

Northern Quest – takes on **THE CHALLENGE**

BY KEITH INGRAM

When you contract and then take delivery of a 30m mussel harvesting vessel it comes with its challenges, as Russell Parker was to find out.

It was back in September 2007 when Challenge Marine approached Richard McBride with a potential new project, a new vessel for a previous client, a mussel farmer from Coromandel. Ultimately, the result of that project was *Northern Quest*, launched in February 2009 in Nelson. This story is about the build process, the companies and the people behind the project. These are the same folk who are now revitalising Nelson's once proud shipbuilding and repair industry.

It would be fair to say that, in recent years, Nelson has seen the boom to bust years as its waterfront faced some serious challenges and vessel numbers significantly decreased in this traditional fishing port. Competition for this diminishing trade gave rise to waterfront scrapping with little desire for companies of the past to work together. This caused a number of casualties. Hopefully however, on our recent visit, we saw the tides of change

as the success story of one of Nelson's growing companies began to unfold.

Challenge New Zealand Group now employs 120 fulltime staff and 20 contractors. It's a long way from 1986 when, as a 22 year old marine engineer and at his father's urging, Nevil Basalaj borrowed the family's Triumph Herald, threw his tool kit in the boot and started trading under his own name. His school time was not great with a lot of time spent on wagging. This routine continued until, at 16, he was told he had to get a trade and started a fitter and turner apprenticeship with Nalder and Biddle. But it was after getting dad's boot that he went on to establish Challenge Marine in 1986. Nevil quickly realised that he was a hands on the tools man and, if the business was to grow he needed to employ a manager to run the show while he remained on the factory floor. Essentially, what he did was employ his own boss. It was a policy that





Russell Parker getting to grips with his new craft

worked as the company has grown to include the others in the group, all working in a successful partnership.

The *Northern Quest* build was a result of the collaborative efforts from this group partnership, a partnership that has now attracted the attention of local boat designer Richard McBride. While Richard retains his own counsel, he is mindful that as a sole trader, one has to think about developing an exit strategy and in doing so, either set up systems or join other like minded marine companies where they can encourage young minds to seek a career at the drawing board and get alongside Richard to pick his brains. A brave and interesting call. Lets have a dabble at getting inside the thinking of this respected New Zealand naval architect and designer. It's a process that now appears to be working as Richard now has a competent understudy ensconced in his drawing room.

As with any working vessel, the key starting point is to find out exactly what the client wants, but this is not always as straight forward as it sounds. In this case, however, client Russell Parker knew exactly what he wanted - a big, fast, efficient vessel capable of carrying up to a 100 tonnes, and shallow enough to work out of Coromandel Harbour. Also, strong enough to deal with the open sea conditions between Coromandel and Great Barrier, and good looking enough to turn a few heads as well. And, he wanted the wheelhouse for'ard rather than at the stern.

Now there are a few features here that are not truly compatible, and that means compromises for any designer. For instance, the ability to carry heavy loads does not sit comfortably with shallow draft, and speed can be a problem for beamy shallow craft in open waters. Also, having the wheelhouse for'ard creates its own problems.

From a purely practical point of view, most designers would choose to have the wheelhouse aft for a number of reasons. First, it enables the vessel to take on a slightly stern-down trim in light mode, but a bow-down trim fully laden, which any bargeman will tell you is more efficient. Second, the engine room air intakes and the exhaust stacks can be placed in suitable locations around the wheelhouse and have shorter runs than with the wheelhouse up for'ard. However, wheelhouse for'ard gives better visibility with a lower profile. As a result, the vertical accelerations are greater when punching into a head sea and the skipper will tend to back off on the throttle a little earlier, and that's not a bad thing. Also, you don't have to worry about where to put a for'ard mast! But you do ►

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Northern Quest is stable and designed for 100 tonne deck loads in all weather

have to consider your pivot point and it's a long way back to the transom.

Russell Parker specified a single engine installation which is more efficient but is a problem for draft. He had also given permission to use rather more horsepower than Richard had used in similar vessels before. This would mean larger running gear and a big paddle somewhere down aft. While Richard has a high regard for the quality of the locally made propellers, for specially demanding jobs and this was to be a high powered - large bite - low profile propeller, his guru of props is Stephen Vincent at Austral Propellers in Australia. Stephen's recommendation was for a 47 inch five blade on a 3:1 ratio. But this was out of the question for depth so a compromise was agreed on a 44.5"x34" at 2.5:1. His estimate was that this would give 16.25 to 17 knots at 60T displacement if the hull was efficient enough! This then placed the challenge right back on Richard to refine the hull to the maximum.

Due to the nature of their work environment, mussel harvesters generally require keel cooling rather than heat exchangers. The auxiliary engine and oil coolers normally need at least as much cooling as the main engine. The main engine works while the vessel is moving but everything else works while the vessel is stopped. You end up with many metres of keel cooling galleries on the bottom, all of which adds to drag. With all this in mind, Richard thought it prudent to indicate to Russell that he expected more than 15 knots but wouldn't say how much more. Russell

was generous enough to leave it at that.

Engine choice also came down to a compromise. At this stage they were tossing about an engine choice between the Cummins KTA 38 and the Caterpillar C32. "Now the Cummins is a lovely piece of machinery," said Richard, "but when I placed the drawing on my hull it was obvious that it wasn't going to fit. Raising the deck and creating a lower working platform was an option but this was rejected to keep the working area as simple and safe as possible." So the big puddy cat got the nod. Richard now had to fit all the different elements together to optimise the end product. The first step was to reduce the effective depth of the keel by putting the prop in a partial tunnel, while bearing in mind that the boat builder and engineers still had to stitch all this together. Such contrivances are somewhat tricky because they can upset the water flow to the propeller. It was important therefore that the transitions were kept as gentle as possible so the water would run cleanly.

The wheelhouse also received a fair bit of attention at this stage of design. The option of for'ard sloping or reverse sheer windscreens was offered, but Russell stuck with his early preference of a racier look with the screen sloped back. I must say that it does look good and decreases the windage of the wheelhouse considerably when motoring or tied up to the farms. The interior is typical of the for'ard wheelhouse mussel harvesters, and it wasn't too difficult to fit in all that was required. Emphasis

is on easy maintenance, crew comfort and safety. And in the end, the boat builders were even able to create a separate cabin for the young woman who, for many years has been a part of the harvesting crew, and suffered those mess-deck noises. The crew accommodation includes a four berth lower cabin, plus the single cabin. A separated head and shower with a large dry area to slip out of wet overalls. The galley and dining and crew rest area remains a part of the bridge.

The helm station is to port to match the vessel's working side and is afforded all round vision. To assist the master she fitted with a comprehensive navigation package supplied by Advance Trident Limited. The Simrad NX 45 has a 12 inch display, high resolution TFT colour display, powerful backlight and bonded screens to eliminate any possibility of condensation and increasing the viewing angle making it sunlight viewable. The NX 45 will display on it's six favorites pages, 4kW radar, chart plotter and depth, water temp and speed, all on full and split screens.

The Simrad Auto-Pilot 24 is matched with the NX 45 to provide reliability for both long and short crossings.

VHF Communication is via a Cobra MRF 55 base set and external speaker so all can keep in contact when working on the wet area.

Control of the bow is vital when working among tight mussel rows and for this reason Northern Quest has a large side-power hydraulic bow thrusters made by Norwegian company Sleipner. The SH 550 bow thruster supplies 550kg of thrust through the 385mm tunnel and is controlled by a proportional controller at the helm. The

installation and commissioning was carried out in Nelson and support will be supplied through ATL's head office in Auckland.

Construction was a further challenge as the hull is a large, long platform, supporting a 100T load. Richard's reply to this issue, "longitudinal strength is obviously the most critical factor so the deck and hull bottom become, in effect, a girder whose flanges are separated by four webs. The hull sides have two rows of columns and diagonals running full length. There is also the keel, which we have found by experience needs to be massively constructed in case the vessel takes the ground while loaded, and this adds considerably to the longitudinal stiffness." We were told that the engine, auxiliary and tank placement all place their demands on the structure and have to be accounted for. "Past experience with the peculiarities of modern computer controlled diesel engines has made us cautious about the drive trains, so I was pleased that Russell agreed to put in a thrust bearing on the prop shaft and leave the main engine isolated."

This obviously helps to keep things under control if a rope gets wound round the prop and the engine power ramps up instantly, which can cause havoc if the shaft is attached directly to the transmission. Richard says, "special attention was also paid to the steering as a mussel harvester can save a lot of time by turning easily. Very long keels with rudders near the transom mean slower turning boats, so we mounted the rudder comparatively well forward. This also helps the efficiency of the tunnel, it's a double bonus. The rudder itself is a true foil ▶



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section, as flat plate rudders just aren't up to it," he said. "Blended into the trailing edge of the rudder is a trim tab whose tiller slides in a fitting mounted to the hull. As the rudder turns, the tab articulates further, increasing the rudder's effectiveness by a huge amount. It requires a stronger rudder stock and more powerful hydraulics as the torque on the rudder is increased considerably, specially when backing up, but it's worth it." All far too techo' for us sailors, but that's what you get when you ask a designer too many questions. The net result was a 30m boat with a turning circle of less than 40m under way. Although fitted with bow thrusters, these are only for use when manoeuvring in the farm or berthing.

One major change made during construction was to the crane base. It was decided that instead of sitting on a deck-mounted base plate the crane should be raised on a 1.5m high pedestal. This, in turn, provides both external access to the engine room and an extraction vent as well, removing the need for an escape hatch elsewhere in the deck. It also gets the crane up out of the shell grit and spray of working and deck washing. Because of the higher point of leverage, the plans for this needed to be approved by an engineer and the result is a great improvement to the working ability of the vessel. The Cormach 28200-E6 crane has a lift of 5200kgs underfoot at 3m and 1140kgs with a horizontal boom at 15.5m, more than enough to lift bulk mussel bags and place them where you want, either on board or on a shore-side truck.

The grunt for all the hydraulics is supplied by a separate auxiliary marine diesel engine powering the main hydraulic pumps and hydraulic services. In looking around the vessel there are some dozen hydraulic motors

of various sizes, all sucking from the central hydraulic power source. A tricky situation at the best of times and one that Fluid Power Solutions Limited were tasked to sort out. All the tubing work is bracketed and all bulkhead penetrations isolated to prevent the transfer of harmonics. Remember this vessel is nigh on 30m long and requires a lot of high-pressure pumps, tubing, hoses and motors all brought together in a seamless, operational unit. And it all needs to be easy to use, after all, mussel farm workers are like sailors, they don't need to know the techo stuff, only that if they pull this or that lever it will work every time.

Rzoska Electrical were contracted by Challenge Marine to design, supply and install the electrical systems onboard the *Northern Quest*.

The scope of the design included all services required for a vessel of this size and function to comply with the Maritime New Zealand Rules. Also within the design was allowance for installation of services provided by other suppliers, including hydraulic bow thruster, water pumps etc. Also included were the DC supply and distribution - battery and charging systems for general service, radio and engine starting and all the AC supply and distribution with all internal and navigational lighting using the latest "Super Bright LED" technology. Also involved was the machinery control box, alarms, safety devices and engine wiring, as well as the fire alarm system and gas detection.

Besides the navigation lighting and control panels, the vessel monitoring system gives real time information of the main and hydraulic engines, tank levels, bilges, temperatures and alarms all via the touch screen, an essential tool for the watch keeper on duty.

As part of the co-operating network within the area, *Northern Quest* was built using the Nelson Reliance Engineering facilities and launched by the Port Nelson crane directly into the harbour. The workmanship and collective skills of the boat building and engineering teams are evident everywhere you look. Her construction is strong, with heavy marine alloy plate being used throughout. We note the deck plates are sand blasted, as opposed to checker plate decking, and we were advised that the traditional non-slip check plate is not as non-slip as one would think. In fact on mussel harvesters it can be bloody slippery. "Much safer to give the decks the occasional sand blast," says Russell.

The hull, during sea trials, was efficient enough to achieve over 17 knots in less than ideal conditions. It is soft riding enough for any big workboat. Its crew spaces and accommodation are fit for any live aboard situation when the ship is away overnight or several nights. Yes, she is big, very big, and capable of harvesting up to 22 tonnes of bulk mussels an hour. This is some production schedule and one that Russell will no doubt soon push to the limits. In fact these limits were stretched after only three weeks into work when the hydraulics would be put to full production tests. While they coped when harvesting they were becoming frustratingly slower when reseeded the farms.

This, along with annoying harmonics in one of the pipe systems, would necessitate a bit of after market remedial and modification work to shut the harmonics up and lift the hydraulic power, work that is now

planned for the next shut down. Likewise the propeller went through some sharp modifications after reinforcing the fact that the turning arc of the stern is still some 20m from the pivot point and can swing you in a 40m turn. Ouch! A quick lesson reinforced as one comes to grips with a new vessel. But apart from these small frustrating problems, Russell reports that the vessel has settled into her working life well. The deck layout works well and with a capacity load she can still return to port at a fair turn of speed. Crew wise the accommodation works well and after some quick on the job training, they have settled down to lifting harvesting production levels to budgeted targets.

Northern Quest is a tribute to the Challenge Group and I am sure she will give Russell good service for many years. ■

specifications	LOA	29.9m
	Beam	8.25m
	Draft	1.5-1.9m
	Displacement	60-170T
	Engine	Caterpillar C32
	Transmission	ZF 3055 2.5:1
	Speed	17.5 knots max, 14.5 cruise
	Cargo	110 tonne
	Fuel	10,000 litres
	Water	2000 litres
	Accommodation	for 5
	Designer	McBride Design Ltd
	Builder	Challenge Marine Limited, Nelson



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