REFIT NEARLY AS GOOD AS NEW

BY KEITH INGRAM

The changing nature of our maritime industry is one of the key factors that tends to keep mariners on their toes, or not, as the case may be. Not only is the way we go about our businesses in a flux of change, so to is the manner in which we manage our ships to meet ever-changing market demands.

When it comes to moving people, Fullers Auckland would have to be streets ahead not only of the rest of the maritime fleet, but also in many cases some other modes of transport, as they shift somewhere equivalent to our national population annually across the waters of the Waitemata Harbour and Hauraki Gulf.

It all started way back in 1860 when the little paddle steamer *Emu* first crossed from the city to the North Shore. Since then, Auckland has maintained strong links and affection with its harbour ferries as they have changed over the years from coal-fired steamers to diesel-powered motor ships, until today we have a fleet of modern, fast ferries servicing our cross-harbour landings and islands in the gulf.

The transition from the slow, wooden fleet into a sleek, modern operation began in 1987 with the arrival of Gulf Ferries' first catamaran, the *QuickCat*.

The introduction of this faster and more efficient ferry set the course for the future and for Waiheke Island. With a more comfortable and faster mode of transport, travel to and from the island was transformed into a 40-minute leisurely commute that changed the structure of the Waiheke community forever.

No longer could it be regarded as an island retreat for holidaymakers with weekend baches, the retired and alternative lifestylers. Waiheke would quickly become a suburb of Auckland within an easy daily commute of the central business district.

The success of the *QuickCat* lead to the fleet's replacement as commuter demand grew, until today Fullers has 16 modern, fast vessels of many sizes servicing the people of Auckland.

Some of the vessels were purpose-built by Fullers to meet specific needs of commuters, and many have been opportunist purchases to meet demands in growth or to ensure vessels of a departing operator were not lost as important backups. Others have been imported second-hand from successful tourist operators in Tasmania as they have maintained their fleet modernisation replacement programme.

One such vessel is the *Wanderer*, which followed the successful acquisition of her sistership the *Adventurer* from the same company.

Given the past performance of Fullers' workhorse *QuickCat*, which is also a Crowther design, Fullers management could identify these hulls were well suited for our local conditions.

They saw the opportunity to purchase these well-found and maintained vessels as making good business sense. Built by the Richard Divine Boatyard in Tasmania in 1996, the Loch Crowther-designed *Wanderer* carries 190 passengers at a service speed of 25 knots.

Powered by twin DDEC Detroit 16V92s, these motors had done some 14,000 hours at the time of her half-life refit, including 6000 hours since beginning services on our harbour.

Ferry master Callum Burson at the helm

Removing the power plants

Clearly, life for the *Wanderer* is now in the fast lane as a passenger ferry when compared to her previous more leisurely tourist life. Fullers has made a conscious effort to plan for her pending refit, reconditioning her engines and a full repaint under the watchful eye of maintenance manager Bob Makin to prepare her for future service in the Fullers fleet.

The vessel was hauled at Oceania Marine's 800-tonne slipway in Whangarei, completely washed and her engines removed through access holes cut in the side of the hulls before she entered the shed.

This shipyard has a history of new construction, refit and repairs going back 50 years. Over the last 10 years the staff at the yard have developed specialised skills to construct and service the superyacht white boat market.

But the yard excels in its ability to service commercial vessels from throughout Oceania as well as black boats (steel), aluminum and the top-of-the-line white boats. Sandblasting, painting and survey requirements are all catered for by a team of on-site contractors and tradesmen.

The yard provides covered workshops for vessels of up to 60m overall, which was essential for the 24m *Wanderer*, as she was about to undergo a complete top-to-bottom repaint.

The recent successful launching of the Royal New Zealand Navy's four new 55m patrol boats, built up the road and transported to the yard's slipway, further demonstrates the flexibility of this yard, and it remains a key part of Whangarei's workboat construction and shipyard marine precinct.

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Aft deck and heads with access up

Once the engines, gearboxes and genset were removed, the vessel was shifted into the shed for repairs and painting.

The two Twin Disc MGN253 transmissions were removed and delivered to Pacific Driveline in Manukau City, Auckland for a total rebuild. The transmissions were completely striped, cleaned and inspected for any excessive wear and tear. All the parts that were expected to be required had been ordered three months in advance to meet a strict delivery time to coincide with the engine rebuilds.

But, as usual, the unexpected can occur. The rebuild could be called "just in time" as the engineers found some of the roller bearings were showing signs of serious wear and definitely needing replacing.

Other components requiring attention were clutch plates, seals and gaskets. Following the assembly of the transmissions, each box was mounted in turn onto Pacific Driveline's test rig, the only marine transmission test bed of this size in New Zealand able to test such a large transmission to its full extent, including emergency stops.

While this was happening, the two Detroit diesel engines were delivered to American Diesel Spares in Manukau. The brief from Fullers was to provide as close as possible to a "zero hour rebuild" on these engines to ensure they continued to operate trouble-free, similar to that experienced to date. In other words, they required a complete factory spec rebuild to equal new engines as closely as possible.

The time span of the job was always going to be tight and it was very important that the engines be completed within a fixed time, as the ferry would be needed in service as Fuller hauls other vessels for annual surveys.

Ninety percent of the required parts were ordered before the engines arrived in the workshop so they were available when needed. The electronic injectors were to be rebuilt in the United States, so they had to be one of the first items off the engines and out the door to catch a plane.

The engines were then fully stripped, with all parts cleaned and inspected prior to any machining being undertaken. These engines are unusual in that the V16 formation is made up of two eight-cylinder blocks bolted together (the alignment of the main bearing tunnel is crucial). The two eight-cylinder crankshafts are also bolted together. All this was tricky stuff as the required machining was carried out and the rebuild began.

Weekly meetings with Fullers engineers were held to confirm progress and sign off any contract variances, thus

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The top observation deck

The new, refurbished interior

avoiding potential delays to complete the job and any "nasty surprises" for the customer with the extras that are found during any rebuild.

Once assembled, the first engine was painted in two-pack epoxy enamel prior to being test run on an engine dynamometer for four hours to check it was operating within its specifications and ensure all components were bedded in before it was reinstalled in the *Wanderer*.

This engine was returned to the shop ready for transport to the vessel. The second engine had been stripped and machined by this stage and all sub-assemblies had been rebuilt in preparation for final assembly. The second rebuild progressed smoothly to the dyno stage and it was also cleaned and painted in two-pack epoxy in preparation for reinstallation.

After the engines had been reinstalled and set up, sea trials were undertaken for two days to check the operation of the engines and transmissions as the *Wanderer* returned to Auckland.

The project from the outset was not without its challenges. Like all major work, full warranties were expected and given, as these engines can be expected to give a further 15,000 hours of reliable service before the next major extraction.

Given the hours these vessels do this could be within five years, so excellent communication was maintained with the client throughout the rebuilding process.

As a part of preventive maintenance and because old wiring gets brittle with heat and age, this was also an ideal opportunity ▶

A fully rebuilt Detroit

The reconditioned genset

for Pro Marine Electrical to upgrade the wiring looms to the main engines and completely revamp the DC battery circuits and cables. This would also help prevent a potential failure or wiring fire.

Meanwhile, the engineers from Fullers maintenance rebuilt the Perkins 6254 marine diesel 85 kVa genset.

Once the *Wanderer* was in the shed her interior was stripped out and all the main deck seating reupholstered. The deckhead-aerated panels were removed for professional commercial cleaning and refitted. Stained or weathered Frontrunner was cleaned or repaired and the interior essentially given a professional spring clean. The airconditioning units, hospitality gear and refrigeration units were also serviced.

With the engines and gearboxes out of the way, the rudders, propellers and shafts were removed and, "Hello, don't you just hate it when you find the unexpected."

The drive chain failed the piano wire test, as it would appear the stern tubes and bearings had been out of alignment since new, with the resulting wear on the shafts. This explained why there had been an uneven load on the main engines.

This required the need to line-bore the stern tubes, fit new inboard and cutlass bearings and replace both shafts with 2205 stainless steel shafts machined locally by the Whangarei Engineering Co, or WECO. The rudder blades and shafts were crack tested and there was some minor cracking to the blades, as would be expected from dagger rudders being repaired. The steering hydraulic cylinders were found to have bent cylinder rods, causing leakage.

New cylinder rods were manufactured and fitted with new seals. New rudder gland packing was installed to the rudder stocks as these were refitted.

The lower forward beltings were extended forward by 2.4m on both hulls to give extra protection to the vessel's shoulders against the increased number of daily berthings.

The hulls were fully surveyed, including valves and sea chests. Any corrosion or cracking was repaired, including corrosion pitting. The surveyor from Dunsford Marine reported that the *Wanderer* was in remarkable condition, given her age of 14 years and the high-speed stresses applied to her hulls when she is in service.

New, five-bladed Star-C propellers were ordered from Veem in Perth, Western Australia, which begs the question, why Australia?

Veem has been around for 50 years and has extensive experience with high-speed performance propellers, including sport boats, workboats, fast ferries and the special needs of naval vessels.

The propellers are made from nickel aluminum bronze for excellent resistance to corrosion, erosion and fatigue. Veem says its precision CNC machines can mill up to 2.1m diameter and multiple blades are all exactly the same. Their competitive price landed in New Zealand also had a bit to do with the final decision.

Preparing and painting the ship presented some significant challenges for the contractor, Bream Bay Marine Holdings, who are specialist coating applicators. Remember, the engines came out through two gaping holes in the side of the hull, and this presented a logistical problem when trying to prepare and paint a large vessel in her new corporate colours in a big shed in the middle of winter.

To combat winter chills and moisture on the alloy structure they bought 10 el-cheapo office 2000-watt blow heaters for $20 each from the Warehouse and set one up in each void and compartment. After two days this raised the hull temperature to five degrees above the ambient temperature and kept it there.

This allowed for good paint drying in what would otherwise

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have been marginal conditions to meet the manufacturer's recommendations. Representatives from International Paints oversaw the painting contract to ensure good trade practices and warranties.

Painting a vessel of this size, even if it is a ferry, is not cheap and it would be many years before the opportunity to repeat this process would be available.

The hull below the waterline was completely sandblasted to bare metal in preparation for primers and undercoats to suit the new Intersleek 900 fluoropolymer foul release coating.

Her top sides were sanded, faired and addressed with spot priming of the substrate with Intershield 300 pure aluminium epoxy, and fully primed with Interplus 356 (a two-component, internally flexibilised, low-temperature curing, surface tolerant epoxy primer).

Once the machinery was replaced in the hulls, the holes were sealed and primed and then the finishing coat of Interthane 990, a two-component acrylic polyurethane finish, was applied to the outboard sides of the hulls.

Fullers' corporate colour stripes have also been applied with Interthane 990 to give a permanent finish. Finally, the external passenger decks were coated with an Awlgrip Linear non-skid polyurethane finish. Fullers says it chose this product because areas damaged during service may only require a light sand and recoated.

Once everything was completed and after only experiencing a minor but yet frustrating delay, the *Wanderer* was launched for sea trials and her delivery voyage to Auckland.

On a grey, wet day we joined the team as they were completing her engine trials and survey sign-off to ensure she was fit for purpose. After such a major engine refit, extensive sea trials are essential with a busy season pending. This proved worthwhile, as the engines required some adjustments before they finally settled down to reliable service day after day.

Prior to the refit, *Wanderer* had a service speed of 24 knots at 1800rpm with a load of 86 percent. Plus there was annoying vibration and resonance from the drive chain and the motors always ran at uneven temperatures on the pyrometers.

Our sea trials delivered 28.8 knots at 76 percent load light ship, giving a recommended service speed of 24 knots laden.

Apart from the new corporate colours, the main cabin upholstery and the general spring clean, passengers may not notice a lot of changes. Noticeably absent is any sign of vibration or resonance from the drive chain and the pyrometers are now matched, as each engine demands less power to deliver the preferred service speed under load, a pleasing sign.

As the *Wanderer* is about to enter service, we are sure even taking into consideration the many variables and challenges of doing such a major refit on time and on budget, it was still a viable option when you consider any replacement cost. This is especially so, given the alternative of buying well-found second-hand vessels from respected overseas operators.

She is a smart, fast, comfortable passenger ferry with excellent seakeeping abilities and offers more than enough to keep commuters happy.

SPECIFICATIONS

Length	24m
Beam	8m
Draft	1.4m
Design	Loch Crowther
Power	2 x Detroit 16V92
Service speed	24 knots
Refit project	Oceania Marine
Safe ship management	Dunsford Marine

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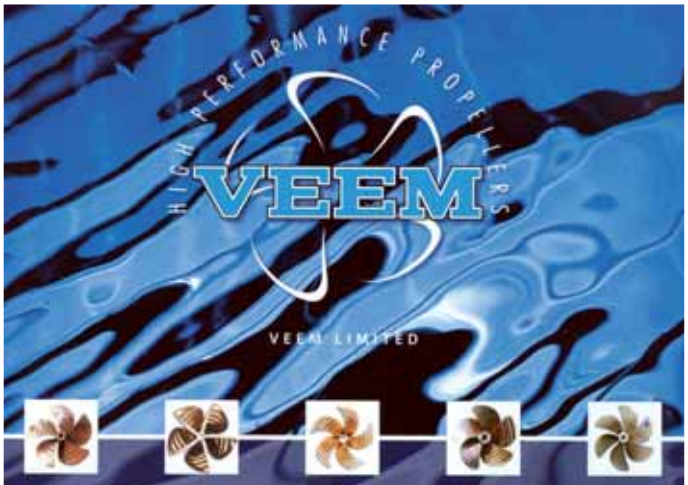

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