they now have under construction. I do not know whether you have asked them for any definite plans as to what they would do in an emergency, but if you haven't it might not be a bad idea to do so. I think

they might give you some thoughts on that subject that would be helpful. Of course, I can see that on the particular question of equipment if an emergency arose now, during a period of transformation from riveting to welding, the problem might be rather difficult to handle. You might want immediately to go back to old types of construction. If the emergency does not occur for ten or fifteen or twenty years I anticipate our welding problem will have been solved to the extent that we will not be faced with this question of old tools or equipment.

Q. We have heard about the difference between the welding and the riveting of ships from the standpoint of weight, I would like to know something about the difference between the cost of riveting and welding ships and the time involved between the two.

A. The process of building is a little slower with the welded ship. Whether that will continue or not it is impossible to tell at the present time but you have to carry on the work, so as to provide for expansions and contractions, you have to proceed from a certain point a little more slowly than you might with riveted construction. Whether that will be eliminated in the end I cannot tell but I presume that it might. So far as cost is concerned, the art has not proceeded to a point yet where the advantage in cost has been realized to any large degree. It is estimated that as mechanical devices are developed for welding so that you can use machines and get more rapid welding that the cost will come down substantially, but that has not been reflected to any extent up to date except through the fact that you have less weight and to the extent that you have less weight you may have some effect on the cost of materials.

Q. Did I understand you, Mr. Smith, to say that we are going to have mechanical welding, that that is something in prospect, something automatic?

A. It is already in existence where you have straight line welding. I think it will be developed for ship building in the course of time.

Q. On the ways?

A. Possibly.

Colonel Jordan We have another member of the Construction Corps here, who is one of the honor graduates of this College - Commander Vickery - and I would like very much to hear something from him.

Commander Vickery I would like to follow the thought that Mr. Smith expressed about getting the ship builders to find out what their expansion possibilities are, what the ship builders feel is a way they can expand to meet the problem that we are preparing to give them in a national emergency, and how would he suggest that such a study be handled?

A. I would suggest that you tell them how many ships you want built and in how short a time and whether you want them built by the riveting or the welding process or a comoination of both. I believe if you did that and asked for recommendations as to whether they could expand in their own plant, or whether they would expand somewhere else and where (perhaps they could not say where because that would depend upon conditions in the time of emergency) I think you would get an answer to that question that would be helpful.

Q. How should that be handled, through the individual ship builders or through the Council?

A. It could be handled either way, but I should rather think it would best be handled through the individual ship builders because you problably have a different ship building program for each.

Colonel Jordan We have another graduate of the Army Industrial College, of the Navy, here today - Captain Allen. I would like very much to have him say something.

Captain Allen: I would like to ask Mr Smith if he thinks we could work through the Council along the lines that Vickery just suggested, the general problem, going into details perhaps later with the individual ship builders?

A. I would be glad indeed to take it up with the Council. I think when it comes to details it would probably have to be handled directly with the plant, but if you wish to present the problem to the Council I should be glad to take it up with our Board of Directors and discuss it.

Q. With reference to the speed of tankers, why is it that we haven't any tankers in America that can make any speed, and isn't it true that the Japanese have their 18 knot tankers and we haven't possibly over five ships that make better than 14½ knots? Is there anything we can do to correct that situation?

A. The underlying reason is that tankers have been built to make money and not speed.

Q. Will the present Maritime Commission change that situation at all?

A. I think there is a tendency to a gradual increase in speed. If you can show that you can build a 15 knot ship and operate it as economically as a 12 knot ship so as not to affect the total cost of operation you may gradually get the tanker owners to approach a little higher speeds, but most of them have developed their services for particular turn arounds at certain speeds. I doubt whether a half knot or a knot would help them. To save a day, for instance, on a long haul they would have to have a considerably higher speed and it is wholly a problem of economy with the tanker owners. I have talked with them many times on the subject to see if it was not possible to get them into a state of mind where they could build 15 to 16 knot tankers and operate them, but the question they immediately ask is Who is going to pay the interest on the additional money put in in the first place and the additional cost of operation? It is a problem that I believe is capable of being worked out by studies such as those which were recently carried on in the Shipping Board where, I think, there was some enlightment on the subject. I believe rather moderate differences in the cost of operation of a 15 knot ship as compared with a 12 knot ship were shown. A study of that kind by you men I think would be helpful to the industry. All you have to do is convince the operators they can operate a higher speed ship and make as much money in operating it as they can on the lower speeds and you will solve the problem.

Q. Does the Shipping Board condemn the pre-fabrication of merchant vessels?

A. I do not know that they ever did. I have never seen a condemnation or an endorsement of it. I would have to refer to the record to answer that definitely.