



Fuel Saving Report for RCL Ship  
Management (PTE) Ltd.

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LITERATURE CITED

# Executive Summary

The fuel saving project involved tests performed on engine efficiency improvements in both controlled conditions and during the real time operations from January 2006 to December 2006. Engine efficiency improvements were evaluated using the M/E indicator diagram results, representing the measurement of fuel oil consumption per horsepower per hour (Grm/BHP/Hr). The results showed that given the same constant conditions (zero slip) Clear mXt™ could save fuel by up to 24.90%.

During the real time operation (January 2006 – December 2006), the operating data on fuel consumption of *before* and *after* using Clear mXt™ were collected. This included the average slip, the rate of fuel consumption (litres per hour), and the displacement (load carried by the ship). With the majority of displacements found in the range of 13,000 – 20,999, the ratios of fuel per displacement were calculated and results indicate a saving of 11.92%. More advantages of Clear mXt™ were also discovered during the positive slip conditions where the engine needs more power to overcome the external resistance. During positive slip, fuel saving was found 17.56%.

In summary, Clear mXt™ had a significant effect, enabling a more complete combustion of fuel oil to occur, thereby obtaining maximal energy from the internal combustion reaction. The cargo ship has run smoothly throughout the year's usage without any negative effects.

TK Fuels are committed to working in partnership with RCL Ship Management (PTE) Ltd. to deliver substantial savings in fuel costs. We look forward to a long and mutually beneficial relationship.

Paul Stobbs  
Director,  
TK Fuels Ltd

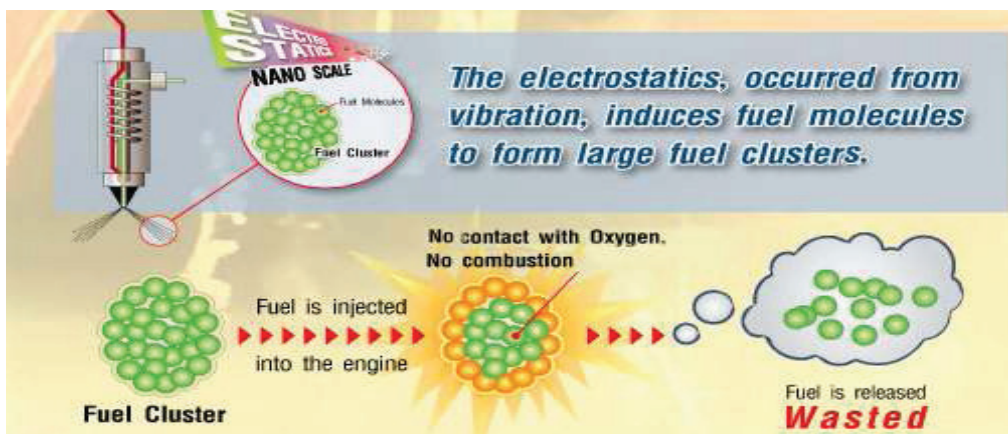
## 2 Product Information

### 2.1 What is Clear mXt™?

Clear mXt™ is a revolutionary new nano-technology electrolyte solution, discovered through molecular science, which possesses the potential to substantially reduce current consumption of global fossil fuel reserves. Clear mXt™ works on the concept of a bio-catalyst which evenly distributes the fuel molecules, thus enabling complete combustion. Furthermore, Clear mXt™ reduces GHG emission through a combination of enhanced combustion and increased engine efficiency. Clear mXt™ also eliminates smog-forming pollutants in all diesel internal combustion engine exhaust, which is caused by incomplete combustion. Clear mXt™ is compatible with all kinds of internal combustion engines and is eco-friendly.

### 2.2 How does it work?

Within combustion engines, intermolecular forces are present which cause fuel molecules to 'stick together', causing 'fuel clusters' to occur. When these fuel clusters pass through the engine, only the outside molecules are burnt, resulting in a percentage of the fuel escaping combustion and being released with the exhaust gases.



Only a small amount of Clear mXt™ solution is needed to remove the intermolecular forces, allowing a more complete combustion to occur. As a result, the engine works with greater efficiency and has increased power. Consequently, less fuel is needed to be pumped into the system in order to travel the same amount of distance. Put simply, there is a saving on fuel consumption which results in approximately 10% more mileage per tank of fuel, resulting in significant savings in fuel costs.

## Section 2: Test Method & Procedure

### 2.1 Engine type and specifications

ENGINE TYPE: HYUNDAI MAN B&W 6L60MC  
M.C.R.: 14,160 BHP x 117 RPM.  
ENGINE NUMBER: B 647  
HULL NUMBER: N-618

Figure 6: RCL ship



## 2.2 Dosing Method

Clear mXt™ was mixed with fuel oil prior to use. The dosing took place at the fuel oil pipe line (Figure 7).

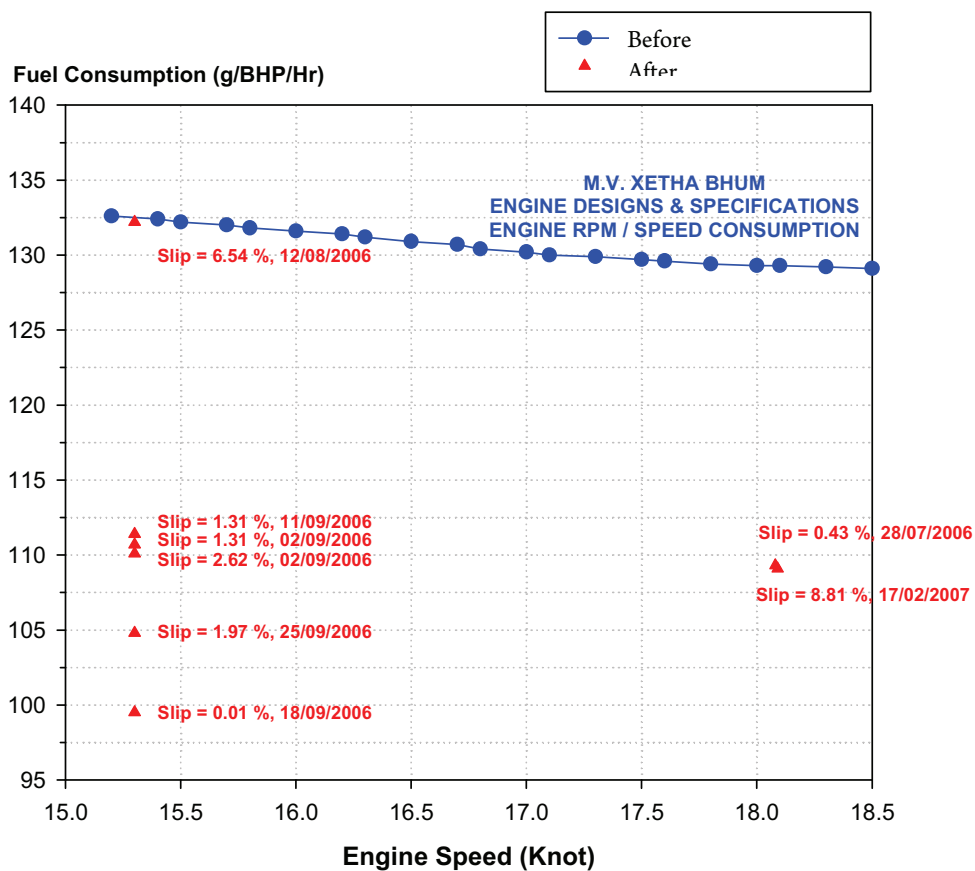
Figure 7: Dosing Clear mXt™ into the fuel oil pipe line.



# Section 3: Fuel savings and engine efficiency results

Engine efficiency improvement was evaluated using the M/E indicator diagram results, which represent the measurement of fuel oil consumption per horsepower per hour (Grm/BHP/Hr) and many other mechanic parameters. Figure 8 displays the relationship between the engine speed (knot) and the fuel consumption (g/BHP/Hr) compared between *before* and *after* using Clear mXt™.

Figure 8: Comparisons on fuel consumption between *before* and *after* using Clear mXt™



At Slip = ~ zero (0.01 %),

$$\% \text{ Fuel Consumption Saving} = \frac{(132.5 - 99.5)}{132.5} \times 100 \% = 24.90 \%$$

The data shown in Figure 8 is taken from the ship information found in Appendix A Tables 1 – 8. Table 1 shows engine characteristics prior to use of Clear mXt™ and tables 2 – 8 are the M/E test results after using Clear mXt™. It is evident that fuel consumption *without* using Clear mXt™ (blue line) are within the normal in the ranges of 129.1 – 132.6, whereas the fuel consumption *with* Clear mXt™ (red triangles) are much lower than the blue line. This suggests that in controlled conditions at an engine speed 15.3 knot and zero slip, the increased efficiency could result in fuel consumption savings of up to 24.90%.

# Section 4: Fuel savings during real time operations

There are numerous factors which affect fuel consumption during real time operation of the ship, such as; the external resistance, water flow direction, local weather condition, etc. In order to measure and account for such factors, the ship crew measured the real *ship speed* (using satellite measurement) compare with the *engine speed* that produced by the engine. *Slip*, as a calculation parameter, was used for this purpose to represent the percentage difference between the real ship speed and the engine speed.

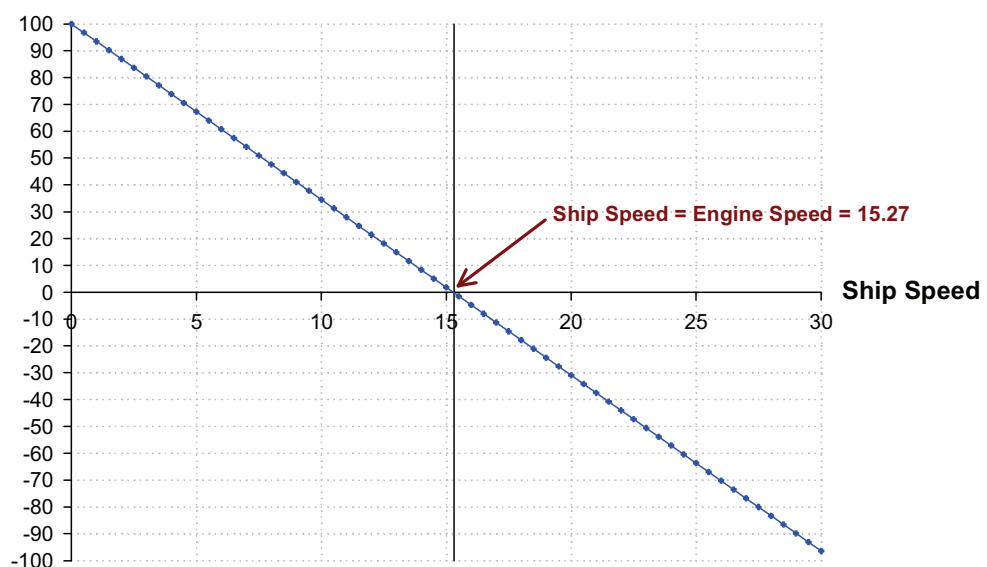
Figure 9: Description of slip. Example of engine speed at 93.7 RPM

SLIP ANALYSIS at 93.7 RPM

$$\text{Engine Speed} = (0.163) * (\text{RPM})$$

$$\text{Slip} = \frac{(\text{Engine Speed} - \text{Ship Speed})}{\text{Engine Speed}} \times 100 \%$$

% Slip  
at 93.7 RPM



POSITIVE SLIP (+)

NEGATIVE SLIP (-)

## 4.1 Calculations

The operating data of fuel consumption both *before* and *after* using Clear mXt™ are shown in Appendices C and D, respectively. Each trip (Bangkok – Singapore, or Singapore – Lamchabang) recorded the following parameters:

- ◆ Average Slip,
- ◆ Rate of fuel consumption (litres per hour),
- ◆ Displacement

1. Average slip is an important factor to understand. When there is positive slip, the ship is travelling counter currently with the direction of water flow, needs to have more engine power to overcome the resistance; subsequently, the vessel uses more fuel.
2. The rate of fuel consumption indicates the average fuel use per hour during the trip. The total fuel quantity should be averaged by time to indicate normal working conditions (litre per hour).
3. Displacement is important because it is the resistance load that the ship engine has to overcome. During controlled conditions, the more the displacement, the more the fuel consumption. The displacement represents directly to the productivity of ship operations (the financial profit). Essentially, the greater the load that can be carried on the ship, the larger the profit that can be obtained.
4. The ratio of fuel per displacement load was also calculated. It indicates the fuel consumption per load.

The statistical data on slip, fuel consumption, displacement, and ratio of fuel per displacement are shown in Table 10. The number of statistical data obtained (travelling trip) was 100. Load distribution of displacement using the statistic histogram is shown in Figure 10.

The histogram shows that the displacement values both *without* and *with* using Clear mXt™ were similar. The displacements ranged from 13,000 – 20,999 and were be used for the calculations of fuel savings in table 11.

Table 10: The statistical data on slip, fuel consumption, displacement, and ratio of fuel per displacement (all data)

(a) Data during January 2006 – May 2006, from Appendix C: WITHOUT Clear mXt™.

Voy No.	Port	Date	RPM	Slip	Fuel Oil ( Liters)	Displacement	Hr.	Fuel per Hour	Fuel per Hour per Displacement (E+02)
627	SIN - LCH	01/01/06 - 04/01/06	96.30	3.70	59,080	15,000	51	1,158	7.72
	BKK-SIN	05/01/06 - 08/01/06	93.65	-8.50	51,960	14,500	60.3	862	5.94
628	SIN - LCH	08/01/06 - 11/01/06	100.20	5.40	70,300	15,750	50	1,406	8.93
	BKK-SIN	12/01/06 - 15/01/06	101.97	2.17	65,040	18,850	53.4	1,218	6.46
629	SIN - LCH	15/01/06 - 18/01/06	93.65	1.95	59,070	15,600	50	1,181	7.57
	BKK-SIN	19/01/06 - 21/01/06	90.77	-1.87	51,730	18,600	53	976	5.25
630	SIN - LCH	22/01/06 - 25/01/06	97.47	4.97	64,860	17,750	47	1,380	7.77
	BKK-SIN	26/01/06 - 29/01/06	89.37	-4.34	49,990	16,400	53	943	5.75
631	SIN - LCH	29/01/06 - 1/02/06	85.54	1.24	56,650	13,900	55	1,030	7.41
	BKK-SIN	2/02/06 - 05/02/06	95.77	-1.30	55,790	17,400	52	1,073	6.17
632	SIN - LCH	05/02/06 - 08/02/06	96.14	2.50	62,500	14,500	51	1,225	8.45
	BKK-SIN	09/02/06 - 12/02/06	99.00	4.80	63,600	20,250	53	1,200	5.93
633	SIN - LCH	13/02/06 - 16/02/06	94.87	3.34	59,570	15,600	57	1,045	6.70
	BKK-SIN	17/02/06 - 19/02/06	98.74	1.44	61,850	19,150	51	1,213	6.33
634	SIN - LCH	19/02/06 - 22/02/06	98.44	4.70	64,570	15,750	51	1,266	8.04
	BKK-SIN	23/02/06 - 26/02/06	97.67	3.67	62,320	20,250	53	1,176	5.81
635	SIN - LCH	26/02/06 - 01/03/06	95.34	0.84	60,270	14,500	51	1,182	8.15
	BKK-SIN	02/03/06 - 05/03/06	97.17	5.20	62,350	20,600	54	1,155	5.60
636	SIN - LCH	5/03/06 - 08/03/06	96.97	1.57	60,950	15,750	51	1,195	7.59
	BKK-SIN	09/03/06 - 12/03/06	101.94	1.60	66,260	19,150	49	1,352	7.06
637	SIN - LCH	12/03/06 - 15/03/06	101.90	3.50	64,100	16,200	47	1,364	8.42
	BKK-SIN	16/03/06 - 19/03/06	99.34	2.20	72,060	19,990	53	1,360	6.80
638	SIN - LCH	19/03/06 - 22/03/06	92.00	-0.10	60,330	15,250	52	1,160	7.61
	BKK-SIN	23/03/06 - 26/03/06	97.30	3.17	66,660	20,250	54	1,234	6.10
639	SIN - LCH	26/03/06 - 30/03/06	97.30	0.64	62,730	15,250	57	1,101	7.22
	BKK-SIN	31/03/06 - 02/04/06	98.67	2.94	67,590	20,250	52	1,300	6.42
640	SIN - LCH	02/04/06 - 05/04/06	96.77	1.87	62,310	15,750	53	1,176	7.46
	BKK-SIN	06/04/06 - 09/04/06	93.67	0.54	64,860	19,150	56	1,158	6.05
641	SIN - LCH	24/04/06 - 26/04/06	107.39	5.98	78,040	18,250	47	1,660	9.10
	BKK-SIN	27/04/06 - 30/04/06	95.94	-2.97	65,570	17,400	56	1,171	6.73
642	SIN - LCH	30/04/06 - 03/05/06	94.94	-3.30	59,060	15,600	58	1,018	6.53
	BKK-SIN	04/05/06 - 07/05/06	87.00	-7.47	51,100	13,900	58	881	6.34
643	SIN - LCH	07/05/06 - 10/05/06	92.90	-3.44	51,920	17,200	60	865	5.03
	BKK-SIN	11/05/06 - 14/05/06	91.74	3.77	51,220	15,000	60	854	5.69
644	SIN - LCH	14/05/06 - 17/05/06	93.07	1.14	52,730	18,250	59	894	4.90
	BKK-SIN	18/05/06 - 21/05/06	83.67	-2.20	54,940	15,600	61	901	5.77
645	SIN - LCH	21/05/06 - 24/05/06	92.80	-5.37	53,700	16,600	60	895	5.39
	BKK-SIN	25/05/06 - 28/05/06	89.34	-3.04	54,780	15,600	58	944	6.05
646	SIN - LCH	28/05/06 - 31/05/06	92.70	-0.94	54,420	16,400	61	892	5.44

Number of Trips = 39

(b) Data during June 2006 – December 2006, from Appendix D: WITH using Clear mXt™

Voy No.	Port	Date	RPM	Slip	Fuel Oil ( Liters)	Displacement	Hr.	F / Hr	Fuel per Hour per Displacement (E+02)
646	BKK-SIN	01/06/06 - 04/06/06	92.00	-2.34	54,900	16,200	57	963	5.95
647	SIN - LCH	04/06/06 - 07/06/06	92.10	-1.40	54,200	16,800	51	1,063	6.33
	BKK-SIN	08/06/06 - 11/06/06	88.17	-1.00	56,140	13,900	58	968	6.96
648	SIN - LCH	11/06/06 - 14/06/06	92.77	-3.00	51,290	17,200	57	900	5.23
	BKK-SIN	14/06/06 - 18/06/06	85.97	-2.97	55,150	13,500	61	904	6.70
649	SIN - LCH	18/06/06 - 21/06/06	92.90	-5.17	50,720	19,450	59	860	4.42
	BKK-SIN	21/06/06 - 25/06/06	93.24	-4.14	55,960	14,500	57	982	6.77
650	SIN - LCH	25/06/06 - 28/06/06	90.33	-4.16	49,850	17,400	49	1,017	5.85
	BKK-SIN	29/06/06 - 2/07/06	102.40	8.84	55,120	20,650	51	1,081	5.23
651	SIN - LCH	02/07/06 - 05/07/06	102.67	-2.97	44,620	17,400	45	992	5.70
	BKK-SIN	06/07/06 - 09/07/06	95.67	2.37	47,200	13,900	56	843	6.06
652	SIN - LCH	10/07/06 - 12/07/06	91.50	-6.20	45,890	15,750	49	937	5.95
	BKK-SIN	13/07/06-16/07/06	87.76	-1.10	53,950	13,450	61	884	6.58
653	SIN - LCH	16/07/06-19/07/06	93.20	-5.40	51,260	19,750	56	932	4.72
	BKK-SIN	20/07/06-22/07/06	91.30	-2.63	53,880	13,900	58	929	6.68
654	SIN - LCH	23/07/06-26/07/06	91.93	-7.80	45,050	16,300	49.1	918	5.63
	BKK-SIN	27/07/06-29/07/06	93.27	-2.13	54,150	14,750	57	950	6.44
655	SIN - LCH	30/07/06-2/08/06	91.27	-6.93	43,300	15,600	48	902	5.78
	BKK-SIN	3/08/06-5/08/06	95.60	-6.20	61,160	17,400	58	1,054	6.06
656	SIN - LCH	6/08/06-9/08/06	92.60	-2.15	43,550	20,700	52	838	4.05
	BKK-SIN	10/08/06-13/08/06	92.30	-0.66	53,450	14,750	57	938	6.36
657	SIN - LCH	14/08/06-16/08/06	96.80	-4.20	40,050	17,200	47	852	4.95
	BKK-SIN	17/08/06-20/08/06	95.40	0.37	58,080	13,500	58	1,001	7.42
658	SIN - LCH	21/08/06-23/08/06	90.93	-6.67	44,350	15,600	51	870	5.57
	BKK-SIN	24/08/06-26/08/06	90.30	-0.33	54,390	14,500	60	907	6.25
659	SIN - LCH	27/08/06-30/08/06	92.70	-7.20	51,620	16,200	58	890	5.49
	BKK-SIN	31/08/06-2/09/06	91.20	-0.93	54,910	15,000	57	963	6.42
660	SIN - LCH	3/09/06-6/09/06	92.43	-4.96	45,880	16,600	51	900	5.42
	BKK-SIN	7/09/06-9/09/06	92.83	-2.80	52,880	14,500	57	924	6.37
661	SIN - LCH	10/09/06-13/09/06	93.00	-4.03	48,140	15,600	61	789	5.06
	BKK-SIN	14/09/06-16/09/06	92.30	-3.13	51,110	13,900	55	929	6.69
662	SIN - LCH	17/09/06-20/09/06	92.30	2.50	51,810	17,750	50	1,036	5.84
	BKK-SIN	21/09/06-23/09/06	90.30	-3.93	52,220	14,500	57	916	6.32
663	SIN - LCH	24/09/06-27/09/06	92.23	1.13	51,170	17,200	62	825	4.80
	BKK-SIN	28/09/06-30/09/06	88.33	0.13	55,320	15,750	59	938	5.95
664	SIN - LCH	1/10/06-4/10/06	93.80	-2.90	49,330	16,600	56	881	5.31
	BKK-SIN	5/10/06-7/10/06	92.53	-2.20	54,250	13,500	56	969	7.18
665	SIN - LCH	8/10/06-11/10/06	93.20	-4.20	49,920	15,600	63	792	5.08
	BKK-SIN	12/10/06-14/10/06	89.67	-3.50	50,920	13,500	58	878	6.50
666	SIN - LCH	15/10/06-18/10/06	92.83	0.50	53,630	17,400	60	894	5.14
	BKK-SIN	19/10/06-21/10/06	90.80	-2.73	51,690	13,900	57	907	6.52
667	SIN - LCH	22/10/06-24/10/06	93.33	0.73	54,710	17,750	60	912	5.14
	BKK-SIN	26/10/06-28/10/06	86.26	-8.73	52,110	12,250	58	898	7.33
668	SIN - LCH	29/10/06-31/10/06	93.10	1.27	56,860	17,200	61	932	5.42
	BKK-SIN	2/11/06-4/11/06	92.37	-4.37	52,260	15,250	56	933	6.12
669	SIN - LCH	5/11/06-8/11/06	92.76	2.70	54,840	16,650	62	885	5.31
	BKK-SIN	9/11/06-11/11/06	91.73	-5.90	51,290	13,900	55	933	6.71
670	SIN - LCH	12/11/06-15/11/06	92.77	5.03	57,750	18,531	52	1,111	5.99
	BKK-SIN	16/11/06-18/11/06	97.40	8.56	58,930	16,307	54	1,091	6.69
671	SIN - LCH	19/11/06-22/11/06	91.85	2.75	52,130	18,850	54	965	5.12
	BKK-SIN	23/11/06-25/11/06	90.37	-7.65	52,730	15,000	58	909	6.06
672	SIN - LCH	26/11/06-28/11/06	93.40	0.33	53,880	15,750	58	929	5.90
	BKK-SIN	30/11/06-2/12/06	92.33	-1.66	51,850	16,800	57	910	5.41
673	SIN - LCH	3/12/06-6/12/06	88.63	0.63	53,740	17,200	52	1,033	6.01
	BKK-SIN	7/12/06-9/12/06	91.90	0.63	51,080	13,500	59	866	6.41
674	SIN - LCH	10/12/06-13/12/06	90.25	5.60	56,460	19,450	52	1,086	5.58
	BKK-SIN	14/12/06-17/12/06	86.68	4.05	51,040	15,600	58	880	5.64
675	SIN - LCH	17/12/06-20/12/06	93.20	12.55	60,630	20,750	54	1,123	5.41
	BKK-SIN	21/12/06-24/12/06	96.83	1.20	62,200	16,600	64	972	5.85
676	SIN - LCH	24/12/06-27/12/06	92.80	3.70	59,400	15,750	51	1,165	7.39
	BKK-SIN	27/12/06-31/12/06	93.27	-0.86	54,940	18,600	56	981	5.27

Number of trip = 61

Figure 10: Histogram on Displacement (Load) of all data

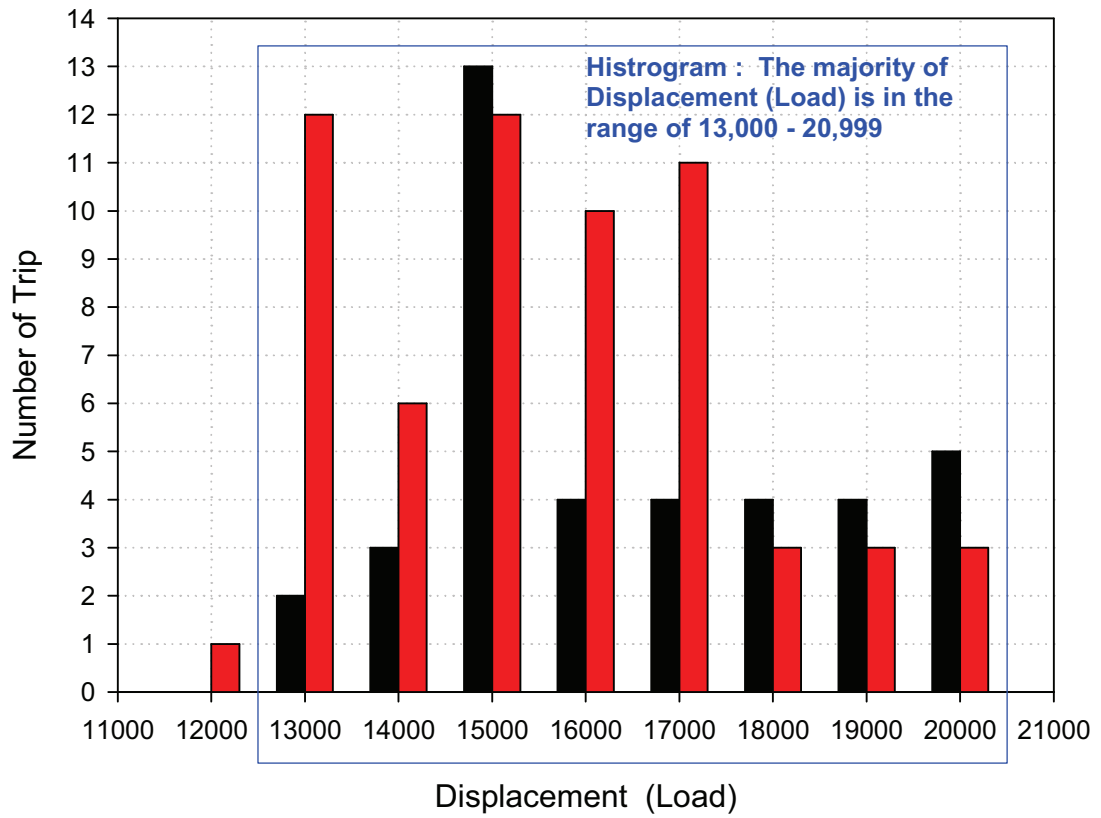
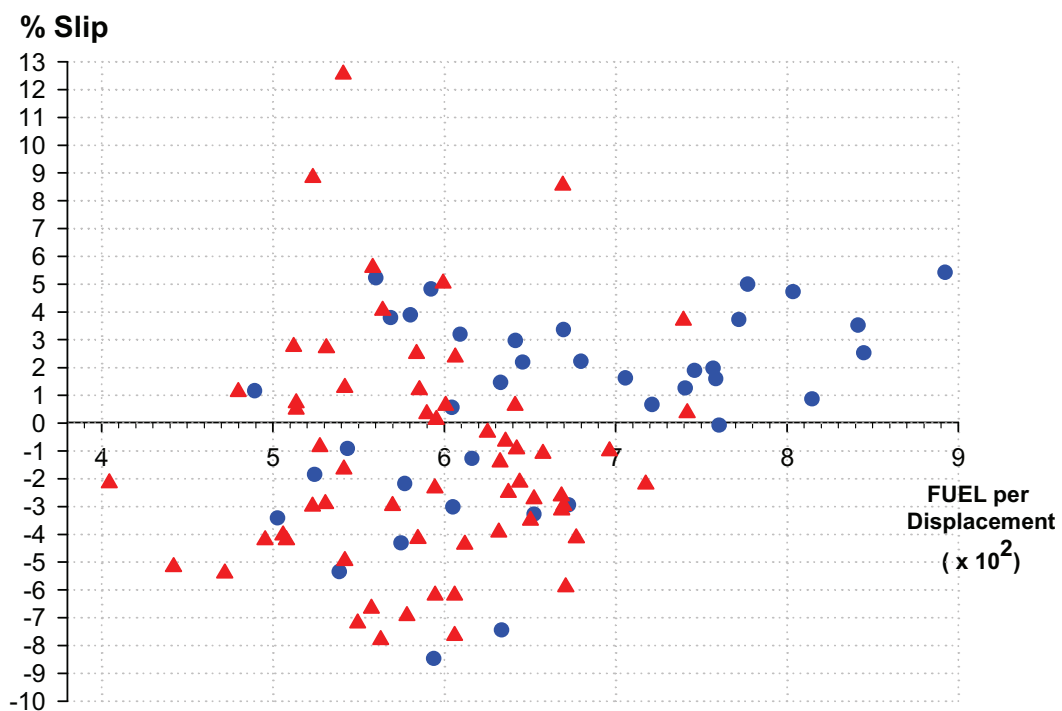


Table 11: The statistical data on slip, fuel consumption, displacement, and ratio of fuel per displacement. The displacements are 13,000 – 20,999.

Voy No.	Port	Date	RPM	Slip	Fuel Oil ( Liters)	Displacement	Hr.	F / Hr	Fuel per Hour per Displacement (E+02)
646	BKK-SIN	01/06/06 - 04/06/06	92.00	-2.34	54,900	16,200	57	963	5.95
647	SIN - LCH	04/06/06 - 07/06/06	92.10	-1.40	54,200	16,800	51	1,063	6.33
	BKK-SIN	08/06/06 - 11/06/06	88.17	-1.00	56,140	13,900	58	968	6.96
648	SIN - LCH	11/06/06 - 14/06/06	92.77	-3.00	51,290	17,200	57	900	5.23
	BKK-SIN	14/06/06 - 18/06/06	85.97	-2.97	55,150	13,500	61	904	6.70
649	SIN - LCH	18/06/06 - 21/06/06	92.90	-5.17	50,720	19,450	59	860	4.42
	BKK-SIN	21/06/06 - 25/06/06	93.24	-4.14	55,960	14,500	57	982	6.77
650	SIN - LCH	25/06/06 - 28/06/06	90.33	-4.16	49,850	17,400	49	1,017	5.85
	BKK-SIN	29/06/06 - 2/07/06	102.40	8.84	55,120	20,650	51	1,081	5.23
651	SIN - LCH	02/07/06 - 05/07/06	102.67	-2.97	44,620	17,400	45	992	5.70
	BKK-SIN	06/07/06 - 09/07/06	95.67	2.37	47,200	13,900	56	843	6.06
652	SIN - LCH	10/07/06 - 12/07/06	91.50	-6.20	45,890	15,750	49	937	5.95
	BKK-SIN	13/07/06-16/07/06	87.76	-1.10	53,950	13,450	61	884	6.58
653	SIN - LCH	16/07/06-19/07/06	93.20	-5.40	51,260	19,750	55	932	4.72
	BKK-SIN	20/07/06-22/07/06	91.30	-2.63	53,880	13,900	58	929	6.68
654	SIN - LCH	23/07/06-26/07/06	91.93	-7.80	45,050	16,300	49.1	918	5.63
	BKK-SIN	27/07/06-29/07/06	93.27	-2.13	54,150	14,750	57	950	6.44
655	SIN - LCH	30/07/06-2/08/06	91.27	-6.93	43,300	15,600	48	902	5.78
	BKK-SIN	3/08/06-5/08/06	95.60	-6.20	61,160	17,400	58	1,054	6.06
656	SIN - LCH	6/08/06-9/08/06	92.60	-2.15	43,550	20,700	52	838	4.05
	BKK-SIN	10/08/06-13/08/06	92.30	-0.66	53,450	14,750	57	938	6.36
657	SIN - LCH	14/08/06-16/08/06	96.80	-4.20	40,050	17,200	47	852	4.95
	BKK-SIN	17/08/06-20/08/06	95.40	0.37	58,080	13,500	58	1,001	7.42
658	SIN - LCH	21/08/06-23/08/06	90.93	-6.67	44,350	15,600	51	870	5.57
	BKK-SIN	24/08/06-26/08/06	90.30	-0.33	54,390	14,500	60	907	6.25
659	SIN - LCH	27/08/06-30/08/06	92.70	-7.20	51,620	16,200	58	890	5.49
	BKK-SIN	31/08/06-2/09/06	91.20	-0.93	54,910	15,000	57	963	6.42
660	SIN - LCH	3/09/06-6/09/06	92.43	-4.96	45,880	16,600	51	900	5.42
	BKK-SIN	7/09/06-9/09/06	92.83	-2.50	52,680	14,500	57	924	6.37
661	SIN - LCH	10/09/06-13/09/06	93.00	-4.03	48,140	15,600	61	789	5.06
	BKK-SIN	14/09/06-16/09/06	92.30	-3.13	51,110	13,900	55	929	6.69
662	SIN - LCH	17/09/06-20/09/06	92.30	2.50	51,810	17,750	50	1,036	5.84
	BKK-SIN	21/09/06-23/09/06	90.30	-3.93	52,220	14,500	57	916	6.32
663	SIN - LCH	24/09/06-27/09/06	92.23	1.13	51,170	17,200	62	825	4.80
	BKK-SIN	28/09/06-30/09/06	88.33	0.13	55,320	15,750	59	938	5.95
664	SIN - LCH	1/10/06-4/10/06	93.60	-2.90	49,330	16,600	56	861	5.31
	BKK-SIN	5/10/06-7/10/06	92.53	-2.20	54,250	13,500	56	969	7.18
665	SIN - LCH	8/10/06-11/10/06	93.20	-4.20	49,920	15,600	63	792	5.08
	BKK-SIN	12/10/06-14/10/06	89.67	-3.50	50,920	13,500	58	878	6.50
666	SIN - LCH	15/10/06-18/10/06	92.83	0.50	53,630	17,400	60	894	5.14
	BKK-SIN	19/10/06-21/10/06	90.80	-2.73	51,690	13,900	57	907	6.52
667	SIN - LCH	22/10/06-24/10/06	93.33	0.73	54,710	17,750	60	912	5.14
	BKK-SIN	26/10/06-28/10/06	86.26	-8.73	52,110	12,250	58	898	7.33
668	SIN - LCH	29/10/06-31/10/06	93.10	1.27	56,860	17,200	61	932	5.42
	BKK-SIN	2/11/06-4/11/06	92.37	-4.37	52,260	15,250	56	933	6.12
669	SIN - LCH	5/11/06-8/11/06	92.76	2.70	54,840	16,650	62	885	5.31
	BKK-SIN	9/11/06-11/11/06	91.73	-5.90	51,290	13,900	55	933	6.71
670	SIN - LCH	12/11/06-15/11/06	92.77	5.03	57,750	18,531	52	1,111	5.99
	BKK-SIN	16/11/06-18/11/06	97.40	8.56	58,930	16,307	54	1,091	6.69
671	SIN - LCH	19/11/06-22/11/06	91.85	2.75	52,130	18,850	54	965	5.12
	BKK-SIN	23/11/06-25/11/06	90.37	-7.65	52,730	15,000	58	909	6.06
672	SIN - LCH	26/11/06-28/11/06	93.40	0.33	53,880	15,750	58	929	5.90
	BKK-SIN	30/11/06-2/12/06	92.33	-1.66	51,850	16,800	57	910	5.41
673	SIN - LCH	3/12/06-6/12/06	88.63	0.63	53,740	17,200	52	1,033	6.01
	BKK-SIN	7/12/06-9/12/06	91.90	0.63	51,080	13,500	59	866	6.41
674	SIN - LCH	10/12/06-13/12/06	90.25	5.60	56,460	19,450	52	1,086	5.58
	BKK-SIN	14/12/06-17/12/06	88.88	4.05	51,040	15,600	58	880	5.64
675	SIN - LCH	17/12/06-20/12/06	93.20	12.55	60,630	20,750	54	1,123	5.41
	BKK-SIN	21/12/06-24/12/06	96.83	1.20	62,200	16,600	64	972	5.85
676	SIN - LCH	24/12/06-27/12/06	92.80	3.70	59,400	15,750	51	1,165	7.39
	BKK-SIN	27/12/06-31/12/06	93.27	-0.86	54,940	18,600	56	981	5.23
			Average Slip =	-1.40		Average Fuel per Hour per displacement =		5.91	
	Load < 13,000								

The statistical data from Tables 10 and 11 are plotted to indicate the difference between the fuel consumption per displacement (X – axis) and the slip (Y – axis) as shown in Figure 11. Without Clear mXt™ (blue circle symbols) the data is scattered and has an average fuel consumption of 6.71 and an average slip of 0.77. With Clear mXt™ (red triangle symbols) the data is more consistent and shows a decrease in average fuel consumption of 5.91 with the average slip of -1.40.

Figure 11: Fuel consumption per displacement at different slip



Without Clear mXt™ fuel consumption = 6.71 Average Slip = 0.77

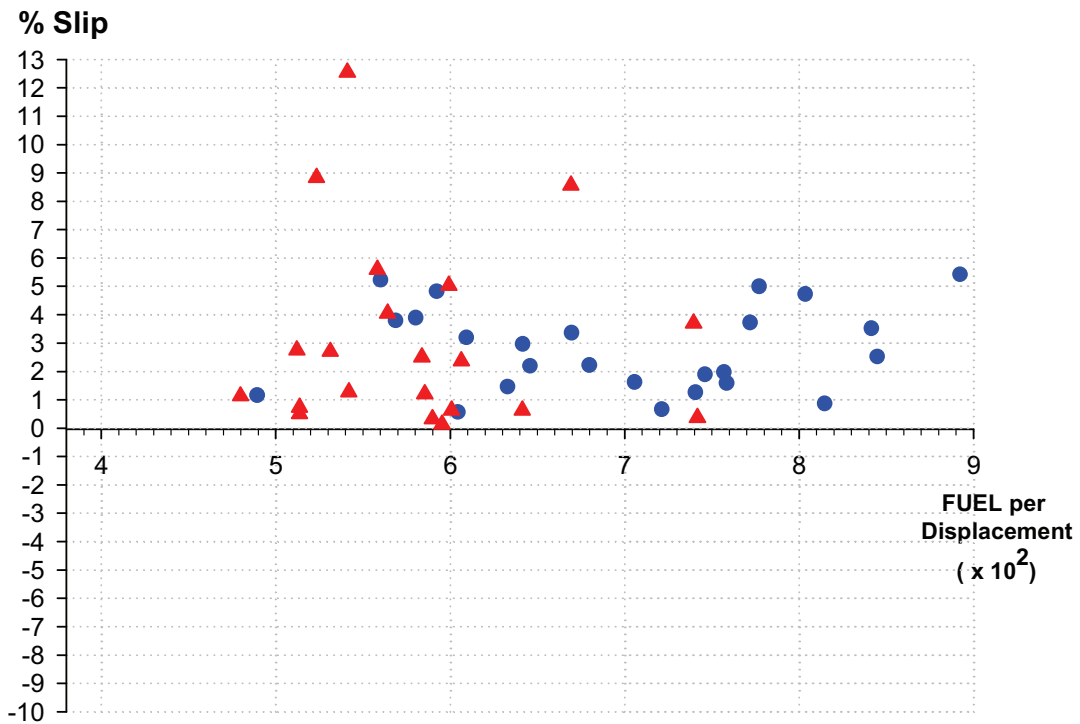
With Clear mXt™ fuel consumption = 5.91 Average Slip = -1.40

$$\text{Fuel savings} = \frac{(6.71 - 5.91)}{6.71} \times 100\% = 11.92\%$$

## 4.2 More advantages during positive slip

During positive slip conditions, Clear mXt™ produced significant increases in combustion efficiency. With Clear mXt™, the molecular clusters of fuel molecules are broken apart and a more complete combustion releases extra energy. The combustion takes place at the top of piston in the cylinder and pushes the piston moving faster, thus producing more power to overcome the positive slip resistance.

Figure 12: Fuel consumption per displacement at the positive slip



Without Clear mXt™, fuel consumption = 7.06

Average slip = 2.89

With Clear mXt™, fuel consumption = 5.82

Average slip = 3.12

$$\text{Fuel savings} = \frac{(7.06 - 5.82)}{7.06} \times 100\% = 17.56\%$$

## Section 5: Conclusions

The fuel saving project performed both during controlled conditions and during real time operations January 2006 – December 2006 yielded positive fuel savings and engine efficiency results. Controlled conditions indicated positive effects of Clear mXt™ of more than 20% and during numerous trips this increase in combustion efficiency resulted in fuel savings of over 11%. The effect of Clear mXt™ was most apparent under positive slip and high load conditions. During the year that the data for this project was collated, there were no adverse effects to the vessel's engine.