

Marine engines of wooden trawlers operating along Ratnagiri coast of Maharashtra

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■ **ABSTRACT** : A total of 47 wooden trawlers were in operation from Mirkarwada fishing harbour of Ratnagiri of which 98 per cent were wooden trawlers fitted with Ashok Leyland make diesel engines. The length class of wooden trawlers ranged from *i.e.* below 40 ft (6%), 40-50 ft (64%), 50-60 ft (28%) and above 60 (2%) and the horse power of the engines ranged from, below 100 hp (83%), 100-200 hp (15%) and above 200 hp (2%). During the present study, Ashok Leyland (AL-370, AL-400, AL-402) diesel engine were found to be the most popular and commonly installed marine engine on the wooden trawlers.

■ **KEY WORDS** : Trawlers, Diesel engines, Propeller pitch, Efficiency, Fuel consumption

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Mirkarwada is one of the important mechanized fish landing center and fishing harbour of Ratnagiri operational since 1988-89, providing berthing and fish landing facilities for all kinds of fishing vessels. The present study was undertaken with respect to the trawlers operating from Mirkarwada Fishing Harbour.

Satyanarayana and Pillai (1992) studied the trawlers operated along the Madras coast. They categorized trawlers into four classes according to overall length *viz.*, 9.5- 10 m, 12 m and 13-14 m with 90 to 120 hp engines. Most of trawlers were operated at 30 to 40 m depth but 11 and 12 m trawler were operated daily at 15 to 30 m depth. Unnithan *et al.* 2005 studied different classes of vessels in Kerala. He observed that small classes of vessels were generally fitted with ALM 370 engine with a maximum of 70 hp. The medium size vessels were fitted with engines of about 100 hp (ALM 400 and 402) whereas the large vessels were installed with engines mostly of 126 hp (ALM 412). Boopendranath and

Hameed (2007) studied the mechanized fishing activities at Cochin Fisheries Harbour situated at Thoppumpady (Kerala, India), where the trawlers length ranged from 9.1-16 m LOA and diesel engines installed on them had horse power ranging from 89 to 122 hp. Jeeva *et al.* (2008) studied the mini trawlers operated from Visakhapatnam whose length ranged from 16.5-20 m LOA and were fitted with Ashok Leyland engine of about 145-210 hp with fuel consumption of 7.89 lit/hr. Rajeswari *et al.* (2012) reported that the trawlers operating along Andhra Pradesh were broadly classified into three types based on the length overall (LOA) and horse power namely Sona boats, Mini trawlers and Large trawlers. Sona boats had an LOA of 13.1 m and were powered with 102 hp engines and Mini trawlers having LOA of 16 m with 145-180 hp engines.

■ METHODOLOGY

Mirkarwada fishing harbor situated 2 km away on the west of Ratnagiri city (16° 59' 42" N latitude and 73°

16° 14" E longitude) was chosen as the sampling station for the present study. Total 47 wooden trawlers fitted with inboard marine diesel engine were operated from Mirkarwada, Ratnagiri during the study period. The interview schedule was formulated to collect the required data comprising of the detail information regarding different types of marine diesel engine used on wooden trawlers, by physically sampling the units. The data included the length class and other specifications of the wooden trawlers as well as the specifications of marine diesel engines, like horse power, fuel consumption (lit/hr), propeller diameter and propeller pitch.

■ RESULTS AND DISCUSSION

A total of 47 wooden trawlers operating from Mirkarwada fishing harbor, Ratnagiri were classified on the basis of length class and engine horse power. The

marine diesel engines of trawlers were classified according to the length class as below 40 ft (6%), 40-50 ft (64%), 50-60 ft (28%) and above 60 (2%) and also according to the engine horse power as below 100 hp (83%), 100-200 hp (15%), and above 200 hp (2%); as detailed in Table 1 and 2.

Wooden trawlers operating from the Mirkarwada fishing harbour were classified according to the length class *i.e.* below 40 ft, 40-50 ft, 50-60 ft and above 60 ft and according to the engine horse power below 100 hp, 100-200 hp and above 200 hp. Same length class and horse power based classification was recorded by Unnithan *et al.* (2004 and 2005) and Boopendranath and Hameed (2007) along the Kerala coast, Gopal *et al.* (2008) along the Andhra coast, Jeeva *et al.* (2008) along the Visakhapatnam base, Rajeswari *et al.* (2012) along Andhra coast and Boopendranath and Hameed (2013) along Cochin coast.

Table 1: Specification of wooden trawlers according to length class

Sr. No.	Specification of wooden trawlers / length class	Below 40 ft	40-50 ft	50-60 ft	Above 60 ft
		No. of wooden trawlers	03	30	13
1.	Length (ft)	29.93 ± 7.54	46.22 ± 0.57	53.23 ± 0.5	61.27
2.	Breadth (ft)	12.88 ± 2.94	16.97 ± 0.65	21.79 ± 0.36	23.80
3.	Depth (ft)	6.59 ± 1.60	6.96 ± 0.24	8.43 ± 0.39	10.48
4.	Gross tonnage (tonnes)	22.8 ± 4.21	37.79 ± 2.18	58.27 ± 3.13	95.31
5.	Net tonnage (tonnes)	16.33 ± 2.88	33.56 ± 2.02	49.78 ± 3.10	-
6.	Engine horse power (hp)	84.51 ± 14.76	97.19 ± 1.25	102.08 ± 1.75	240
7.	Engine RPM	1533.33 ± 266.67	1833.33 ± 39.63	1853.84 ± 59.5	1500
8.	Fuel tank capacity (lit)	500 ± 173.20	572.33 ± 74.90	670.76 ± 96.91	500
9.	Fuel consumption liters / hour	16.66 ± 1.67	17.16 ± 1.67	17.2 ± 1.15	18
10.	Propeller diameters (inches)	36.67 ± 0.67	38.86 ± 0.25	37.23 ± 0.62	36
11.	Propeller pitch (inches)	29.21 ± 0.33	29.29 ± 0.11	29.42 ± 0.27	28.88

Table 2: Specification of wooden trawlers according to engine horse power

Sr. No.	Specification of wooden trawlers / engine horse power	Below 100 hp	100 – 200 hp	Above 200 hp
		Wooden trawlers	39	07
1.	Length (ft)	46.64 ± 1.12	49.90 ± 1.76	61.27
2.	Breadth (ft)	17.53 ± 0.66	21.02 ± 0.72	23.08
3.	Depth (ft)	7.16 ± 0.25	8.46 ± 0.32	10.48
4.	Gross tonnage (tonnes)	40.32 ± 2.44	55.65 ± 4.57	95.31
5.	Net tonnage (tonnes)	35.16 ± 2.27	48.39 ± 3.97	-
6.	Engine horse power (hp)	95.65 ± 1.29	109.42 ± 2.79	240
7.	Engine RPM	1805 ± 39.72	1900 ± 72.37	1500
8.	Fuel tank capacity (lit)	538.2 ± 61.38	914.28 ± 73.77	500
9.	Fuel consumption lit / hour	17.5 ± 1.19	18 ± 0.99	18
10.	Propeller diameters (inches)	37.02 ± 0.27	36.57 ± 0.37	36
11.	Propeller pitch (inches)	29.35 ± 0.12	29.16 ± 0.18	28.88

Breadth, depth and tonnage of wooden trawlers operating from the Mirkarwada landing center of the various length class have been recorded during the present study and presented in detailed in Table 1 and 2.

Forty six wooden trawlers were fitted with six cylinder Ashok Leyland make inboard marine diesel engine and only one wooden trawler was observed to be fitted with Ruston make marine diesel engine. Three models of Ashok Leyland engine were observed *viz.*, AL-370 (09), AL- 400 (24) and AL-402 (13).

Wooden trawlers with length class below 40 ft, 40-50 ft, 50-60 ft and above 60 ft were fitted with diesel engine of horse power ranging from 55-99.27 hp, 87-120 hp, 95-120 hp and 240 hp; respectively. Unnithan *et al.* (2005) along Kerala coast have reported three models of Ashok Leyland engine but their horse power were different from that recorded during the present study. Same horse power was recorded for trawlers by Unnithan *et al.* (2005) and Boopendranath and Hameed (2007) along the Kerala coast, Gopal *et al.* (2008) along the Andhra coast, Jeeva *et al.* (2008) at the Visakhapatnam base, Rajeswari *et al.* (2012) along Andhra coast and Boopendranath and Hameed (2013) recorded there observations along Cochin coast.

In the wooden trawlers operating from the Mirkarwada fishing harbour, the speed of the engine were recorded as 1000-1800 rpm (length class below 40 ft), 1500-2000 rpm (length class 40-50 ft), 1500-2000 rpm (length class 50-60 ft) and 1500 rpm (length class above 60 ft) and based on the engine horse power *i.e.* below 100 hp (1000-2000 rpm), 100-200 hp (1500-2000 rpm) and above 200 hp (1500 rpm).

Fuel consumption of 15-20 lit/hr, 12-20 lit/hr, 14-20 lit/hr and 18 lit/hr were observed for length class of wooden trawlers below 40 ft, length class 40-50 ft, length class 50-60 ft and length class above 60 ft vessels during the present study; respectively. Similarly, based on the engine horse power the fuel consumption during the present study was recorded as, below 100 hp (15-20 lit/hr), 100-200 hp (16-20 lit/hr) and above 200 hp (18 lit/hr). Unnithan *et al.* (2005) indicated that one liter of fuel can generate the power of 5 hp in medium and large vessels along Cochin coast, which is almost same as recorded in the present study. For 50-60 ft vessels and 100-200 hp and above 200 hp vessels low fuel consumption was noted by Unnithan *et al.* (2004) along Cochin coast and by Jeeva *et al.* (2008) along the

Andhra coast. Similarly, the range of the diameters and the pitch of the propellers, fitted to the wooden trawlers of the various length class and engines with varying horse power have been recorded during the present study and presented in Table 1 and 2.

Conclusion :

Thus, it was observed that Ashok Leyland make marine diesel engines (models AL-370 AL-400 and AL-402) with their horse power ranging from 55 to 240 hp and having fuel consumption ranging from 15 lit/hr to 18 lit/hr were found to be the most popular and commonly installed marine diesel engines on the wooden trawlers of overall length ranging from 15.21 to 61.27 ft, operated along the Ratnagiri coast of Maharashtra.

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