

# TSCF Shipbuilders Meeting

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## CSR: Initial Designs & Future Developments

**Dan Cronin**  
Manager  
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## Introduction

- Steel Weight Increases and the Use of High Tensile Steel
- CSR Approach to Corrugated Bulkheads and Hopper Knuckle
- Plating outside of 0.4L
- CSR Maintenance
- Future Developments



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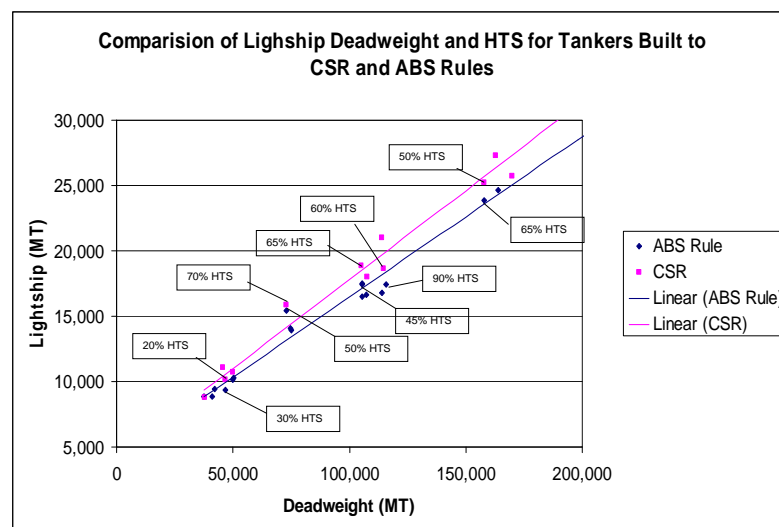
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## Steel Weight Increases & HTS

- Compiled lightship weight and deadweight for 35 unique designs, 15 CSR
- Estimated percentage high tensile steel (HTS) based on midship properties. Focused on similar designs from the same shipyard
- Average lightship increase 8% due to CSR
- Smallest lightship increase was 2% which corresponded to 25% increase in use of HTS
- Largest lightship increase was 14%
- Study showed many CSR designs used less HTS



## Steel Weight Increases & HTS



## Corrugated Bulkheads

- More detailed prescriptive requirements
- Specific alternative requirements for eliminating lower stool for vessel with depth less than 16 m
- Permissible angle of corrugation decreased
- Requirements address plating thickness at different heights
- CSR provides additional design flexibility by addressing more scenarios with prescriptive requirements

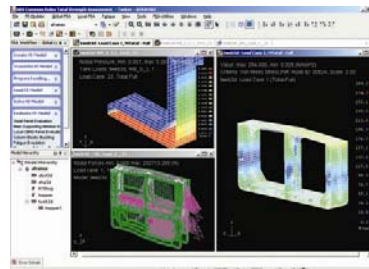


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## Hopper Knuckle

- More detailed prescriptive requirements
- Mandates main supporting member at knuckle
- Permits weld toe grinding to increase fatigue life
- Analysis requirements are very specific
- Guidance covers mesh size, meshing techniques and modeling of openings



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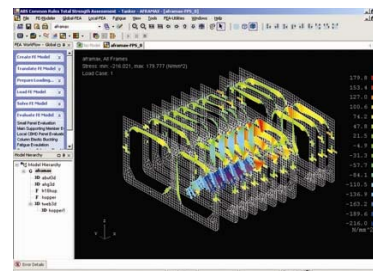
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## Plating Outside 0.4L

- Initial designs 1-4 mm lighter plating
- Designs complied with specific CSR requirements
- “Properly tapered” subject to interpretation
- Rule change increased minimum thickness outside 0.4L
- Common Interpretation clarified proper tapering



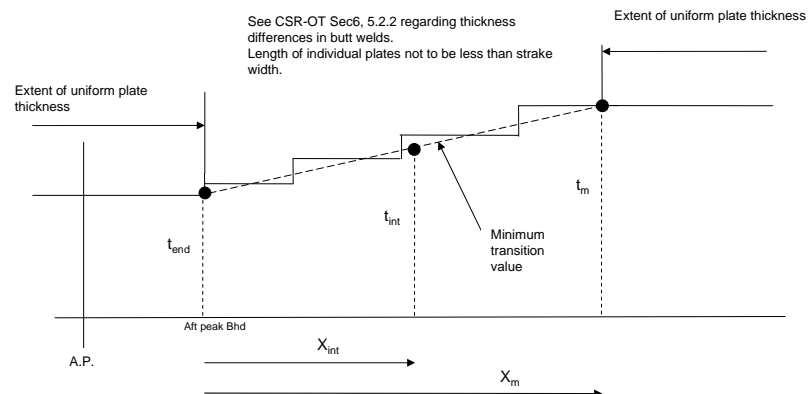
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## Plating Outside 0.4L

- CI-T8



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## CSR Maintenance

- Feedback from in-service history
- IACS Knowledge Center
- Common Interpretation augments the Rules
- Rule change procedure similar to current practice
- Rule changes involve all 11 IACS members



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## Future Developments

- Rule maintenance
- Rule harmonization for oil tankers and bulk carriers
- Key technologies
  - Wave loads
  - Fatigue
  - FEA
  - Buckling
- CSR will be replaced by three parts
  - General Requirements
  - Oil Tanker Requirements
  - Bulk Carrier Requirements



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