Green Fuel Tabs Liquid Test Evaluation Data from July 23rd to September 3rd 2010. Evaluation being made on the basis of actual fuel consumption per 24 hours

Due to the reality that there are so many factors in a ship on the open ocean that affect fuel performance, from the weather, the current, propeller, the engines and maintenance and other factors, this becomes the most complex part of the data to analyze accurately. This analysis is identifying the bigger picture to see broad improvements in performance that can be measured. Typically GFT will result initially in a 10% improvement, plus or minus a 2% degree of variation. Over time and distance this percentage should improve further as GFT cleans up and optimizes more of the combustion system, and results will typically rise into the 15% to 20% range, plus or minus 2%.

Fuel improvement can broadly be identified in two ways.

1). It can be seen as the ship maintains the same speed as it accustomed to or is planned, and using a lesser amount of fuel...OR

2). It can be seen by the ship maintaining the same constant RPM, burning the same amount of fuel, using the same amount of power, but performing and moving at a faster speed.

Note - Most ships that are steaming along in a real world environment will use a combination of the first two scenarios.

This method of identifying fuel consumption improvement is very similar to what we see in car and trucks that use GFT, though it is more complex in ships. Vehicles on the road either get better mileage and go farther, or they can drive faster with more performance on the same amount of fuel.

The following spreadsheet excerpts are from a comprehensive set of data that the shipping company uses to track performance on all their voyages. In the spreadsheet the clearest portion of data for us to pick up a pattern of change is in the beginning of the trip where there are 3 days of "baseline data" when the ship was not using the GFT liquid product.

1. July 22,23, and 24th – These are the averages for the highlighted areas below: RPM's 68.4; speed is 13.0 kts; fuel consumption per 24 hours is 98.1

5			obs.			mip			power	power	actual			Mergi	fuel
6					steamg						fuel			soot	cons
7			spd		time	by	load	slip	ikw by	kw by	cons			ind	per
8	date	displ.	kts	rpm	hours	C'mate	ind	%	Cylmate	Kyma	tons	Pm	Pc	readg	24 hr
9	22-Jul-10	303,225	13.0	69.07	24.0	17.15	8.1	22.99	23,934	22,441	100.7	133.7	105.1		100.7
10	23-Jul-10	303,225	13.0	67.3	24.0	15.6	7.8	21.11	22,184	20,349	96.3	129.2	95.2		96.3
11	24-Jul-10	303,225	13.1	68.86	24.0	16.6	7.8	21.6	23,588	22,179	97.4	131.3	100.1		97.4

2. July 25th - GFT Liquid Concentrate is added; Soot indicator readings begin to measure emissions at 7.

5			obs.			mip			power	power	actual			Mergi	fuel
6					steamg						fuel			soot	cons
7			spd		time	by	load	slip	ikw by	kw by	cons			ind	per
8	date	displ.	kts	rpm	hours	C'mate	ind	%	Cylmate	Kyma	tons	Pm	Pc	readg	24 hr
9	22-Jul-10	303,225	13.0	69.07	24.0	17.15	8.1	22.99	23,934	22,441	100.7	133.7	105.1		100.7
10	23-Jul-10	303,225	13.0	67.3	24.0	15.6	7.8	21.11	22,184	20,349	96.3	129.2	95.2		96.3
11	24-Jul-10	303,225	13.1	68.86	24.0	16.6	7.8	21.6	23,588	22,179	97.4	131.3	100.1		97.4
12	25-Jul-10	303,225	13.1	70.05	**23.0**	15.96	7.7	22.96	23,004	21,319	94	131.6	98.0	7.0	98.3

3. July 25th and 26th - no significant change; RPM's have increased to 70; speed slightly increased to 13.2 kts; fuel consumption per 24 hours is down only very slightly to 97.8; Soot indicator remains at 7. Even though GFT goes to work immediately in the fuel and the combustion system, it typically takes a couple of days for it to start showing up in the data.

5			obs.			mip			power	power	actual			Mergi	fuel
6					steamg						fuel			soot	cons
7			spd		time	by	load	slip	ikw by	kw by	cons			ind	per
8	date	displ.	kts	rpm	hours	C'mate	ind	%	Cylmate	Kyma	tons	Pm	Pc	readg	24 hr
9	22-Jul-10	303,225	13.0	69.07	24.0	17.15	8.1	22.99	23,934	22,441	100.7	133.7	105.1		100.7
10	23-Jul-10	303,225	13.0	67.3	24.0	15.6	7.8	21.11	22,184	20,349	96.3	129.2	95.2		96.3
11	24-Jul-10	303,225	13.1	68.86	24.0	16.6	7.8	21.6	23,588	22,179	97.4	131.3	100.1		97.4
12	25-Jul-10	303,225	13.1	70.05	**23.0**	15.96	7.7	22.96	23,004	21,319	94	131.6	98.0	7.0	98.3
13	26-Jul-10	303,225	13.3	69.88	**24.0**	16.01	7.7	15.44	22,908	21,373	97	131.7	98.6	7.0	97.3

4. July 27th - RPM's are about the same at 69.8; fuel consumption is about the same at 97.7; speed has jumped significantly to 15.0 kts(up 15.4% from the baseline); the emissions Soot indicator is still at 7.

5			obs.			mip			power	power	actual			Mergi	fuel
6					steamg						fuel			soot	cons
7			spd		time	by	load	slip	ikw by	kw by	cons			ind	per
8	date	displ.	kts	rpm	hours	C'mate	ind	%	Cylmate	Kyma	tons	Pm	Pc	readg	24 hr
9	22-Jul-10	303,225	13.0	69.07	24.0	17.15	8.1	22.99	23,934	22,441	100.7	133.7	105.1		100.7
10	23-Jul-10	303,225	13.0	67.3	24.0	15.6	7.8	21.11	22,184	20,349	96.3	129.2	95.2		96.3
11	24-Jul-10	303,225	13.1	68.86	24.0	16.6	7.8	21.6	23,588	22,179	97.4	131.3	100.1		97.4
12	25-Jul-10	303,225	13.1	70.05	**23.0**	15.96	7.7	22.96	23,004	21,319	94	131.6	98.0	7.0	98.3
13	26-Jul-10	303,225	13.3	69.88	**24.0**	16.01	7.7	15.44	22,908	21,373	97	131.7	98.6	7.0	97.3
14	27-Jul-10	303,225	15.0	69.76	**23.0**	16.11	7.7	11.25	23,177	21,157	94	131.0	100.0	7.0	97.7

5. July 28 and 29 - RPM's are still about 70; speed remains significantly higher than baseline at 14.7 kts; fuel consumption is still consistent at 97.8; Soot indicator has now decreased for both days from 7 to 6(a 14% drop in emissions)

5																
6			obs.		steamg	mip			power	power	actual fuel			Mergi soot	fuel cons
7			spd		time	by	load	slip	ikw by	kw by	cons			ind	per
8	date	displ.	kts	rpm	hours	C'mate	ind	%	Cylmate	Kyma	tons	Pm	Pc	readg	24 hr
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11	24-Jul-10	303,225	13.1	68.86	24.0	16.6	7.8	21.6	23,588	22,179	97.4	131.3	100.1		97.4
12	25-Jul-10	303,225	13.1	70.05	23.0	15.96	7.7	22.96	23,004	21,319	94	131.6	98.0	7.0	98.3
13	26-Jul-10	303,225	13.3	69.88	24.0	16.01	7.7	15.44	22,908	21,373	97	131.7	98.6	7.0	97.3
14	27-Jul-10	303,225	15.0	69.76	23.0	16.11	7.7	11.25	23,177	21,157	94	131.0	100.0	7.0	97.7
15	28-Jul-10	303,225	14.7	69.98	24.0	15.95	7.7	13.44	22,428	21,558	98	131.2	98.2	6	98.0
16	29-Jul-10	303,225	14.7	70.1	23.0	15.61	7.6	13.52	22,923	21,191	93	130.9	98	6	97.5

6. July 30 and 31 - the ship's data has changed slightly for these two days, as it was maneuvering and slowing down in the Singapore Strait. So the spreadsheet numbers are slightly different from the pattern that has been established since the GFT kicked in the last few days. However the details are still very interesting and show very positive signs.

The RPM's have decreased to an average of 63.2; the speed in knots are averaging 13.35..., which is closer to what the baseline speed and initial speed was from July 22nd to 26the before the GFT was introduced. However at that period of time, with the speed being about 13.1 kts, the RPM's required were much higher at 98.

Also the fuel consumption per 24 hours as averaged over these two days has now dropped to 81.3, which is due in part to the ship slowing to 13.4 kts and using less power. However when the ship was running at speeds slightly lower than this at 13.1 kts on the 22nd thru the 26th, the fuel consumption was around 98, while now it is at 81, a reduction of 17% in fuel use per 24 hours.

5																
6			obs.		steamg	mip			power	power	actual fuel			Mergi soot	fuel cons
7			spd		time	by	load	slip	ikw by	kw by	cons			ind	per
8	date	displ.	kts	rpm	hours	C'mate	ind	%	Cylmate	Kyma	tons	Pm	Pc	readg	24 hr
9	22-Jul-10	303,225	13.0	69.07	24.0	17.15	8.1	22.99	23,934	22,441	100.7	133.7	105.1		100.7
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11	24-Jul-10	303,225	13.1	68.86	24.0	16.6	7.8	21.6	23,588	22,179	97.4	131.3	100.1		97.4
12	25-Jul-10	303,225	13.1	70.05	23.0	15.96	7.7	22.96	23,004	21,319	94	131.6	98.0	7.0	98.3
13	26-Jul-10	303,225	13.3	69.88	24.0	16.01	7.7	15.44	22,908	21,373	97	131.7	98.6	7.0	97.3
14	27-Jul-10	303,225	15.0	69.76	23.0	16.11	7.7	11.25	23,177	21,157	94	131.0	100.0	7.0	97.7
15	28-Jul-10	303,225	14.7	69.98	24.0	15.95	7.7	13.44	22,428	21,558	98	131.2	98.2	6	98.0
16	29-Jul-10	303,225	14.7	70.1	23.0	15.61	7.6	13.52	22,923	21,191	93	130.9	98	6	97.5
17	30-Jul-10	303,225	13.5	64.3	24.0	11.79	5.8	13.8	15,220	13,527	86	99.6	67.23	6	85.7
18	31-Jul-10	303,225	13.2	62	24.0	15.6	7.6	12.43	22,487	21,415	77	130.9	97.13	5	76.9

7. August 1st thru August 5th - after maneuvering past Singapore Strait, RPM's, speed, and fuel consumption have all picked back up to fit closely with the trends prior to the slow down on July 30th. There are still some interesting observations in these 5 days.

Over the 5 days the average RPM is 67.7(with a range from 6614 to 69.14); observable speed is 14.6 kts (with variation from 12.7 kts to 15.7 kts; with an average fuel consumption per 24 hours decreasing to 90.9.

The Soot indicator over this time period has now dropped to 5.5(this is now a 22% decrease in emissions soot).

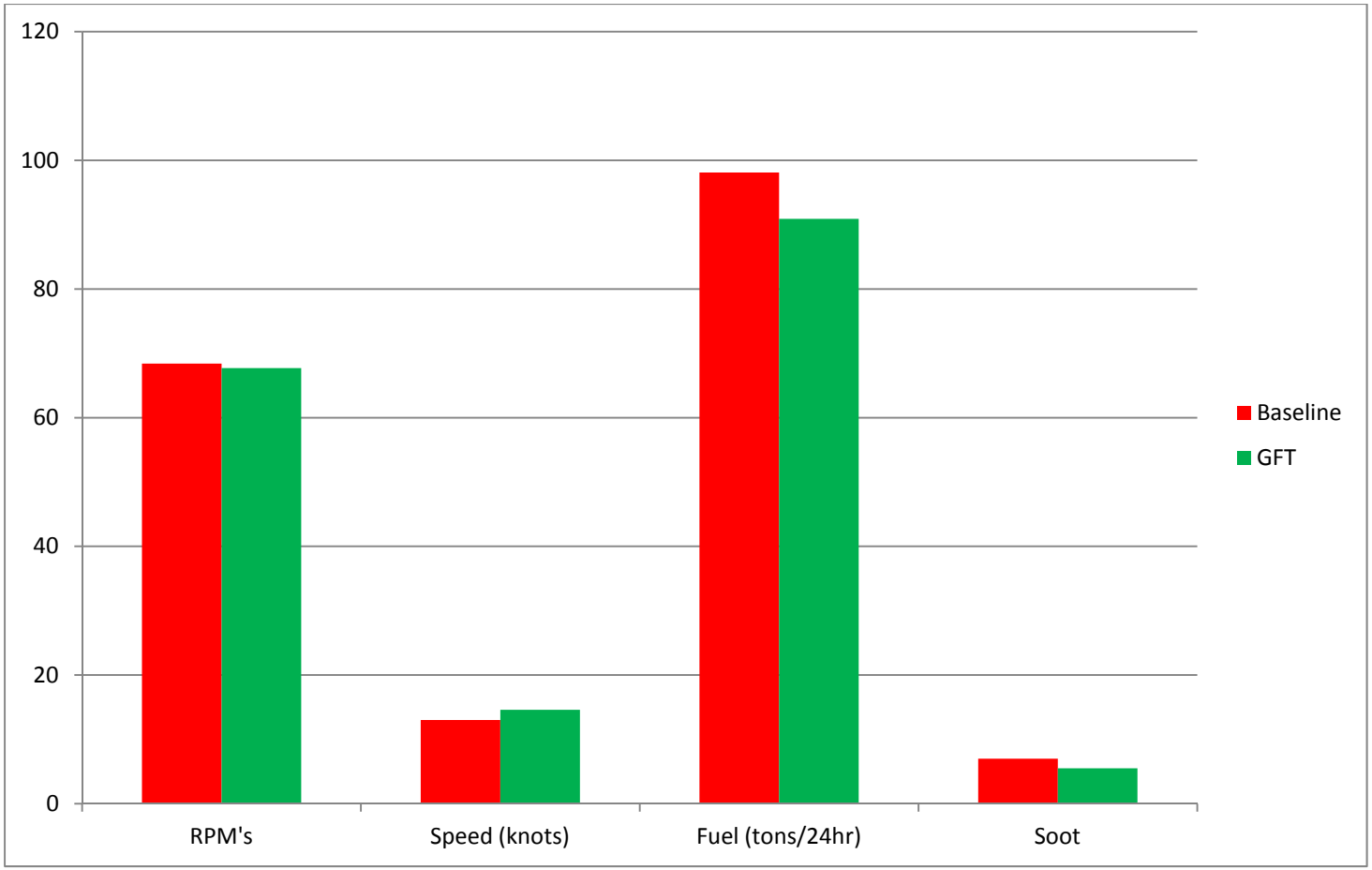
The average for these last 5 days of this trip indicate an improving trend of using less fuel, and getting more range or speed at lower RPM's. Versus the original baseline, the ship is now running at a slightly lower RPM, with a fuel usage (per 24 hours) decrease from 98.1 to 90.9(7.3%), and an average speed increase of 12.3%.

21	date	displ.	obs. speed	rpm	steaming hours	mip Cylmate	t/c rpm (avg)	Pscav	load ind.	slip %	power ikw Cylmate	power kw by Kyma	actual fuel cons - tons	Pmax	Pcomp	Mergi soot indicator	fuel cons per 24 hrs
22	1-Aug-10	303,225	14.8	69.06	24	15.62	9,800	1.73	7.4	11.91	21,832	20,447	**93**	129.0	94.3	5.0	93.2
23	2-Aug-10	303,225	15.0	69.14	**24.0**	15.49	9,600	1.7	7.4	10.89	21,529	20,078	**93**	128	93.76	5.5	92.7
24	3-Aug-10	303,225	12.7	66.14	**22.0**	15.07	9,350	1.69	7.5	12.7	21,300	20,056	**82**	127.0	93.49	5.5	89.1
25	4-Aug-10	303,225	14.7	66.16	22.0	14.97	9,400	1.59	7.4	8.7	20,710	19,037	81.5	124.0	89.49	5.0	88.9
26	5-Aug-10	303,225	15.7	68	24.0	15.33	9,500	1.61	7.4	6.8	21,178	19,751	90.4	123.9	90.59	6.0	90.4

Summary

The net result is that combinations of a 12.3% increase in speed/performance, plus a 7.3% decrease in fuel consumption nets a **19.6% total performance gain**. There is also a net **22% emissions reduction** from this test. With some fine-tuning, this extra performance could be tuned and selected to be more on the side of fuel savings, or more on the side of performance and speed of the ship without increasing its fuel costs. These numbers should also improve over time as more and more of the combustion system is cleaned up. Additionally, GFT made a significant impact on it in its first use with a reduction in sludge of 33% on half of the properly operating engines, but there is still more room for GFT to optimize the combustion system through continual use, and have further benefit.

VLCC Cargo Ship 7/2010 to 9/2010



RPM's decreased by 1% while speed increased by 12.3 %. This is a **12.4 %** increase in performance.

Fuel consumption decreased by **7.3%.** When combined with a **12.4%** performance increase this equates to a total performance gain of **19.7%.**

Soot decreased by **22%.**

If we assume a $600/ton price on bunker fuel and 200 days per year of sailing this would mean a savings of **$2,311,00/yr. per vessel** of this type