



ESTALEIROS

NAVAIS

1P1

SHIP YARDS



CONTEÚDO PROGRAMÁTICO

PARTE II

- 1. ESTALEIROS NAVAIS**
- 2. INFRAESTRUTURAS E EQUIPAMENTOS**
- 3. O PROCESSO DE NEGÓCIO**
- 4. AS ESTRUTURAS FUNCIONAIS**
- 5. ESTRUTURAS DE APOIO**
 - 1. FORMAÇÃO E RECURSOS HUMANOS**
 - 2. QUALIDADE AMBIENTE E RESÍDUOS**
 - 3. SEGURANÇA**
 - 4. “PROCUREMENT” E SUBEMPREGADAS**



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- 2. INFRASTRUCTURES AND EQUIPMENTS**
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- 4. THE FUNCTIONAL STRUCTURES**
- 5. SUPPORT ACTIVITIES**
 - 1. HUMAN RESOURCES AND TRAINING PROGRAMMES**
 - 2. QUALITY ASSURANCE, ENVIRONMENT AND WASTES**
 - 3. SAFETY**
 - 4. PROCUREMENT AND SERVICES**



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1. O ESTALEIRO NAVAL

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WHAT ARE WE GOING TO DEAL ?

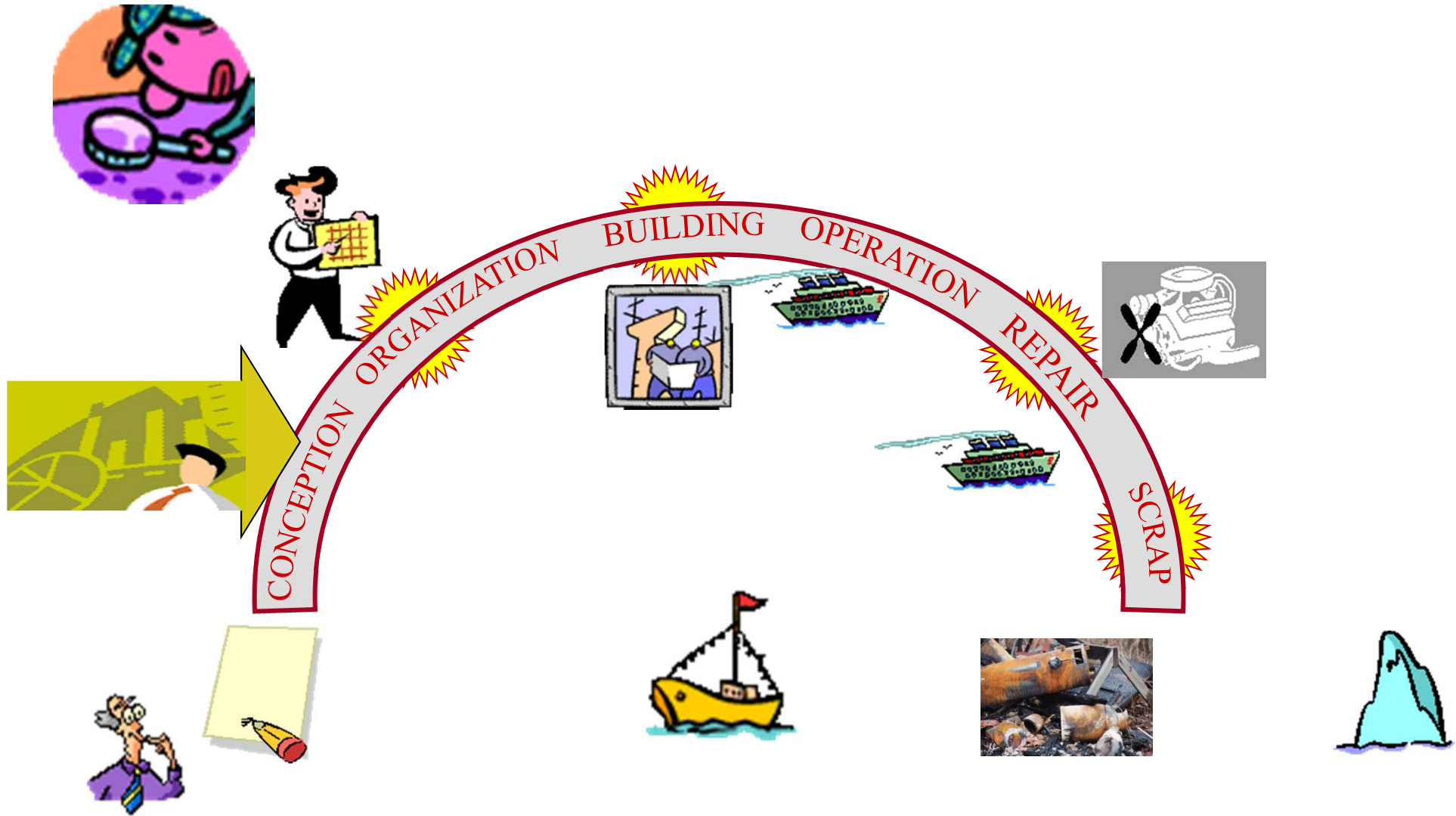




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LIFE CYCLE OF A SHIP

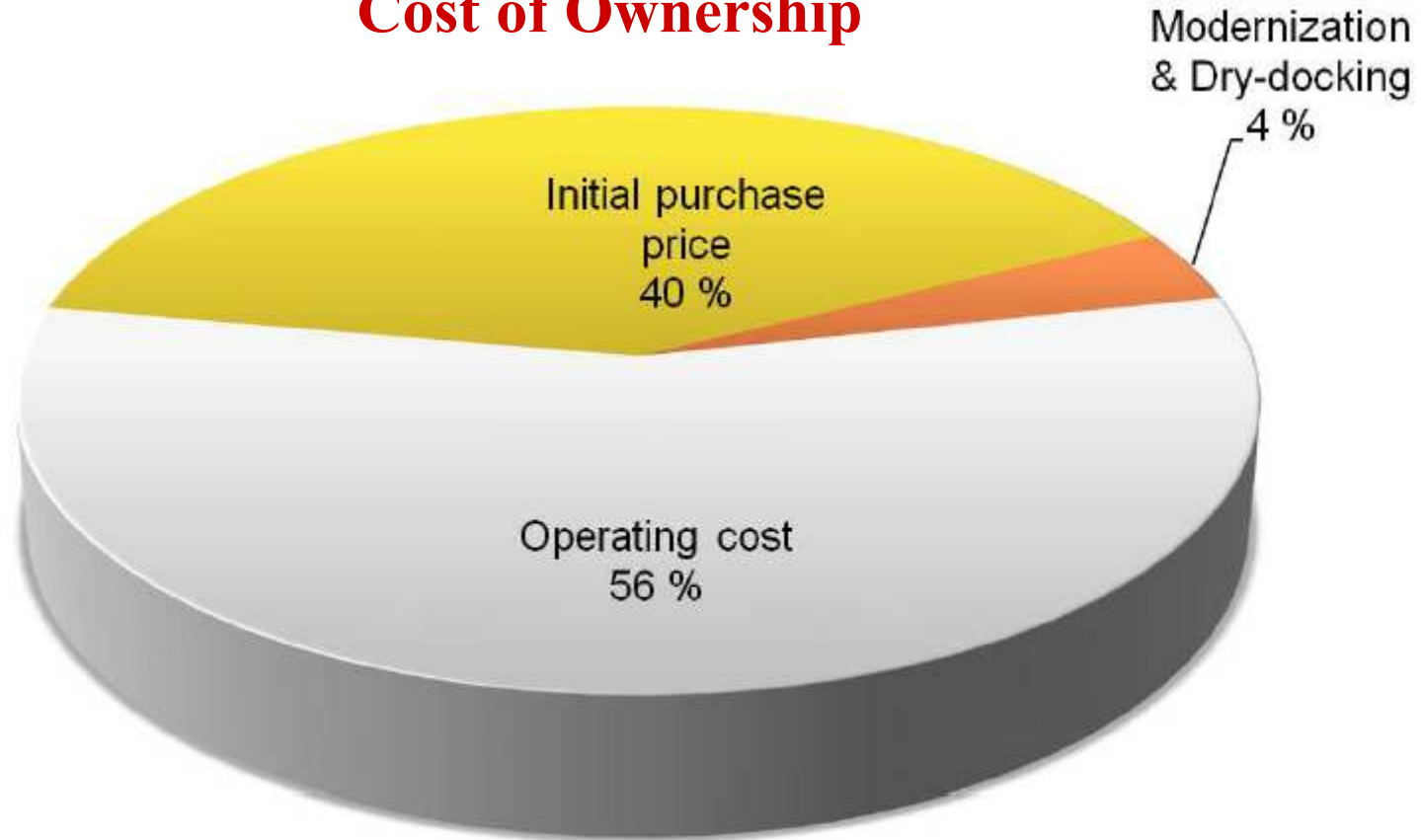
SHIPYARD MANAGEMENT





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Cost of Ownership



Example of 30 years cost of ownership for a typical RoRo vessel excluding fuel and capital costs

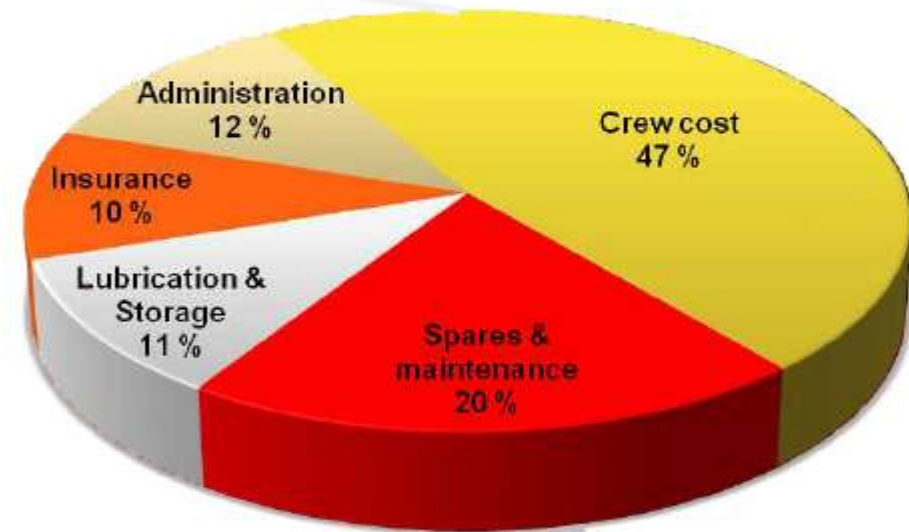
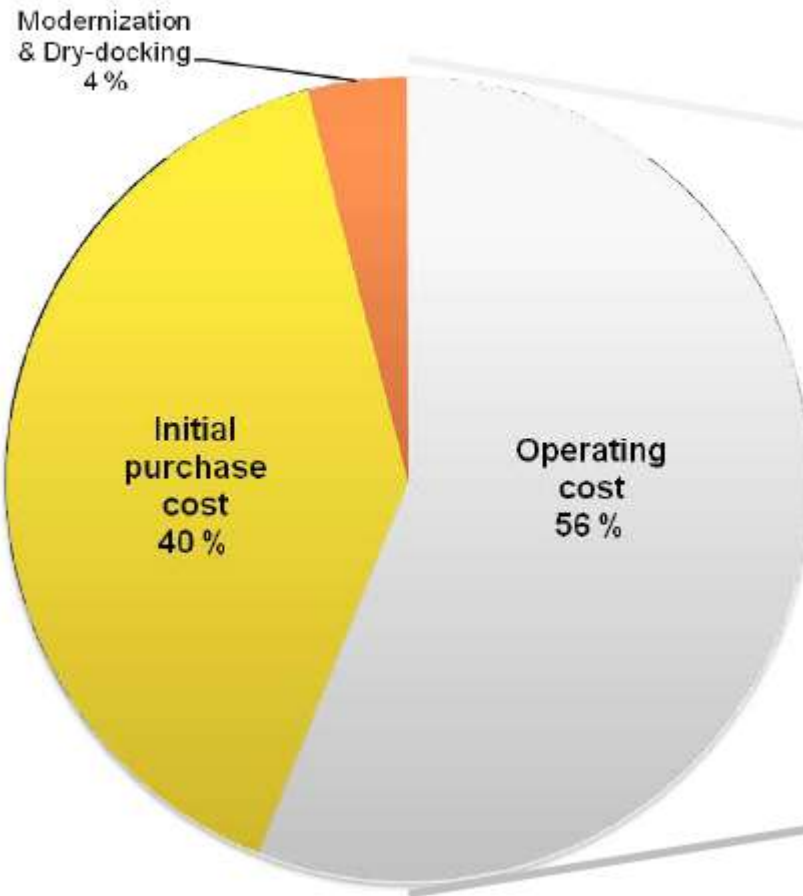


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Cost of Ownership

Total cost of ownership (30yrs)

Operating costs



Roro vessel, excluding fuel oil costs and capital costs

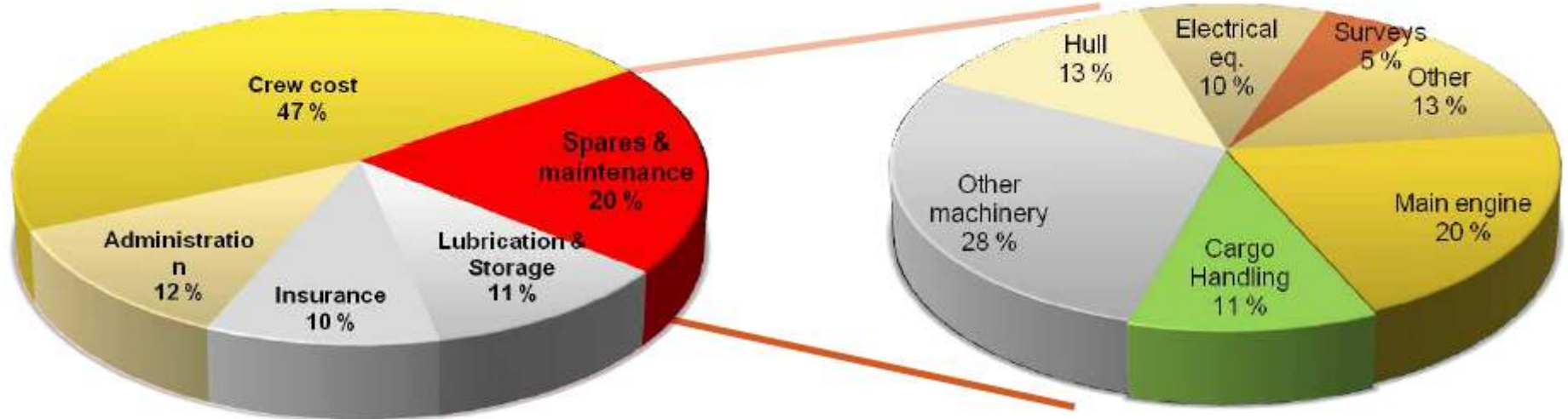


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Cost of Ownership

Operating costs

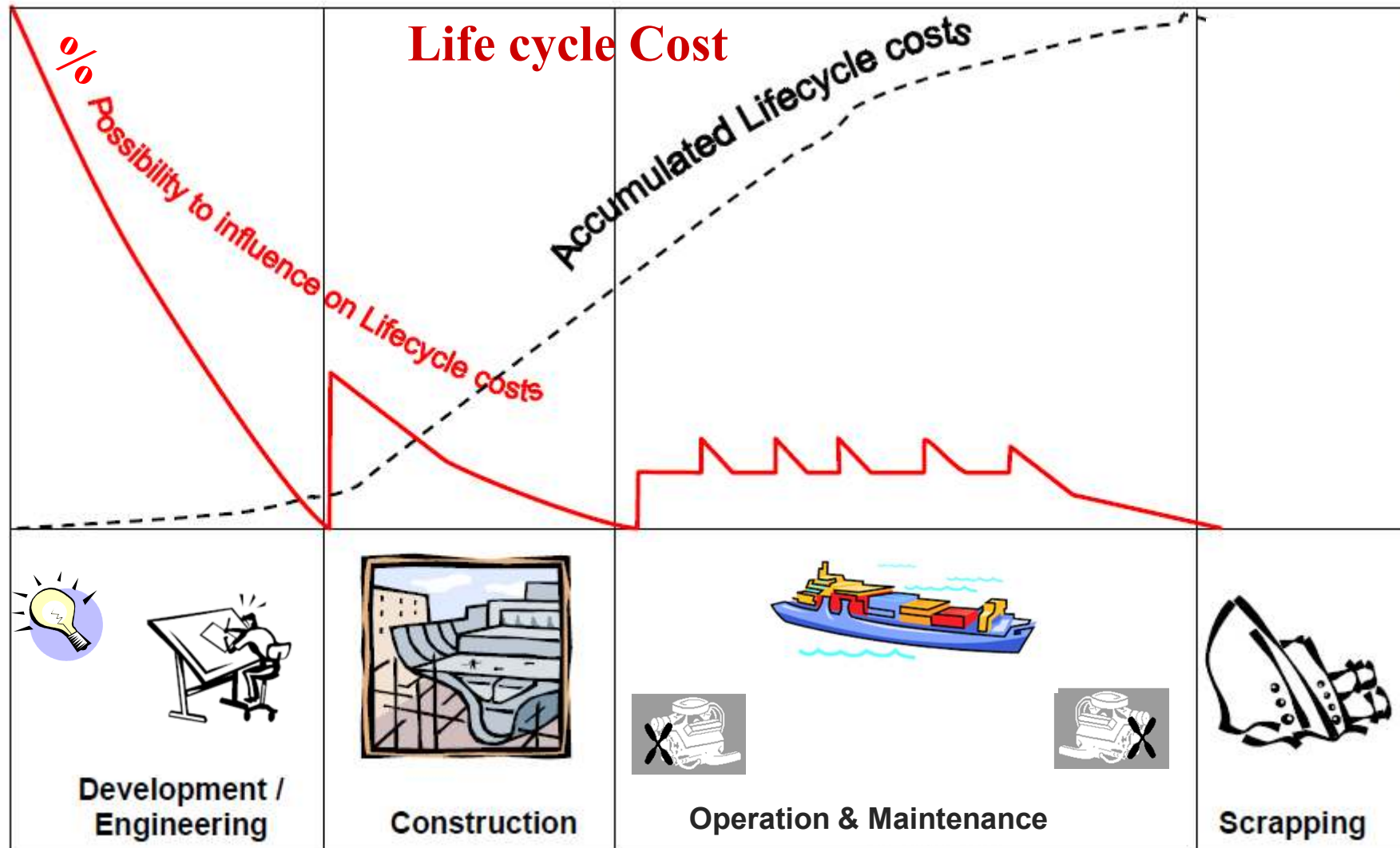
Spares & Maintenance cost



Roro vessel, excluding fuel oil costs and capital costs



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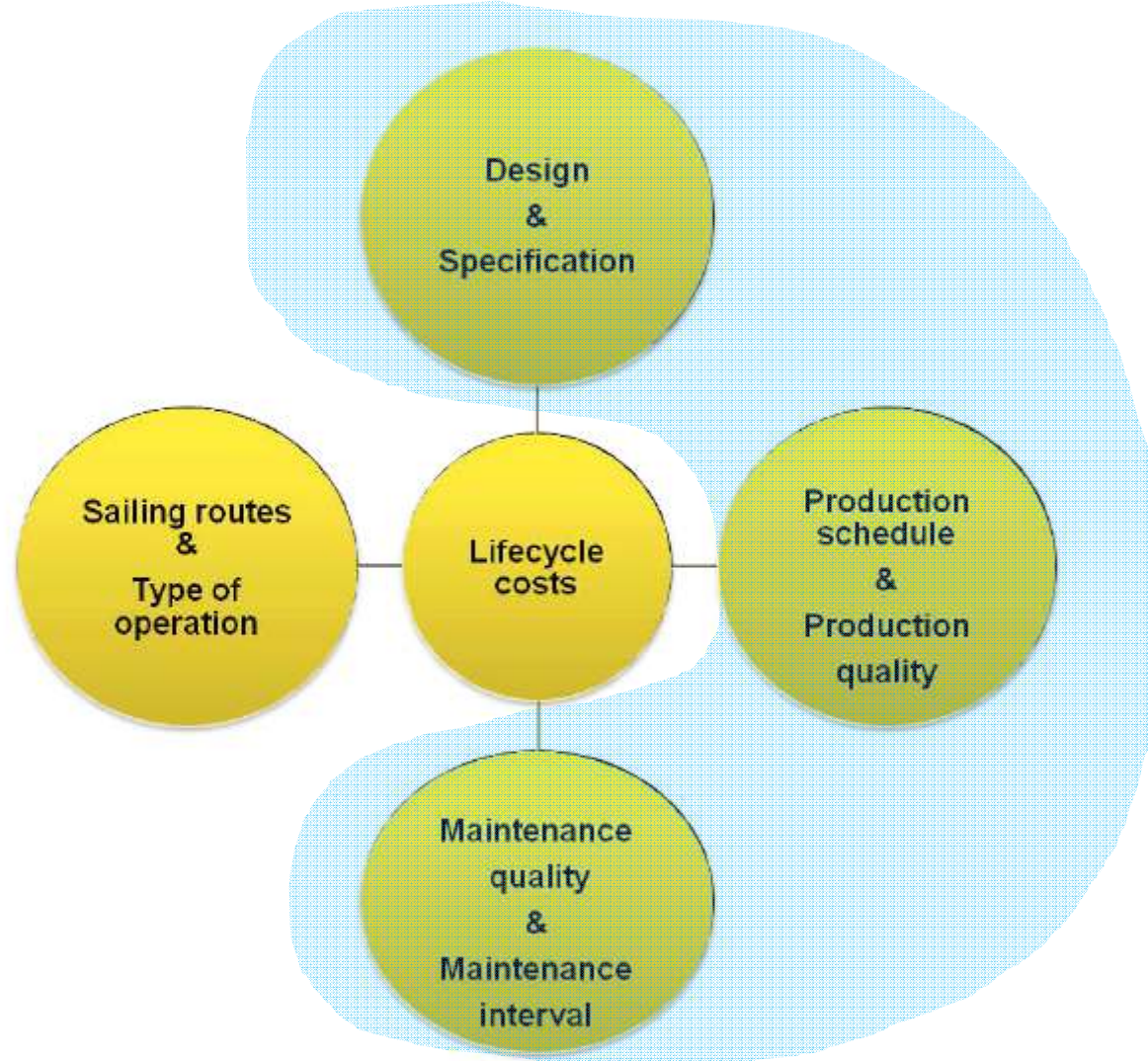


Adapted from Mac Gregor May 15, 2008



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Factors impacting on equipment life cycle



Adapted from Mac Gregor May 15, 2008

IP1_OGEN_UK_ESTALEIROS_RV4 by: Gomes Lopes



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❖ SHIPYARD

A BUILDING OR REPAIR YARD IS A BUSINESS UNIT ENGAGED IN CONSTRUCTION OR REPAIRING SEA VESSELS.

WE CAN'T SAY THAT A REPAIR YARD JUST DO REPAIRS AND CONSTRUCTION YARDS ONLY PRODUCES NEW VESSELS, THE BORDERS INTERPENETRATE.

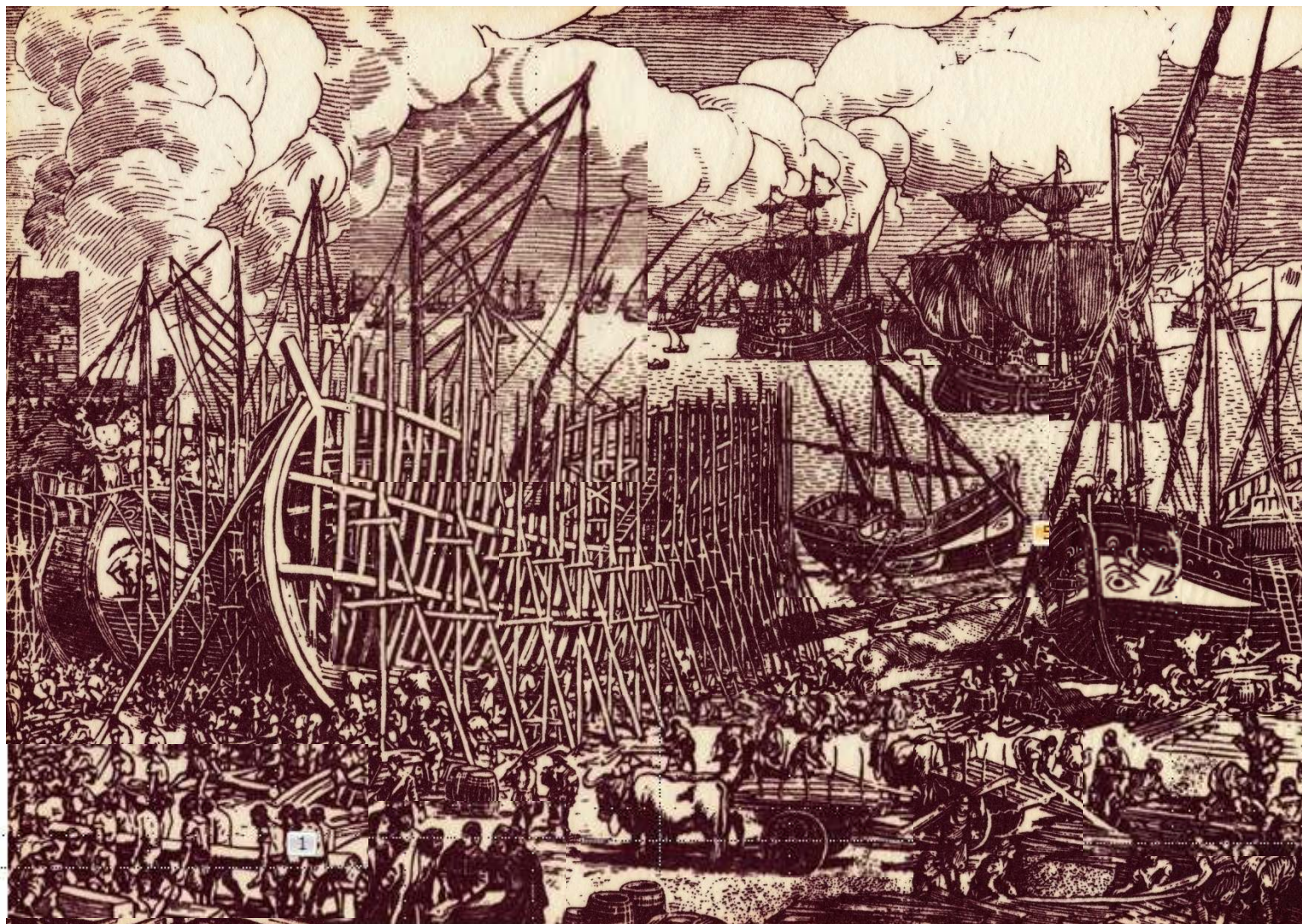
ACTIVITIES LIKE: WELDING PLATES AND PROFILES OF THE DIFFERENT TYPES, ASSEMBLING AND ALIGNMENT MAIN ENGINES, CONVERSIONS AND OTHER SIMILAR WORKS ETC., ARE COMMON ACTIVITIES FOR THE TWO YARD TYPES

LONG TIME AGO IT WAS MOST PROBABLY THAT THE SHIPS WERE REPAIRED IN THE SHIPYARDS WHERE THEY HAVE BEEN BUILT



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SHIPYARD MANAGEMENT



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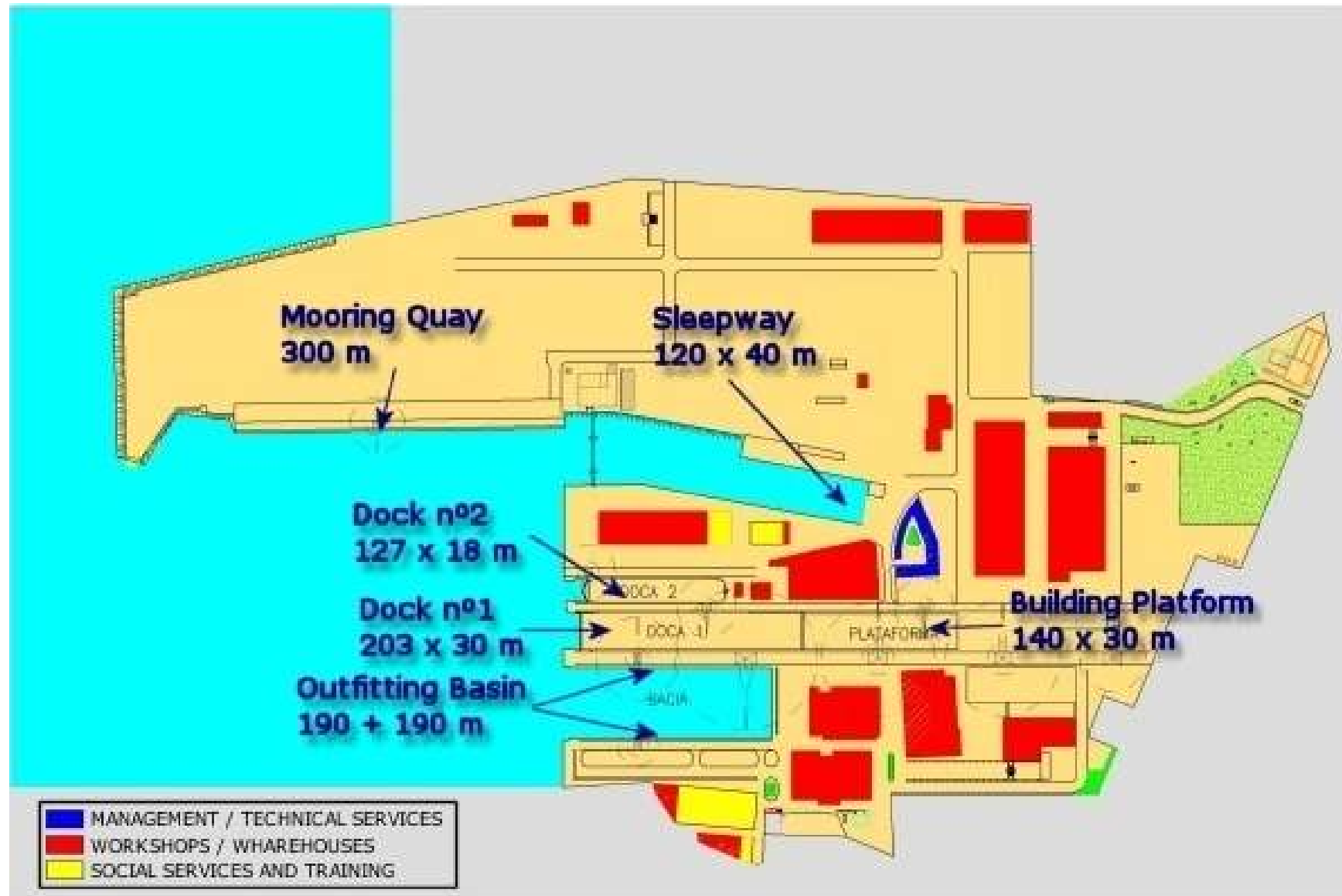
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SHIP MOVING OUT FROM BLOHM VOSS





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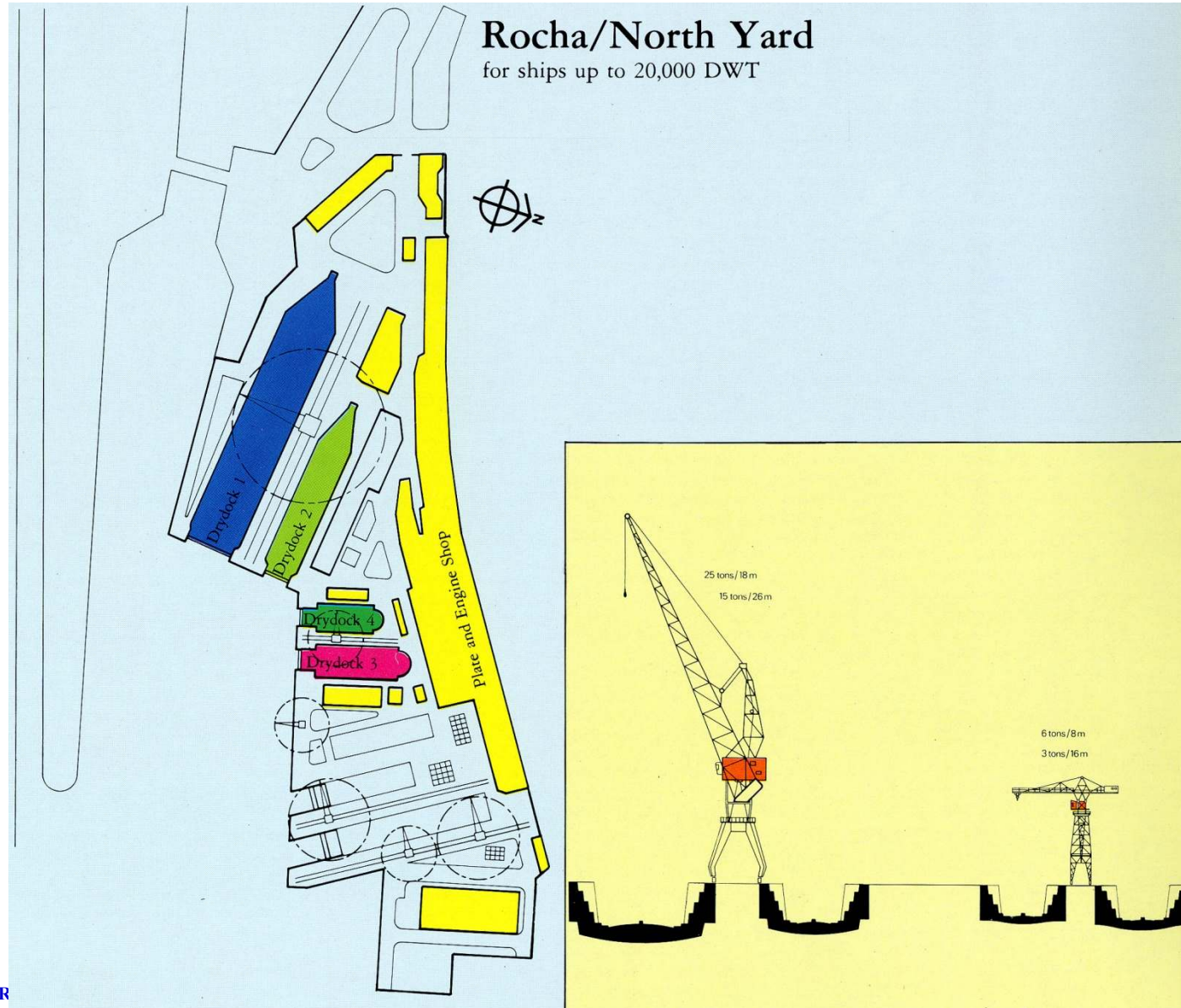


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SHIPYARD MANAGEMENT



Mont (2009–2010)
Knock Nevis (2004–2009)
Jahre Viking (1991–2004)
Happy Giant (1989–1991)
Seawise Giant (1979–1989)

Type:	Crude oil tanker
Tonnage:	•260,941 GT •214,793 NT •564,763 DWT
Displacement:	81,879 long tons light ship 646,642 long tons full load
Length:	458.45 m (1,504.10 ft)
Beam:	68.8 m (225.72 ft)
Draught:	24.611 m (80.74 ft)
Depth:	29.8 m (97.77 ft)
Propulsion:	Steam Turbine; 50,000 shp
Speed:	16 knots (30 km/h; 18 mph)

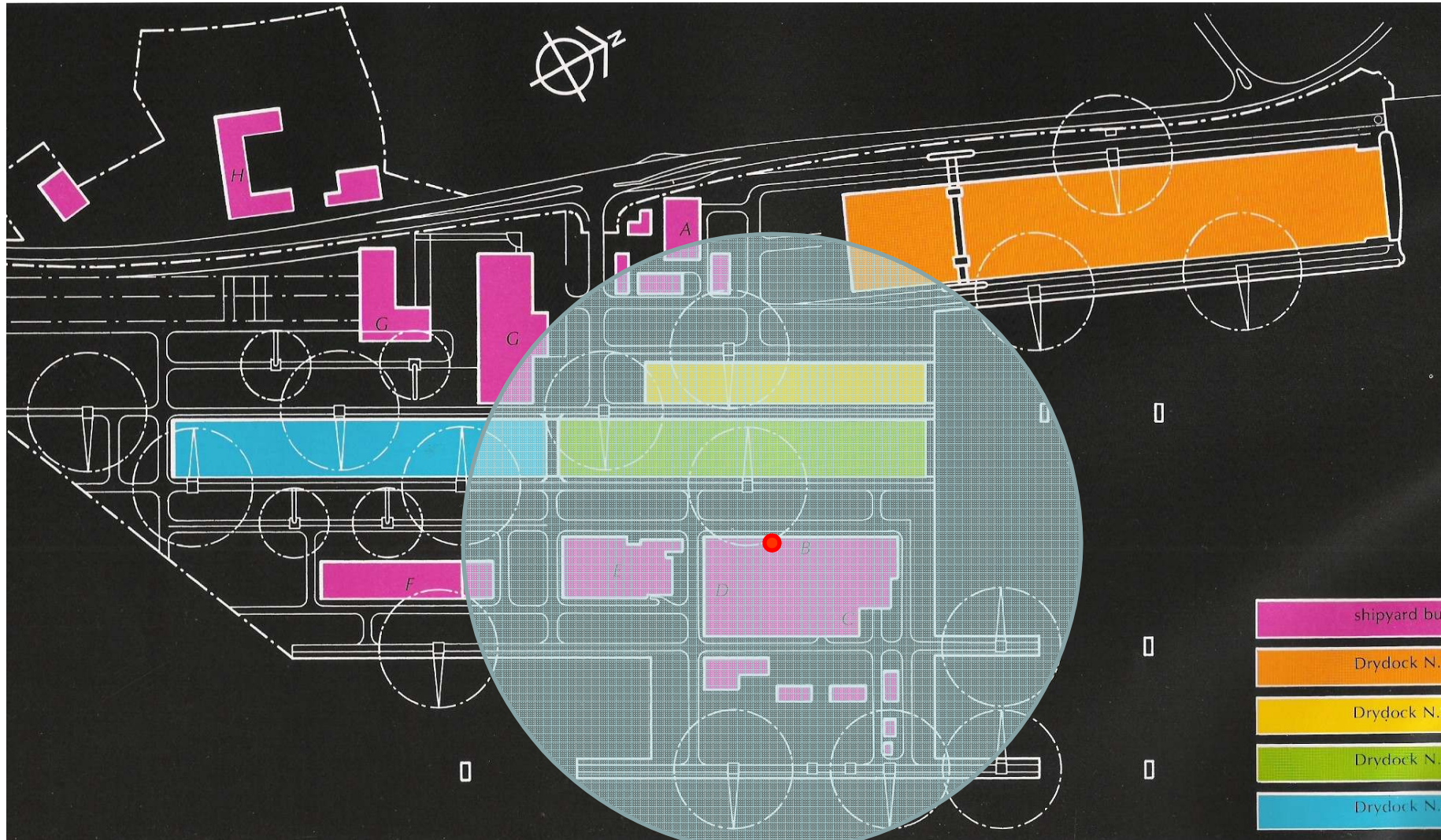


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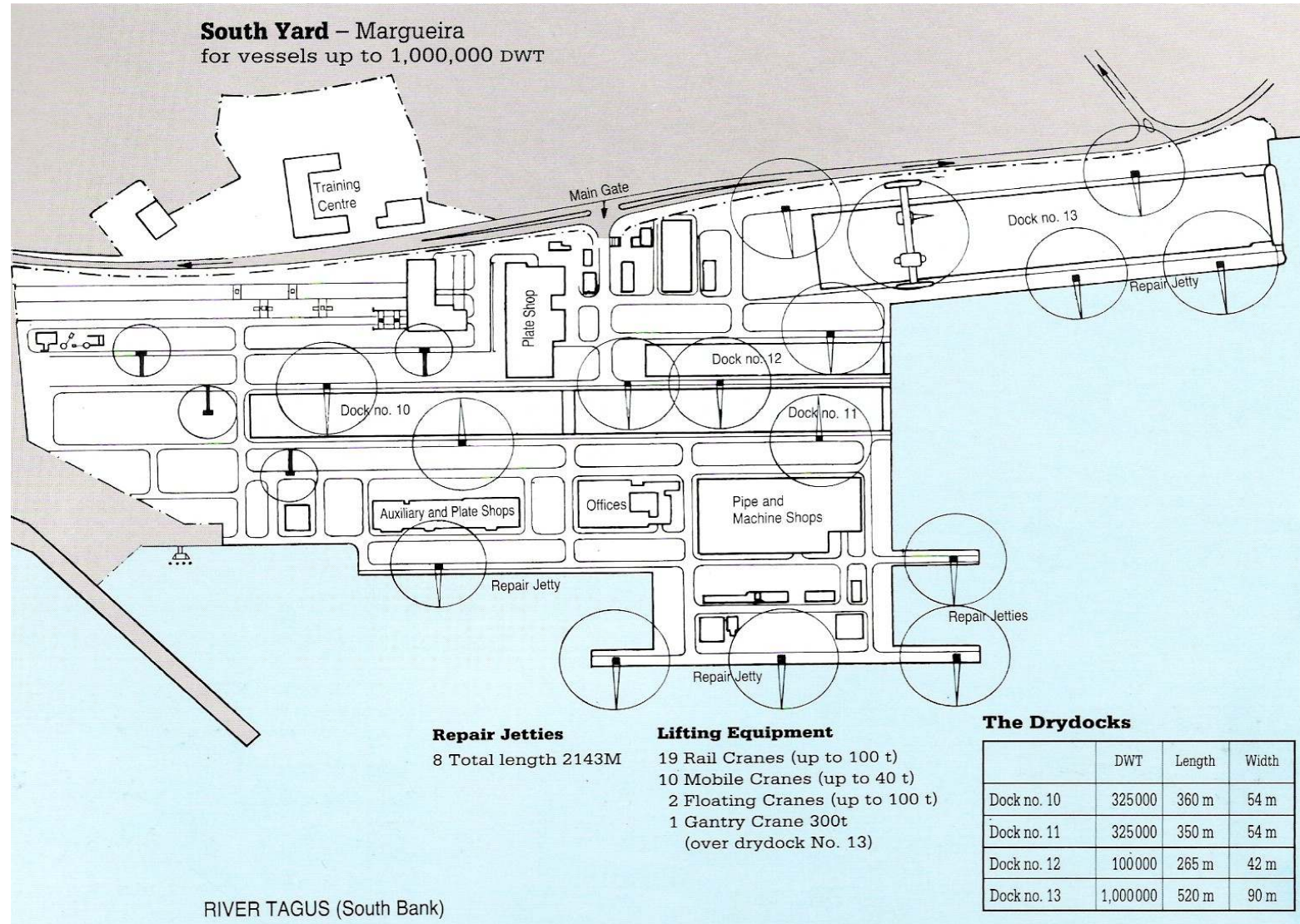


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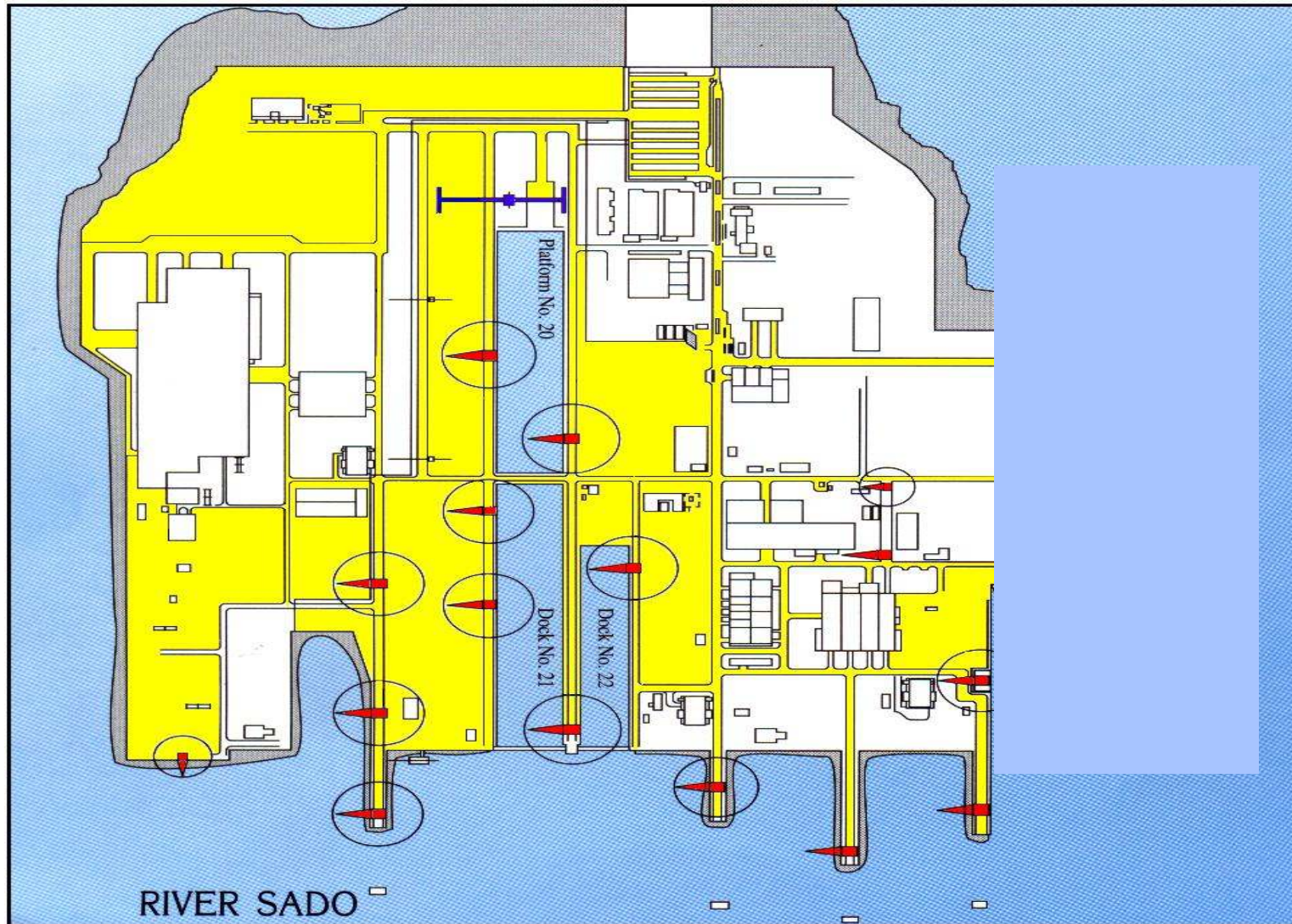


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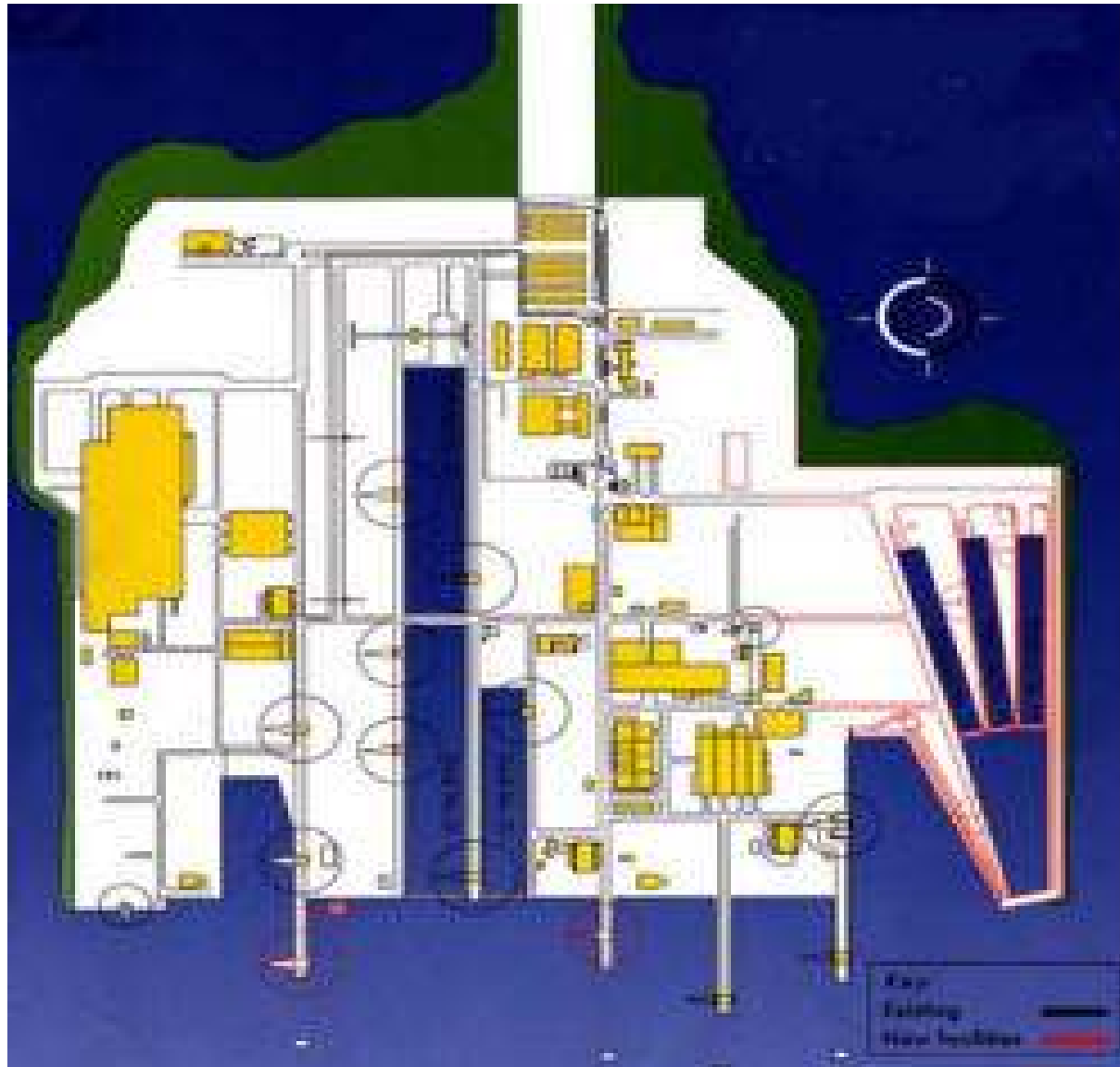
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ESTALEIRO DA LISNAVE MITRENA



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SHIPYARD MANAGEMENT





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HOW TO FIND YOUR WAY IN THE YARD

1. 72,000 DWT Floating Dock No 1
2. 37,000 DWT Floating Dock No 2
3. 1,010-ft Repairs pier No 1
4. 37,000 DWT Slipway No 1
5. Prefabrication Section Area No 1
6. Helicopter Shed & Landing Pad
7. Recreation hall
8. Electrical substation
9. Administrative offices
10. Shiprepairing offices-Repairs Manager- Yard Manager
- 11, 12. Painters Shop
13. First Aid station
14. Port Captain
15. Foremen offices
16. Heavy Machine shop
17. Light Machine shop
18. Pipe and Fitting shop
19. Tool shop
20. Electrical Repair shop
21. Stores
22. Compressed air Station
23. Mould Loft
24. Waiting Room - Bus Terminal
25. Materials Arrangement Plant
26. Heavy Plate shop
27. Light Plate shop
28. Boiler shop
29. Maintenance shop
30. Fire brigade
31. Riggers shop
32. Changing rooms
33. Canteen
34. 6,000 DWT Slipway No 2
35. Pipe Fitters School
36. Carpenter shop
37. Steel Yard
38. Gritblasting & Painting installation
- 39, 40, 41. Timekeeping-Entrance Gate-Custom & Port Police
42. Paint Stores
43. Stores
44. Pipe Stores
45. Prefabrication Section Area No 2
46. 950-ft Repairs Pier No 2
47. 60,000 DWT Floating Dock No 3
48. 250,000 DWT Graving Dock No 4
49. Prefabrication Section Area No 3
50. Building for Industrial Constructions - Rolling stocks
51. 1,115 ft Outfitting & Gritblasting Quay
52. 500,000 DWT Graving Dock No 5
53. Garage
54. Gritblasting Station
55. Prefabrication buildings





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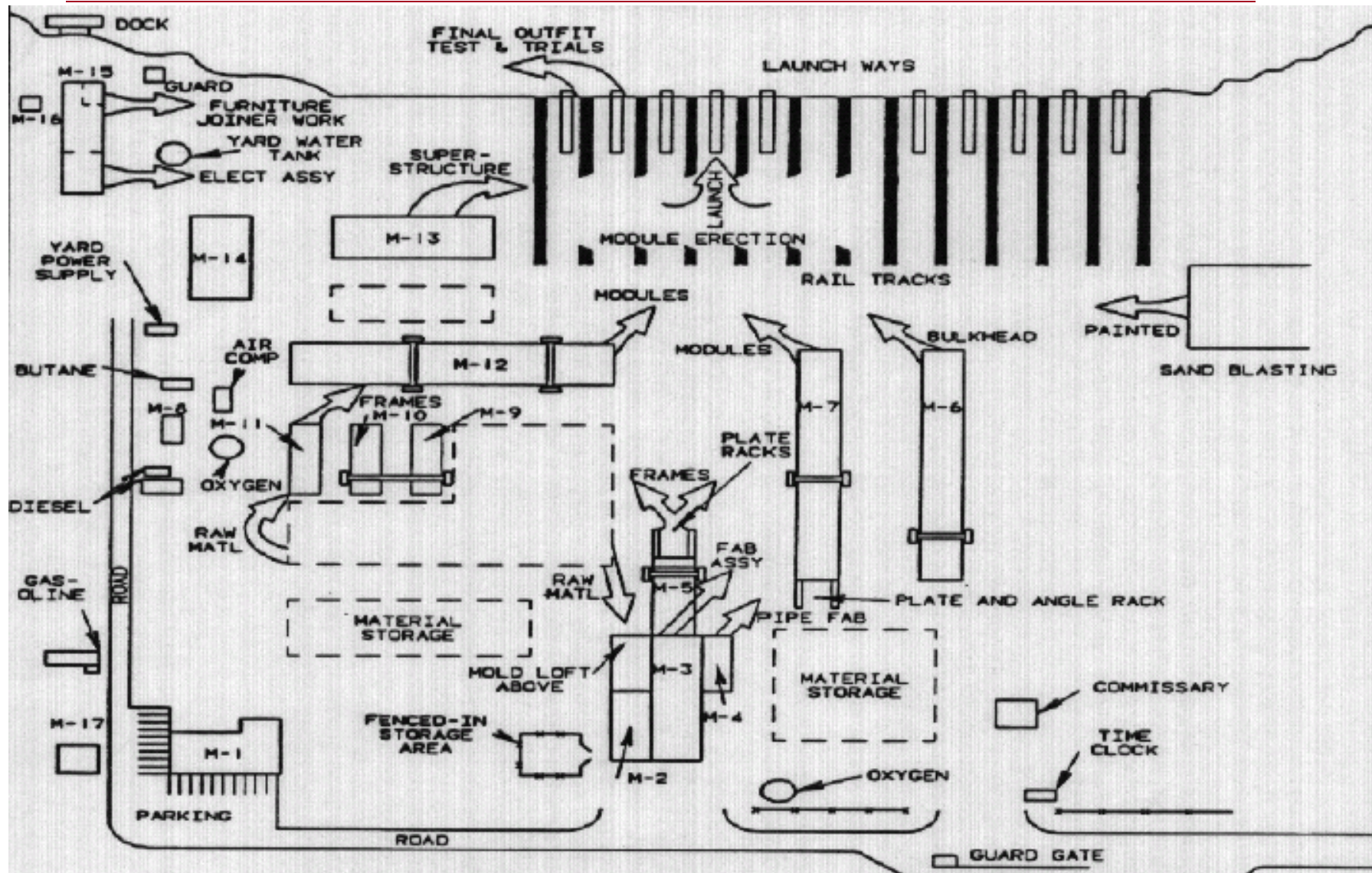


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SHIPYARD MANAGEMENT



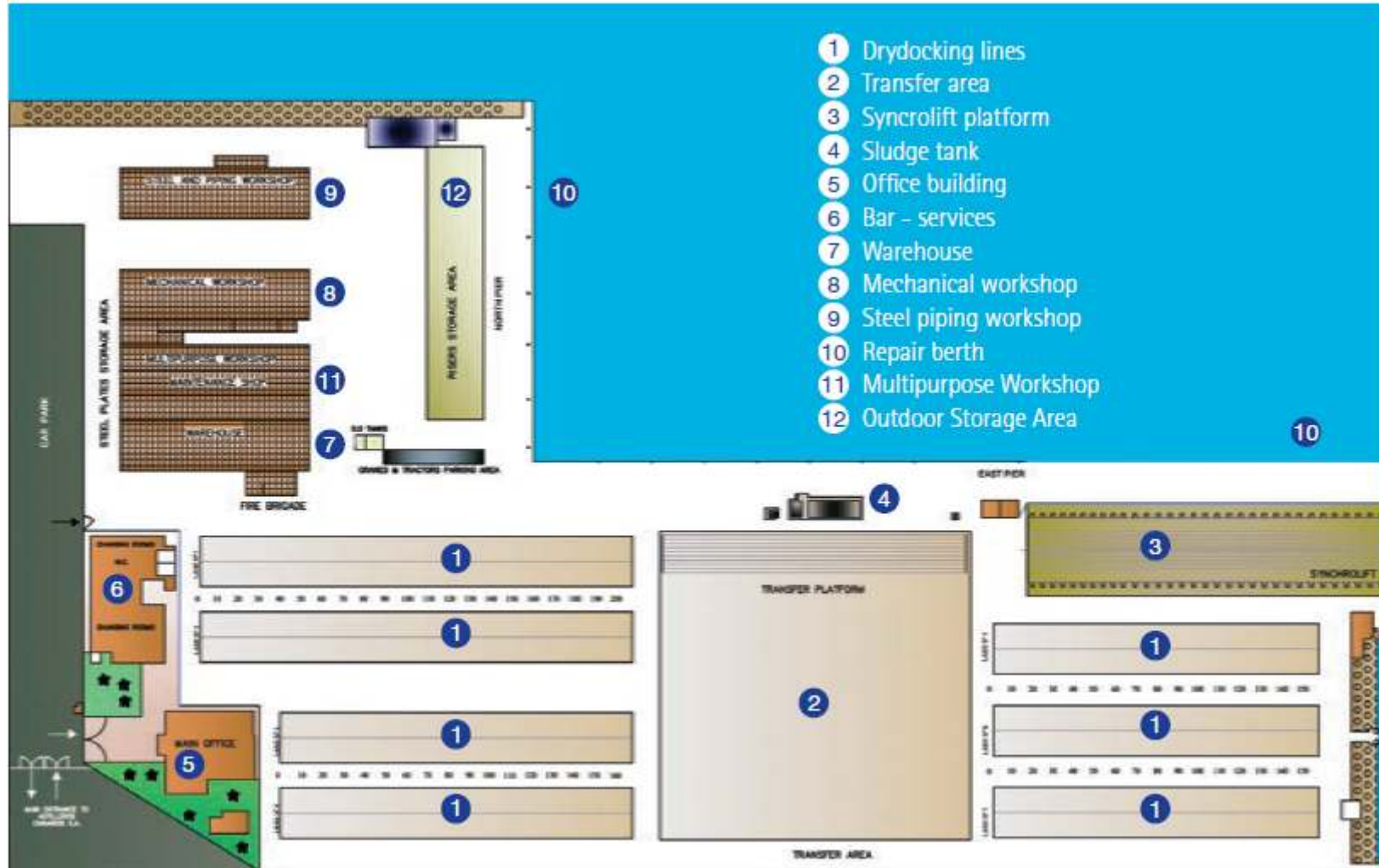


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Vancouver Shipyard Transformation



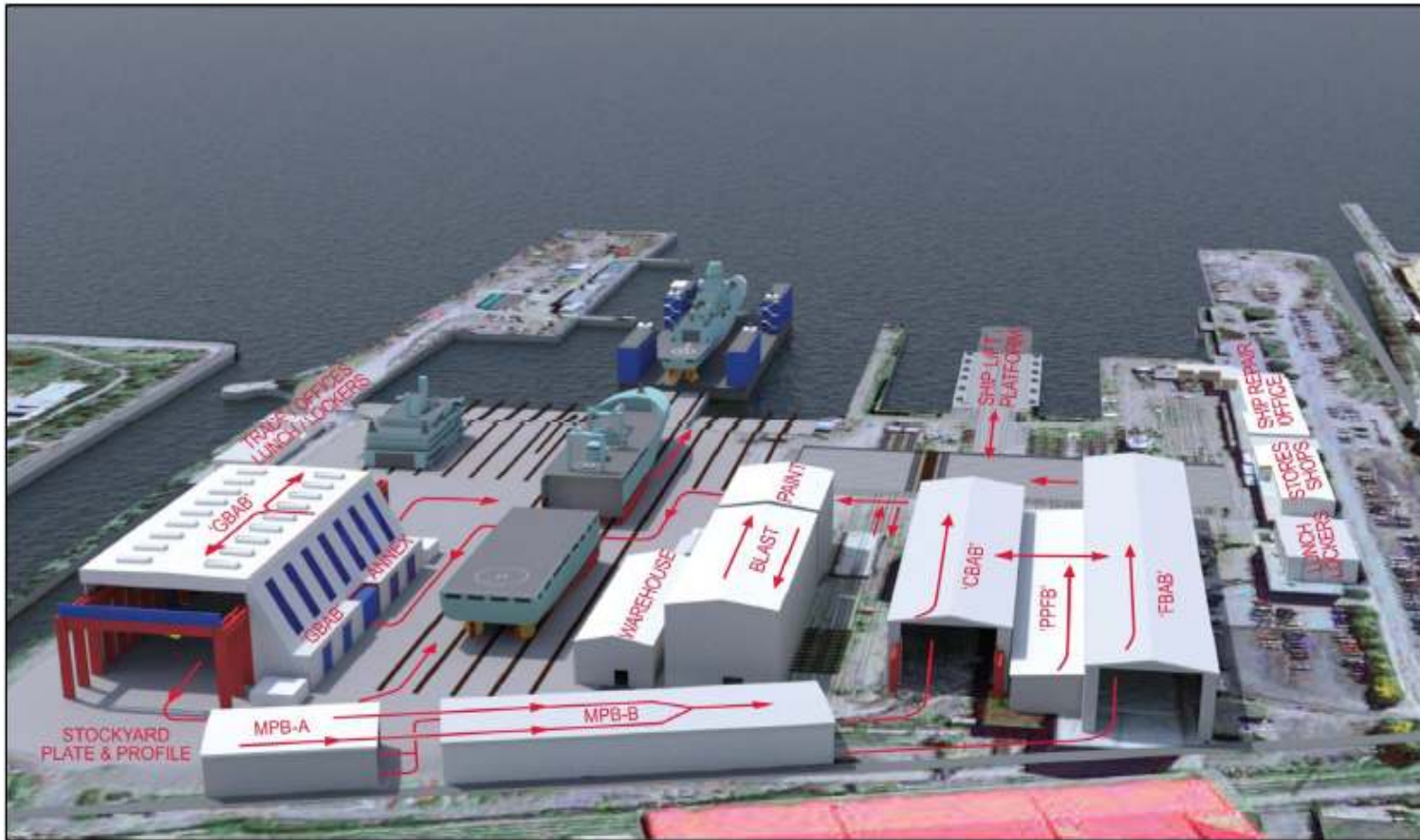
Current Facility



Facility Post Modernization

Vancouver Shipyard Transformation

New and modified facilities provide efficient material flow





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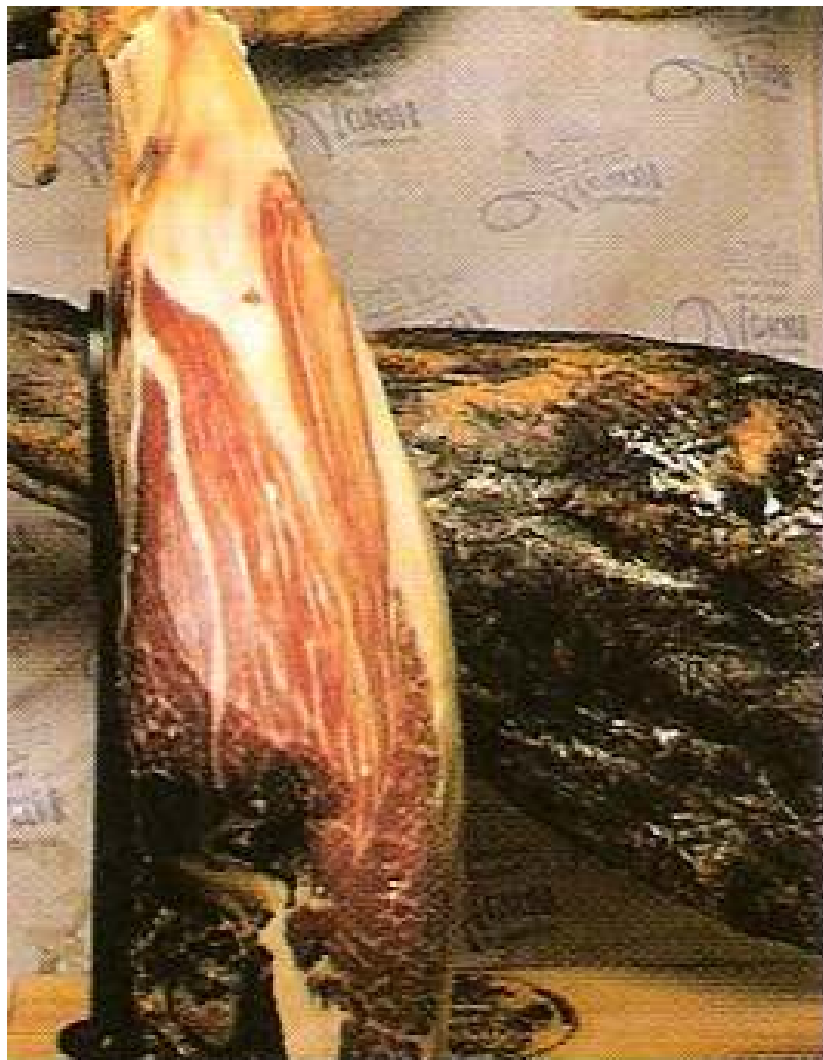


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❖ **THE SHIPYARD AS AN ENTERPRISE**

A Building or Repair shipyard is a company with the main purpose of:

- ❖ **Returning the capital to the shareholders through its activity as company.**

There may be other elements of a social nature which justify the existence of shipyards while a company, despite the invested capital.

- ❖ **Elements normally identified and encouraged by public officials (Regional States or local authorities) whose objective are:**
 - ❖ **Ensure ability to repair in order to maintain local fleets (shipyards established in major fishing ports);**
 - ❖ **Ensure industrial economic activity in a given region.**



❖ **THE SHIPYARD AS AN ENTERPRISE**

The shipyard, as a company, must observe laws and rules in the domain of:

- ✓ **Activity permit;**
- ✓ **Tax administration;**
- ✓ **In compliance with rules and standards in the domain of**
 - ✓ **Occupational, Safety and Health (OSHA)**
 - ✓ **Labour;**
 - ✓ **Environment etc.**

To establish the activity it is necessary to evaluate:

- ✓ **The Market (Quantitative and qualitative);**
- ✓ **The location Where the shipyard is going to be built;**
- ✓ **The logistic support.**



❖ SHIPYARD GENERAL ORGANIZATION

DESPITE OF THE DIMENSION ALL SHIPYARDS SHOULD HAVE:

- ❖ **MANAGEMENT;**
- ❖ **INFRASTRUCTURES;**
- ❖ **COMMERCIAL & PRODUCTION;**
- ❖ **HUMAN RESOURCES;**
- ❖ **FINANCIAL AVAILABILITY.**



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❖ SHIPYARD GENERAL ORGANIZATION (CONTINUE)

The initial definition and the start-up of the initiation of a new SHIPYARD project, should be based on FEASIBILITY STUDY, and supported in a STRATEGIC PLAN.

There must always be a margin for further adjustment, whether qualitative or quantitative, taking into account various factors, including market changes, nowadays fairly frequent.

Established the order to proceed with the shipyard project, the guarantee of success of the business depends on:

- ✓ **MARKETING CAPABILITY;**
- ✓ **TECHNICAL COMPETENCE;**
- ✓ **COMPETITIVENESS;**
- ✓ **GENERATION OF PROFIT MARGINS.**



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

❖ SHIPYARD GENERAL ORGANIZATION (CONTINUE)

❖ MARKETING CAPABILITY

- ✓ Capacity to understand the clients;
- ✓ Obtaining financing solutions.

❖ TECHNICAL COMPETENCE

- ✓ Management capacity (Planning, Organizing, Leading and Controlling);
- ✓ Existence of adequate industrial production and technology;
- ✓ Availability of qualified and motivated personnel;
- ✓ Ability to produce in quality;
- ✓ Ability to anticipate and to meet deadlines.



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❖ SHIPYARD GENERAL ORGANIZATION (CONTINUE)

✓ COMPETITIVENESS

✓ RATIONAL POST-OPERATIVE PROCESSES AND APPROPRIATE PRODUCTIVITY;

✓ REDUCTION OF SUPERFLUOUS CHARGES.

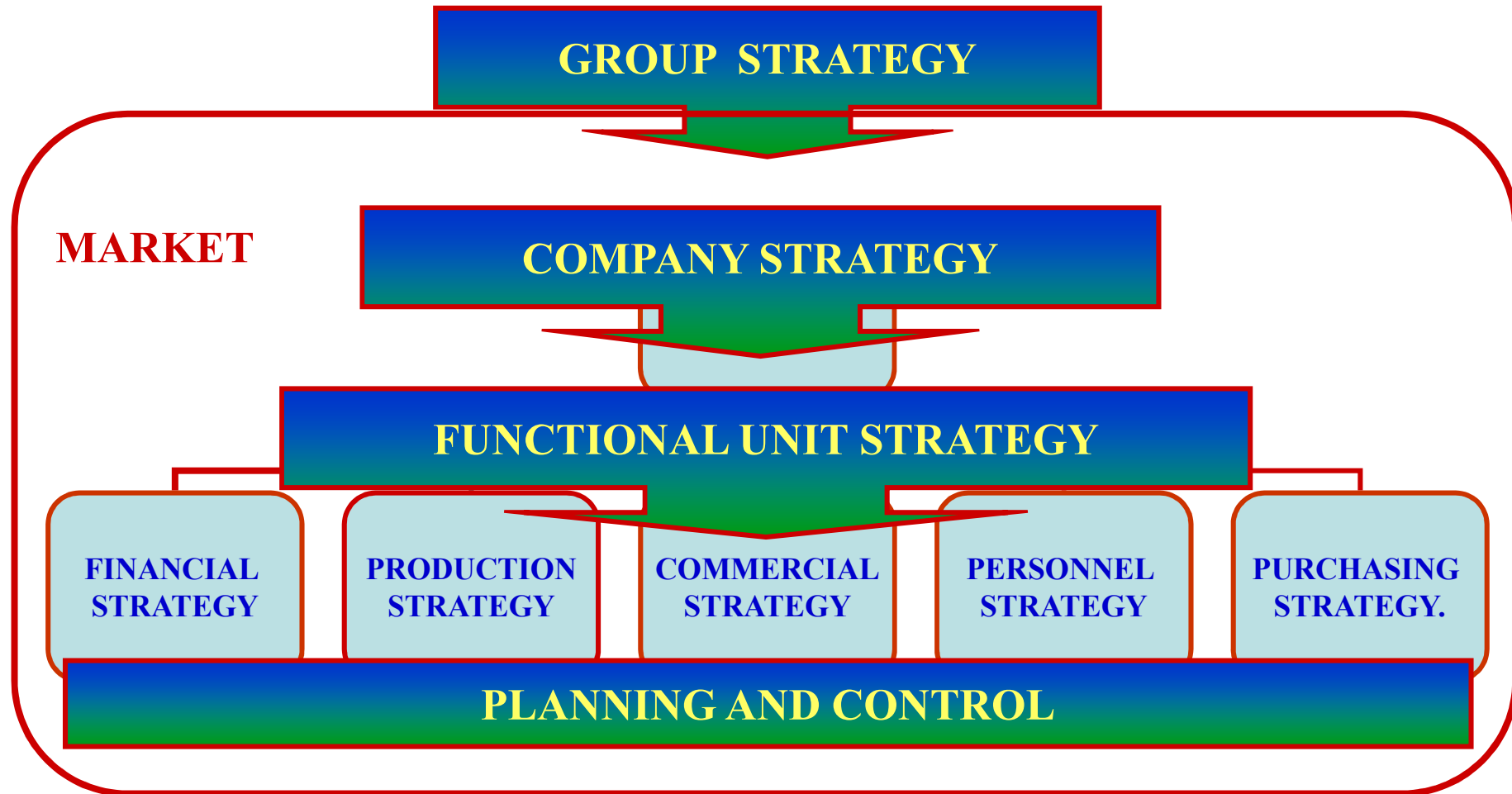
✓ GENERATION OF PROFIT MARGINS

✓ LESS PRODUCTION COSTS IN RELATION TO SALES;

✓ DIFFERENTIAL FOR PAYING THE RETURN ON CAPITAL.



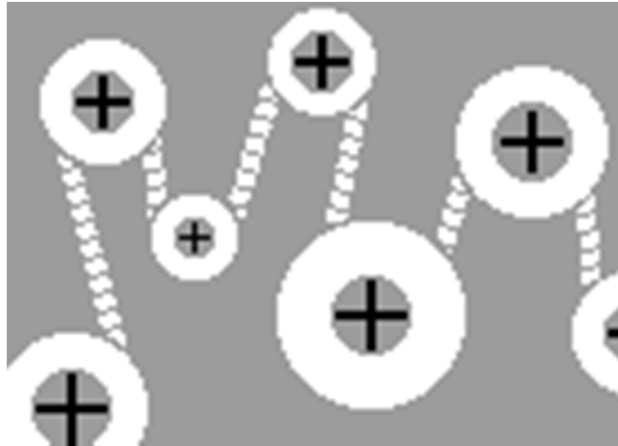
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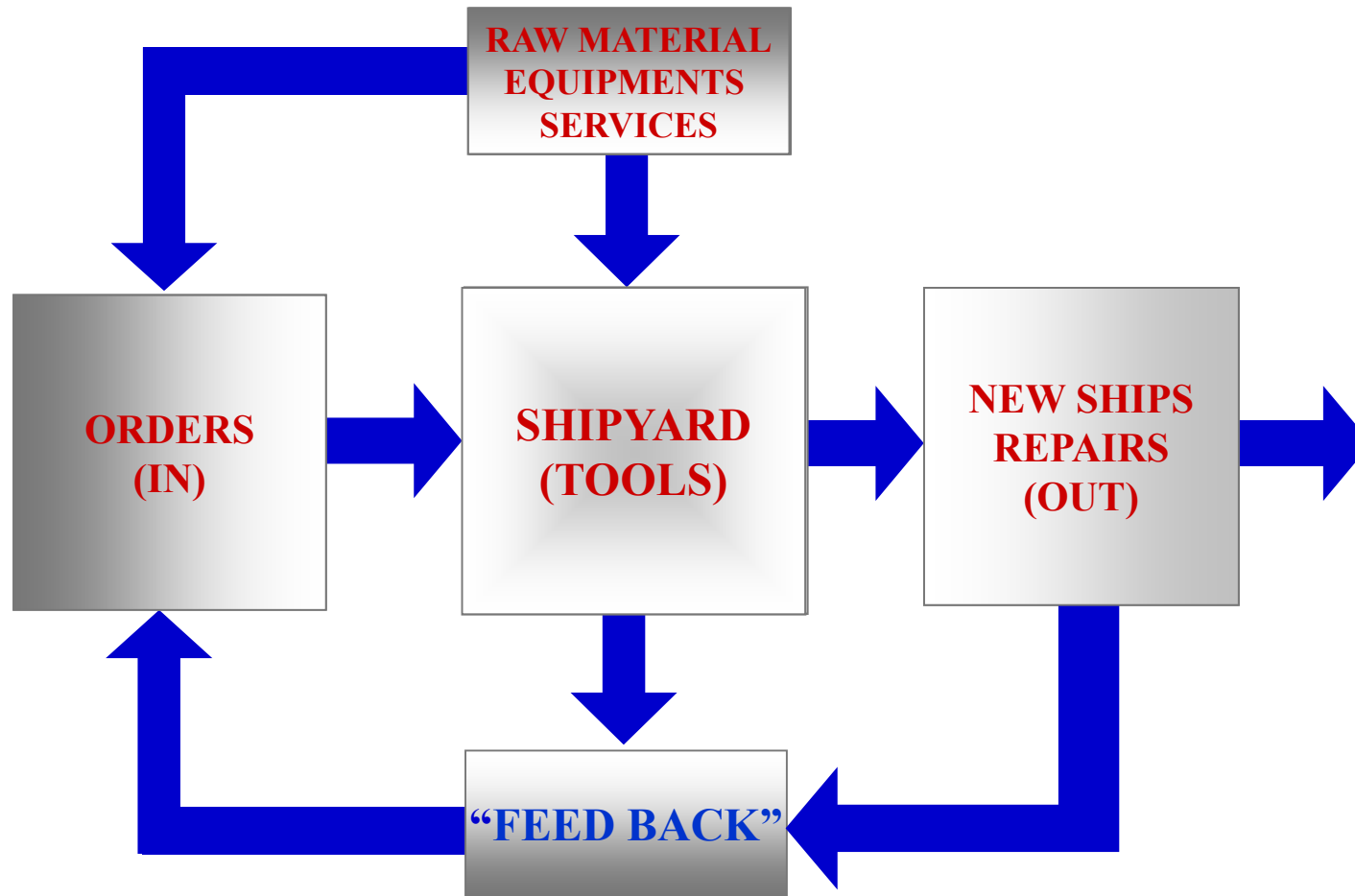
PROCESS UNIT





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

DIAGRAM





❖ CHARACTERIZATION OF THE ACTIVITY

Beyond the intensive labor, the Ship Building, Ship Repair and the recently Offshore industry, they embrace, the Design, and the Implementation of specific products, with the use of various methodologies and processes, acquisition of new equipments and materials used in building, repair and conversion of vessels, whether commercial or military of various dimensions and complexity.

Shipyards range from big companies, passing by S.M.Es. and ending in family-sized shipyards.

Shipbuilding practices, the consequent adaptation of ship repair and general arrangement of the yards have evolved over time, following the evolution of the productive industry methods.



❖ CHARACTERIZATION OF THE ACTIVITY (CONTINUED)

The majority of Shipyards were built on the banks of the rivers or in sheltered sea bays and near of accessibilities where it was easily to get the components, equipment and material necessary for its operation. Depending on the "layout" of the shipyards, the ships are most often maneuvered and moved to the "dry spots" in accordance with the tides.

The first early modern European and oldest surviving drydock still in use was commissioned by Henry VIII at HMNB Portsmouth in 1495, This drydock currently holds the world's oldest commissioned warship, HMS Victory.



❖ CHARACTERIZATION OF THE ACTIVITY (CONTINUED)

In the 16th century, there were already floating docks in Venice. The sideway or longitudinal building platforms are the "dry spots" oldest known, being the lifting platforms mechanical or fluid operated the most modern equipment.

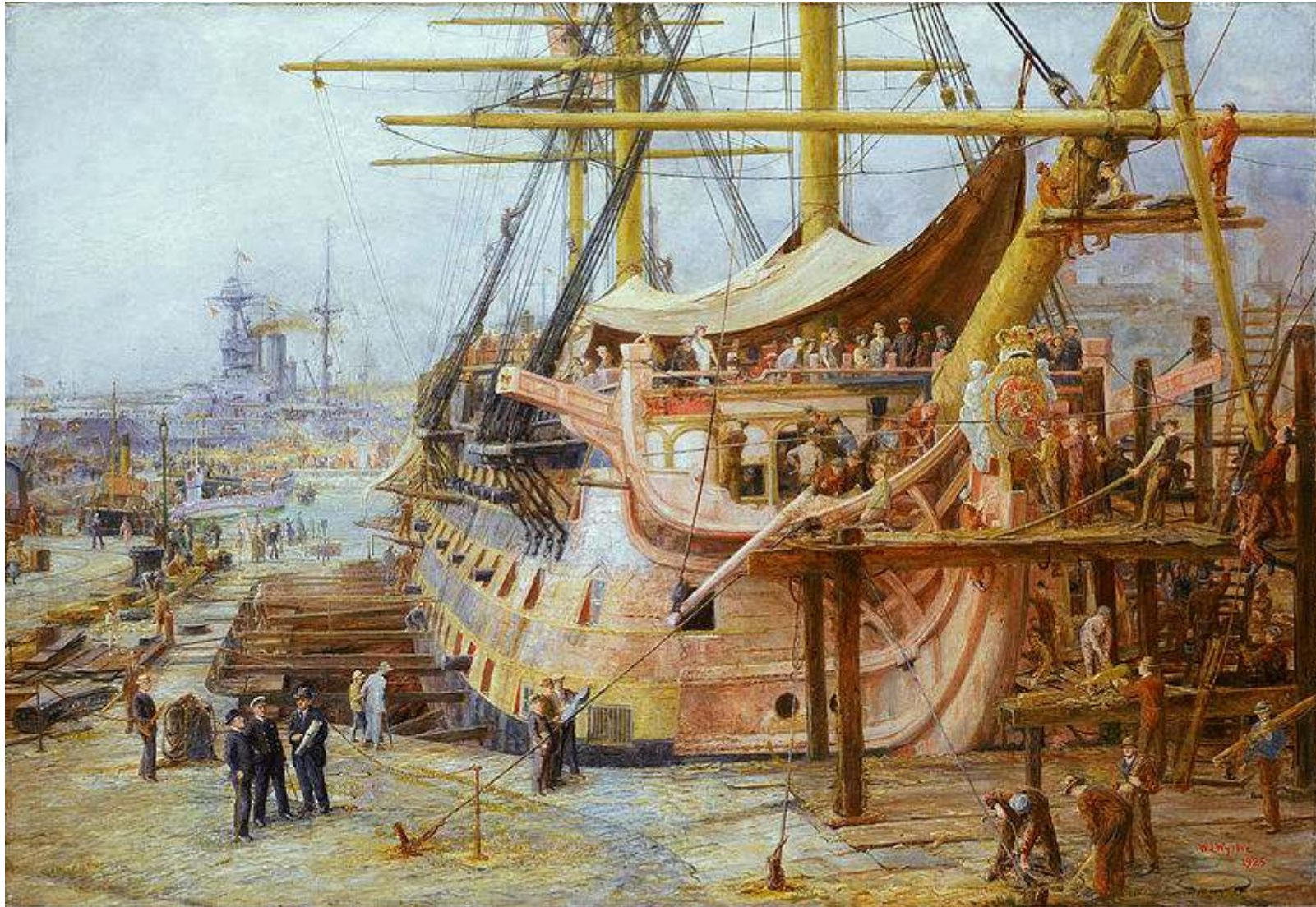
The modern docks as we know them today began to be constructed in the 60's of the last century.

Most of the shipyards built after 60's are based on "lay-outs" of straight lines well suited to new building processes.



1st GRAVING DOCK

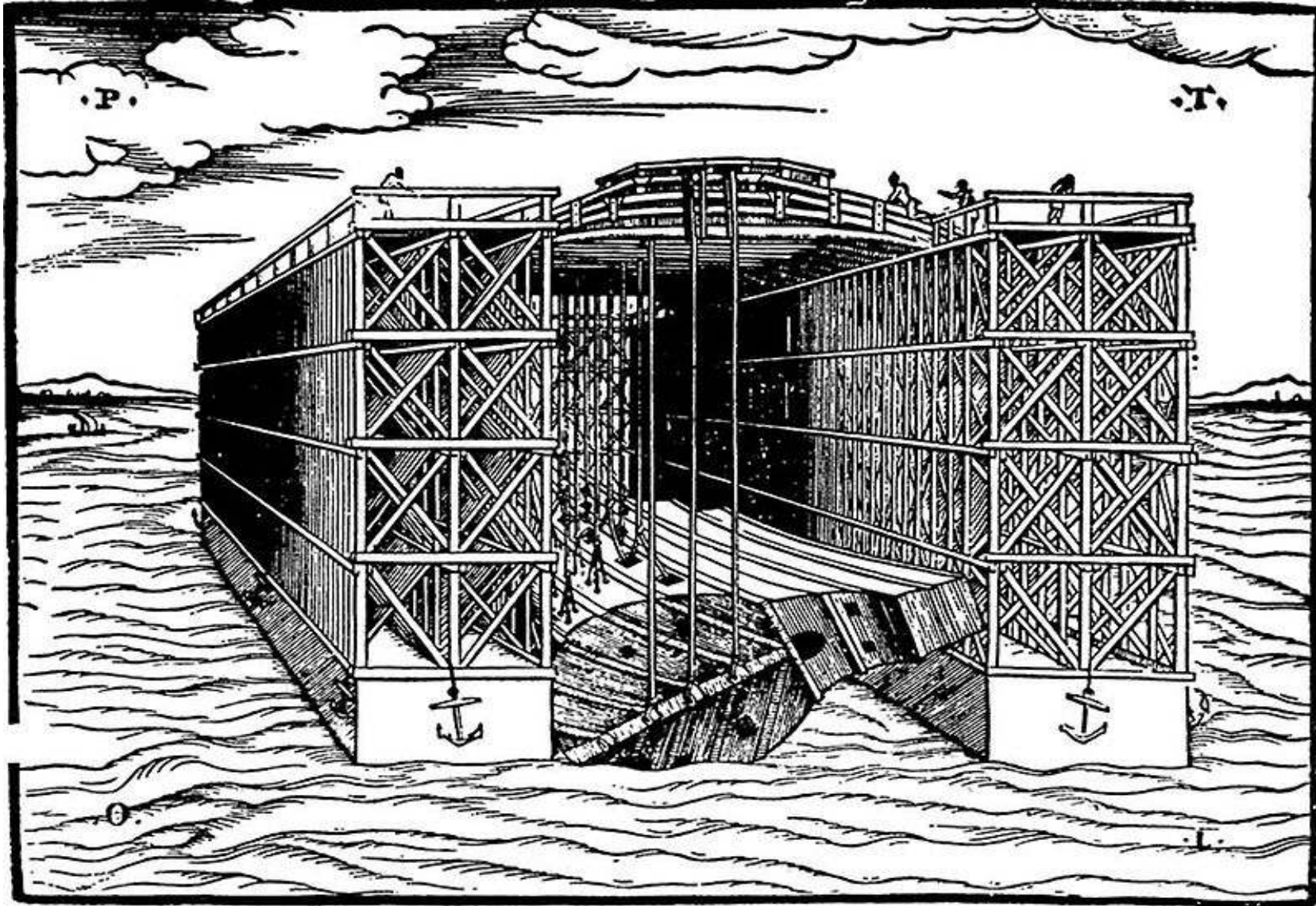
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1st FLOATING DOCK VENICE





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SHIPBUILDING CHRONOLOGY

CRETA	10000 - 4000 BC	Mediterrâneo	Commerce
EGIPTO	5000 - 2100 BC	Nilo	Naval
EGIPTO	2100 - 600 BC	Mediterrâneo	Naval
MESOPOTÂMIA	1500 - 330 BC	Mediterrâneo	Commerce
CARTAGO	800 a 240 BC	Mediterrâneo Europa, Africa	Commerce
GRÉCIA	700 - 145 BC	Mediterrâneo	Commerce; Naval
ROMA	270 BC - 420 DC	Mediterrâneo Europa, Africa	Commerce, Naval
ENEZA	200 BC - 1050 DC	Mediterrâneo Europa	Commerce
VIKINGS	420 - 900 DC	Europe, Mediterrâneo	Naval
GÉNOVA	420 - 1500 DC	Mediterrâneo Europa	Commerce



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

SHIPBUILDING CHRONOLOGY

INGLATERRA	800 -1960	DC	Wood and steel	Naval	
HOLANDA	1240 - 1850	DC	Wood	Naval, Commerce	
PORTUGAL	1300 - 1550	DC	Wood	Commerce, Naval	
ESPANHA	1300 - 1600	DC	Wood	Commerce, Naval	
FRANÇA	1500 - 1900	DC	Wood, steel	Commerce; Naval	
E.U.A.	1770 - 1945	DC	Wood, steel, Steam	Commerce, Naval, steam	
ALEMANHA	1900 - 1960	DC	Steel, Diesel	Commerce, Naval	
DINAMARCA	1945 - 1960	DC	Steel, Diesel	Commerce	
JAPÃO	1955 -	P	DC	Steel, Diesel	Commerce
COREIA	1973 -	P	DC	Steel, Diesel	Commerce
CHINA	1980 -	P	DC	Steel, Diesel	Commerce



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

SHIPYARD MANAGEMENT





❖ SHIP BUILDING

I. The construction of steel ships initially followed the methodology of the construction of wooden ships, Construction and Assembly "on a dry place":

- 1. Keel;**
- 2. Bow and Stern frame;**
- 3. Bulkheads and bays;**
- 4. Top and Bottom longitudinals;**
- 5. Hull revited plates.**

In this period the ships are launched to the water with few outfitting and without machine, then moored alongside at the "Outfitting Pier" to be finished.

II. During the World War II the conception of block construction starts, due to the development of the welding process.

III. During the 80's of last century, as the welding processes were developing, the incidence of block manufacturing is increasing and the outfitting installation into the blocks increased too.

IV. During the 90's the integrated block building and assembling, due to the advancement of the /CAD/CAM.



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

WOOD

SHIPYARD MANAGEMENT



For centuries, due to the nature of the material (timber) and fasteners available, the sequence for erecting ships' hulls remained unchanged.

First the keel 'system' was assembled, then the frame system was fitted, and thereafter the sheathing, bulkhead, and decks systems were added. Each part was separately fitted at the shipways.



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STEEL SHIPYARD MANAGEMENT



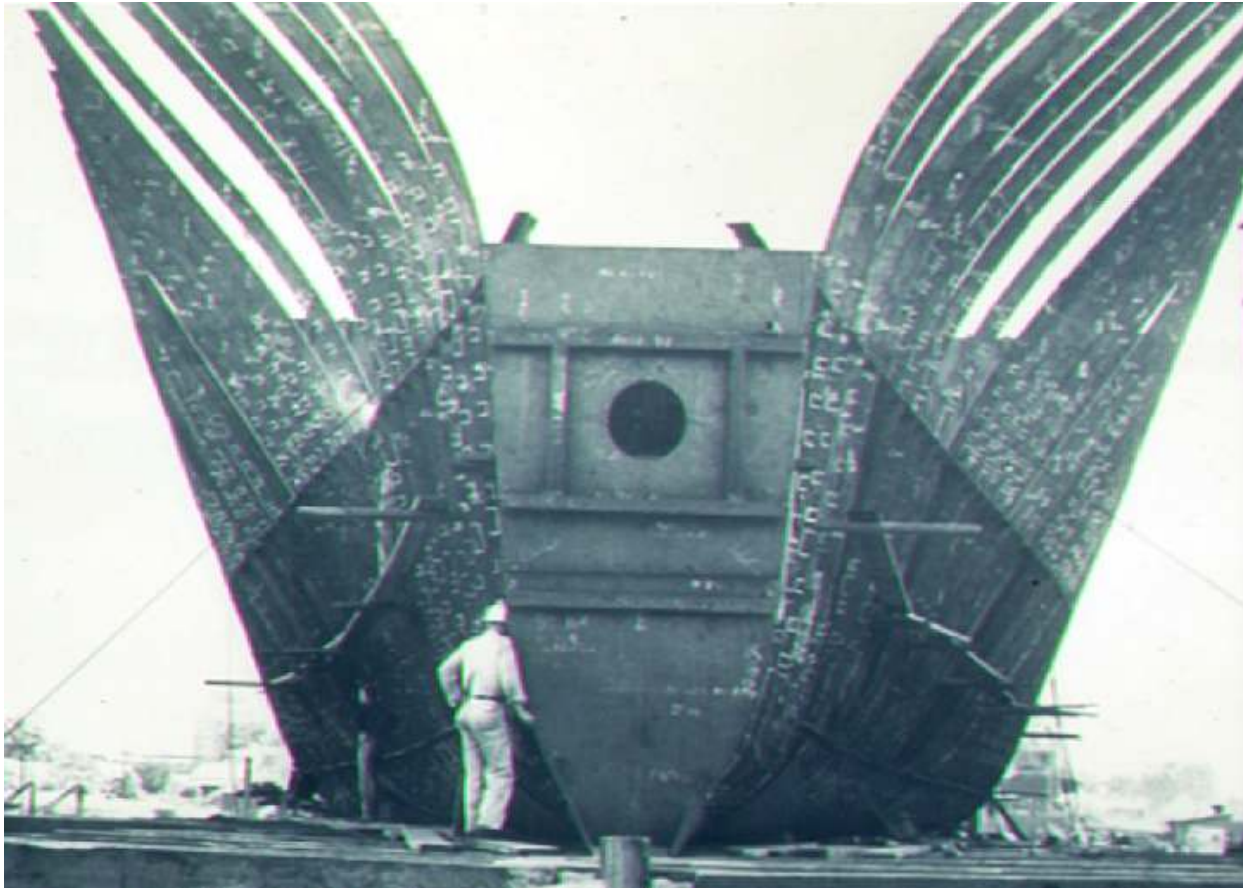


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By 1941 when mobilization for World-War II was underway, shipbuilders were employing welding in every conceivable combination with riveting. For example, some were welding shell butts and riveting seams, others were doing the reverse, and some were welding both and riveting shell plates to frames.

Since welding was much more productive when applied down hand, the production of large subassemblies on platens away from shipways was a natural outcome. The subassemblies could be turned to any position for the purpose of maximizing welding productivity.

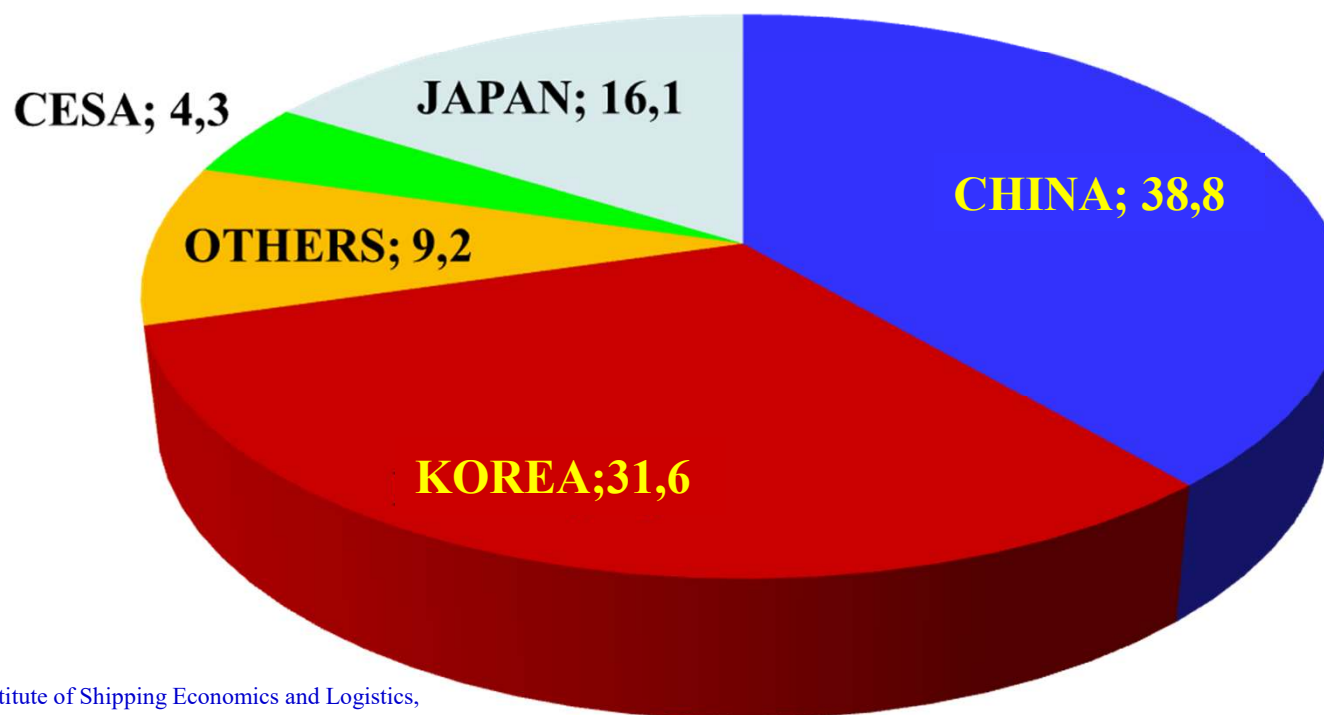


Even though welding caused some shipbuilders to adopt the smart way for erecting hulls, i.e., producing large subassemblies on platens away from the shipways.



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

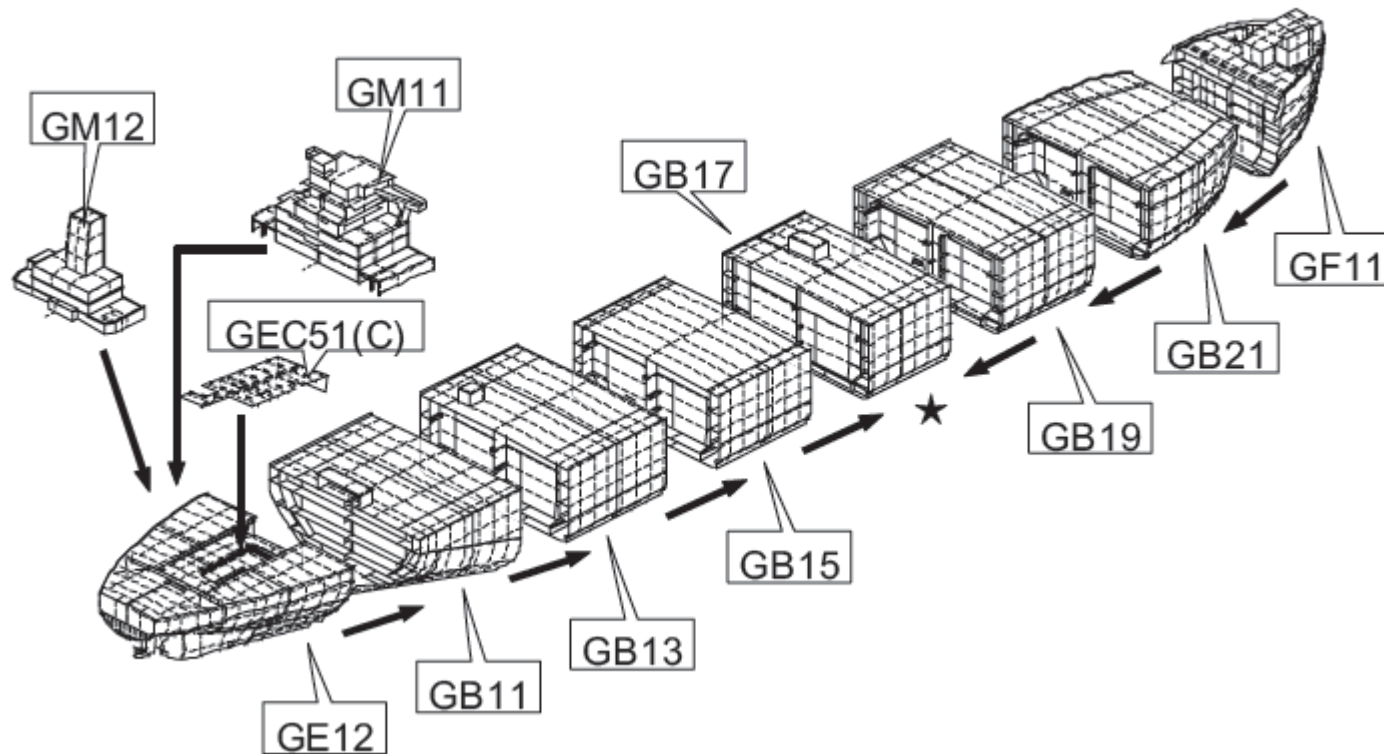
ORDER BOOK MARKET SHARES OF LEADING SHIPBUILDING COUNTRIES AS OF JANUARY 2011 (CGT%)



Source: ISL Institute of Shipping Economics and Logistics,
Bremen Germany

Compensated Gross Tonnage (CGT) is an indicator of the amount of work that is necessary to build a given ship and is calculated by multiplying the tonnage of a ship by a coefficient, which is determined according to type and size of a particular ship.

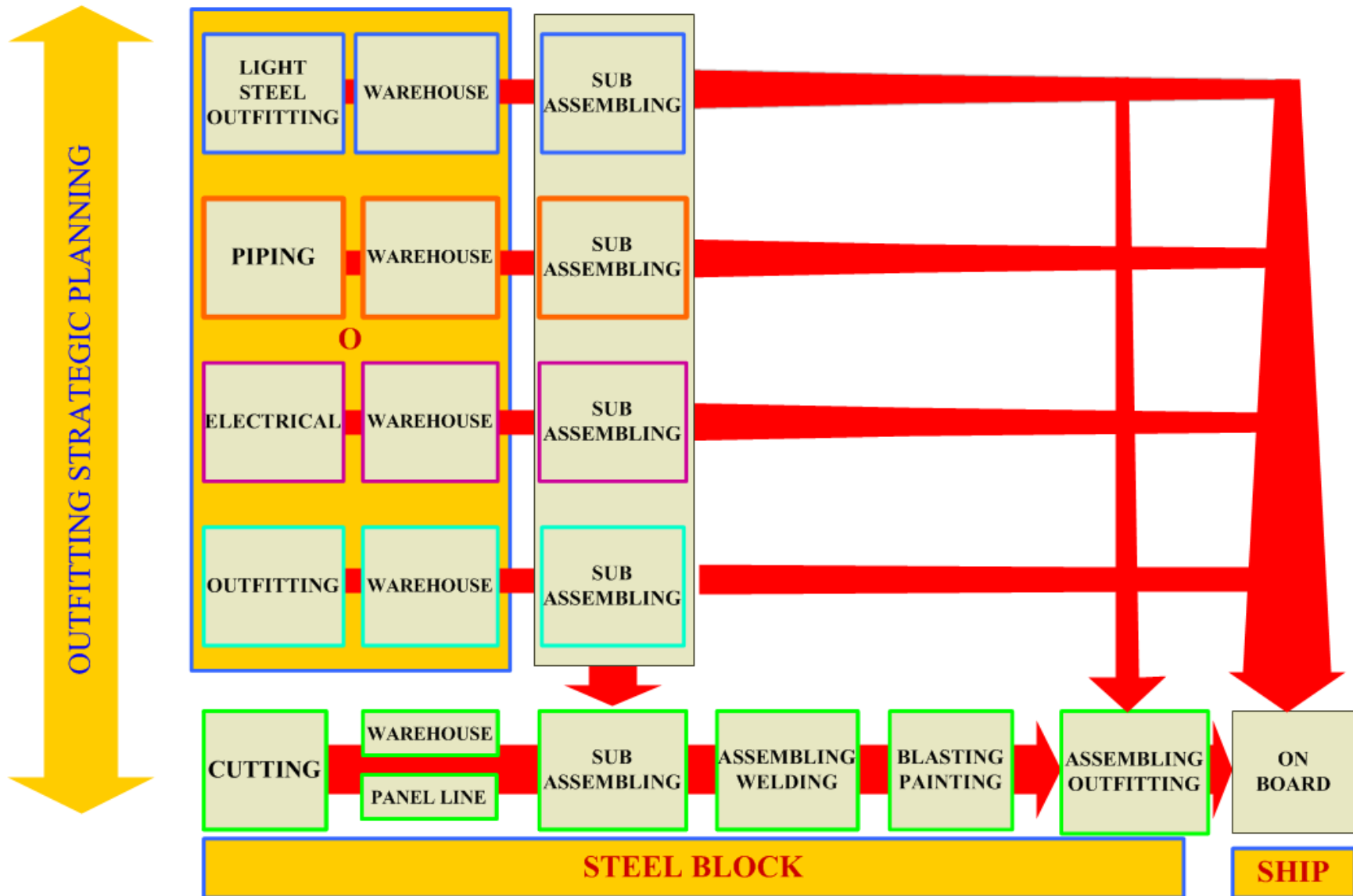
BLOCK ASSEMBLING





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

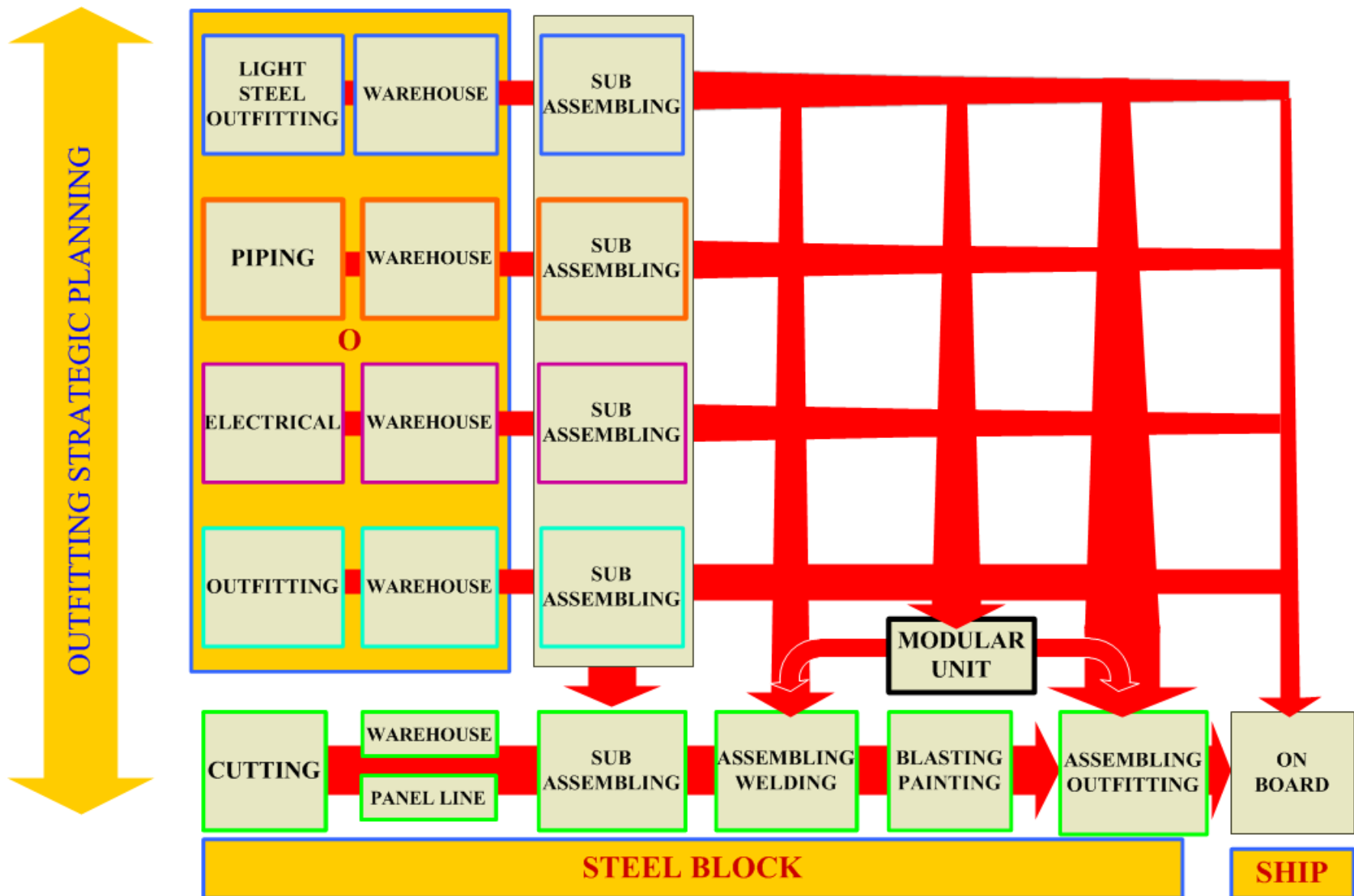
INSTALLING OUTFITTING ON BOARD SHIPYARD MANAGEMENT

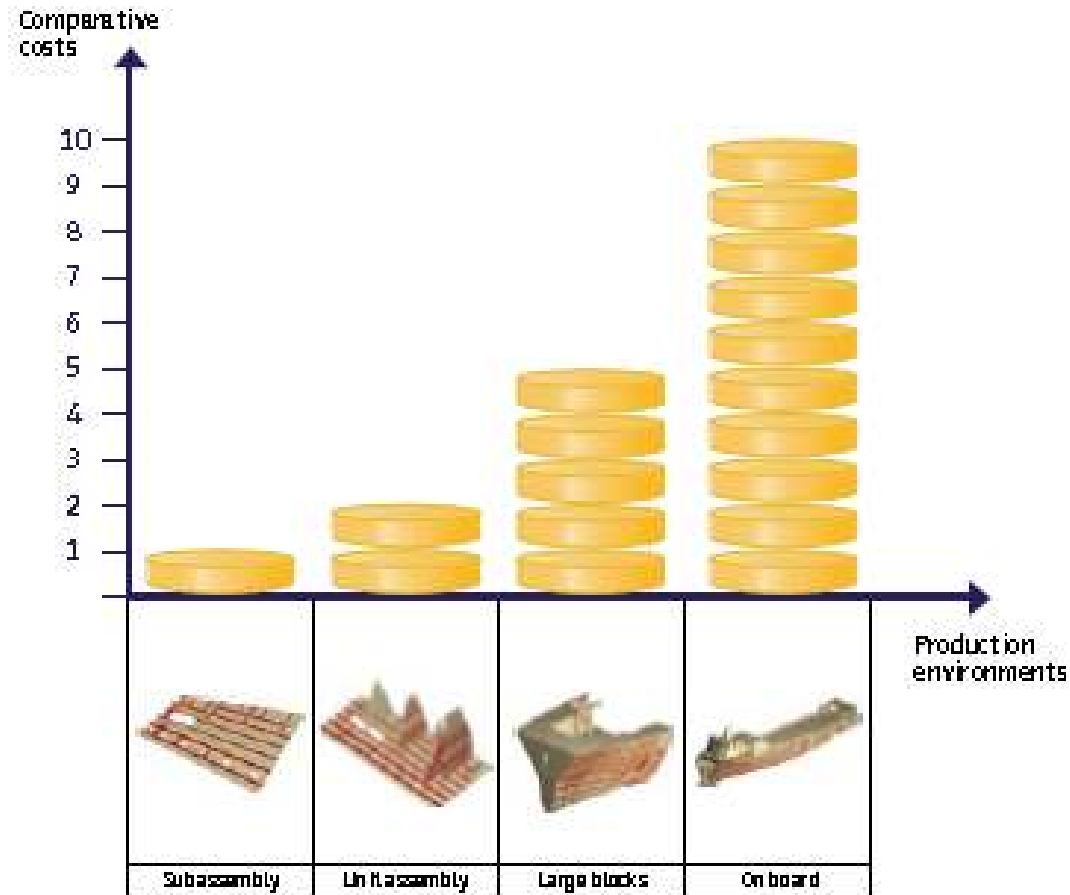




ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

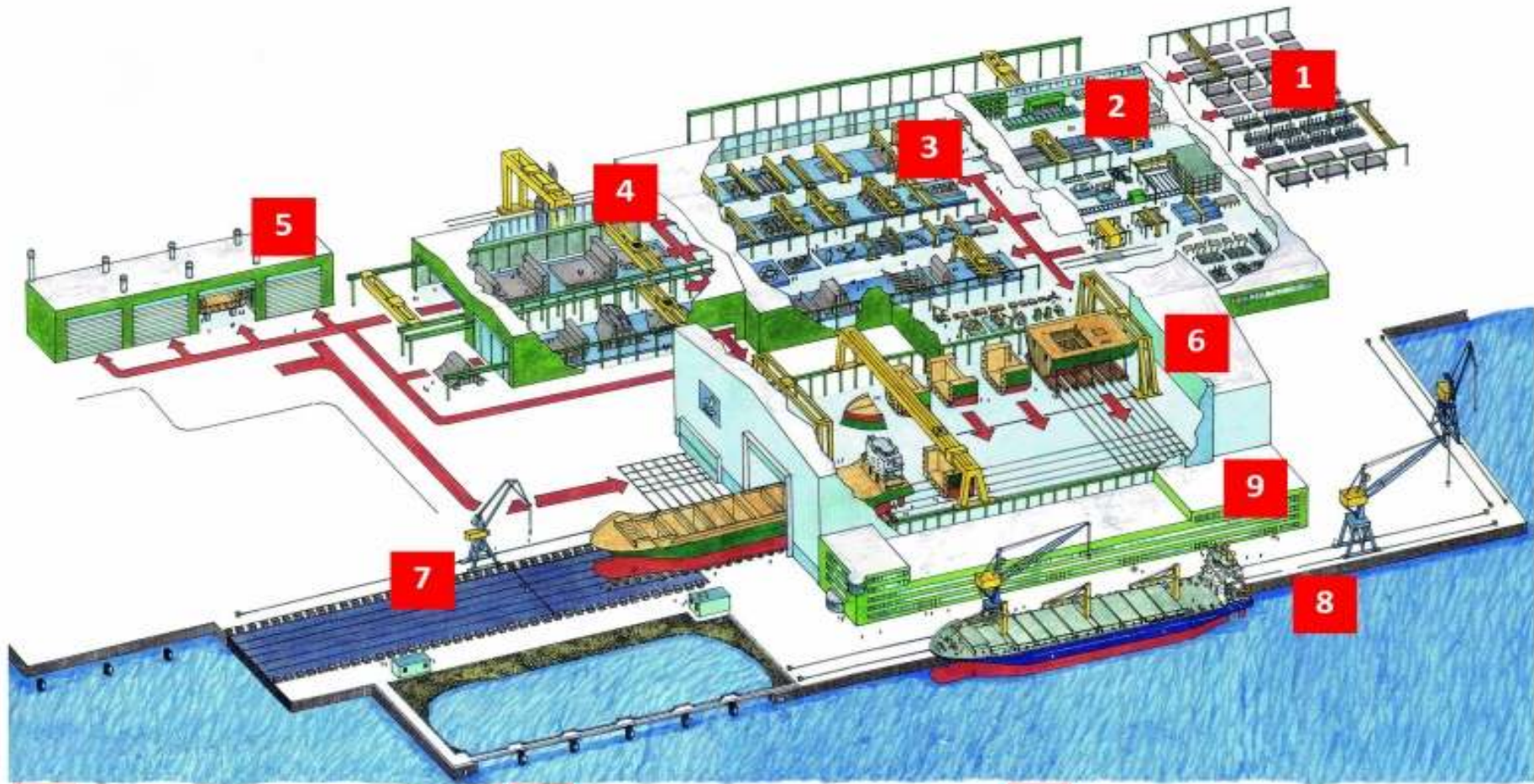
INSTALLING OUTFITTING MODULAR PROCESS SHIPYARD MANAGEMENT





COMPARATIVE COSTS OF INSTALLING AN OUTFITTING ITEM IN DIFFERENT STAGES OF THE ASSEMBLING PROCESS

ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT



- | | | | | | |
|----------|------------------|----------|----------------|----------|-----------------------|
| 1 | STEEL STORES | 4 | BLOCK ASSEMBLY | 7 | SHIP LIFT |
| 2 | STEEL CUTTING | 5 | PAINTING | 8 | OUT FITTING QUAY |
| 3 | PANEL PRODUCTION | 6 | FINAL ASSEMBLY | 9 | OUT FITTING WORKSHOPS |



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT



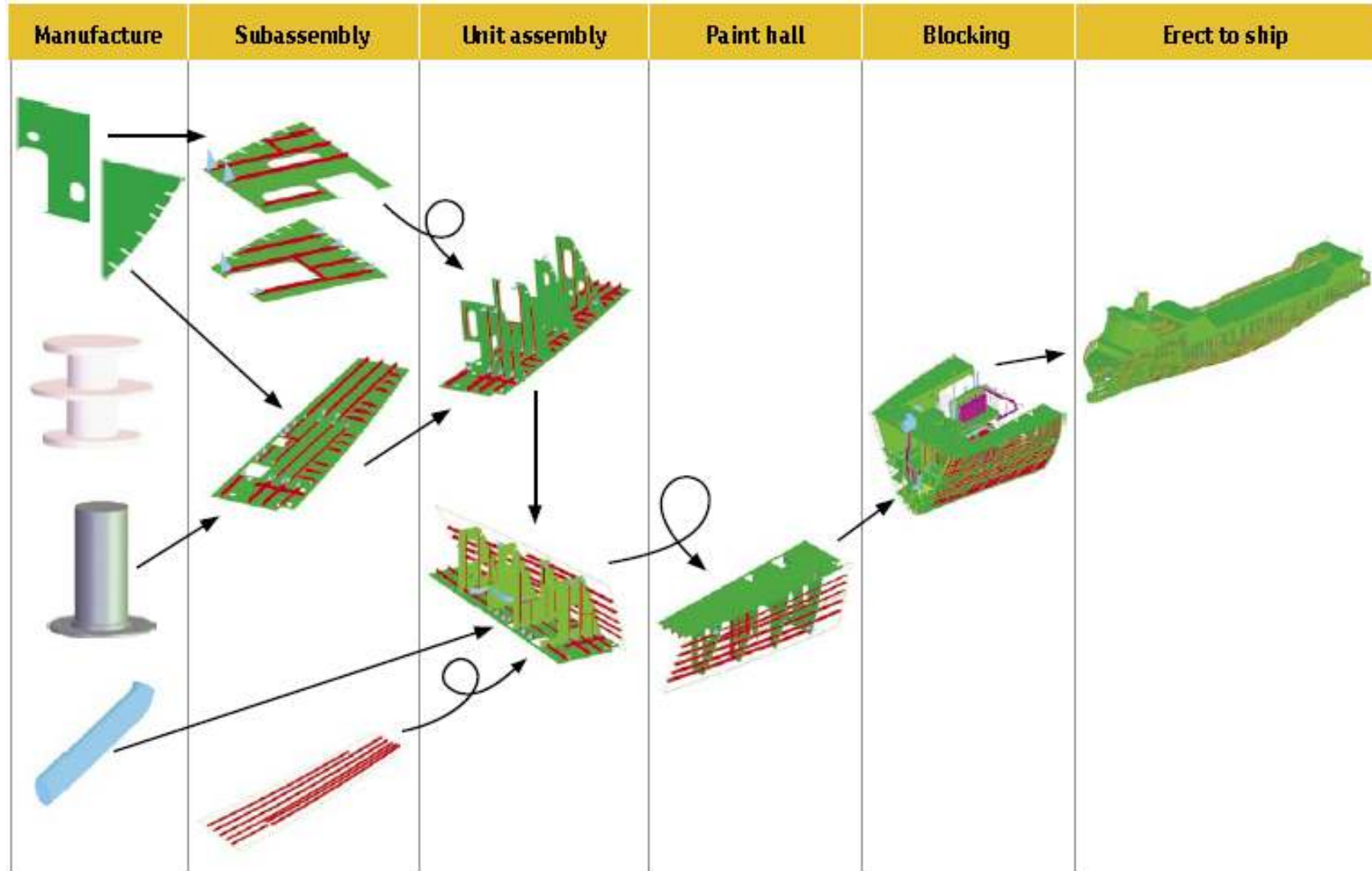


ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

PLATES CUTTING





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

PLATES ASSEMBLING





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

CURVED BLOCK





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

OUTFITTING MODULES





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

SHIPYARD MANAGEMENT

BLOCK





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

SHIPYARD MANAGEMENT

SUB ASSEMBLING ASSEMBLING AND ERECTING





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

SHIPYARD MANAGEMENT

SUB ASSEMBLING ASSEMBLING AND ERECTING

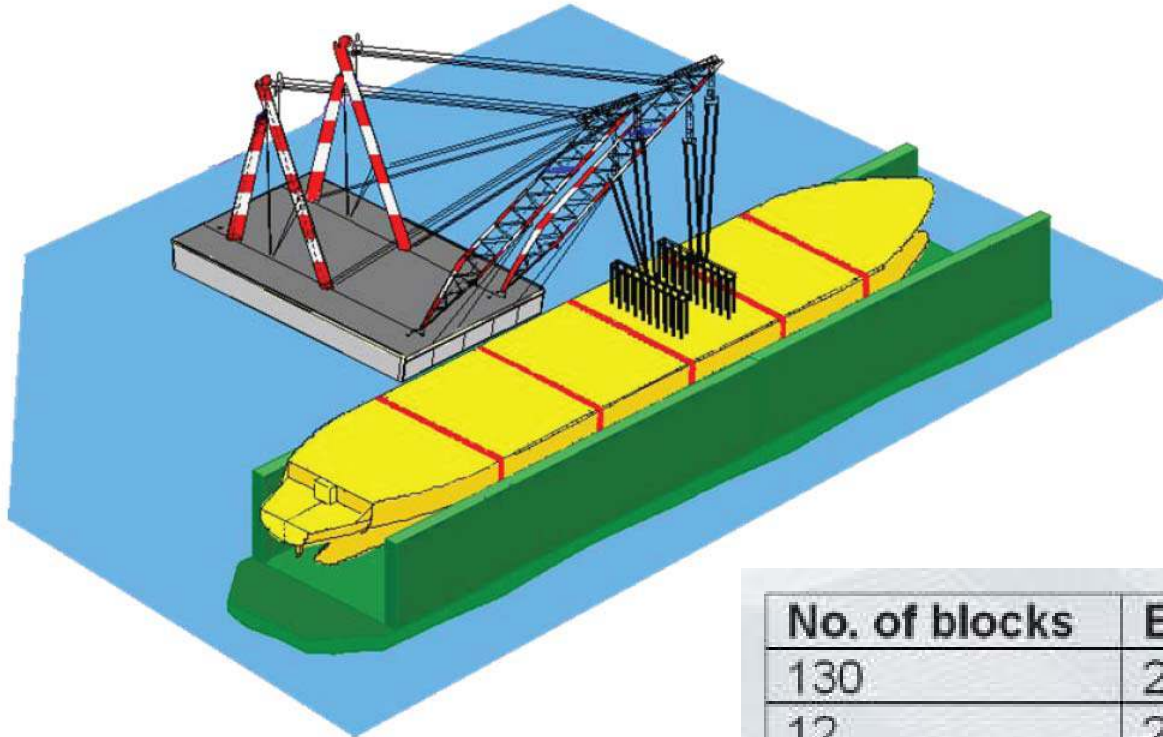




ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

ASSEMBLING

SHIPYARD MANAGEMENT



No. of blocks	Block size	Dock time
130	250ton	
12	2300ton	100 days
10	2760ton	37 days
8	3450ton	29 days

SAMSUNG TERA BLOCK METHOD



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ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

Mega Block Technology



Mega Block Technology at Samsung Heavy Industries



Mega Block

2K~3K T of block



Giga Block

4K~6K T of block



Tera Block

10K T of block

Ship assembly technology at a dock with about 10 pieces of Mega Block (2,000~3,000 ton per each) using 3,600 ton barge crane vessel to shorten ship construction period at a dock.

The technology has been developed a Giga Block Technology which using 5~6 pieces of 4,000~6,000 ton of block and a Tera block Technology which using 2 piece of 10,000 ton of block!





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

ERECTING AND FINAL OUTFITTING





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

SHIPPING REPAIR

SHIPYARD MANAGEMENT





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

SHIPYARD MANAGEMENT

SHIPPING REPAIR



Azimuth thrusters being disassembled at the Multipurpose Work



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

SHIPYARD MANAGEMENT

SHIPPING REPAIR



Pipe Workshop



Overhauling of main engine pistons and cylinder heads in the Machine Shop



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ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT





❖ SHIP REPAIR

- ❖ Ship repair is a fairly complex industrial activity, we are repairing autonomous floating units, they are small cities where normally are presented all types of skills that we find in other types of industries.
- ❖ The quality we are expected from a repair yard is the ability to quickly mobilize and implement skill human and material resources in within relatively short periods, to apply to the critical jobs in order to complete the repair in due time and with quality, fulfilling the client's expectations. Not forgetting too that there must be profit margin.



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

❖ **SHIP REPAIR (CONTINUED)**

❖ **By placing the ship in repair yard the ship owner expects:**

- ✓ **The ship is repaired by the best and most skilled workers;**
- ✓ **Within the highest standards of quality and safety;**
- ✓ **The technical problems are solved within expectations;**
- ✓ **The duration of the repair does not exceed the period initially established;**
- ✓ **The invoice is within the previously agreed value.**

❖ **The shipyard only obtain the trust from the customers as well as their own survival if it has organization and competent personnel able to deal with.**

- ✓ **Administrative processes (accounting, budgeting, invoicing, purchasing etc.);**
- ✓ **Technical processes (planning, controlling, production etc.).**

In normal ship repair, about 70% of the costs are due to works in which prevails the labor work.



❖ SHIP REPAIR (CONTINUED)

❖ Ship repair may be carried out on the ship's Upper Works or Quick Works.

❖ “Upper Works”

- Made anywhere out of shipyards with the ship afloat;

❖ “Quick Works”

- Done with the ship trimmed forward or aft or tilted;
- Done in shipyards with the vessel dry, in respective locations.



❖ **SHIP REPAIR (CONTINUED)**

❖ **TYPES OF SHIP REPAIR**

- ❖ **On voyage;**
- ❖ **Periodic repair ;**
- ❖ **Docking for periodic surveys**
- ❖ **Upgrades, Modifications;**
- ❖ **Conversions.**

REPAIRS ARE MADE ANYWHERE IN THE WORLD, IN THE MOST CONVENIENT LOCATIONS USUALLY IN THE DESTINATION HARBORS.



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR



(NY33-Jan.22) TANKER IN TROUBLE--The American-owned oil tanker Universe Patriot lies grounded on a sandbar off Sardinia's southwest coast Friday. Sixteen seamen were missing and feared lost following two explosions and fire aboard the craft. Twenty-three other members of the crew, two thirds of which was made up of Japanese, were rescued after spending the night in two wooden lifeboats and a rubber raft in the storm-tossed Mediterranean. (AP Wirephoto by cable from Malta)(See AP AA Wire Story)(hrm61417pw) 1971



MEDIA NEWS YEAR 1970



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





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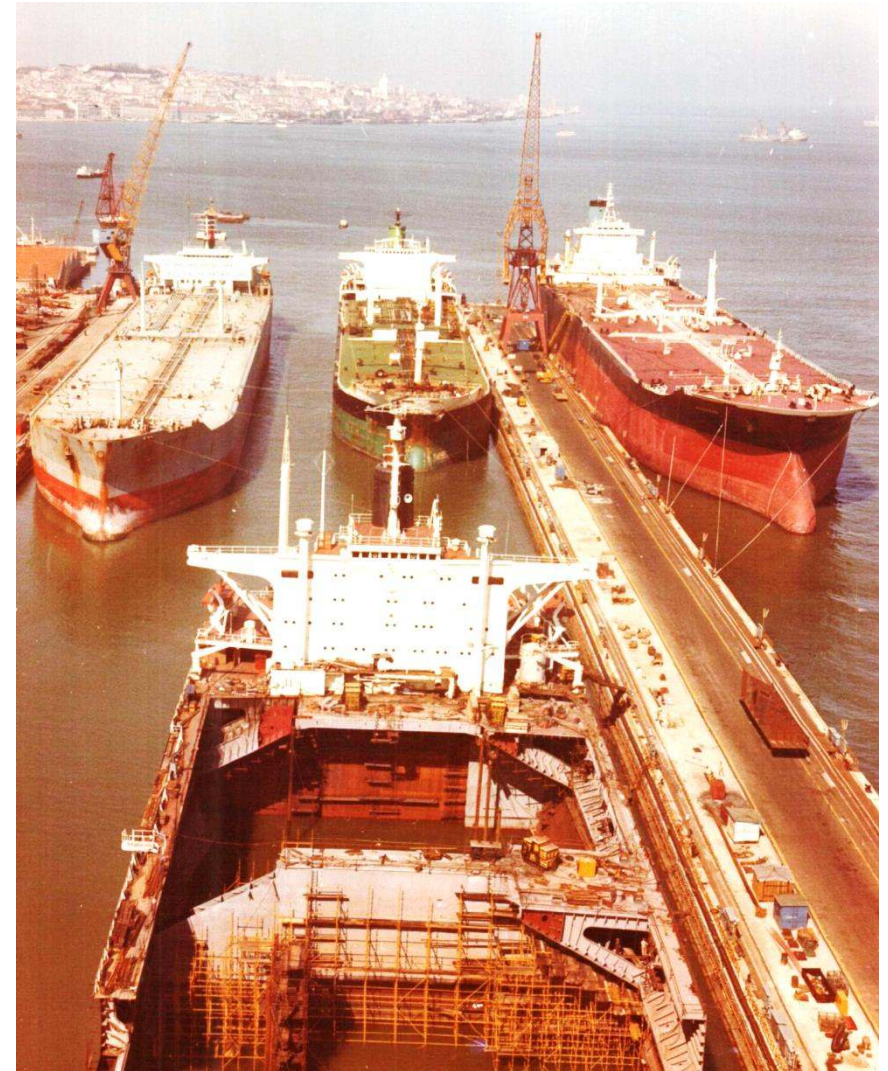
HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

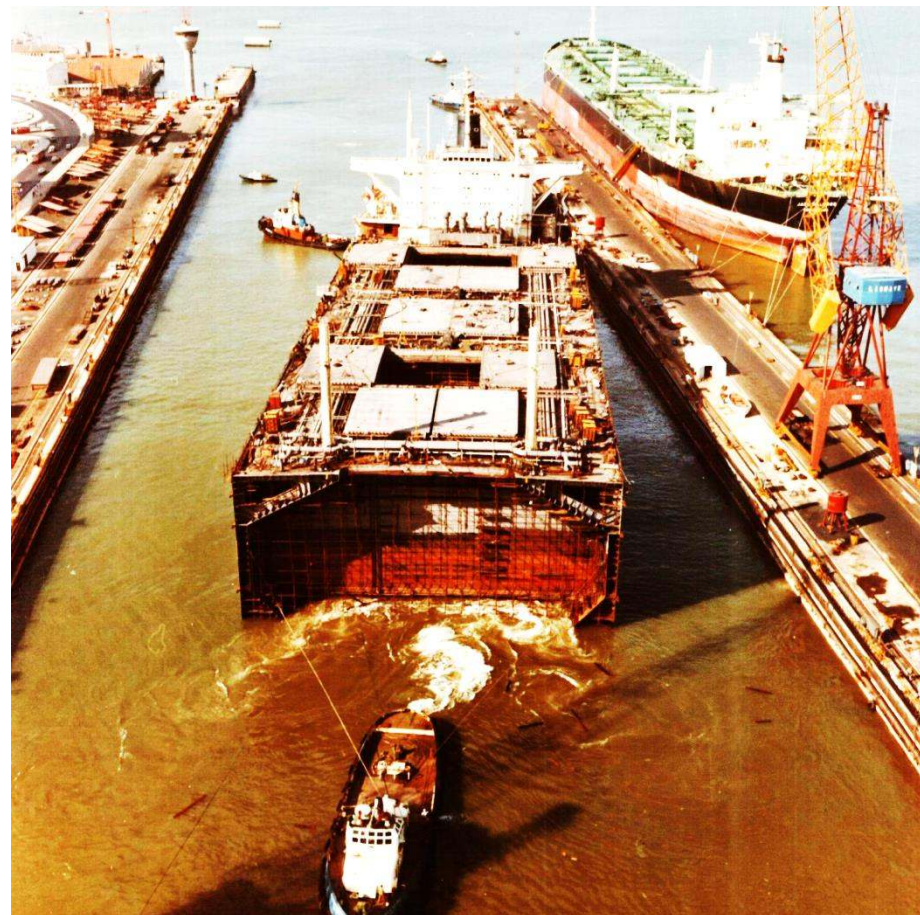
HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS

SHIPYARD MANAGEMENT

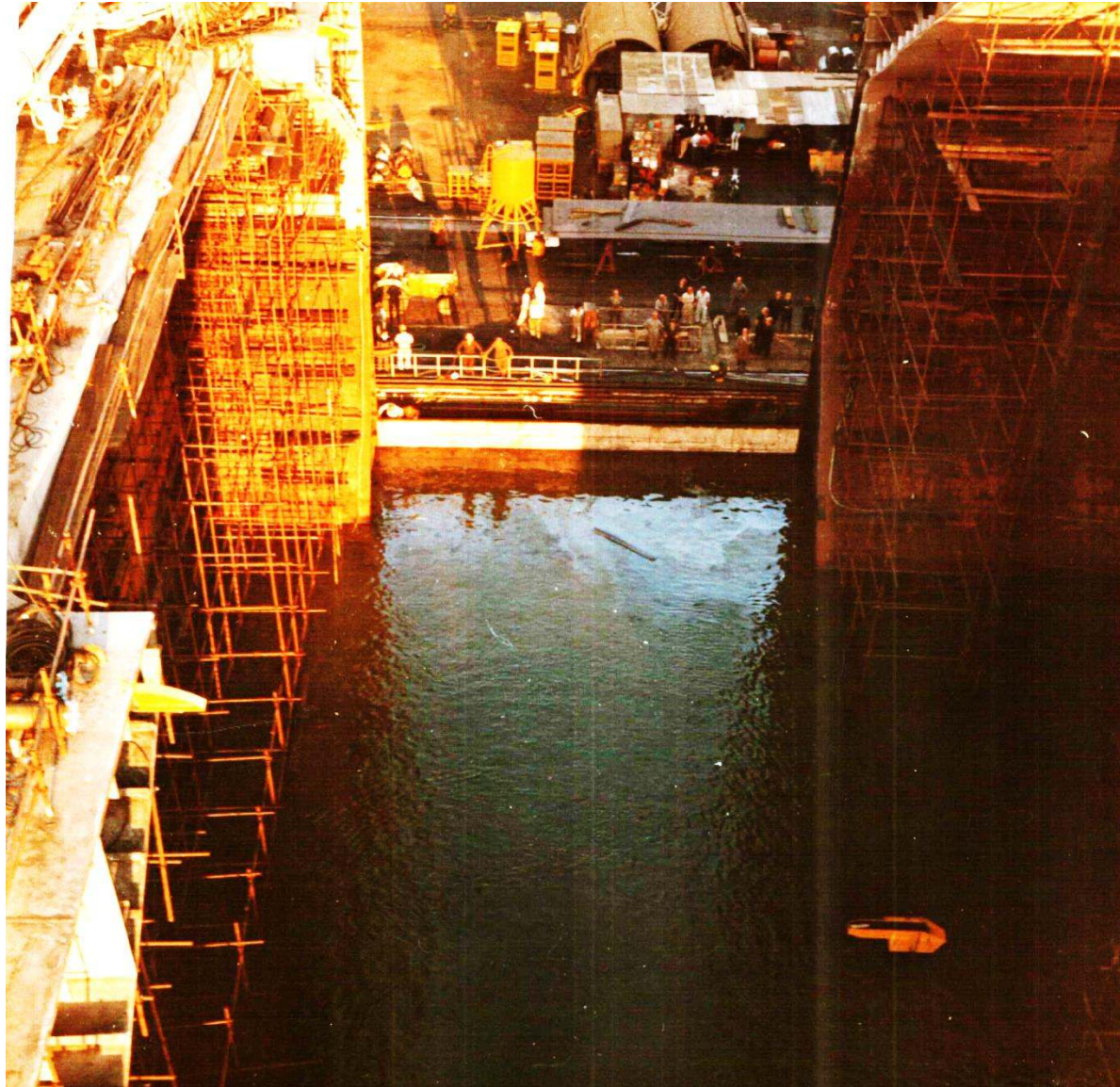
HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





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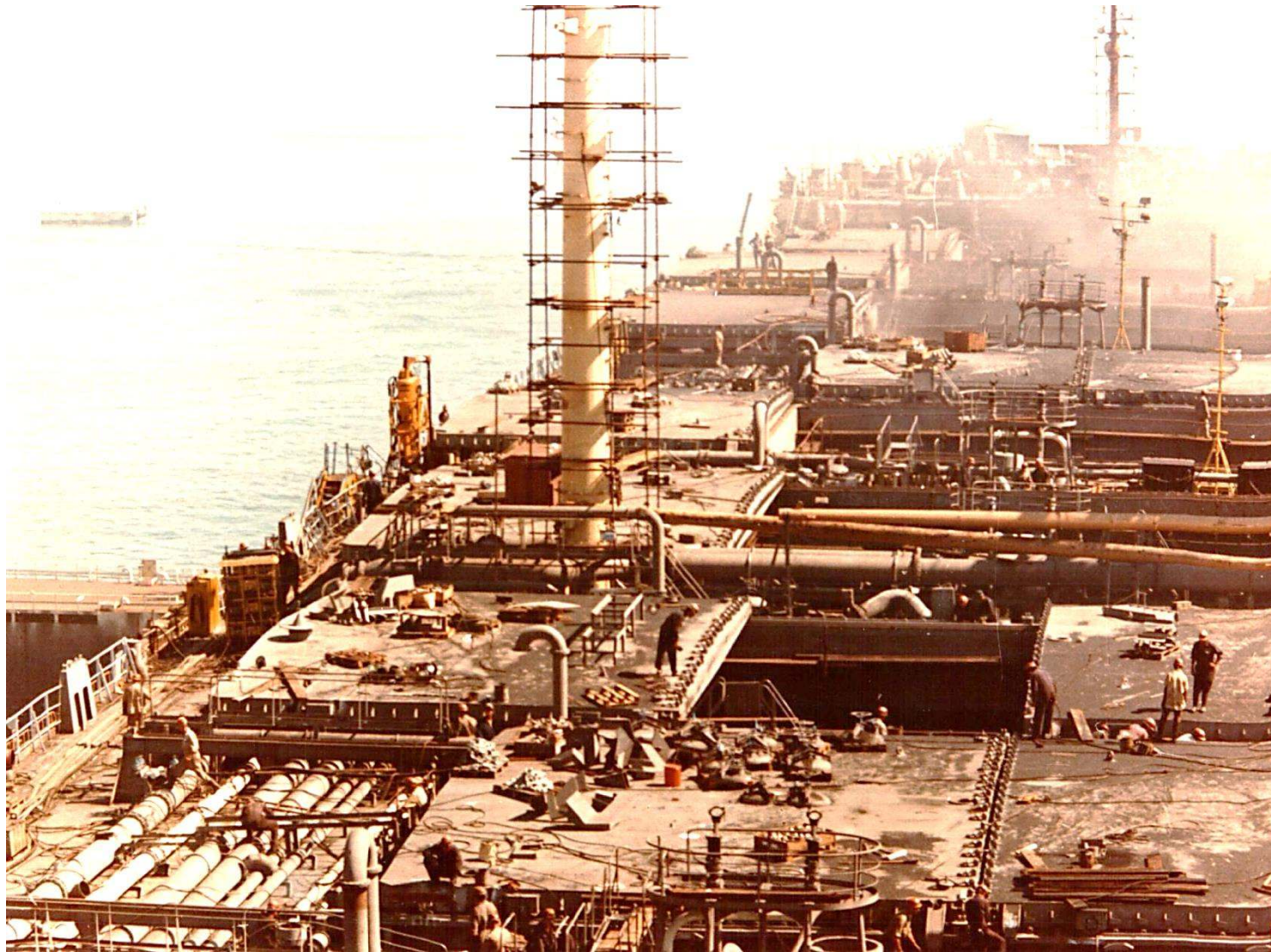
HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

HUGE REPAIR





❖ **SHIP REPAIR (CONTINUED)**

THE SHIPYARDS THAT WERE BUILT DURING 60's AND 70's OUTSIDE OF THE TOWNS, ARE MOSTLY SURROUNDED BY URBAN PERIMETERS, ARE QUITE LIMITED IN ITS OPERATION DUE TO THE IMPACT THAT CREATE THE ENVIRONMENT IN RELATION TO FOR:

- **BLASTING (ENVIRONMENT POLLUTION);**
- **PAINTING OVERSPRAY (AIR POLLUTION);**
- **INDUSTRIAL ACTIVITY (NOISE POLLUTION);**
- **HULL WASHING (WATER POLLUTION).**



SHIPYARD UPGRADING

❖ UPGRADING INFRASTRUCTURES E ORGANIZATION

The oldest shipyards in the western world are undergoing upgrading in the processes of organization and modernization of their equipment, in particular at the level of the steel workshops in the areas of cutting, welding and handling, in order to remain competitive in relation particularly to Korea and China, which have modern shipyards and where the cost of labor is extremely lower in relation to the West.

Modernisation of facilities and new equipment:

1. **Manufacture and Assembly of structures (steelshops),**
2. **Pipe manufacturing (pipe shops),**
3. **Outfitting production (module shops),**
4. **Assembling areas.**



SHIPYARD UPGRADING (CONTINUED)

❖ MODERNISATION OF STRUCTURES AND ORGANIZATION

Modernizing the organization:

1. Development new processes of tendering and budgeting;
2. Development new production processes;
3. Application of integrated computer systems in value chain;
4. Rejuvenation and retraining of the workforce;
5. Certification in quality assurance, safety and environment.



SHIPYARD UPGRADING (CONTINUED)

1. Building and assembling (steel shops)

THE UPGRADE INCLUDE:

- 1. Plasma cutting equipment (dry or wet);**
- 2. Automatic forming of profiles;**
- 3. Manufacture and welding of panels using "Robots";**
- 4. Automated one side welding;**
- 5. Shaped and straight Blocks welding by Robots;**
- 6. Automated construction of cradles for Curved Blocks;**
- 7. Automation of marking and cutting peripheries of blocks;**
- 8. Equipment and accessories of handling and transport of heavy weights.**



SHIPYARD UPGRADING (CONTINUED)

❖ Pipe Shop

To compete with short deadlines and low wages of the shipyards in the East, it was necessary to modernize the workshops for the production of large quantities of pipes:

1. Automation of manufacturing shops, through CNC equipment for cutting, welding, bending and positioning of flanges and spool pieces;
2. Blasting and painting units, for inside and outside pipe treatment.



SHIPYARD UPGRADING (CONTINUED)

❖ **Module shops**

- 1. Modern concepts of outfitting production were developed and "packages" of systems with equipments are previously produced in workshops and mounted on blocks or other type of structures;**
- 2. Cabins manufactured and assembled in workshops and fitted on board as the technique of stacking "Containers", and finalize later the end connections of the various systems .**



SHIPYARD UPGRADING (CONTINUED)

❖ ASSEMBLING YARDS AND PARKS

Due to the aggressiveness of its climate during winter season particularly in the Nordic European countries there are assembling halls to cover the complete ship with proper lifting equipment with capacity to handle very high weights.

- ✓ These roofs sometimes are mobile with two purposes
 1. Due to the climate;
 2. To give access to fit the steel blocks manufactured in other shops.



SHIPYARD UPGRADING (CONTINUED)

❖ MODERNISATION OF STRUCTURES AND ORGANIZATION

Modernizing the organization:

1. Development new processes of tendering and budgeting;
2. Development new production processes;
3. Application of integrated computer systems in value chain;
4. Rejuvenation and retraining of the workforce;
5. Certification in quality assurance, safety and environment.



SHIPYARD UPGRADING (CONTINUED)

1. Development new processes of tendering and budgeting

BUDGETING IS NOT AN EXACT SCIENCE, HAS EVOLVED OVER YEARS AND IS BASED ON THE EXPERIENCE OF THE SKILLED PEOPLE A SEEKING TO ESTIMATE THE VALUES THAT BE MORE ACCURATE POSSIBLE.

IT IS AN AREA IN WHICH HAVE BEEN INVESTED A LOT IN THE DEVELOPMENT OF COMPUTER PROGRAMS FOR PERFORMING BETTER VALUES.

IT IS A FIELD WERE MORE EFFORT MUST BE DONE, BECAUSE NOW A DAYS A WELL DONE BUDGET BASED ON THE HIERARCHIES OF THE JOB ACTIVITIES IS A SUCCESS KEY FOR THE SHIPYARDS GETTING ORDERS FOR NEXT PHASE OF THE PROJECTS; PREPARATION AND PRODUCTION.



SHIPYARD UPGRADING (CONTINUED)

2. Development new production processes

The fierce competition that the Western shipyards today are subjected, forces them to constantly revise the organisation of work processes, in such a way to increase their productivity, :

1. Development the building processes;
2. Direct involvement of production management at the early project phases such as design and tendering;
3. Integration of all project phases;



SHIPYARD UPGRADING (CONTINUED)

3. Application of integrated computer systems in value chain;

THE APPLICATION OF INTEGRATED INFORMATION SYSTEMS, TO THE WHOLE BUSINESS PROCESS VALUE CHAIN IS CRITICAL TO KNOW AT EACH PHASE OF ANY PROJECT, WHERE WE ARE IN RELATION TO WHAT WE HAVE PLANNED;

IT MAY SEEM A UTOPIA BUT THE FACT IS THAT VERY FEW SHIPYARDS HAVE THIS TOOL TO COVER THE ENTIRE SHIP BUILDING OR REPAIR PROCESS AND AS IN MOST CASES THESE PROGRAMS HAVE BEEN DEVELOPED "IN HOUSE" EACH ONE THINKS HIS OWN PROGRAM IS THE BEST ONE, BECAUSE IT WAS DEVELOPED BY HIMSELF AND REFUSES TO ACCEPT OTHERS MORE WELL PLACED ON THE MARKET.



SHIPYARD UPGRADING (CONTINUED)

4. Rejuvenation and retraining of the workforce

There has been a remarkable change of human resources policy for the past 10 years, with the shipyards reducing their capacity below the work load, thus obtaining in periods of low work load less unemployment personal. When the shipyards are overloaded they run risks for not having enough man power or qualified subcontractors with sufficient capacity to face the yard work load.

The importance of a stable and competent workforce is recommended but hard to achieve due to the variation of the workload in this type of industry specially in shipping repair.

Noting a lack of manpower in particular in Portugal due to:

1. Market loss of the Portuguese shipyards;
2. Aging of actual human resources and lack of input of young people;
3. Early retirement.



SHIPYARD UPGRADING (CONTINUED)

5. Certification in quality assurance, safety and environment

WE CAN CONSIDER THAT VIRTUALLY ALL SHIPYARDS HAVE A QUALITY ASSURANCE SYSTEM APPLIED TO THE SHIP REPAIR AND SHIPBUILDING, BUT AS REGARDS ENVIRONMENTAL ARE STILL RARE THE YARDS WHO FOLLOWS THIS PROCESS.

THE APPLICATION OF THESE SYSTEMS CAUSES A CONFIDENCE IN INTERNAL AND EXTERNAL STAKEHOLDERS, BECAUSE THEY KNOW THAT A SET OF PREDEFINED RULES ARE BEING FOLLOWED AND APPLIED.

IN THE VERY NEAR FUTURE ALL SHIPYARDS WILL BE REQUIRED TO COMPLY WITH THESE DIRECTIVES.

Shipbuilding & Shiprepair – A Comparison



Shipbuilding

- Shipbuilding is Like a Marathon race
- Long Lead Time
- Long Delivery Schedule
- Tasks can be automated, standardized
- Work schedule is planned and deliberate
- Scope of Changes minimal
- Incase of deviation, enough time to implement



Shiprepair

- Shiprepair is like 100 m sprint race
- High turnaround
- Difficult to estimate work content
- Time schedule
- Project budget
- Hidden work emerges during execution
- Has to work with pre defined conditions
- Degree of Specialization is very high
- Work contract ought to change as repair work progresses



❖ **ARRANJO GERAL DOS ESTALEIROS NAVAIS**

❖ **The layout of shipbuilding and ship repair are different**

❖ **Shipbuilding**

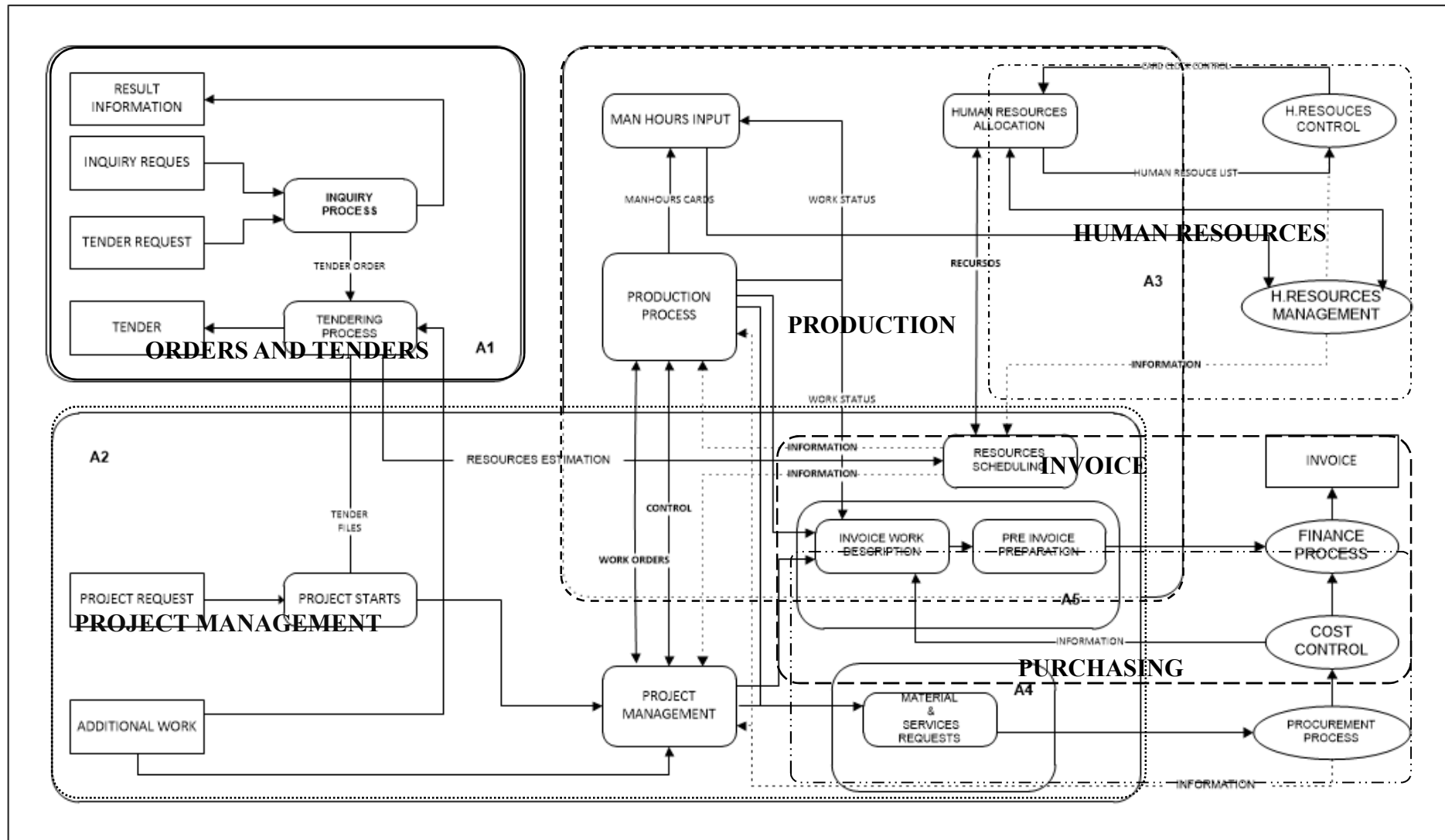
- ❖ **Large steel workshops for processing steel, pipes and outfitting;**
- ❖ **Big warehouses and raw material parks;**
- ❖ **Parks and covers areas for steel assembling;**
- ❖ **Block steel assembling areas ;**
- ❖ **Few piers or wharfs.**

❖ **Repair**

- ❖ **Small steel workshops for processing steel, pipes and outfitting;**
- ❖ **Warehouse focused on large diversity of consumable materials;**
- ❖ **Strong mechanical shop and pipe repair shop and electrical shop;**
- ❖ **Pier and wharfs related to the number of docks.**



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

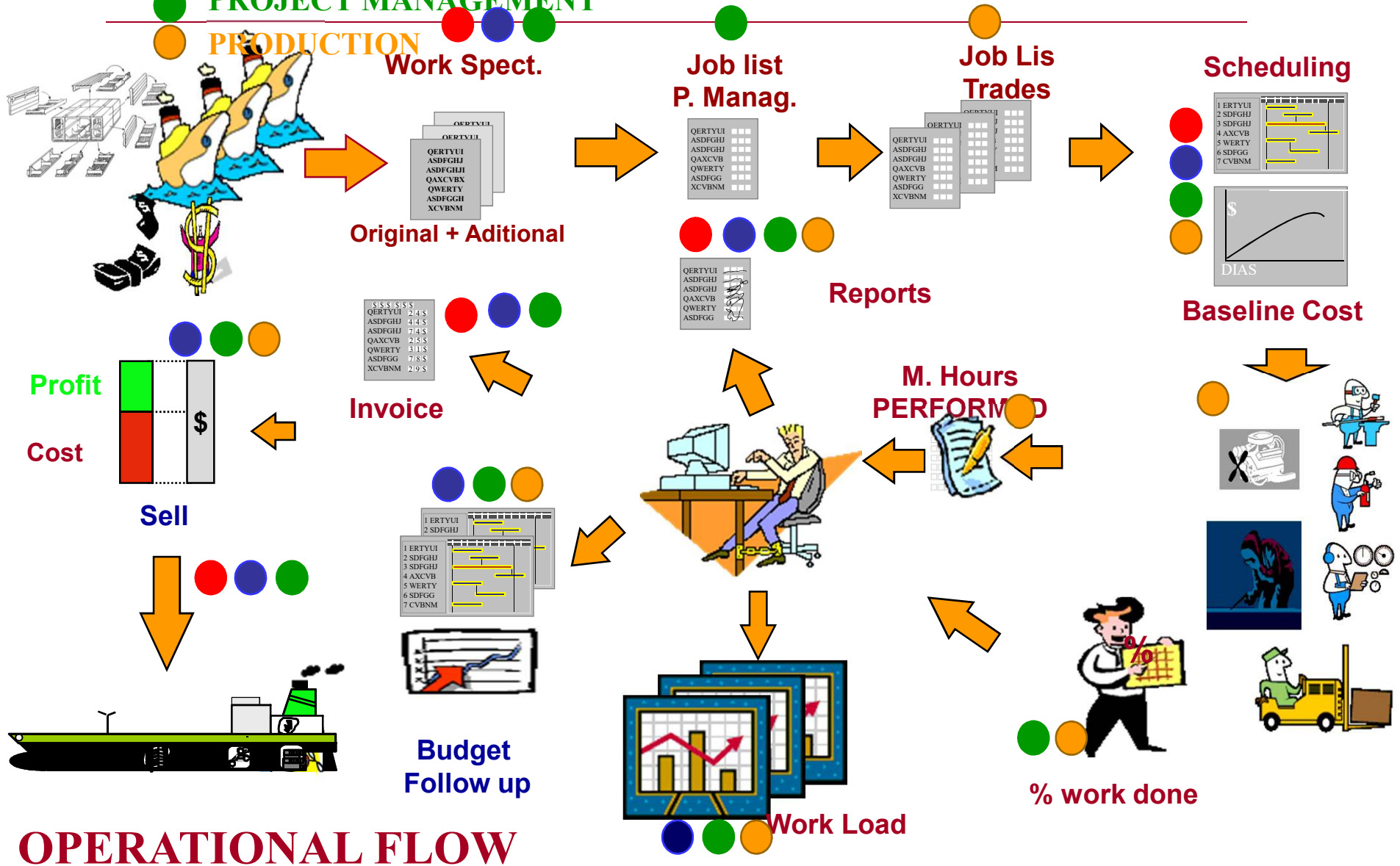


SHIPBUILDING & REPAIR PROCESS



- CLIENT
- COMMERCIAL
- PROJECT MANAGEMENT
- PRODUCTION

ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT



OPERATIONAL FLOW



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT



SHIPYARD PROCESSES



NON PRODUCTIVE

- HUMAN RESOURCES;
- MANAGEMENT;
- FINANCE AND ACCOUNTABILITY;
- GUARANTY AND CONTRACTS (after sales);
- E.D.P.;
- COMMERCIAL; MARKETING;
- TENDERING, INVOICE;
- DESIGN;
- TECHNICAL & QUALITY CONTROL;
- SCHEDULING;
- PURCHASING;
- SAFETY & QUALITY ASSURANCE;
- ENVIRONMENT.

PRODUCTIVE

- WAREHOUSE;
- MANEUVERING & TRANSPORTS;
- WORK PREPARATION;
- CUTTING;
- WELDING;
- ASSEMBLING;
- OUTFITTING;
- MECHANICAL;
- ELECTRICITY;
- PIPING;
- PAINTING & BLASTING;
- PRODUCTION SUPPORTS;
- DOCKING.



SHIPYARDS

MAIN INFRACTUTURES

AND

EQUIPMENTS



ORGANIZAÇÃO E GESTÃO DE ESTALEIROS NAVAIS SHIPYARD MANAGEMENT

MAIN INFRASTRUCTURES & EQUIPMENTS

- 1. OFFICES, CANTEENS, CHANGING ROOMS etc.;**
- 2. DOCKS & DOCKING EQUIPMENT;**
- 3. WAREHOUSE, PARKS;**
- 4. TECHNICAL SUPPORT OFFICES (TSO) (PMO)**
- 5. TECHNICAL STRUCTURES, PRODUCTION EQUIPMENT**
- 6. ASSEMBLING PARKS;**
- 7. SURFACE PREPARATION EQUIPMENT**
 - 1. WASHING, BLASTING & PAINTING EQUIPMENT;**
- 8. PIERS AND WHARFS;**
- 9. SUPPORT EQUIPMENT;**
- 10. LIFTING EQUIPMENT;**
- 11. TRANSPORT EQUIPMENT;**
- 12. RIGGING EQUIPMENT;**
- 13. TREATMENT PLANTS;**
- 14. MAINTENANCE.**



**THE
END**