Condition Assessment Programme (CAP)

An introduction to CAP Hull

Øystein Wikeby
Background for today’s legislation and requirements

What is CAP

Commercial Aspects

Basic Principles & Methodology

Practical Project Management
Shipping is perceived by the public as an industry

- partly made up of rustbuckets and ticking environmental bombs crossing the oceans.
- where operators are always on the lookout for even more lenient flags of convenience, even cheaper crews, more corners to cut ……
- collisions and similar incidents are partly tolerated as an unavoidable part of life, but
- ships braking in two for no particular reason is neither understood, nor tolerated, particularly when causing major pollution.
Erika / Prestige

- Oil tanker accidents in European waters in 1999/2001 causing major pollution
- Initial political reflex: Ban single hull tankers from European waters.
- EU pressure on IMO by threats of unilateral action
- Accelerated phase-out of single skin tankers and introduction of CAS
- CAP as a commercial requirement
- A paradigm shift within the shipping industry
Enron / WorldCom / Tyco

- A string of corporate scandals involving fraud and “creative book-keeping” by some of the largest companies in the US
- Involved directors recently sentenced to up to 25 years in prison
- Led to introduction of the Sarbanes-Oxley accounting / auditing rules

- A paradigm shift in the general business climate
Arthur Andersen

- Global Auditing firm with 90,000 employees
- One of the world’s most respected companies
- Failed to detect and report irregularities as Enron’s auditor
- Media claims of shredding of documents and attempted cover-up
- Entire company wiped out within months
- Recently acquitted of any wrongdoing by the US Supreme Court

- Involved in the fraud or innocent victim of false perceptions?
- Bottom line: It does not matter – the risk is real!
Response

The perceived situation is no longer tolerated by the public, and the response is manifested at different levels

- Political response
- Pressure group attention
- Media attention
- Legal implications / liability
- Regulations
- Commercial requirements

A new risk reality!
Risk management

The need to manage this risk applies to all players in the maritime sector

- Classification societies
- Oil majors / cargo owners
- Shipowners / management companies

It has resulted in increased focus on

- Quality (documented and verified)
- Transparency
- Media / Information strategy
Oil Major’s view

“Civil society expects companies, especially the biggest ones, to manage the environmental impact of their operations and industrial risk. In practical terms, that means engaging in broader dialogue with a wide array of stakeholders. But more than that, it means we have to tailor our practices, organization, decision-making processes, and management systems to these new developments.”

Thierry Desmarest
Chairman and Chief Executive Officer - TOTAL
Background for today’s legislation and requirements

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There is a general scepticism to ageing vessels in the market

- Charterers, cargo owners, insurers, port authorities etc.
- Irrespective of their technical standard
- Which may not be known.

As a consequence, vessels down to 15 years of age are sometimes termed "over aged". 
A Need from Shipowners operating well maintained and sometimes extensively modernised older vessels

- To have the technical standard of their vessels more specifically verified and documented
- The vessels to be judged based on the actual condition rather than their age alone

Avoid that these two vessels are treated equally
CAP Background

- DNV developed CAP in close co-operation with stakeholders
- Introduced in 1989
- Rapidly followed by other leading Classification Societies
- All with different Scopes, different Rating Scales, different Rating Levels

- DNV took initiative to harmonise the assessment schemes between Lloyds, ABS and DNV
- Resulted in Harmonised CAP Schemes with identical scope and ratings
- Effective from 1st June 1996
CAP Purpose

The purpose of CAP is:

- To have the vessel judged based on the actual condition on board rather than age
- To contribute to protecting life, property and the environment and to ensure safest possible transportation of the cargo
- To establish a sound basis for decisions on repair or investments in order to extend the lifetime of the vessel
- To document a vessel's technical condition towards/in connection with:
  - Charterers
  - Cargo owners and/or authorities in connection with entry into new charters or extension of existing charters
  - Refinancing of the vessel
  - Sale or termination of management agreements etc.
  - Ports and terminals
  - Flag states
Difference between CAP and Class

- CAP is a consultancy service and is independent, yet complementary, to classification.

- The CAP-service is rendered according to a contract with the client and rendered to ships with or without DNV class.

- CAP is a voluntary service.

Class is a **continuous service** based on **regular inspections** and the issuing of class certificates with specified validity periods.

A CAP Declaration is issued documenting the **actual condition** of the vessel **at the time of the inspection**.
Difference between CAP and Class

- **CAP Rating Scale**
  - Very good 1
  - Good 2
  - Satisfactory 3
  - Poor 4

- **Requirements for new buildings**
- **Ship condition spread**
- **Charter Preference**
  - Minimum charter requirements for vessels > 20 years
- **Minimum requirements for a new 5 year period**
- **CC-line**

- Age: 0, 5, 10, 15, 20, 25, 30
Class is aimed at ensuring a minimum standard for the vessel whereas the main purpose of CAP is to evaluate and report the vessel’s condition above minimum class standard.

The scope for CAP Hull is more comprehensive than for class surveys with respect to the combination of close up inspections, extent and analysis of thickness measurements, structural strength evaluation and reporting.
■ Background for today’s legislation and requirements
■ What is CAP
■ Commercial Aspects
■ Basic Principles & Methodology
■ Practical Project Management
Background

“Civil society expects companies, especially the biggest ones, to manage the environmental impact of their operations and industrial risk. In practical terms, that means engaging in broader dialogue with a wide array of stakeholders. But more than that, it means we have to tailor our practices, organization, decision-making processes, and management systems to these new developments.”

Thierry Desmarest
Chairman and Chief Executive Officer - TOTAL
Decision making on chartering

Most Oil Majors have made policy decisions to only charter vessels of documented good quality, assured by:

- Vetting
- CAP rating of 2 or better for older vessels.

Negative impact:
  - Cost & complexity

Positive impact:
  - Significant lift of the quality of the tanker fleet
  - Barring low quality ships and operators from lucrative markets, thus…
  - Supporting strong freight-rates for quality tonnage
# Requirements of some oil majors

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>HULL</th>
<th>FATIGUE</th>
<th>MACHINERY</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP/AMOCO</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>EXXON/MOBIL</td>
<td>ITM</td>
<td>(X)</td>
<td></td>
<td>UTM 75%</td>
</tr>
<tr>
<td>SHELL</td>
<td></td>
<td>(X)</td>
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<td></td>
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<tr>
<td>VELA</td>
<td>X</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>STATOIL</td>
<td>X</td>
<td></td>
<td></td>
<td>X(&gt;20years)</td>
</tr>
<tr>
<td>PETROBRAS</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>PETRONAS</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>REPSOL</td>
<td>X</td>
<td></td>
<td></td>
<td>X (as from 2006)</td>
</tr>
<tr>
<td>FORTUM</td>
<td>X</td>
<td></td>
<td></td>
<td>X(&gt;20years)</td>
</tr>
<tr>
<td>GAS NATURAL</td>
<td>X</td>
<td></td>
<td></td>
<td>LNG</td>
</tr>
</tbody>
</table>
Market requirements

- It is not DNV, but the charterers who ultimately decide the technical acceptance criteria for a vessel.

- It is DNV’s experience that requirements change over time, and that the trend is consistent towards stricter requirements.

- Some variations between Oil Majors exist, but general acceptance criteria are similar.
Typical market requirements

- CAP is required for oil, chemical and LPG vessels above 20,000 dwt and older than 15 years or LNG vessels older than 20 years.

- CAP for the former set of vessels should also include a simplified fatigue analysis.

- The acceptable overall CAP rating for the vessel is 2 or better.
Secondary market requirements

- **Substantial corrosion** within the cargo tank length or ballast space is not accepted.

- **Poor coating** conditions will require a plan from the owners for upgrading and confirmation on completion.

- Tank internal **inspections** of areas where there are potential **fatigue** hot spots should not exceed 12 months for ballast spaces and 30 months for cargo tanks, high fatigue sensitivities will increase the frequency of inspection.

- Note: It is difficult to obtain explicit requirements from the Oil Majors on this. The above are DNV’s interpretations.
CAP rating objectives

- Alt. 1) Minimum overall CAP 2.

- Alt. 2) Minimum overall CAP 2, and
  - no substantial corrosion.

- Alt. 3) Minimum overall CAP 2, and
  - no substantial corrosion.
  - no local visual or UTM rating 3.

- Alt. 4) Minimum overall CAP 2, and
  - no substantial corrosion.
  - no local visual or UTM rating 3.
  - no POOR coating (coating rating 3).

- Alt. 5) Overall CAP 1 (no single 3 rating of any item allowed and average of rated items is CAP 1)
CAP rating objectives

■ To ensure general acceptance by the end users, alternative 4 is recommended.
  - Alt. 4) Minimum overall CAP 2, and
    - no substantial corrosion.
    - no local visual or UTM rating 3.
    - no POOR coating (coating rating 3).

■ When deciding on CAP rating objectives it is advisable to take into account also the technical condition of the vessel at the start of the process, as well as the time and money intended spent on possible upgrading.

■ It should be noted that a specific CAP rating with DNV cannot be ordered. It has to be justified based on the technical condition of the ship.

■ CAP 1 overall may be a commercial advantage, but is generally not a requirement from end users.
Background for today’s legislation and requirements
What is CAP
Commercial Aspects
Basic Principles & Methodology
Practical Project Management
## Rating scale

<table>
<thead>
<tr>
<th>CAP Rating</th>
<th>Condition</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP 1</td>
<td>Very good</td>
<td>Superficial reductions from “as new” or current rule scantlings. No maintenance or repair required.</td>
</tr>
<tr>
<td>CAP 2</td>
<td>Good</td>
<td>Deficiencies of a minor nature not requiring correction or repairs and/or found to have thickness significantly above class limits.</td>
</tr>
<tr>
<td>CAP 3</td>
<td>Satisfactory</td>
<td>Deficiencies, which do not require immediate corrective actions, or found to have thickness, although generally above class renewal levels, with substantial corrosion.</td>
</tr>
<tr>
<td>CAP 4</td>
<td>Poor</td>
<td>Deficiencies which may affect the ship’s potential to remain in class, or found to have, in some areas, thickness which are at or below the class renewal acceptance criteria.</td>
</tr>
</tbody>
</table>
# Rating scale - coating

<table>
<thead>
<tr>
<th>CAP Rating</th>
<th>Condition</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP 1</td>
<td>GOOD</td>
<td>Condition with only minor spot rusting.</td>
</tr>
<tr>
<td>CAP 2</td>
<td>FAIR</td>
<td>Condition with local breakdown at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition.</td>
</tr>
<tr>
<td>CAP 3</td>
<td>POOR</td>
<td>No coating or condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.</td>
</tr>
<tr>
<td>CAP 4</td>
<td>-</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Coating Condition – As defined in DNV Rules Pt.7
Rated items

- Ballast tanks.

- Cargo tanks and void spaces.

- External structure (main deck, ship sides and bottom).

- Structural strength.
The rating of each main structural element is based on the following input:

- **Visual inspection** to establish extent of local corrosion and defects, and to give a visual impression of the overall condition.

- Analysis of thickness measurements *(UTM)* to establish extent of general corrosion.

- Extent and condition of **coating** for segregated ballast tanks.
Rating principle

- **CAP 1**: \( \frac{1}{3} \)
- **CAP 2**: \( \frac{1}{3} \)
- **CAP 3**: \( \frac{1}{3} \)
- **CAP 4**: \( \frac{1}{4} \)

**Within Class Limit**

**Substantial Corrosion**

**Condition of Class**

- **Newbuilding Thickness**
- **Corrosion Margin**
- **Class Minimum Thickness (Tmin)**

- **Allowable margin**
Ballast tanks

- UTM
- Visual condition
- Coating
Cargo tanks

- UTM
- Visual condition
- Coating described, but not rated
External structure

- UTM
- Visual condition
- Coating described, but not rated
Strength

- Section Modulus

- Buckling Capacity of Deck and Bottom Panels

Buckling capacity is calculated using DNV’s program PULS (Panel Ultimate Limit State)
Ballast & Cargo tanks

- Each tank/space is rated.
- The rating is boundary oriented:
  - Deckhead, side, bottom, longitudinal / transverse bulkheads and internal structure is rated separately.
Visual condition rating

• Visual
  — Edge corrosion, incl. openings
  — Grooving
  — Pitting
  — Indents
  — Any other local defect (e.g. Crack, buckling)

• UTM

• Coating
UTM based rating

- **Visual**
  - Edge corrosion, incl. openings
  - Grooving
  - Pitting
  - Indents
  - Any other local defect (e.g. Crack, buckling)
- **UTM**
- **Coating**
UTM based rating

For every Tank/Space:

Distribution curves for all Main Structural Elements:

- Deck
- Side
- Bottom
- Inner bottom
- Inner deck
- Longitudinal bulkhead
- Transverse bulkhead
- Internal structures

(As applicable for each tank/space)

<table>
<thead>
<tr>
<th>Main structural element</th>
<th>UTM</th>
<th>Visual</th>
<th>Coating</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deckhead</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2,3</td>
</tr>
<tr>
<td>Side</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1,0</td>
</tr>
<tr>
<td>Bottom</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1,0</td>
</tr>
<tr>
<td>Transverse bulkhead</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2,0</td>
</tr>
<tr>
<td>Internal structure</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1,7</td>
</tr>
<tr>
<td>Tank average rating</td>
<td></td>
<td></td>
<td></td>
<td>1,6</td>
</tr>
<tr>
<td>Tank overall rating</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
Coating rating

- Visual
  - Edge corrosion, incl. openings
  - Grooving
  - Pitting
  - Indents
  - Any other local defect (e.g. Crack, buckling)

- UTM

- Coating

Coating rating only for Ballast Tanks
Ballast & Cargo tanks

All tanks / spaces are rated accordingly
Tank rating

Example: Single skin oil tanker
Ballast & Cargo tanks

Rating Cargo Tanks & Cofferdams

Rating Ballast Tanks
Ballast tanks – overall rating

<table>
<thead>
<tr>
<th>Ballast Tanks</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forepeak</td>
<td>1</td>
</tr>
<tr>
<td>Aft peak</td>
<td>1</td>
</tr>
<tr>
<td>Ballast Wing Tank 2P</td>
<td>2</td>
</tr>
<tr>
<td>Ballast Wing Tank 2S</td>
<td>2</td>
</tr>
<tr>
<td>Ballast Wing Tank 4P</td>
<td>1</td>
</tr>
<tr>
<td>Ballast Wing Tank 4S</td>
<td>1</td>
</tr>
</tbody>
</table>

Ballast tanks average rating: 1.3

Ballast tanks overall rating: 1
Cargo tanks – overall rating

Cargo Tanks & Cofferdams

<table>
<thead>
<tr>
<th>Cargo Tanks, voids, etc.</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo Center Tank 1C</td>
<td>1</td>
</tr>
<tr>
<td>Cargo Center Tank 2C</td>
<td>1</td>
</tr>
<tr>
<td>Cargo Center Tank 3C</td>
<td>1</td>
</tr>
<tr>
<td>Cargo Center Tank 4C</td>
<td>2</td>
</tr>
<tr>
<td>Cargo Center Tank 5C</td>
<td>1</td>
</tr>
<tr>
<td>Cargo Wing Tank 1P</td>
<td>1</td>
</tr>
<tr>
<td>Cargo Wing Tank 1S</td>
<td>2</td>
</tr>
<tr>
<td>Cargo Wing Tank 3P</td>
<td>1</td>
</tr>
<tr>
<td>Cargo Wing Tank 3S</td>
<td>2</td>
</tr>
<tr>
<td>Slop Tank P</td>
<td>2</td>
</tr>
<tr>
<td>Slop Tank S</td>
<td>2</td>
</tr>
<tr>
<td>Forward Cofferdam</td>
<td>2</td>
</tr>
<tr>
<td>Aft Pump Room</td>
<td>2</td>
</tr>
<tr>
<td>Cargo tanks, voids, etc. average rating</td>
<td>1.5</td>
</tr>
<tr>
<td>Cargo tanks, voids, etc. overall rating</td>
<td>2</td>
</tr>
</tbody>
</table>
External structure
External structure

<table>
<thead>
<tr>
<th>Structural element</th>
<th>UTM</th>
<th>Visual</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maindeck</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Shipside</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Bottom</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**External structure**

<table>
<thead>
<tr>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

**External structure average rating** 1.7

**External structure overall rating** 2
Strength rating

- Hull section modulus
- Buckling capacity

<table>
<thead>
<tr>
<th>Structural strength rating</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hull section modulus rating</td>
<td>1</td>
</tr>
<tr>
<td>Buckling capacity</td>
<td>2</td>
</tr>
<tr>
<td>Structural strength overall rating</td>
<td>2</td>
</tr>
</tbody>
</table>

The lower rating governs the overall rating.
Vessel overall rating

<table>
<thead>
<tr>
<th>Vessel Overall</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballast tanks overall rating</td>
<td>1</td>
</tr>
<tr>
<td>Cargo tanks, voids, etc. overall rating</td>
<td>2</td>
</tr>
<tr>
<td>External structure overall rating</td>
<td>2</td>
</tr>
<tr>
<td>Structural strength overall rating</td>
<td>2</td>
</tr>
<tr>
<td>Vessel average rating</td>
<td>1,8</td>
</tr>
<tr>
<td>Vessel overall rating</td>
<td>2</td>
</tr>
</tbody>
</table>
Vessel overall rating - Limitations

- A tank overall rating is 3 if *substantial corrosion* is found in any area of the tank.

- Each tank overall rating is not to be better than one grade above any part rating for the tank.
  - (UTM, visual or coating rating for any structural element in the tank)

- The vessel overall rating is not to be better than one grade above any part rating in the report.
  - (Strength, UTM, visual or coating rating for any structural element in any tank)

- The final rating is decided by DNV’s CAP Rating Committee
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Phases of a CAP project

1. Request
2. Contract
3. Preliminary Strength Check
5. Fatigue Assessment (Optional)
6. Kick-off meeting onboard
7. Inspection + UTM on board
8. Repairs / Upgrading + inspection and reporting of same
9. Issue Preliminary CAP Hull Declaration
10. UTM Analysis
11. Strength Analysis
12. Full Report
13. Rating Committee
Co-operation

- A successful CAP project relies on co-operation from all the involved parties.

- Success also depends on feedback of information, and communication throughout the process.

- It is advisable to allocate appropriate resources towards the management of the project.
Interface with class and flagstate

- Co-ordinating the different surveys applicable will save:
  - Cost of the surveys
  - Cost and time of repairs
  - Downtime and off-hire
Ultrasonic Thickness Measurements (UTM)

- Representative thickness data for all main structural elements in all tanks/spaces in the cargo area are required.

- The final thickness measurements report is to be updated after renewals
The thickness measurement data are to be reported using the DNV UTM Template.

<table>
<thead>
<tr>
<th>Ship’s Name:</th>
<th>Example ship</th>
<th>Tank/Space</th>
<th>Structural Element</th>
<th>Element / Frame No.</th>
<th>Draw ref</th>
<th>Orig.thk.</th>
<th>Class.thk.</th>
<th>Gauged.thk.</th>
<th>%</th>
<th>Diminution</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td></td>
<td>Port</td>
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<td>%</td>
<td></td>
<td></td>
<td></td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>Tank</td>
<td>Space</td>
<td>Reverse side</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WT2</td>
<td></td>
<td></td>
<td>Longitudinal stiffener</td>
<td>102</td>
<td>1</td>
<td>12.50</td>
<td>8.00</td>
<td>8.30</td>
<td>10.00</td>
<td>4.20</td>
<td>33.6%</td>
</tr>
<tr>
<td>WT2</td>
<td></td>
<td></td>
<td>Longitudinal stiffener</td>
<td>103</td>
<td>2</td>
<td>12.50</td>
<td>8.00</td>
<td>9.00</td>
<td>11.90</td>
<td>3.50</td>
<td>28.0%</td>
</tr>
<tr>
<td>WT2</td>
<td></td>
<td></td>
<td>Longitudinal stiffener</td>
<td>104</td>
<td>3</td>
<td>12.50</td>
<td>8.00</td>
<td>10.00</td>
<td>12.00</td>
<td>2.50</td>
<td>20.0%</td>
</tr>
<tr>
<td>WT2</td>
<td></td>
<td></td>
<td>Longitudinal stiffener</td>
<td>105</td>
<td>4</td>
<td>12.50</td>
<td>8.00</td>
<td>10.20</td>
<td>12.30</td>
<td>2.30</td>
<td>18.4%</td>
</tr>
<tr>
<td>WT2</td>
<td></td>
<td></td>
<td>Longitudinal stiffener</td>
<td>106</td>
<td>5</td>
<td>12.50</td>
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<td>10.00</td>
<td>12.40</td>
<td>2.50</td>
<td>20.0%</td>
</tr>
<tr>
<td>WT2</td>
<td>CT2</td>
<td></td>
<td>Bulkhead plating</td>
<td>A1</td>
<td>6</td>
<td>12.00</td>
<td>8.00</td>
<td>10.00</td>
<td>11.50</td>
<td>2.00</td>
<td>16.7%</td>
</tr>
<tr>
<td>WT2</td>
<td>CT2</td>
<td></td>
<td>Bulkhead plating</td>
<td>A1</td>
<td>7</td>
<td>12.00</td>
<td>8.00</td>
<td>11.40</td>
<td>11.80</td>
<td>0.60</td>
<td>5.0%</td>
</tr>
<tr>
<td>WT2</td>
<td>CT2</td>
<td></td>
<td>Bulkhead plating</td>
<td>A1</td>
<td>8</td>
<td>12.00</td>
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<td>11.70</td>
<td>10.00</td>
<td>0.30</td>
<td>2.5%</td>
</tr>
<tr>
<td>WT2</td>
<td>CT2</td>
<td></td>
<td>Bulkhead plating</td>
<td>A2</td>
<td>9</td>
<td>12.00</td>
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<td>0.20</td>
<td>1.7%</td>
</tr>
<tr>
<td>WT2</td>
<td>CT2</td>
<td></td>
<td>Bulkhead plating</td>
<td>A2</td>
<td>10</td>
<td>12.00</td>
<td>8.00</td>
<td>12.00</td>
<td>12.00</td>
<td>0.00</td>
<td>0.0%</td>
</tr>
<tr>
<td>WT2</td>
<td>CT2</td>
<td></td>
<td>Bulkhead plating</td>
<td>A2</td>
<td>11</td>
<td>12.00</td>
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<td>12.00</td>
<td>12.00</td>
<td>0.00</td>
<td>0.0%</td>
</tr>
<tr>
<td>WT2</td>
<td>CT2</td>
<td></td>
<td>Bulkhead plating</td>
<td>A2</td>
<td>12</td>
<td>12.00</td>
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<td>12.00</td>
<td>12.00</td>
<td>0.00</td>
<td>0.0%</td>
</tr>
<tr>
<td>WT2</td>
<td>CT2</td>
<td></td>
<td>Bulkhead plating</td>
<td>A2</td>
<td>13</td>
<td>12.00</td>
<td>8.00</td>
<td>11.80</td>
<td>11.80</td>
<td>0.20</td>
<td>1.7%</td>
</tr>
<tr>
<td>CT2</td>
<td>CT2</td>
<td></td>
<td>Centreline Bulkhead plating</td>
<td>P5</td>
<td>14</td>
<td>15.00</td>
<td>12.00</td>
<td>11.30</td>
<td>11.30</td>
<td>3.70</td>
<td>24.7%</td>
</tr>
<tr>
<td>CT2</td>
<td>CT2</td>
<td></td>
<td>Centreline Bulkhead plating</td>
<td>P6</td>
<td>15</td>
<td>15.00</td>
<td>12.00</td>
<td>13.00</td>
<td>13.00</td>
<td>2.00</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

The specification, template and other supporting documents may be downloaded from [http://cap.dnv.com](http://cap.dnv.com)
Access and safety

- According to the CAP contract, the client is responsible for providing
  - satisfactory safety and access for the CAP surveyors
  - suitable lighting
  - ventilation
  - cleanliness

- Means of access are to be ensured in accordance with recognised international standards and DNV instructions.

- Safe access for close-up inspection of all ballast tanks and access for overall inspection and/or close-up inspection of all other tanks and spaces in the cargo area are required for CAP Hull inspection.
Access and safety

- Safe access and cleaning/de-scaling of the structure require preparations in advance of the CAP inspection.

- Insufficient provisions for access/cleaning/de-scaling may lead to an incomplete inspection and/or a conservative CAP rating due to uncertainty of the condition.

- Defects may also remain undetected.

- If insufficient information is obtained, no overall rating of the vessel can be given.
Access and safety

- Rafting must be carried out in calm waters. DNV’s safety limit regarding peak-to-peak amplitude of the water surface is 0.5 m.

- Professional standard rafts should be provided.

- Deballasting restrictions in MARPOL Special Areas may be a limiting factor that should be considered.

- If the close-up survey is to take place from staging it may only commence after completion of the staging.
Access and safety

For close-up examination, one or more of the following means for access, acceptable to the attending surveyors, shall be provided:

- permanent staging and passages through structures
- temporary staging and passages through structures
- lifts and moveable platforms
- rafts or boats
- other equivalent means
Access and safety

- Rafts or boats alone may be allowed for survey of the under deck areas within tanks if the depth of the webs is 1.5 m or less.

- The revised IACS UR are harmonized with the requirements applicable for Condition Assessment Scheme (CAS).
Access and safety

If the depth of the webs is more than 1.5 m, rafts alone may be allowed if:

- The coating of under deck structure is in **GOOD** condition and there is no evidence of wastage.

- An escape route through the air space is provided.
The CAP inspection will be started with a kick-off meeting onboard to:

- familiarise all parties with CAP
- clarify scope of inspection & UTM
- clarify owner’s objectives regarding CAP Hull Ratings.
- highlight known defects or problem areas
- discuss practical issues like sequence of inspections, safety, etc.
Rating objectives

Based on the latest feedback from Oil Majors, it seems advisable to avoid any local CAP 3 ratings:

For advising the client how to upgrade areas within acceptable class limits, but below the target rating, DNV uses the CAP Upgrade Report.
CAP survey scope

- Close-up inspection:
  - All web frame rings in all ballast tanks (see note 1)
  - All web frame rings in a cargo wing tank (see note 1 and 4)
  - Web frame rings in each remaining cargo wing tank (see note 1, 3 and 4)
  - All transverse bulkheads in all cargo and ballast tanks (see note 2 and 4)
  - Deck and bottom transverses including adjacent structural members in each cargo centre tank (see note 3 and 4)
  - All cofferdams in cargo area
  - Aft peak tank and fore peak tank
  - External structure, including dry dock inspection of bottom (see note 5)
  - Fatigue critical details, i.e. details identified in fatigue assessment report (if applicable) with fatigue life expectancy less than the current age of the vessel
  - Possible problem areas as identified during inspection or in the Hull Survey Programme (see note 6)

Notes:
1. Complete transverse web frame ring including adjacent structural members
2. Complete transverse bulkhead, including girder and stiffener system in adjacent members
3. 30 % (rounded up the next whole integer)
4. Valid for single hull oil tankers, ore/oil ships only. For other vessels, 30-50 % of the cargo tanks are to be completely close-up inspected. Alternatively, for chemical tankers all cargo tanks may be partially close-up inspected (e.g. from ladders, stringers and scaffolding) provided sufficient representative areas are accessible for close-up inspection.
5. An underwater inspection in the presence of a CAP surveyor may be accepted on a case-by-case basis
6. If design related fatigue cracks are found, all similar locations are to be close-up inspected
CAP survey scope

- Overall inspection:
  - All remaining tanks in cargo area
  - Deep tanks
  - All voids and holds in gas tankers, including tank support structures (see note 7)

Notes:

7. If design related fatigue cracks are found, all similar locations are to be close-up inspected
CAP Survey documents

- CAP Defects List
- CAP Upgrade Report
- (Preliminary) CAP Hull report
CAP Defects List

- Only items considered to represent a Condition of Class (CC).

- The items on the list will be converted to one CC at the end of the CAP inspection, referring to the CAP Defects List.

The report lists all deficiencies found during the CAP survey of the vessel. The deficiencies are considered to be below DNV's Class Requirements. All items on the list may be converted to Conditions of Class (CC) at completion of the CAP survey.
The CAP Upgrade Report identifies all main structural elements with proposed rating below the owner’s target.

The reason for rating an element accordingly is given.
6.1.2 Fore Peak Tank

Results from visual CAP inspection

The Internal structure was found in a satisfactory structural condition with thin edges of manholes and stringer openings.

Shipside longitudinal No. 15 was found cracked at starboard webframe No. 92.

Owner's Objectives regarding CAP Hull Ratings:

<table>
<thead>
<tr>
<th>Min individual element rating</th>
<th>Min individual tank rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTM</td>
<td>Visual</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

The Internal structure was found in a satisfactory structural condition with thin edges of manholes and stringer openings.
Completion and follow-up

- The CAP report describes:
  - the condition of the vessel at the time of the inspection (with photos)
  - defects found (with photos)
  - the repair of defects
  - any upgrading carried out
  - condition at the end of the process (with photos.)

- A CAP completion survey is normally required to document the final condition
## Updating of UTM after repairs

- **Example:** Initial UTM report for deck in forepeak tank:

### THICKNESS MEASUREMENT REPORT

<table>
<thead>
<tr>
<th>Ship's Name:</th>
<th>Exampleship</th>
<th>Id.No:</th>
<th>Report No:</th>
<th>UTMCO 4321</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tank / Space</strong></td>
<td><strong>Tank/Space Reverse side</strong></td>
<td><strong>Structural Element</strong></td>
<td><strong>Element / Frame No.</strong></td>
<td><strong>Draw ref.</strong></td>
<td><strong>Orig thk.</strong></td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - centre plate  - fwd</td>
<td>201–216</td>
<td>inboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - centre plate  - fwd</td>
<td>201–216</td>
<td>outboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - centre plate  - middle</td>
<td>201–216</td>
<td>middle</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - centre plate  - aft</td>
<td>201–216</td>
<td>inboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 1st outboard  - fwd</td>
<td>201–216</td>
<td>outboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 1st outboard  - fwd</td>
<td>201–216</td>
<td>inboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 1st outboard  - fwd</td>
<td>201–216</td>
<td>outboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 1st outboard  - middle</td>
<td>201–216</td>
<td>middle</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 1st outboard  - aft</td>
<td>201–216</td>
<td>inboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 1st outboard  - aft</td>
<td>201–216</td>
<td>outboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 2nd outboard  - fwd</td>
<td>201–216</td>
<td>inboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 2nd outboard  - fwd</td>
<td>201–216</td>
<td>outboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 2nd outboard  - middle</td>
<td>201–216</td>
<td>middle</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 2nd outboard  - aft</td>
<td>201–216</td>
<td>inboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 2nd outboard  - aft</td>
<td>201–216</td>
<td>outboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - outboard  - fwd</td>
<td>201–206</td>
<td>inboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - outboard  - fwd</td>
<td>201–206</td>
<td>outboard</td>
<td>11.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - centre plate  - fwd</td>
<td>201–207</td>
<td>outboard</td>
<td>20.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - centre plate  - aft</td>
<td>201–207</td>
<td>outboard</td>
<td>20.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 1st outboard  - fwd</td>
<td>201–207</td>
<td>outboard</td>
<td>20.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 1st outboard  - fwd</td>
<td>201–207</td>
<td>inboard</td>
<td>20.00</td>
</tr>
<tr>
<td>Deck</td>
<td>FPT</td>
<td>Deck Plating  - 1st outboard  - fwd</td>
<td>201–207</td>
<td>outboard</td>
<td>20.00</td>
</tr>
</tbody>
</table>
Updating of UTM after repairs

- Example:
  - Initial UTM analysis
  - and rating for FPT

<table>
<thead>
<tr>
<th>Main structural element</th>
<th>UTM</th>
<th>Visual</th>
<th>Coating</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deckhead</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2,3</td>
</tr>
<tr>
<td>Side</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1,0</td>
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<tr>
<td>Bottom</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1,0</td>
</tr>
<tr>
<td>Transverse bulkhead</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2,0</td>
</tr>
<tr>
<td>Internal structure</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1,7</td>
</tr>
<tr>
<td>Tank average rating</td>
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<td></td>
<td></td>
<td>1,6</td>
</tr>
<tr>
<td>Tank overall rating</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
### Updating of UTM after repairs

- **Example:** Updated UTM report for deck in forepeak tank:

#### Thickness Measurement Report

<table>
<thead>
<tr>
<th>Tank / Space</th>
<th>Structural Element</th>
<th>Draw ref</th>
<th>Orig thk</th>
<th>Class min thk</th>
<th>Gauged</th>
<th>Diminution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Port Stbd</td>
</tr>
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<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Details

- **Legend:**
  - Below class min
  - Substantial corr

#### Table Example

<table>
<thead>
<tr>
<th>Tank / Space</th>
<th>Structural Element</th>
<th>Draw ref</th>
<th>Orig thk</th>
<th>Class min thk</th>
<th>Gauged</th>
<th>Diminution</th>
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</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Footnotes

- **Version:**
- **29 January 2010**
- **Slide:** 75
Updating of UTM after repairs

- Example:
  - Updated UTM analysis
  - and rating for FPT

<table>
<thead>
<tr>
<th>Main structural element</th>
<th>UTM</th>
<th>Visual</th>
<th>Coating</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deckhead</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1,7</td>
</tr>
<tr>
<td>Side</td>
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<td>1</td>
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<td>1,0</td>
</tr>
<tr>
<td>Bottom</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1,0</td>
</tr>
<tr>
<td>Transverse bulkhead</td>
<td>2</td>
<td>2</td>
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<td>2,0</td>
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<tr>
<td>Internal structure</td>
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<td>1,7</td>
</tr>
<tr>
<td>Tank average rating</td>
<td></td>
<td></td>
<td></td>
<td>1,5</td>
</tr>
<tr>
<td>Tank overall rating</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
Completion and follow-up

6.1.2 Fore Peak Tank

Results from visual CAP inspection
The shipside as found in a very good structural condition.
The internal structure was found in a satisfactory structural condition with thin edges of manholes and stringer openings.

Deficiencies found during CAP inspection
Shipside longitudinal No. 15 was found cracked at starboard webframe No. 92.

Repairs and upgrading carried out after CAP inspection

Photos

Photos of condition after repairs and upgrading

All edges of manholes and stringer openings were renewed by inserts.

Shipside longitudinal No. 15 Fr. 92 was repaired by insert.

Normally no change of rating!
Completion

- Required for completion of the final CAP Hull Report:
  - Final UTM report
  - Verification of repairs and upgrading

- Based on the above:
  - Statistical analysis of UTM data
  - Strength calculation based on as-measured scantlings
  - Completion of the CAP Hull Report

- Evaluation and decision by the CAP Rating Committee

- Issue of final CAP Hull Report and CAP Hull Declaration