



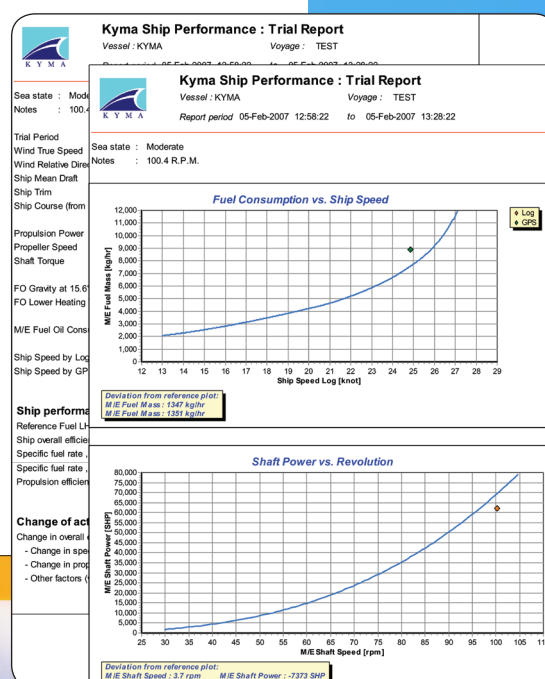
# KYMA

## SHIP PERFORMANCE

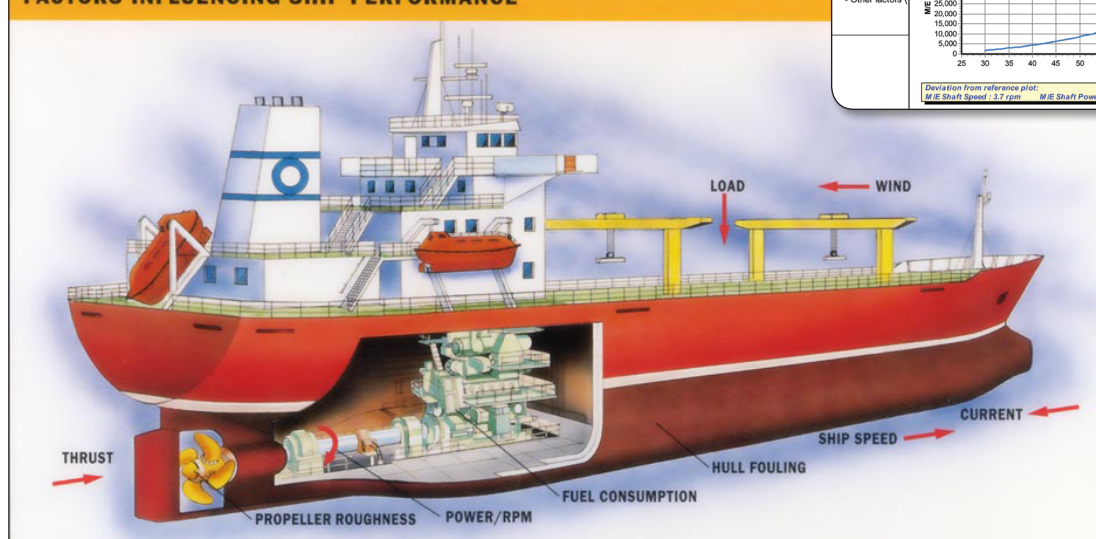
Kyma Ship Performance

- The most sophisticated solution for overall vessel performance monitoring.

- Instant performance information
- Fuel reporting
- Speed loss and performance analysis
- Sea trial reports
- Daily and voyage reports
- Transfer of data to main office
- EEOI calculation
- Trim Optimization
- Statistical analysis of historical data



### FACTORS INFLUENCING SHIP PERFORMANCE



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# KYMA a.s HAVE BEEN WORKING WITH SHIP PERFORMANCE SYSTEMS FOR MORE THAN 30 YEARS AND ARE ONE OF THE LEADING SUPPLIERS WITHIN THIS FIELD OF TECHNOLOGY

**P**ropulsion economy is based on fuel efficiency and ship reliability. To achieve an optimum result you need the best balance between fuel consumption, power output and ship speed. This can be obtained from accurate information provided by high quality instrumentation.

Kyma Performance Monitoring provides bridge and engine officers with vital propulsion data for cost-effective operation of the ship.

## **Reduced fuel consumption**

As fuel consumption is a major cost factor, the use of Kyma Performance Monitoring can contribute significantly to an improved bottom line.

## **Hull fouling and propeller roughness indication**

Kyma Performance Monitoring makes it possible to evaluate the economic impact of reduced propeller efficiency and increased hull resistance. It can show the effect of any action taken to improve hull or propeller smoothness.

## **Overload protection**

Early warning signals provide a further benefit for the continuous monitoring of propulsion components. These can indicate the overload stress of components and thus prevent unexpected breakdown.

## **Performance evaluation**

Contracts for new buildings are based on performance estimates from model tank testing.

Kyma Performance Monitoring can confirm precisely to the contract performance parameters or to any specified deviations.

## **Environmental information**

Emission calculation of CO<sub>2</sub> and SO<sub>2</sub> is included in Ship Performance and EEOI will be continuously calculated.

## **Trim optimization**

Kyma Ship Performance can be used to optimize vessel operation by the use of empirical data. In order to optimize ship trim for a given power and draft the functions LOGGING HISTORY and TRIAL are included in the KSP program.

## **Diagnostic Toolbox**

An optional trend analysis toolbox is available for detailed statistical analysis of speed loss and performance information.



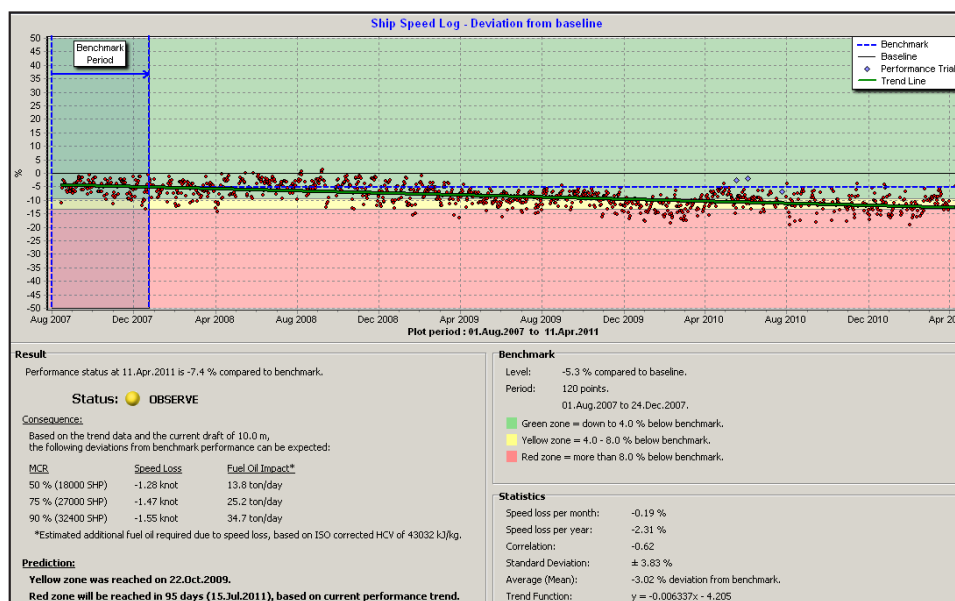
# A SEPARATE KYMA OFFICE APPLICATION IS AVAILABLE FOR FLEET PERFORMANCE EVALUATION



## FLEET PERFORMANCE SUMMARY:

Vessel Name	Voyage ID	Last updated	Performance Status
M/V Vessel 1	Voyage 110	22.10.2010 23:59:59	
M/V Vessel 2	Voyage 121	21.10.2010 23:59:59	
M/V Vessel 3	Voyage 89	23.10.2010 23:59:59	
M/V Vessel 4	Voyage 76B	22.10.2010 23:59:59	
M/V Vessel 5	Voyage 14A	20.10.2010 23:59:59	

## DIAGNOSTIC TOOLBOX



The Diagnostic Toolbox is an efficient tool giving the operator and ship owner a clear indication of vessel condition related to hull, machinery or propeller by the use of coloured flags for performance status indication.

Performance status ok

Performance to be observed

Performance not ok



# KYMA SHIP PERFORMANCE - INSTANT VALUES

A wide range of output information is available from the system computer. All output may be presented in SI or metric units as required.

## a) Numerical

All logged and calculated parameters can be output to computer monitor and printer. Typical updating time is 15 sec.

The following real-time values are available:

• Revolutions	rpm	• HFO low calorific value (LCV)	kJ/kg
• Shaft Torque	kNm	• MDO low calorific value (LCV)	kJ/kg
• Shaft Thrust	kN	• CO2 emissions	ton/ day
• Shaft Power	kW	• Energy Efficiency Operational Index, EEOI (CO2 Index)	g CO2 /ton, nm
• Ship speed by log	knots	• SO2 emissions	ton/day
• Ship speed by GPS	knots	• Wind speed, rel.	knots
• M/E specific fuel consumption	g/kWhr	• Wind speed, true	knots
• Propulsion efficiency	m/kWhr	• Wind direction, rel.	Deg
• Ship overall efficiency	kg/nm	• GPS position, latitude	Deg.Min.Sec
• M/E fuel consumption	kg/hr	• GPS position, longitude	Deg.Min.Sec
• G/E's fuel consumption	kg/hr	• GPS, ship course	Deg
• Aux. Boiler's fuel consumption	kg/hr	• Draft fwd/aft	m
• Type of F.O. in use (HFO or MDO)	-	• Draft MS, port /starboard	m
• Fuel Temperature at flow meters	C °	• Trim/List	m
• HFO density at 15°C	kg/l		
• MDO density at 15°C	kg/l		

## b) Graphic mode

Presentation of performance curves where the actual condition is indicated as a plot in the graph with numerical indication and deviation from the performance curve.

Performance curves are derived from model tank data or sea trial data.

- Shaft Power versus Revolutions
- Shaft Power versus Ship Speed
- Daily Fuel Consumption versus Ship Speed
- Specific Fuel Rate versus Shaft Power

Trend curves:

- Long-term trend capability over the life of the vessel of selected vessel performance data subject to change over time, such as speed loss due to hull fouling and increase of main engine specific fuel rate.
- Short-term trending of any five selectable parameters on a selectable time basis of up to 14 days. Resolution is 1 sample pr 15 sec.





## Kyma Ship Performance : Trial Report

Vessel : M/V Kyma Demo

Voyage : Test Demo

Report period from 06.03.2000 15:37:16 to 06.03.2000 16:37:16

Sea state : Calm sea, no wind

Notes : Test report

Trial Period	60.1	min
Wind True Speed	15.7	Knots
Wind Relative Direction	50	Deg
Ship Mean Draft	18.1	m
Ship Trim	0.4	m
Ship Course (from GPS)	0	Deg
Propulsion Power	27500	SHP
Propeller Speed	72.0	rpm
Shaft Torque	234.0	Tm
FO Gravity at 15.6°C	0.9400	
FO Lower Heating Value	10184	kcal/kg
M/E Fuel Oil Consumption	3999	kg/hr
M/E Fuel Temp. at Meter	89	°C
Ship Speed by Log	15.2	Knots
Ship Speed by GPS	14.9	Knots

### Ship performance data

Reference Fuel LHV for corrected data	10200	kcal/kg
Ship overall efficiency	263.1	kg/mile
Specific fuel rate , Actual	145.4	g/SHPhr
Specific fuel rate , Corrected	145.2	g/SHPhr
Propulsion efficiency	1.02	m/SHPhr

### Change of actual fuel consumption relative to reference condition.

Change in overall efficiency	12.76	MT/day
- Change in specific fuel rate	4.15	MT/day
- Change in propulsion efficiency	8.79	MT/day
- Other factors (wind, sea, trim etc.)	-0.18	MT/day



# Kyma Ship Performance : Trial Report

Vessel : M/V Kyma Demo

Voyage : Test Demo

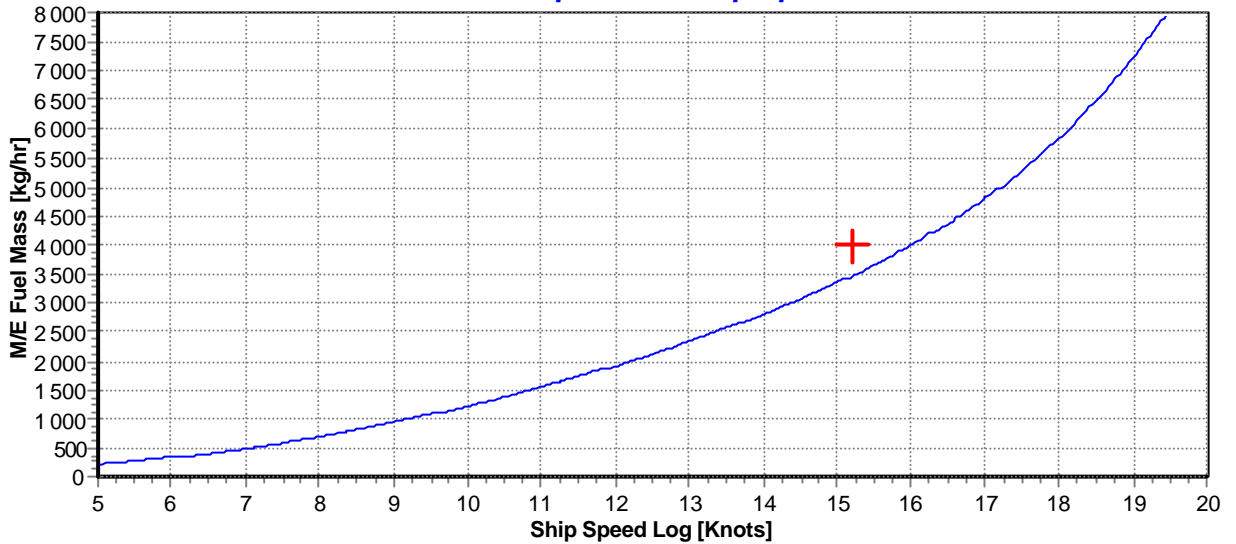
Report period from 06.03.2000 15:37:16

to 06.03.2000 16:37:16

Sea state : Calm sea, no wind

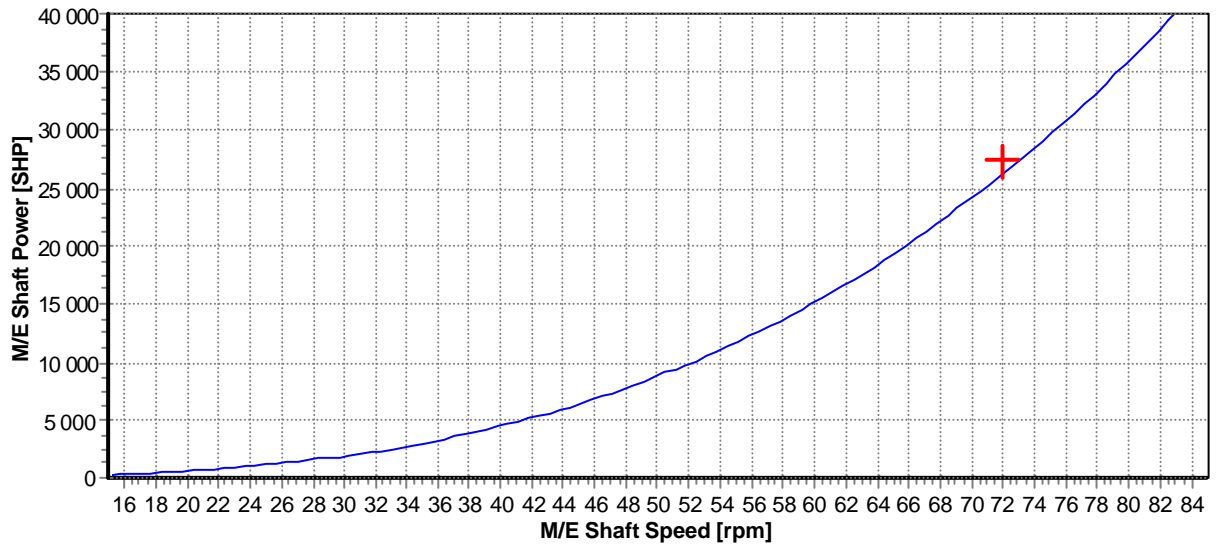
Notes : Test report

**Fuel Consumption vs. Ship Speed**



Deviation from reference plot:  
M/E Fuel Mass : 532 kg/hr

**Shaft Power vs. Revolutions**



Deviation from reference plot:  
M/E Shaft Speed : -1.1 rpm    M/E Shaft Power : 1269 SHP



# Kyma Ship Performance : Trial Report

Vessel : M/V Kyma Demo

Voyage : Test Demo

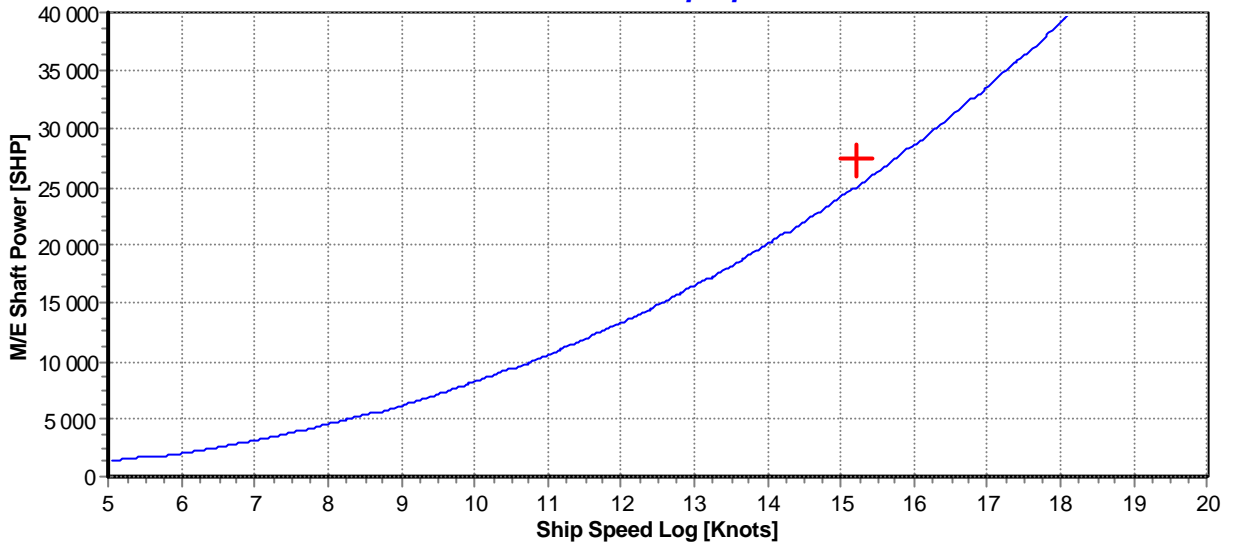
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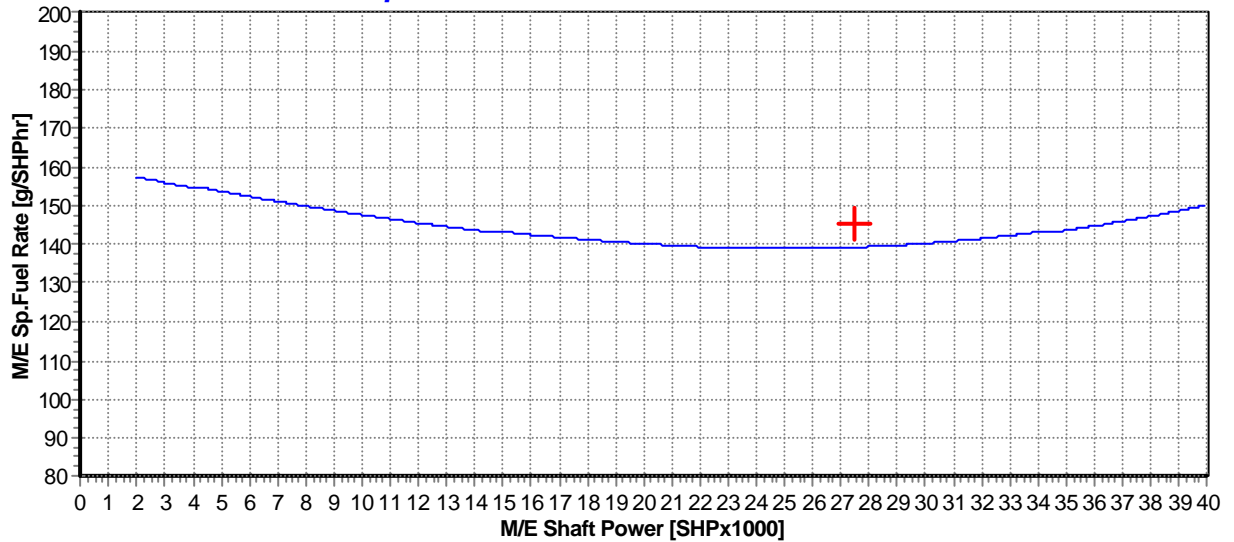
**Shaft Power vs. Ship Speed**



Deviation from reference plot:

Ship Speed Log : -0.6 Knots M/E Shaft Power : 2518 SHP

**Specific Fuel Rate vs. Shaft Power**



Deviation from reference plot:

M/E Sp.Fuel Rate : 6.3 g/SHPhr