Influencing Skipper behaviour reduces fuel expense by up to 25% and reduce vessel emissions

AST iRAMS Maritime Fuel Saving Analysis

GOAL

To demonstrate potential cost savings for vessel/fleet owners commonly implemented in the land Fleet Management industry through use of AST's Intelligent Remote Asset Management System (iRAMS) telemetry to monitor vessel parameters, and influence skipper behaviour to drive down operating costs and reduce environmental emissions.

Fifteen years of land fleet management telemetry has shown cost savings in the transport industry and the experience learnt can be applied to the maritime sector with iRAMS telemetry.

SUBJECT VESSEL

Type: Crew Transfer Vessel (CTV)
Length: 27m
Engines: 2 x MAN D2 842 (1019hp)
Top Speed: 27.5 kn (±2150RPM)
Cruising Speed: 25.5 kn
Passengers: 24

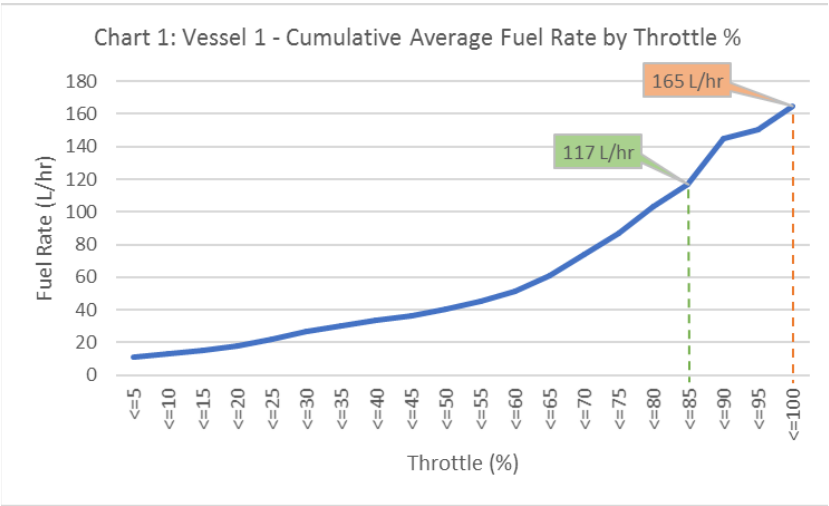
Data Period: 27/03/18 - 25/03/19 *
Operational Days: 284
Operational Hours: ±3597 (total 'engine on' hours ±2056 per engine)
Operational hours/day: 12.5 (avg)
Operational days/week: 5.5

**blown engine Jan 2019; out of service for ±2 weeks*

WHAT WE DID

A CTV vessel was identified, via the iRAMS alerting feature, that was clearly using excessive throttle on a regular basis, resulting in higher than optimal fuel consumption rates and emissions when bench marked against similar CTV vessels. Reviewing the iRAMS historical data, configurable alerts and reports it was clear the way this specific vessel was being skippered was impacting materially on the optimum fuel consumption.

iRAMS captured data in its raw state, directly from a vessel's CAN bus, which was used without any manipulation or alteration to analyse the difference in fuel rates for the subject vessel.



Using the dual reporting feature in iRAMS, data was extracted from an actual working Crew Transfer Vessel (CTV) servicing the UK wind farm industry. The data set contained fuel rate vs throttle covering a 12-month period (27/03/2018 – 25/03/2019).

The throttle values were grouped in increments of 5% (e.g. ≤5%, ≤10%, ≤15% … ≤100%) and the cumulative fuel rates that fell within each range were then averaged, giving an approximate fuel use rate for each interval, as illustrated in Chart 1 (below).

This approach was considered to give a fair approximation of fuel rate across the range of throttle positions used on a vessel under normal operating conditions.

By reviewing the results, it was determined that a throttle position of approximately 85% might give the best balance between lower fuel rate and practical vessel operation. Operating at 85% throttle showed a potential fuel rate saving of approximately 29%!

It was recognised as unrealistic, however, to expect a vessel to never use 100% throttle (e.g. when operating against the tide, when trying to avoid weather fronts, or for other operational needs influenced by safety). In fact, the subject vessel's data revealed that 100% throttle was used for 19.4% of its operational time, equivalent to 698 hours at 100% throttle over 12 months.

To place some context around the subject vessel's method of operation, we compared behaviour of similar CTVs, where iRAMS was installed and actively monitored by the vessel operators. This analysis showed that other similar vessels were using 100% throttle for a fraction of their operating time, instead favouring the range >80 to ≤90 (see Table 1).

Table 1

Vessel	Throttle Mix (%)					
	100	>95 to ≤100	>90 to ≤95	>85 to ≤90	>80 to ≤85	>75 to ≤80
Subject Vessel	19.36%	20.12%	5.66%	19.54%	6.40%	5.90%
Comparison Vessel A	0.27%	0.29%	0.07%	5.88%	39.98%	5.48%
Comparison Vessel B	0.01%	0.04%	1.17%	38.21%	5.48%	3.86%
Comparison Vessel C	0.14%	0.15%	0.22%	50.49%	4.08%	2.16%

With this information in mind, the model was refined to indicate costs and savings where 100% throttle was used for 5% of 'engine on' hours and ≤85% throttle for the remaining 95% of the time.

Table 2 (below) illustrates how this mixed fuel approach was calculated. Fuel usage was calculated using iRAMS data from the subject vessel, an estimated fuel cost of £0.55 per litre, and an estimated 4,111 hours of total 'engine on' hours (2 x 2,056 hours per engine). Interestingly, data also showed that over a 12 month period of time, the fuel rate at 100% throttle averaged 222.40 litres per hour.

Table 2

Throttle %	Est. Fuel Rate (l/hr)	Est. Fuel Cost (£/hr)	Selected Throttle Mix	Est. Fuel Rate @ Throttle Mix	Est. Mixed Fuel Rate (l/hr)	Est. £/hr @ Throttle Mix	Est. Mixed Cost (£/hr)
100 *(c. 2150 RPM)*	222.40	£122.32	5%	11.12	122.38	£6.12	£67.31
≤85 *(up to c. 1827 RPM)*	117.11	£64.41	95%	111.26		£61.19	

Note: All data used was extracted from AST iRAMS directly from the vessels' CAN bus, and not adjusted in any way; therefore, possible high and low anomalies within the data were retained. It was felt this was the most honest way to assess and present the findings. There is no intention to state that the fuel rates are accurate fuel consumption values, but they are intended to illustrate indicative fuel use at given times and throttle position. All data is an averaged over the whole period.

Table 3 (below) shows how the throttle mix impacts on fuel costs. Influencing skipper behaviour and reducing the proportion of time that 100% throttle is used can yield a potential 25.9% saving when compared with the subject vessel's actual throttle use.

Table 3

Vessel	Throttle Mix (≤85% / 100%)	Est. Fuel Rate (l/hr)	Est. Fuel Cost (£/hr)	Est. Fuel Used (l)	Est. Fuel Cost (£)
Subject Vessel	All *(see Table 1)*	165.04	£90.77	678,563	£373,210
Illustration	95/5	122.38	£67.31	503,147	£276,731
			Estimated savings:	175,415 litres	£96,478

IN SUMMARY

It is clear that using AST iRAMS actively, operation can be made more efficient (up to 25%) in fuel savings by influencing skipper behaviour.

Beyond fuel savings iRAMS also:

- remote vessel diagnostics and alerts in near real time
- compares twin engines for optimal performance
- archives data for vessel and/or fleet analysis
- provides real time monitoring of position
- provides geo-fence capability to avoid dangerous areas
- provides on task and off task data alerts for cost and risk control
- archives data for performance analysis

To see how iRAMS can complement the way you influence skipper behaviour to comply with your fleet policy on efficient vessel operation, contact AST Marine Sciences and start saving today.

For impartial expert advice on iRAMS and other AST marine solutions, please contact AST Marine Sciences
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