Commercial Ship Lifecycle and Standards

This presentation was prepared by Webb Institute and ABS under award 70NANB21H174 from the National Institute of Standards and Technology, U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the National Institute of Standards and Technology or the U.S. Department of Commerce.

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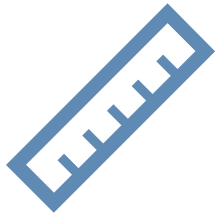
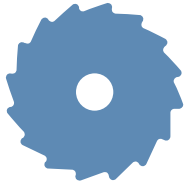
Commercial Ship Lifecycle



Design



Construction

Operation

Disposal and Recycling

Regulations, rules, and related standards play a role in all four stages of a ship's lifecycle.

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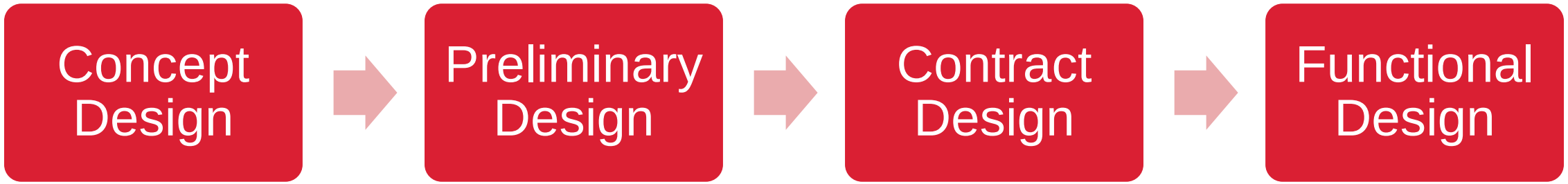
The ship design process can be broken into phases



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Concept Design Phase

- Also called Feasibility Study
- Goals are to
  - Clarify shipowner's requirements
  - Satisfy those requirements
  - Conduct cost and risk assessments
- Constraints are identified
- Limited use of standards, codes, and regulations

Preliminary Design Phase

- Goals of this phase include
  - Validate requirements
  - Establish ship size and overall arrangement
  - Select major systems – propulsion, cargo handling, etc.
  - Quantify ship performance – speed, endurance, seakeeping, capacity, loading/unloading times
  - Reduce major risks – technical, cost, schedule
  - Refine cost estimates – capital, operational
  - Develop initial build strategy concept
- Trade-off studies carried out to support decision-making
- High-level regulations, class rules, and industry requirements addressed

Contract Design Phase

- Goals of this phase include
  - Confirmation of capabilities
  - Confirmation of costs – capital and operational
  - Development of bid package for shipbuilders
    - Design and refinement of all ship systems
    - Refinement of general arrangement
    - Selection of major components
    - Development of performance requirements and technical specifications
  - Development of criteria of acceptance of ship
- Design efforts include compliance with flag state regulations, class rules, and industry requirements

Functional Design Stage

- Goals of this phase include
  - Complete all detailed calculations and analysis
  - Complete all drawings and diagrams
  - Planning of system routing
  - Complete configuration definitions
  - Complete definition of all outfitting
  - Development of bill of materials and purchase specifications
  - Vendors are selected
  - Material and components are ordered
- During this phase regulatory and class review and approval processes are conducted

Ship Specifications

- Technical descriptions, requirements, plans, and drawings that define the physical ship and its performance required by the shipowner
- No “standard” form - varies
  - Owner to owner
  - Project to project
- Typical components
- May be simple or highly detailed
- Becomes part of the shipbuilding contract
- Specifications are also required for ship conversion and repair projects

Specifications and Standards

- Specifications often reference standards and regulations
- Referenced standards become part of the specification
- Care needs to be taken to ensure that the latest standards and regulations are referenced in the specifications
- Specifications and standards are applied to critical components and materials used in shipboard systems
- Specifications and standards are applied to tests and trials conducted during construction and repair projects

Shipbuilding Contract

- “the contract is the mechanism that conveys the technical, as well as non-technical, understandings, obligations, rights and responsibilities between the shipowner (or Purchaser) and the shipyard (or Contractor).”[1]
- Purpose of the contract is to develop and deliver a ship or ships desired by the shipowner
- Contract forms a temporary business and legal relationship
- Assigns and mitigates risk between parties
- Establishes business practices between parties
- Establishes rights and responsibilities of parties
- Includes technical requirements in the form of
  - Specifications
  - Plans - schematics, and drawings

1 - Ship Design & Construction, Volume 1, Chapter 9: Contracts and Specifications, Dr. Kenneth W. Fisher, SNAME 2003

Shipbuilding Contract and Standards

- Contracts often reference standards and regulations
- Reference standards become part of the contract
- This may result in layered standards that are part of the contract
- Example
  - Contract calls for the ship to be classed to current ABS Rules.
  - ABS Rules reference an ASTM Standard
  - The ABS Rules and the ASTM Standard are considered part of the contract and are binding
- Care needs to be taken to ensure that the latest standards and regulations are referenced in the contract
- Non-applicable standards and regulations should not be included in the contract

Ship Construction

- Ships are to be constructed in accordance with
  - The specification
  - The design documents
  - Flag state regulations
  - Class Rules
- Construction compliance is verified through
  - Inspections
  - Physical tests
  - The use of approved
    - Materials
    - Equipment
    - Technicians
    - Processes

Ship Operation

- The operation of a ship is governed by international and flag regulations
- During a ship's life maintenance and repairs must be carried out in a manner that maintains compliance with
  - International and flag state regulations
  - Class Rules
  - Relevant Standards
- Charterers may also have additional operational requirements for commercial vessels

Operational Compliance

- Class
  - Classification Surveys - Annual, Special, Intermediate
  - Regulatory Surveys – on behalf of the flag state serving as a Recognized Organization (RO)
  - Corrective Surveys – in response to damage, equipment failure, Port State Control findings
  - Audits – operating procedures and records
- Flag State
  - Inspections
    - Regular intervals as per regulations
    - Issuance of regulatory certificates
    - In response to incidents, accidents, and Port State Control actions
    - May be multi-agency

Operational Compliance - Continued

- Port State Control
  - Inspections - verify compliance with international and applicable regulations, including referenced standards
  - Targeted inspections scheme - vessel age, flag state, classification, owners/operators, vessel type
  - Evaluate physical condition, manning, documentation, operational procedures, and operational records
- Charterers
  - Vetting Inspections – physical condition, operational procedures and records
  - Risk Assessment Systems – grade the ship on a risk basis

Ship Disposal and Recycling

- Governed by the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships
- Ensure that when ships are being recycled, they do not pose any unnecessary risk to
  - Human health
  - Human safety
  - The environment
- Governs the design, construction, operation, and preparation of ships for recycling
- Requires the production and maintenance of a hazardous materials inventory

References

- Ship Design and Construction, Volume 1, SNAME 2003
- International Association of Classification Societies – www.iacs.org.uk
- Lloyd's List - www.lloydslist.com
- American Bureau of Shipping – www.eagle.org
- International Maritime Organization – www.imo.org
- UN Trade & Development – www.nctad.org
- United States Coast Guard – www.uscg.mil
- US Government Accountability Office – www.gao.gov

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Review Questions

1. In what phases of a ship's life are standards applicable?
2. What role do standards play in shipbuilding contracts?
3. How is compliance with regulations, rules, and standards verified during the ship's operational life?
4. What governs ship disposal?

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