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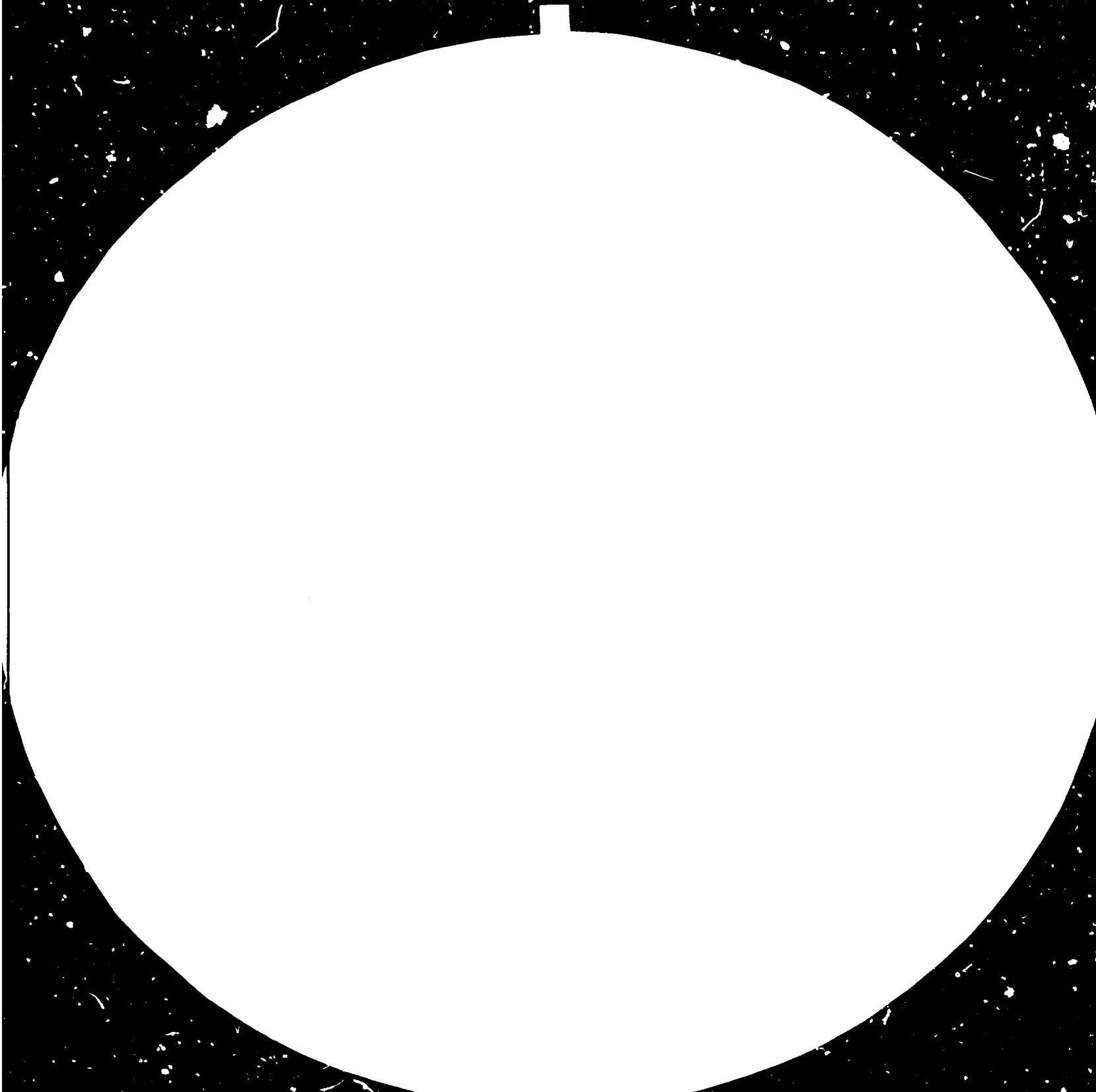
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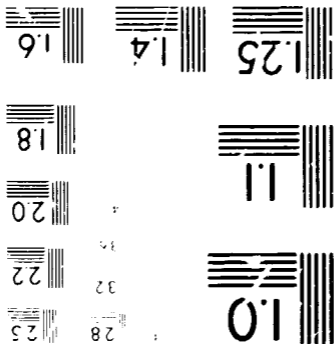
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and the Pacific Countries

Jakarta, Indonesia, 26-31 March 1984

PRESENT POSITION, MAJOR TRENDS  
AND SPECIFIC PROBLEMS OF SHIPBUILDING  
AND SHIPREPAIR INDUSTRY IN ASIA AND THE PACIFIC\*

prepared by

S. Srinivasan\*\*

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\*\* Deputy General Manager, Hindustan Shipyard Limited

## 1. INTRODUCTION

- 1.1. With shipbuilding capacity, worldwide, well in excess of demand and competition for orders extremely fierce, both new building and repair yards are under pressure to ensure that all resources are used effectively. Productivity improvement to reduce costs when ship prices are low is just as important as in normal market conditions. At the same time, capital investment becomes harder to provide and much greater attention should be directed towards low cost improvements. Actually, the most important area to improve is the organisation of work, in other words the coordination of the supply of material, information and manpower to the set of tasks required to build or repair ships.
- 1.2. The competition for business, quite apart from resulting in shorter lead times, has resulted in shipyards building a wider range of products than was envisaged even a short time ago. For example, a European Shipyard which for many years built only VLCCs now markets a range of products from offshore supply vessels through floating factories to large LNGCs. The potential variety of individual operations within a Shipyard in this situation is much greater than in the case of a single product facility. The resulting level of coordination of operations must clearly be much higher.
- 1.3. If the progress which has been made in the technology of ship production is compared with

the progress made in managing that process, the difference seems quite marked. In the case of engineering and technology, progress has been steady - whether the developments in hydrodynamics since Froude, or, the developments of plastic theory and finite element analysis in structures. Looking at the organization of production, the achievements of the industry has not been very much impressive. Indeed, when considering the number of new techniques which have been developed and successfully applied over the last eighty years, it seems that the level of insight actually achieved has been nearer to that of the alchemists than management scientists would have us believe.

- 1.4. Like shipping, shipbuilding is also an international industry. Even if the ships produced in a particular yard are sold to domestic owners, by virtue of their being used in highly competitive overseas trade, they have to give good performance at reasonable cost. If the ships do not satisfy these requirements, the domestic shipowners would not like to place orders at home. Thus, the shipbuilding industry is compelled to keep an eye on developments abroad in ship design, ship prices, delivery time, quality and performance of ships of similar design.
- 1.5. Internationally the shipbuilding industry is characterised by very keen competition. Shipbuilding industry all over the world is generally highly subsidised. Some of the countries do not conceal the facts and publicise information about direct and indirect subsidies. In some countries, the industry is helped indirectly by visible and invisible means.
- 1.6. The following reasons may be assigned to explain the need for Government subsidies.
  - \* The necessity to compensate shipbuilders for higher local costs outside their control in order to put the domestic industry on an equal footing with foreign competitors.
  - \* Social and strategic importance of shipbuilding.
  - \* To help the industry to adjust itself to changing/changed market conditions.
  - \* To help an emerging industry in the early stages of development.

In addition to direct subsidies and grants, tax concessions, interest concessions and various other measures of assistance are adopted in many countries. On account of the distorted competition and subsidies, prices of ships are artificially pegged down. There seems to be no relationship between the costs of construction and the prices.

## 2. GLOBAL SITUATION

- 2.1. The present situation is not different from what it was a year ago. In fact, in certain respects it is gloomier and more disheartening. One such aspect is the marked downward trend in new building prices while the costs of construction have been soaring up. The run for orders is so frantic that, as reported in the world press, many foreign shipyards have deliberately resorted to the practice of under selling or dumping. In some cases, loss-making prices have been quoted with the blessings or knowledge of the particular country's governments. Thus, the chain reaction continues without any hope for restoration of normalcy in the near future. Although sporadic attempts are being made to restore supply demand equilibrium by voluntary restriction of output and retardation of production against existing orders, the results are yet to be watched. In a slump-affected market where the orders are too few and the competitors are too many, a number of shipyards have to anxiously watch the depletion of orders in their order books. India is no exception.

## 3. GLOBAL SURVEY OF SHIPBUILDING INDUSTRY

- 3.1. Survey of shipbuilding industry in any advanced country will reveal the following reasons for the spectacular success and progress achieved:
- \* Highly skilled/technically qualified employees
  - \* Modernisation of production facilities and adoption of advanced technology
  - \* Reliable supplies from steel mills and ancillary industries.
  - \* Massive support from the Government
  - \* Business relationship between shipyards and other industries which together constitute large combines
  - \* Close co-operation between shipbuilding industry, the ancillary industries and the Government.
  - \* Modular construction with advanced outfitting.

- 3.2. However, the nature of the shipbuilding industry is such that automation cannot be adopted to take over a predominant portion of ship construction work. Mr TAKEZAWA of MHI, Japan, expressed the following views on this aspect:

"...the shipbuilding industry, viewed as a whole, would not fully qualify as a truly modern industry when if all such elements of technology were to be developed. In Shipyards, while fabricating and assembling operations are performed indoors and increasingly modernised by numerical control and other means, all others are conducted outdoors and are therefore, affected by weather. Such operations account for more than half of the total work. Thus, automating and mechanising equipment, even though already developed, cannot be thoroughly applied for practical use..."

Great importance is attached to pre-production planning and commence production only after the minutest details are linked with the production programme.

4. HUMAN ELEMENT

- 4.1. The fact that human element plays a more vital role in shipbuilding than in any other industry, has been re-emphasised by the Kockums Report on Labour problems.
- 4.2. Around 1968, Kockums introduced factory production techniques and to achieve immediate results, implemented with the consent of the unions a pre-determined piece-rate system, replacing the earlier system. In practical application, the system was found to be imperfect, resulting in disparities in wages for certain categories of workers. In the highly mechanised and rigidly controlled environment workers lost their individual and group affinities. The human factor was so much underrated. Communication and relations between the workers on the one hand and foreman, managers and wage-fixers on the other, were not in good shape. In these circumstances, a third party investigation was authorised with the consent of the unions. The report was submitted in March 1970 and a summary of it was released to world press in 1973. Following the suggestions incorporated in the report, the piece-rate system was abandoned and replaced by a wage system with relatively large fixed wage plus a variable amount directly



linked to the individuals performance. Welfare facilities were further improved. Working environment was also improved. A limited number of Union representatives were authorised to work full-time on wage and personnel matters.

- 4.3. Commenting upon the Kockum's report, Roy Hill, Senior Editor of 'International Management', wrote in the April 1973 issue, as follows:

"Work in a Shipyard is inherently different from work on a car production line. Much of it is still done by groups of men, many of whom are genuine craftsmen. They have group loyalties. They rely on their co-workers. The performance of one man often depends on the performance of another".

## 5. FUTURE OUTLOOK

- 5.1. A recent report of Lloyd's shipping categorically states, "Many major shipbuilders have gone into liquidation; some have been absorbed into consortia, many have been nationalised, most have been and continue to be subsidized...."

"Despite actions taken by Governments and private enterprise, there is good reason to believe that the world shipbuilding industry is in a far less healthy state than it was at the start of the decade during the upswing of the boom period."

- 5.2. Almost the same note was sounded by OECD in its yearly maritime review. It wrote, "The 1980s opened with hopes of better times for shipping after a long and damaging recession. During the course of last couple of years, however, such hopes were somehow disappointed as the long-awaited approach to balance the demand and supply did not materialise."
- 5.3. However, the ill-effects of this recessionary downturn in the shipbuilding activity are not shared by all regions and countries uniformly. For example, the EEC countries are more hard-hit than say countries like Japan, South Korea, China, Taiwan and so on. According to the London-based FINANCIAL TIMES the shipbuilding costs in Europe were about 20 per cent higher than that in Japan.
- 5.4. In a recent survey on tanker building shipyards, Consultants H.P. Drawry of the U.K. pointed out the generous subsidies and credit given to the Korean industry. The survey also pointed out that Korean Government was keen that by 1986 the proportion of domestically produced components used in shipbuilding should rise from 60 to 90 per cent.

- 5.5. European countries, on the other hand, have been fighting hard to keep their shipbuilding industries going, and trying to restore some semblance of viability. For example, the nationalised British shipbuilders has cut its heavy losses and expects to do so further. It has also reduced its labour force and recently gathered some big orders from Hong Kong, Greece and Canada. Other traditional shipbuilding countries like Sweden, West Germany and the Netherlands have had to undergo painful contractions in their shipbuilding sectors.
- 5.6. On the whole, currently new orders the world over are slowly giving a breath of life to the sorely-pressed shiptuilers. As an expert comments succinctly: "Whether shipbuilding on a world-wide basis can ever be fully profitable again is a moot point but one thing that is certain is the fact that the world's shipowners will continue to require ships of all types and sizes in future years and, logically shipyards will be needed to fulfil that demand."
- 5.7. This is imperative as the nature of shipbuilding labour intensive, on one hand, but requiring a high degree of technological skill in design, on the other, has countless spin-offs for the economy: all of which makes shipbuilding one of the world's most politically sensitive industries.

## 6. MANAGEMENT PROBLEMS IN SHIPBUILDING INDUSTRY IN INDIA

- 6.1. Narration of the problems faced by the shipbuilding industry in India, is not likely to present a realistic picture, without considering the nature and characteristic features of the industry.

## 7. CHARACTERISTIC FEATURES OF THE INDUSTRY

- 7.1. Ships are generally "Custom-built". In Hindustan Shipyard at Visakhapatnam, they are built against specific orders placed by Shipping Companies. Even when the basic requirements of the Shipping Companies/Shipowners in terms of cargo carrying capacity, draft, speed etc. are common, there can be a large number of variations in the design of a ship as well as specifications of ship-borne equipment and systems. The ship-builder has to keep his facilities and equipment ready to build ships of various types and sizes, according to the owners' requirements, choices and preferences. Maximum size of a ship that could be built in a particular yard is governed by physical factors such as dimensions and

capacity of the slipways/docks and wharves. Extent and depth of water in front of the slipways/docks and alongside the wharves will also dictate the maximum size of ship that could be constructed in a shipyard. Scope for producing standard types of ships in long series is limited mainly due to varying requirements of the owners which in turn stem from the volume and direction of trade in particular commodities, nature of the commodities, peculiar features and limitations of the ports and waterways through which the shipping operations are intended to be carried out. Shipbuilding is essentially an assembling industry. The hull is fabricated out of steel plates and sections obtained from the steel mills. All the equipment, machinery and systems which are installed to make the hull a ready-to-sail ship, are also bought-out. Thus, the shipbuilding industry is greatly dependent upon the products of steel, engineering, electrical and other industries. Since production can be commenced only after reaching complete understanding on design and construction features as well as specifications of all ship-borne equipment and systems, the shipbuilder will not be in a position to keep ready stocks of shipbuilding materials. They have to be bought after the contract with the owners is signed. The nature of shipbuilding materials including steel is such that they cannot be bought off-the-shelf. The shipbuilder has to place orders and await arrival of the materials. This lead time is inevitable. Another factor which has a bearing on the lead time is the status of occupancy/vacancy of a slipway/dock on the basis of orders already on hand. Thus, forward delivery with long lead time is an important characteristic feature of shipbuilding contracts. In shipbuilding, it is not an unusual phenomenon to sign a contract for one or more ships, with deliveries extending upto 4 years into the future.

These factors - building ships against specific orders, building different types of ships and long-term forward deliveries - make the shipbuilding industry susceptible to several problems particularly in the areas of planning and scheduling, cost estimate and cost control, formulating marketing strategies, diversification plans and development programmes on the basis of long-range projections which may ultimately go hay-wire due to unforeseen factors.

7.2. Progress of the industry elsewhere in the world is attributable to -

- \* Technological advancement
- \* Close contacts with related industries and shipping
- \* Extensive design and research facilities
- \* Change-over to capital-intensive methods (Mechanisation and Automation) and
- \* Smooth flow of supplies.

8. PECULIAR PROBLEMS OF THE SHIPBUILDING INDUSTRY IN INDIA

8.1. Procurement of materials

Soon after signing the contract, steps should be taken to procure a large variety of materials from domestic as well as foreign sources. It takes quite sometime to obtain import licences and foreign exchange releases for import items. It is only after these formalities are gone through that the order could be confirmed and the manufacture asked to go ahead with production. After the particular item is procured, it awaits shipment to Visakhapatnam or any other Indian Port. The whole process, from determining the requirement before placing the order to the arrival of material at the yard, takes anything upto 24 months. Depending upon the sequence of operations, priorities are determined and procurement of material programmed. Naturally, steel for hull construction gets the top priority. Other materials are programmed on a keel-launch-delivery time scale. Any bottleneck in the supply lines is bound to hamper production. Due to inter-dependencies, deficiency in a particular segment or stage of production causes delays in other stages and the cumulative delay at an early stage. Production Chiefs and Material Managers should always be ready with an alternative contingency plan. Monitoring and progressing should be a continuous process without which the Shipyard will not be able to ensure smooth flow of supplies and remedy any distortions/deviations already caused by unforeseen bottlenecks and handicaps. In Japan, Sweden and other countries where the shipbuilding industry has achieved notable progress, a large number of steel fabrication and outfitting jobs are entrusted to sub-contractors and ancillary units. It saves considerable time and effort of the Shipyards in planning, controlling and keeping track of the manufacture of hundreds of components such as steel doors, ladders, manhole covers, tanks, coamings, seatings, flanges, ventilation ducting, furniture, etc. similarly by engaging the

services of subcontractors to handle, on a regular basis, jobs like insulation, flooring, interior decoration, painting, refrigeration, erection and commissioning of machinery/equipment - the process of outfitting is greatly simplified and accelerated. Indigenous shipbuilders have still to undertake most of these jobs themselves. Despite earnest efforts, the development of ancillary industry to back up shipbuilding industry, has not so far been fully successful. One of the main reasons responsible for this unsatisfactory situation is the low off-take of products and services from the ancillary units. The off-take is low because the level of ship production is low. If a Shipyard produces 3 ships per annum and calls upon the ancillaries to supply 3 units of certain components, it may not be really attractive and viable proposition for the ancillaries. The same consideration holds good not only in the case of ancillaries intended to produce minor components but also applies to the sub-contractors as well as manufacturers of major items of ship-borne equipment. The ancillary industries and the larger industrial establishments can be induced to take up manufacture of shipbuilding components and marine equipment when the shipyards are in a position to offer them adequate business on a regular basis. It is hard to believe that the situation would improve without increasing the shipbuilding capacity. At the unit level, production of 4 to 6 ships per annum would provide attractive volume of work for the ancillary units and sub-contractors. For the producers of ship-borne equipment and systems at the country level, demand arising out of the production of atleast 15 ships per annum, would be an encouraging and viable proposition. Until then, the shipyards and the ancillaries will have to pull together with determination and understanding. The Government of India intend to enlarge the capacities of the existing shipyards and modernise them. It is hoped that the infrastructure of marine industries, ancillary industries and specialised sub-contractors will be firmly established by the time the shipbuilding capacity of the country is enhanced to reach a level much higher than at present.

Expansion of the existing shipyards calls for the supply of shipyard equipment such as cutting and welding equipment, material handling equipment, etc. Here again, the supply position from indigenous sources is uncertain. For instance, high-capacity cranes required for the development

programme of the Hindustan Shipyard were ordered on indigenous sources. Supplies, in all the cases, were unduly delayed. This situation emphasizes upon the desirability of allowing imports on a limited scale, depending upon the urgency of requirement and a realistic evaluation of the indigenous manufacturer's ability to meet the delivery schedule. While upholding the principle of import substitution, this kind of relaxation may sometimes be made so that Shipyard development and shipconstruction might be accelerated as envisaged.

### 8.2. Order Book

Because of the inevitable lead time between the contract for building a ship and actual commencement of hull construction, if orders were not booked in advance, there is a likelihood of the slipway/building dock remaining idle or hurried commencement of production without linking all essential factors in the production programme. In either of these cases, the resources and production facilities are wasted. This situation is averted if by constant marketing effort, orders are booked in advance. This will result not only in the avoidance of a negative situation but in achieving positive advantages. For example, on the basis of the orders booked, requirement of materials could be consolidated for placing bulk orders. Similarly, optimum utilisation of manpower and other resources could be planned in greater detail if the shipyard knows every thing about what it should produce over a given span of time. This is possible only when the shipyard has secured firm orders. It will be more advantageous if the builder could prevail upon the owners to accept a standard design or even a semi-standard model with a range of optional features to suit the varied considerations of the owners.

The marketing effort should also include a realistic evaluation of the future requirements and changing trends. It will enable the shipyard to get ready with the required designs, techno-economic information and ideas for development and possible lines of diversification. Without exchange of information and ideas (feed-back) between the shipping companies and shipyards, progress cannot be achieved in this direction. Cooperation and understanding between shipping and shipbuilding industries will be mutually advantageous.

Indigenous shipbuilding industry has not yet reached a position to evolve basic designs. If the Shipyard offers a limited range of designs and the shipowners turn them down, it is nobody's fault but in the ultimate analysis the indigenous yard loses an order and the country loses foreign exchange. This situation underlines the importance of consolidating and adjusting the shipping requirements in such a way that a large number of ships could be covered in a limited number of designs with which the indigenous shipyards are familiar and their facilities best suited.

### 8.3. Production Planning

Shipbuilding industry in India is handicapped in many ways - irregular flow of orders, bottlenecks in supply lines, dependence upon foreign sources for critical items, lack of reliable, economical sources within the country, lack of ancillary industries, etc.

Production Planning in these conditions is an extremely difficult task. One after another, problems arise to test the patience and talents of the planners. Re-scheduling, diverting resources, proposing crash programmes, formulating alternate contingency plans and such things have become usual features of the planner's game. He has to make the chain, linking several variable and presently unpredictable factors.

### 8.4. Economic Problems

Materials and wages represent a predominant portion of the cost of a ship. Inflationary pressures continue to push up the prices of all materials and the cost of living indices with which the wages are linked. Cost estimates made at the time of the contract with reasonable provision for inflation appear meaningless after the ship is completed. Shipbuilding is particularly vulnerable to inflation because of the long exposure inherent in it. Without provision for actual escalation, the shipbuilding industry will be in a very tight corner.

### 8.5. Development of skills

Shipbuilding technology continues to make rapid advances. Far-reaching developments have already taken place in Japan and Western Europe. The industry in India is still lagging behind in this respect although certain advanced techniques have been introduced. 1/10 scale lofting in conjunction with electronically controlled flame-cutting

introduced in early 70s in the Hindustan Shipyard, is a typical example. Introduction of modern techniques is as much dependent upon the provision of up-to-date equipment as on the availability of persons with requisite skilled and training. When rivetting yielded place to welding, the Hindustan Shipyard has to implement an intensive training programme for new entrants and a re-training and re-deployment scheme for the rivetters. Apprentices training, refresher courses for various categories of employees, study tours and training programmes at foreign shipyards and supervisory and Management Development Programme have been a regular feature with Hindustan Shipyard. The Shipyard firmly believes that human assets, more than anything else, should be continuously developed in order to achieve success and progress.

## 9. SUMMARY OF MAJOR PROBLEMS

### 9.1. Shipbuilding

- (a) Order book position and need for additional orders.
- (b) Standardisation.
- (c) Patronising the Shipyard by domestic shipowners.
- (d) Pricing of ships.
- (e) Shipyard's capability to build any product-mix at a given time.
- (f) Potential for building small crafts.
- (g) Indigenisation - Delays in supply of equipment by indigenous suppliers, apart from increased costs.
- (h) Problems faced by indigenous suppliers.
- (i) Canalisation of shipbuilding steel.
- (j) Cash flow - Financial assistance.
- (k) Development of Ancillaries.
- (l) Export of ships.
- (m) Central Marine Design and Research Organisation.
- (n) Extension of sound pricing formula for offshore constructions.
- (o) Updating of technology/modernisation as a continuous process.
- (p) Forum of Indian Shipbuilders Association.

### 9.2. Shiprepairs

- (a) Patronising shiprepair facilities by domestic shipowners.
- (b) National Policy on shiprepairs industry.
- (c) Timely settlement of shiprepair bills by various Shipping Companies.
- (d) Updating of technology and facilities.



10. CONCLUSION

- 10.1. While the debates and discussions continue, many countries within the EEC and outside the EEC are going ahead with the creation of new facilities or expansion of existing facilities. Such efforts are based upon a conviction that in addition to the direct benefits that could be derived in supporting the industry, it will foster the growth of related industries and create additional employment, directly and indirectly as well.
- 10.2. Development of shipbuilding and shiprepairing industries involve long-term planning, co-ordination with shipping, and ancillary industries, adaptation of up-to-date technology, and continued support of the Government.
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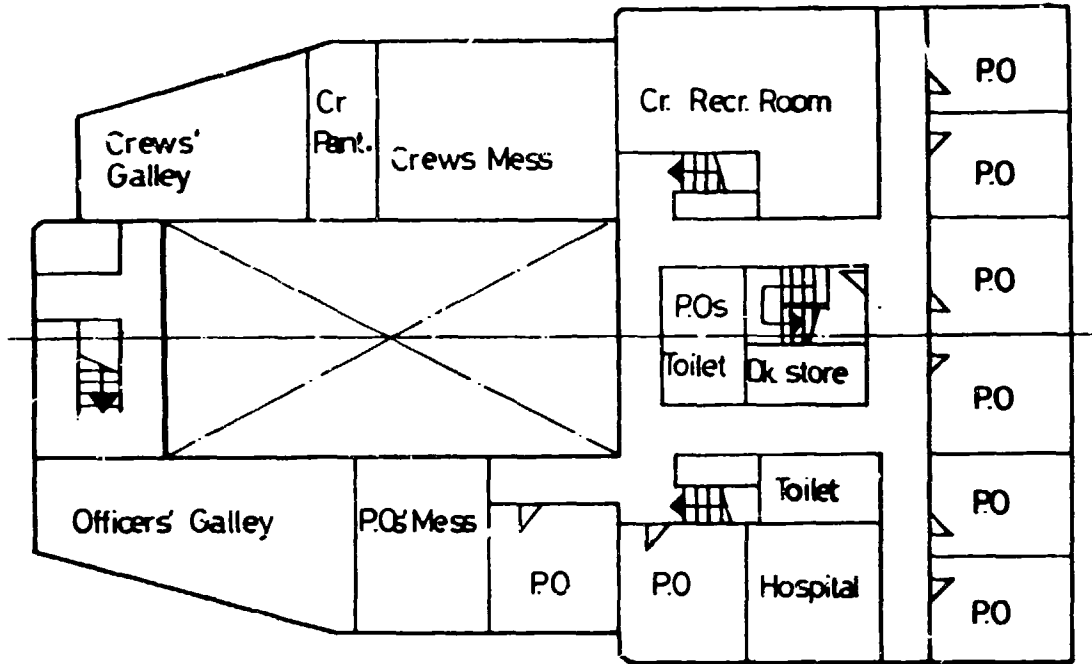


TYPICAL NON-MODULAR TYPE CABIN LAYOUTS  
OF SAME SIZE VESSEL BUILT BY  
EUROPEAN YARD

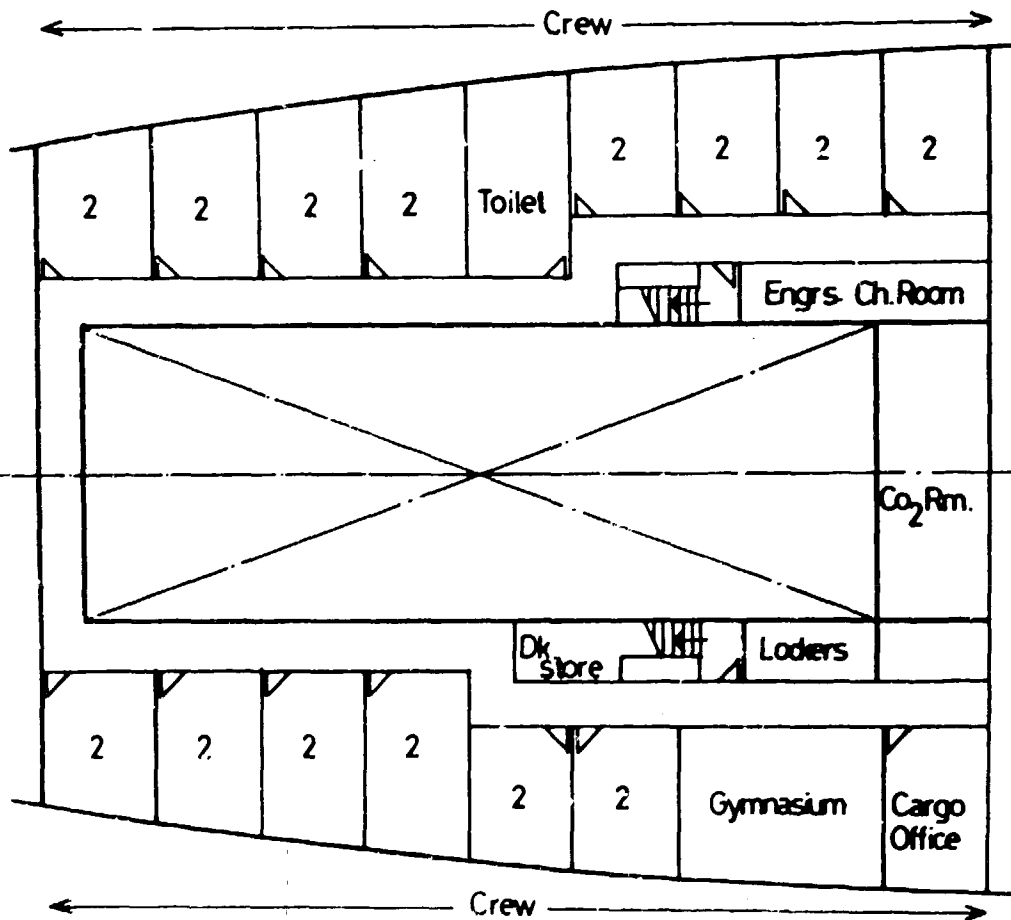
Annexure I

IN 1978

1st Poop Deck



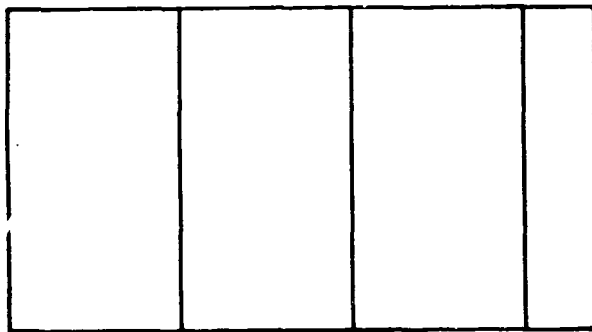
Upper Deck



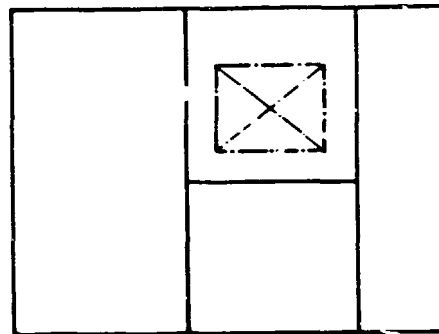


TYPICAL MODULAR TYPE CABIN LAYOUT ON  
H.S. STANDARD SERIES

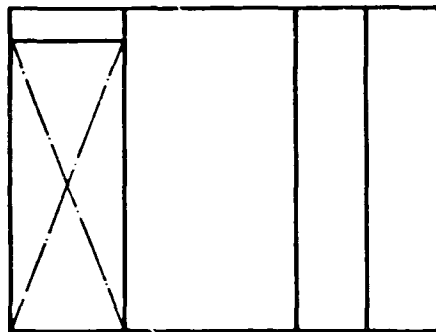
Annexure II



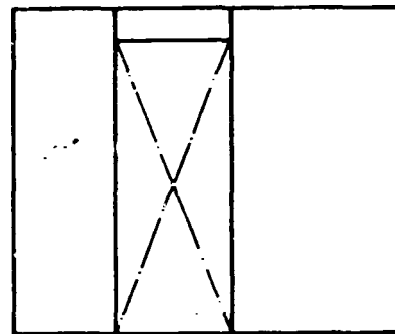
ELEVATION - A & A'



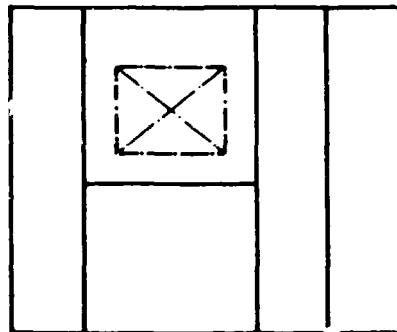
ELEVATION - D.



ELEVATION - E.

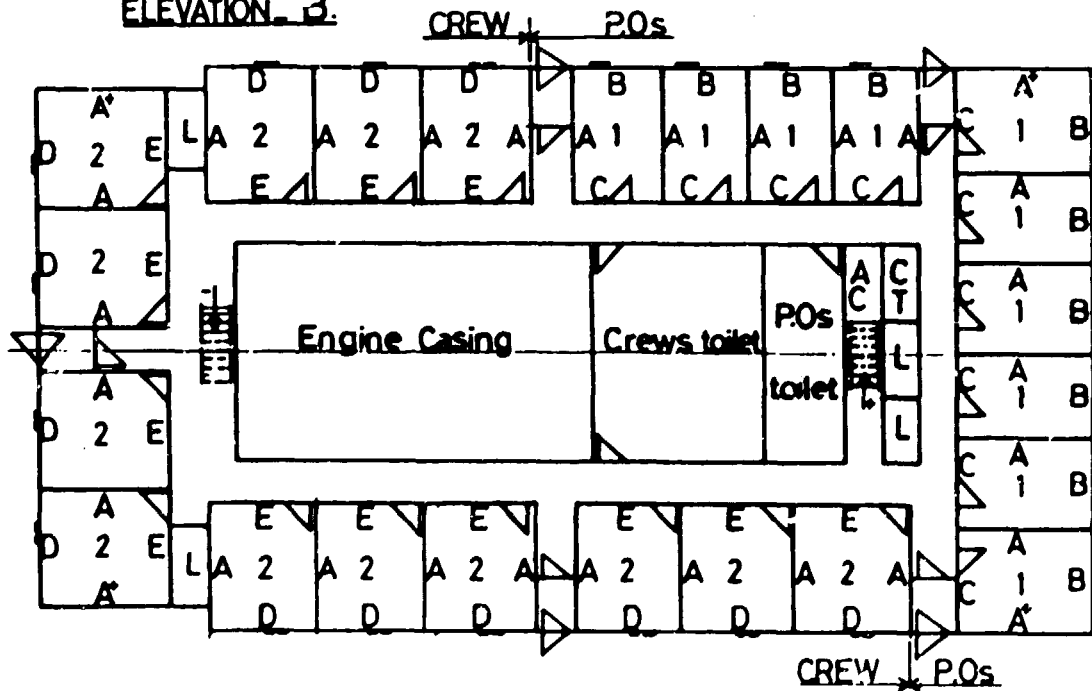


ELEVATION - C.

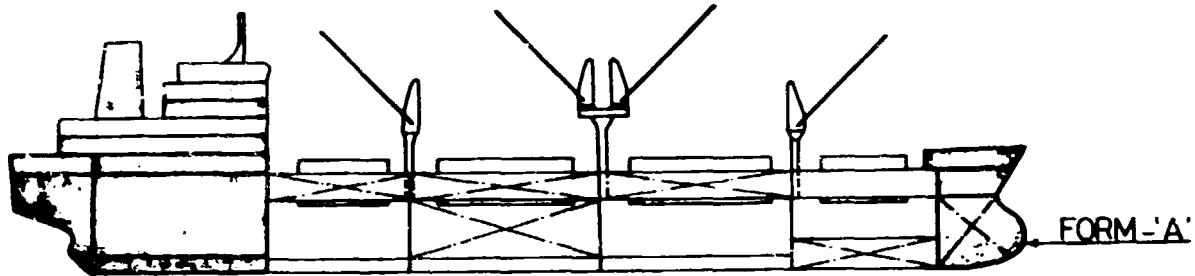


ELEVATION - B.

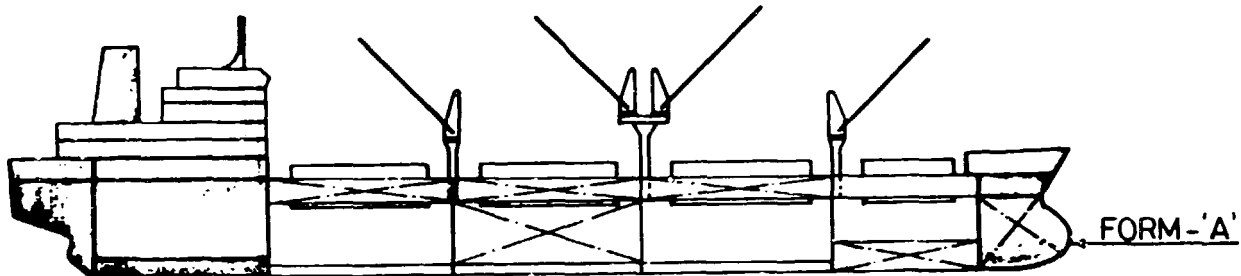
Accommodation for 26.Crew and 10.P.Os  
built up with 127 uncut panels and  
10nos. in width W<sub>1</sub>  
13nos. in width W<sub>2</sub> &  
84nos. in width W<sub>3</sub>



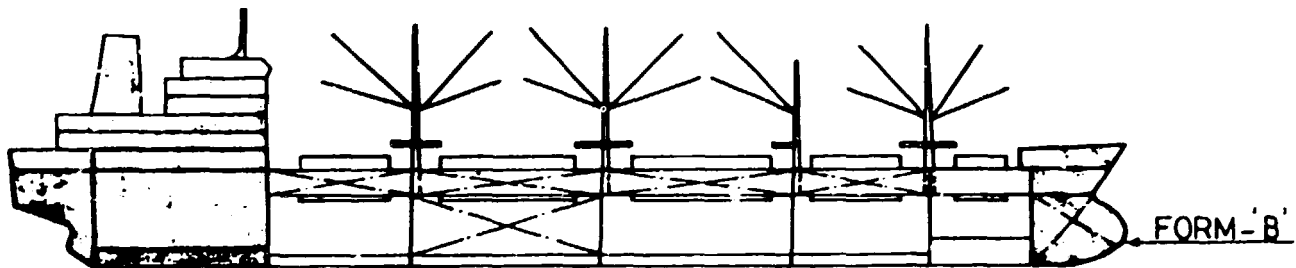
# Hindustan Shipyard Family Of Standard Ships



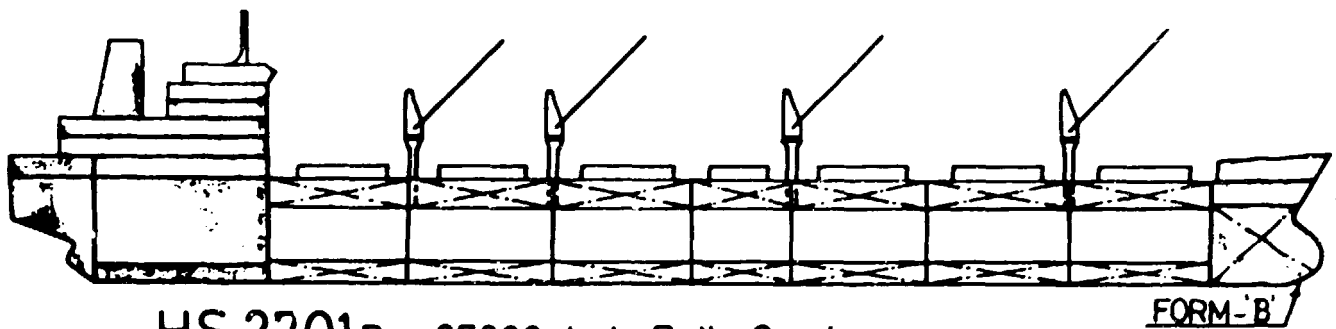
HS 1403A - 14,000 dwt. Container Oriented Cargo Liner.



HS 1604A - 16,000 dwt. Container Oriented Cargo Liner.



HS 1801B - 18,000 dwt. General Cargo Vessel.



HS 2701B - 27,000 dwt. Bulk Carrier.

Dimensions in mtrs.

	<u>HS1403A</u>	<u>HS1604A</u>	<u>HS1801B</u>	<u>HS 2701B</u>
L.	133.80	140.20	146.60	174.00
B.	22.90	22.90	22.90	22.90
D.	13.30	13.30	13.30	14.40

ABBREVIATIONS

1. UNIDO - United Nations Industrial Development Organisation.
  2. ESCAP - Economic & Social Commission for Asia & the Pacific.
  3. EEC - European Economic Community.
  4. VLCC - Very Large Crude Carriers.
  5. LNGC - Liquefied Natural Gas Carrier.
  6. OECD - Organisation for Economic Co-operation & Development.
  7. LPGC - Liquefied Petroleum Gas Carrier.
  8. AWES - Association of West European Shipbuilders.
  9. SDFC - Shipping Development Fund Committee.
  10. ECL - Equitorial Carriers Ltd.
  11. SSNC - Scindia Steam Navigation Company.
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