Concepts and Innovations in Increasing Vessel Efficiency

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Major expenditures in vessel operation

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MAJOR Vessel Operational Costs

- FUEL: 50 ~ 60%
- CREW: 20 ~ 30%
Current Regulations

• First legally binding climate change treaty Effecting Shipping

• The Energy Efficiency Design Index (EEDI) was made mandatory for new ships and the Ship Energy Efficiency Management Plan (SEEMP) for all ships with the adoption of amendments to MARPOL Annex VI
SEEMP

- is an operational measure that establishes a mechanism to improve the energy efficiency of a ship in a cost-effective manner. The SEEMP also provides an approach for shipping companies to manage ship and fleet efficiency performance over time
EEDI

• The regulation will require most new ships to be 10% more efficient beginning 2015, 20% more efficient by 2020 and 30% more efficient from 2025.

• If implemented as per schedule Projected reduction in CO2 is 263 million tonnes (Mt) will be reduced annually by 2030.

• Projected savings up to 75 Mt and $52 billion of fuel annually.
FUEL SAVINGS

- Closer Monitoring of Bunker Spec
- Trim Optimisation
- Weather Routing
- UW Cleaning of Hull & Special Under Water Paints
- Capacity improvement
- Minor structural changes
- Optimisation of the Auxiliary Engines
- Optimisation of Main propulsion system

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Closer Monitoring of Bunker Spec

Recent studies have shown that you can save up to 4% fuel by verifying on the quantity and quality of the Bunker.

Density Dodging.

Short Supply
Trim Optimisation

• Generally 4~6 % is the predicted savings
• Various Reputed Classification societies are in the Market on this
• Simple to use Software tools based on Ship specific model tests and actual operational data.
• May not be so effective for smaller ships and certain hull forms
Weather Routing

• This is found to be a cost effective way to address the Fuel savings.

• Helping the On board Staff on decision making.

• All major Companies and charterers are using this.

• Many vendors in the Market
Under Water Hull cleaning and Propeller Polishing

- Regular Cleaning with special equipments which do not damage the paint coating reduces the water resistance and improves Fuel efficiency.
- VSL trading in especially in tropical waters with Regular anchorages

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Special Under Water Paints

• Claims varies from 4 ~10 %
• Basically coatings are reducing the surface roughness and preventing hull fouling with different technologies
• Biocidal Free Hull coatings FFR
• Hydro gel effect
• Fuel savings are not effective on certain type of vessels.
Capacity improvement

• Modification of Stowing plans to carry max cargo
• Increasing the vessel Draught without effecting class of the vessel.
• Increasing height of the deck house for container vessels
• Lengthening of vessel
• All the above require Class Involvement.

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Minor structural changes

• Modification of Bulbous Bow.
Reduces the water resistance and wave making 3 ~ 6 % fuel savings is predicted

• Propeller Modification
Addition of new Devices for improving the water flow to the propeller and minimising the Wake loss.
Propeller Boss Cap Fins ,Costa Bulb etc
Optimisation of the Auxiliary Engines

- By Changing the generator configurations to take the Normal sea load as its optimum load
- Eg 2 X 6 cylinder and 1 x 8 cylinder generators.
- Installing shaft generator
- Also by controlling the electric load. Eg optimising Air condition load, lighting load and installation of Harbour Sea water pumps
Optimisation of Main propulsion system

Change over to Slide Fuel Valves

Fuel savings and complete combustion especially during Slow steaming has been Recorded and currently Approved method for MAN Engines for NOX reduction

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De Rating Of ME

• 10~ 15 % fuel savings

Most of the current vessels have excess power and have been designed for High Top speed. By matching the operating speed with New optimum speed the fuel savings are considerable.
Change of Propeller

To Improve the propeller efficiency by incorporating latest designs.
MAN has come out with Kappel Propellers which is having High Skew and a more hydro dynamically Balanced.

7 % Fuel Savings is Predicted.
ME configuration.

- Single screw single Engine installation. Conventional type
Multiple screw installation.

Ships may be fitted with one, two, three or even four propellers. By fitting two propellers, the diameter of each can be reduced allowing a shallower draught. The two engines will be smaller and lighter than the single screw alternative.
ME configuration.

Multiple screw arrangement is advantageous as it gives a large power range and increases the reliability of the vessel by providing higher redundancy in propulsion.
ME configuration.

- Plants with mixed machinery.

Modern mixed plants usually comprise combinations of diesel engines, steam turbines, gas turbines or electric motors.
ME configuration.

- Electric propulsion.

A system which has generating sets which can be used to provide power to both propulsion system and ship services have the obvious advantages.

Cruise ship and Ferries.

Have High redundancy and the operational load range is vast.