

Report of construction of first
Aluminium catamaran built by the

FAO/DANIDA Village Fisheries Project

in

Western Samoa

by

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This project has built most of the boats delivered of marine plywood. However, after careful consideration, it was decided to go ahead with the purchase of materials and welding equipment for seven aluminium catamarans.

Both a TIG and a MIG aluminium welding machine were purchased and a separate workshop constructed. This is required in order to keep dust from the wood boat construction away from the welding area and to prevent the wind from blowing away the expensive shield gas in the welding zone.

A bending machine for sheet metal was constructed, thereby enabling the chine to be bent with a radii of 60mm, and the sheets from each side are therefore welded together in the bottom and to the next sheet. The advantage of this is a strong, stiff and smooth chine and a saving in welding compared with separate sides and bottom welded together. A suitable V-bottom is also easily achieved.

The both is constructed of 3 lengths of sheets, each 3m long, giving a finished length of 8,8m (29 ft). The hulls are symmetrical in contrast to the plywood version with straight inside, which means that the engine has to be dropped further down to avoid cavitation caused by the wave between the hulls. Both hulls are built over the same jig which would not be possible for asymmetrical hulls.

The chine is 3 straight lines because of the bend, while the gunnel has a fair curve.

Spraybattens, consisting of angle profile are also acting as side stiffeners. The keel is a top-hat section bent all the way up to the top of the stem and spotwelded.

The frames are also angle profile reinforced with 2mm plate across the top and 300mm down the frame.

All four corners of the catamaran have enough foam to make the boat unsinkable.

It took 330 man hours to build the prototype. However, much of this was taken up by discussion and in experimenting with different solutions. Therefore, in the costings below, 250 man hours is used.

Also the cost of the welding should be reduced, after the operator gets more practice.

The hulls are connected with the same method as for the plywood version, using 7 beams of 38 x 90mm (1 1/2 x 3 1/2in) strong wood (Ifilele) and one beam 38 x 190mm (1 1/2 x 7 1/2in) where the engine is mounted. These beams are bolted through the frames and the 2mm plate with 3/8in. stainless bolts together with epoxy glue and 10 screws, 3/4 x No.10.

The superstructure is 9mm plywood and the deck is 12mm plywood. This is fastened to the aluminium side by nailing it into a 19 x 65 timber batten which is again glued and screwed to the aluminium plate.

This means that all the parts of the boat which is subject to abrasion and submerged in water is aluminium, while the rest is timber and plywood for economical reasons.

The boat should therefore last longer, require a minimum of maintenance and not be subject to waterlogging and thereby reducing strength and speed.

The aluminium is not painted, only the timber and the plywood. This eliminates the cost of epoxy sheathing, timber preservative, glue and paint, which are required for the plywood versions, and is the main reason why the final price for the complete aluminium boat including engines and gear is only 12% higher than the wooden version.

To get an accurate weight comparison, three boats were taken to a copra weighing station.

Boat I:	New plywood catamaran	610 kg = 1340 lb
Boat II:	20 month old plywood catamaran	686 kg = 1507 lb
Boat III:	Aluminium catamaran	505 kg = 1110 lb

These are hull weights only without crew, equipment, engines, water and fuel.

Boat II is 76 kg (167 lb) heavier than boat I, which can only be water absorbed by the timber and the plywood. This reduces the speed of the boat and the strength of the timber.

The aluminium boat will absorb a little water in the deck, cabin and beams, but very little compared to a boat with wooden hulls.

The speed of the aluminium catamaran is as follows, using Tohatsu 25hp outboard engine with E-E type propeller.

I:	With one man and one engine, but no fishing gear:	15,3 knots
II:	With 4 men, spare engine and fishing gear:	13,7 knots

This is about 1,5 knots faster than the plywood catamaran which means that one 5 gallon petrol tank will take the aluminium boat 5 miles further than the plywood version using the same engine.

COSTING:

Frames: 50 x 25 x 3mm, 35m	\$1.63	\$57.05
Side stiffener/spray stopper	38 x 25 x 3mm, 12m	\$1.45 \$17.40
" " " "	25 x 25 x 3mm, 30m	\$0.82 \$24.60
Keel extrusion	19m	\$1.64 \$31.16
Railcap	30m	\$1.00 \$30.00
Sheet 15,5 sheet -	\$25	\$387.50
Total cost aluminium		<u>WS\$547.71</u>

STAINLESS STEEL FASTENINGS:

2 1/2 x 3/8in.	32 pc	\$1.06	\$33.92
3 x 3/8in.	4 pc	\$1.10	\$4.40
4 x 3/8in.	8 pc	\$1.13	\$9.13
3/8 Nuts	44 pc	\$0.20	\$8.80
3/8 Washers	44 pc	\$0.05	\$22.20
3/4 x No.10 wood screws	200 pc	\$0.03	\$6.00
Total stainless steel fastenings			<u>WS\$64.54</u>

WELDING SUPPLIES:

9 kg 0.9mm Welding wire:	\$81.-
1,36 cyl. Argon gas (190 kpa/cyl.)	\$102.-
Total	<u>WS\$183.-</u>

OTHER COSTS:

Epoxy glue 1,5 kg	\$5.00	\$7.50
Paint:		\$13.00
Timber 107 board feet		
\$0.32		\$35.00

PLYWOOD:

12 x 244 x 1220mm, 3 sheet -	\$17.70	\$53.10
9 x 2440 x 1220mm, 3 sheet -	\$14.24	\$42.72
Plexiglass		\$13.00
Nails		\$ 4.00
Foam		\$18.00
Total		<u>WS\$186.32</u>

LABOUR:

250 man hours	\$1.25	<u>WS\$312.50</u>
4 Fishing reels		<u>US\$ 70.00</u>

COSTING SUMMARIZED

Aluminium	\$547.71
Stainless steel fastenings	\$ 64.45
Welding supplies	\$183.00
Other materials	\$186.32
Labour	\$312.15
4 reels	\$ 70.00
Total	<u>\$1363.63</u>
Mark up	<u>\$ 186.37</u>
Selling hull price	<u>WS\$1550.- = US\$2060</u>

EQUIPMENT AS STANDARD:

1 x 25hp outboard main engine	\$490
1 x 5hp outboard spare engine	\$250
Fishing gear	<u>\$177</u>
Total price, complete unit	<u>WS\$2467 = US\$3280</u>