

AN OPERATOR'S INITIATIVES TO MITIGATE CLIMATE CHANGE

CLIMATE CHANGE AND SHIPS: INCREASING ENERGY EFFICIENCY

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MITAGS

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Always There. Always Delivering.®



HORIZON LINES

▪ OVERVIEW

- LARGEST AMERICAN CONTAINER SHIP OPERATOR
 - EIGHT DIESEL SHIPS – 2 CLASSES
 - TWELVE STEAM SHIPS – 5 CLASSES

HORIZON LINES



OUR APPROACH TO MITIGATE CLIMATE CHANGE

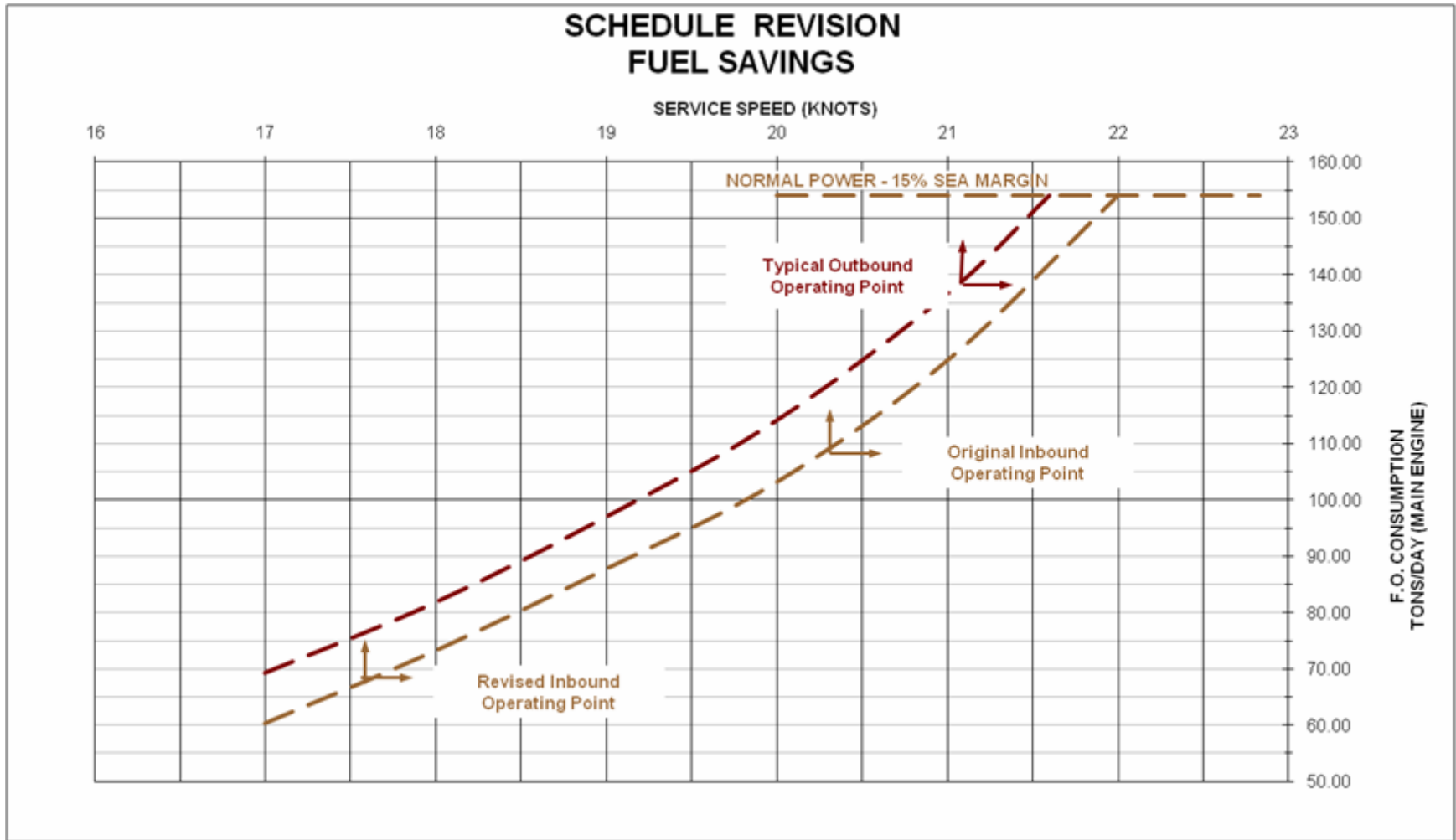
HORIZON LINES HAS DECIDED THAT THE MOST DIRECT WAY TO REDUCE EMISSIONS IS TO REDUCE FUEL CONSUMPTION.

HORIZON LINES

▪ ALL SHIPS

- SCHEDULE ADJUSTMENT (SLOW STEAMING)
- USE WEATHER ROUTING AND VOYAGE MANAGEMENT SYSTEMS – AVOID HEAVY WEATHER – TAKE ADVANTAGE OF BENEFICIAL ENVIRONMENTAL FACTORS (e.g., wind, currents)
- AUTOMATION UPGRADES
- BRIDGE EQUIPMENT UPGRADES
- M&R – KEEP EQUIPMENT IN OPTIMUM CONDITION
- REGULARLY SCAMP HULL AND POLISH PROPELLER
- VARIABLE SPEED CONTROL FOR LARGE MOTORS
- HULL COATINGS

SCHEDULE ADJUSTMENT



Voyage Management Systems

Select Results: May 2008 – June 2009

Voyages for D8-class Vessels

Vessel	Voyage	Date	Actual	Forecast Optimal	Potential Fuel Savings (MT)
Falcon	18	19-Nov-08	23.70%	1.90%	119.0
Hunter	14	20-May-08	14.80%	0.41%	101.0
Hunter	20	15-Dec-08	12.90%	2.37%	53.6
Eagle	16	19-Aug-08	7.60%	0.81%	43.8
Eagle	19	2-Dec-08	9.45%	3.46%	34.8
Tiger	20	10-Mar-09	9.50%	3.27%	45.4
Tiger	21	14-Apr-09		0.81%	
Tiger	22	10-May-09	1.50%	3.96%	(20.0)
AVERAGE			11.35%	2.12%	53.9

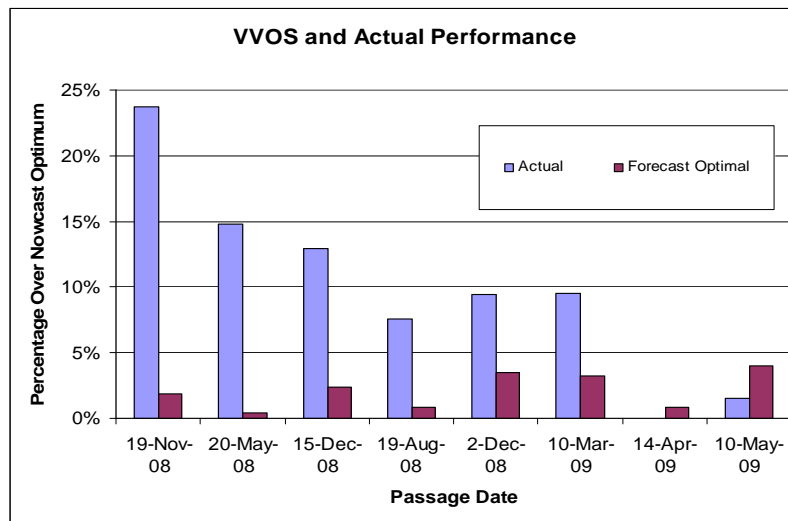
•Before using VMS, ships were consuming an annualized average of 8.3% (or 57.6 MT) above projected optimum fuel

•VMS optimizations of selected past and current voyages using forecast weather show that, had the VMS optimum routes been followed each day, fuel consumption would have averaged **2.12%** above the projected optimum vs. an actual average of **11.35%** on those same voyages

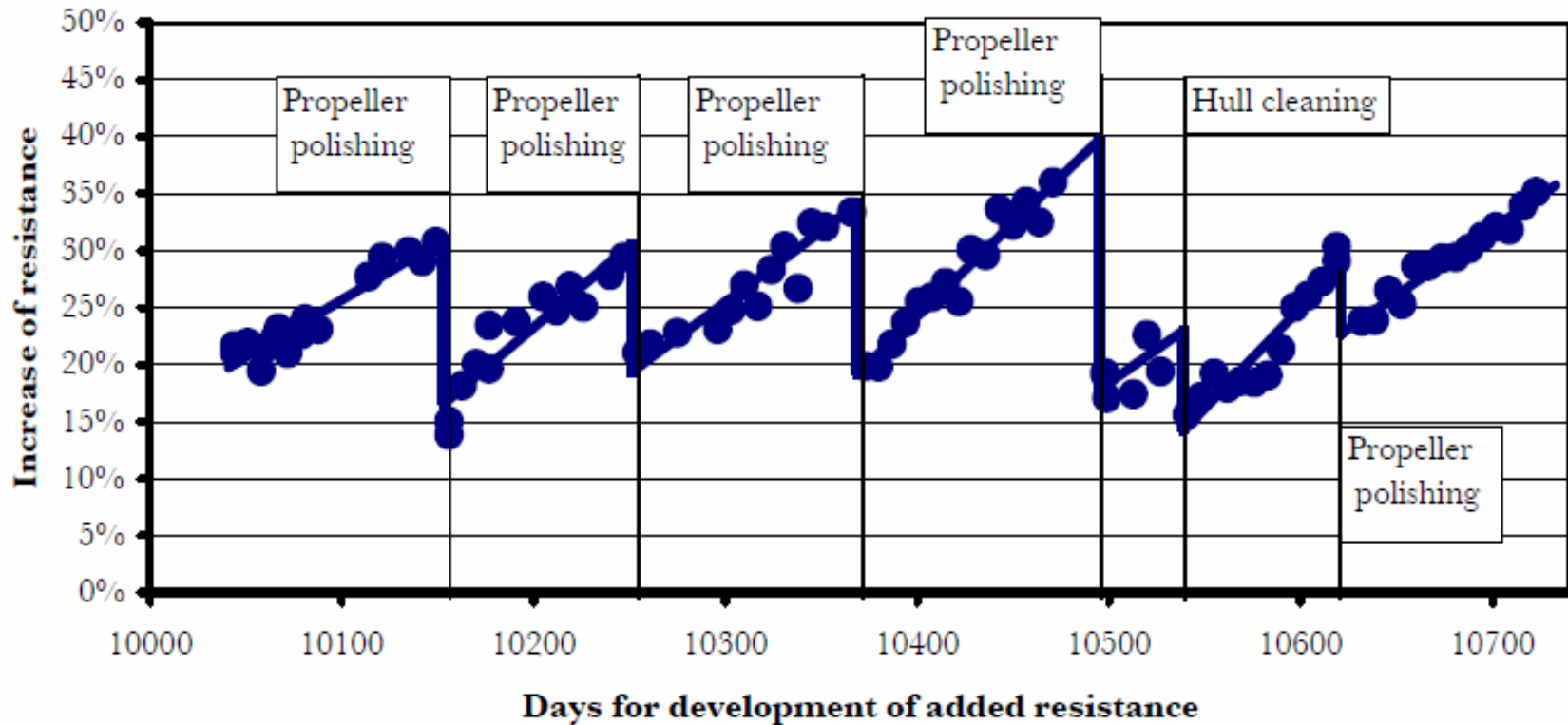
Resulting in 11.35% - 2.12% = 9.23% improvement & fuel savings

This is consistent with reports from other customers of the VMS service, who are actually achieving an average fuel consumption of 2.16% over optimum

\$21.6K fuel savings @ \$400/MT



Hull Cleaning/Propeller Polishing



Hull Coatings



Hull Coatings

- Full blast at dry dock –
 - Reduced hull roughness results in improved performance for longer periods
 - Avoids roughness issues with spot blast, especially in way of transition areas
- Careful attention to surface preparation and application results
- Analysis of performance of different coating products –
 - Track coating systems used throughout fleet to determine which provide better performance in actual service

▪ DIESEL SHIPS

- MAINTAIN PRO FORMA SCHEDULES, BUT HAVE SHIPS TRAVEL AT THE SPEED NECESSARY TO ELIMINATE “DIESEL DRIFT”
- INJECTOR SLIDE VALVES FOR MAIN ENGINES
- ALPHA LUBRICATORS
- CPP CONTROL UPGRADES
- ENGINE PERFORMANCE MONITORING

ALPHA LUBRICATORS

Alpha ACC Lubricator "Cylinder Oil Reduction"

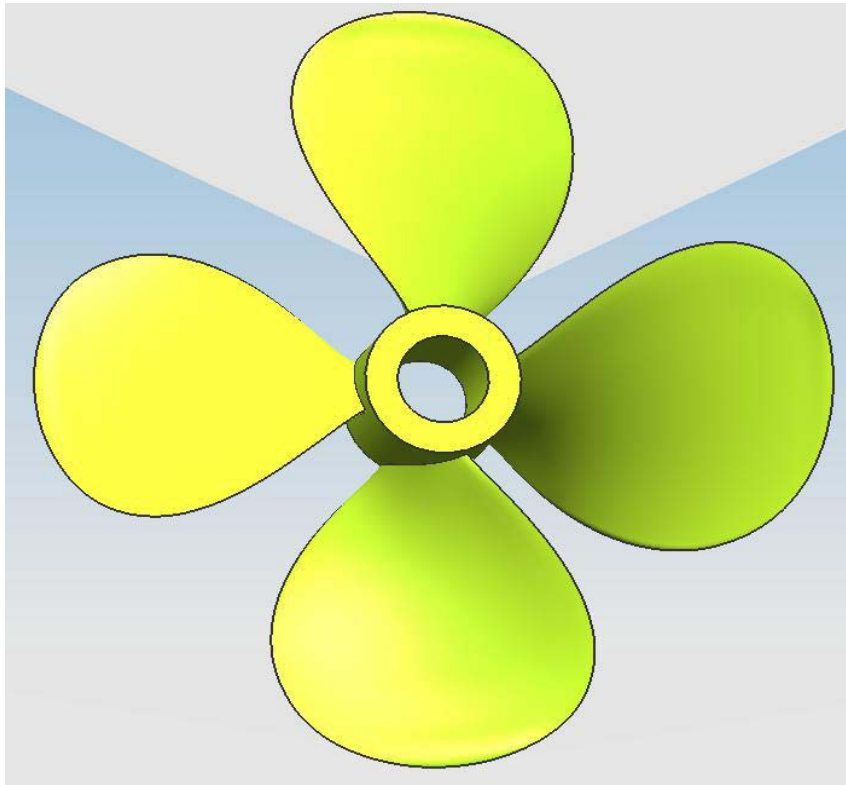
Engine type:	7K80MC-C
Layout point:	25,270 kW
Load point:	17,689 kW 70%
Lub. oil consumption with conventional H.J. Lubricator:	1.55 g/kW
Lub. oil consumption with Alpha ACC Lubricator:	0.85 g/kW
Fuel oil sulphur content:	2.50 %
Running hours per year:	7,500 Hour
Lub. Oil Consumption with conventional H.J. Lubricator:	261,034 kg
Lub. Oil Consumption with Alpha ACC Lubricators:	112,813 kg
Saving in Cyl. Lub. Oil consumption per year:	<u>148,221 kg</u>

▪ STEAM SHIPS

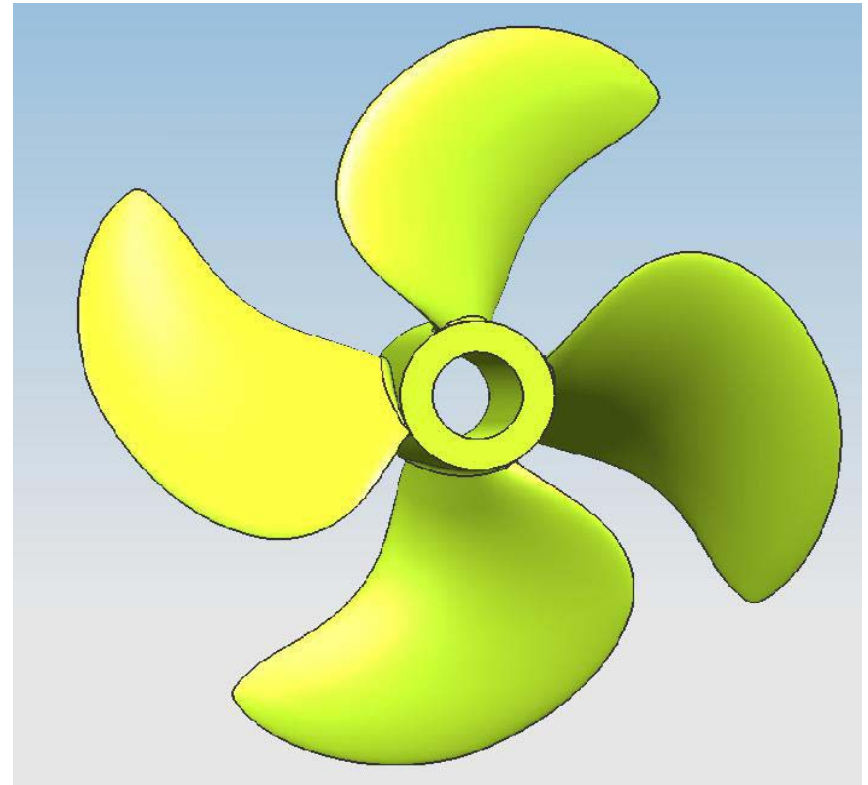
- PROPELLER UPGRADES – OPTIMIZE AT NEW DESIGN POINT (APPROX. 3% IMPROVEMENT FOR ONE VESSEL CLASS)
- BULBOUS BOW RENEWAL – IMPROVED DESIGN (PROJECTED 4% IMPROVEMENT FOR ONE VESSEL CLASS)
- STEAM CYCLE UPGRADES
 - ELECTRIC VACUUM PUMP IN LIEU OF AIR EJECTOR
 - ELECTRIC IN-PORT FEED PUMP
- KYMA – HEAT BALANCE MONITORING
- HFO HOMOGENIZERS

PROPELLER UPGRADE

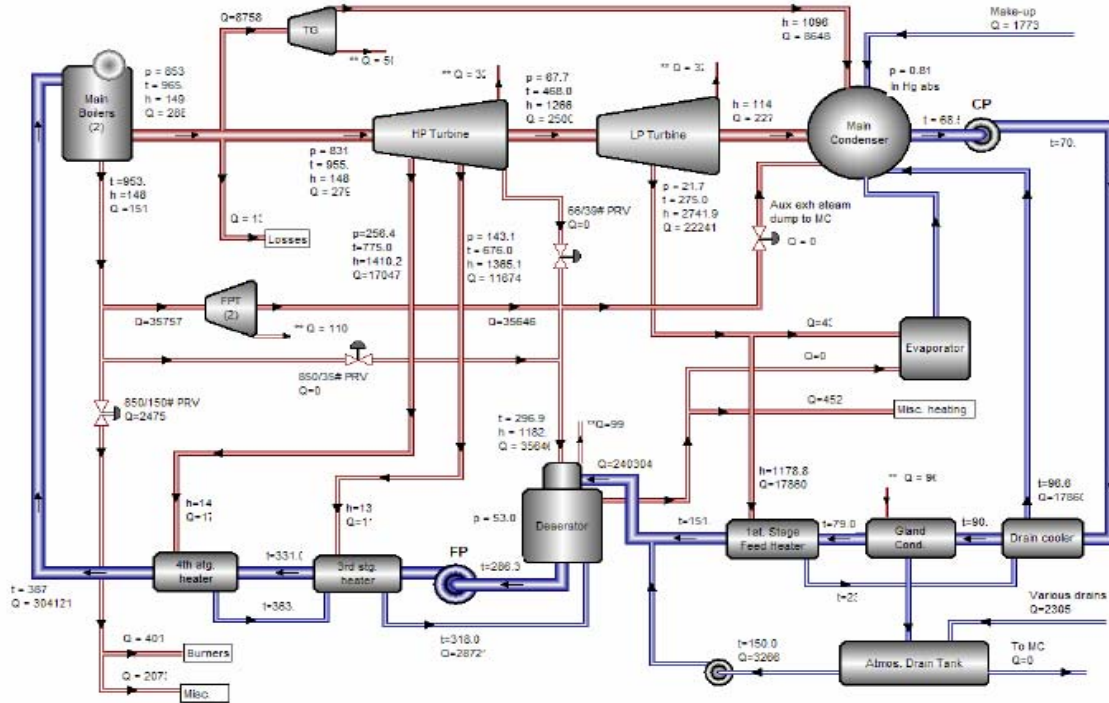
ORIGINAL DESIGN



**NEW DESIGN - OPTIMIZED AT
NEW LOWER POWER DESIGN
POINT**



HEAT BALANCE MONITORING



SAMPLE STEAMSHIP INTERACTIVE HEAT BALANCE

UPCOMING CHANGES

- ADDITIONAL MODIFICATIONS UNDER ACTIVE DEVELOPMENT:
 - COLD IRONING
 - FLUE GAS SCRUBBER

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