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## VANGUARD forges ahead

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ISSUE 134







# VANGUARD FORGES OPEN WATER MUSSEL FARMING

BY KEITH INGRAM, PHOTOS JACQUIE O'NEILL

The latest mussel harvesting vessel designed and built for the mussel industry has been delivered by Whanganui-based boat builder Q-West.

After delivery, the new vessel immediately entered service with the Nelson based family-owned company MacLab New Zealand, operating out of Port Nelson. MacLab was founded in 1973 by brothers Jim and Bill Broadbent, who pioneered the green-lipped mussel nutraceutical market and are now recognised as the premium producer of powder made from New Zealand's Greenshell™ mussel.

The company exclusively supplies its business partner Pharmalink Extracts Ltd with the mussel powder it produces.

Pharmalink converts this into oil for nutraceutical use in global brands including *Lyprinol* and *Antinol* which provide an anti-inflammatory solution for people and animals suffering from arthritis.

MacLab employs around 75 staff, with around 20 based at the Pharmalink Extracts factory near Richmond. The firm sources about 7,000 tonnes of mussels per year (some seven percent of national production) from marine farms in the Marlborough Sounds, Golden and Tasman Bays, which it owns or leases, as well as buying mussels from other supply partners.

MacLab is expanding, says Scott Gillanders from MacLab, and the *MV Vanguard* is part of that expansion. He says the vessel's name fits perfectly with the company's record of achievement in the nutraceutical industry and its values with respect to the environment.

"*Vanguard* describes a position at the forefront of new developments or innovators, who forge the path and guide others, showing the way forward," he explained.

"The 'Guard' part also evokes the idea of a guardian, protecting and respecting our oceans precious resources," Scott said.

"To reduce the environmental impact of our operations, we created 'Greenlab', our in-house resource dedicated to continual improvement in sustainability.

"As a team, we've improved our recycling and waste management processes and increased our energy efficiency, while also eradicating any product waste by drying discarded mussel shells, crushing and using them as land fertiliser," says Scott.

*Vanguard* is now the third vessel in the MacLab fleet used for servicing its farms in the Top of the South. The vessel was designed to operate in the challenging open waters of Tasman Bay and Golden Bay where MacLab has existing farms and is involved in partnerships developing new water space.

Green-lipped mussels are highly self-sufficient. Unlike land or fish farming, mussels don't require any additives (such as feed or fertiliser) to grow. Instead, they feed on plankton and other microscopic sea creatures occurring in the sea.

And because they're *filter feeders*, they clean the water as they go, allowing sunlight to penetrate deeper, which encourages seagrasses to grow and increases oxygen levels in the water. Now who wouldn't support mussel farms?

*Vanguard* will be based in Nelson. The MacLab factory is situated in Nelson and the farms are just out in the bays.

The design brief was to be able to carry two days' worth of



Turning the massive hull at Q-West

factory production. That's 80 tonnes of mussels, plus gear, in a harvesting day.

It needs to be able to cart harvests in all weathers that Golden Bay and Tasman Bay can present – significantly more challenging than the sheltered waters of the Marlborough Sounds.

Plus, good crew comfort was important. ▶

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Inside the wheelhouse

"We appointed Richard McBride and Kirk Mullen and the team at OceanTech as the designers," Scott explained. "I went to see Richard in the early stages of planning to build a vessel, knowing that Richard had designed many successful vessels and has a vast knowledge of mussel farming vessels. After a great discussion we had the start of a vessel design."

In discussing their requirements when setting the design brief with OceanTech, and recognising the open water conditions in both Golden and Tasman bays, the vessel ended up being 30m x 8.5m wide.

It's a multipurpose vessel, so it can be used to carry out all aspects of mussel farming from seeding to harvesting.

MacLab have acquired large new farming areas in Golden Bay, which is open to the ocean swells coming in from the Tasman. (This has caused problems in the past.)

Harvesters built to work in the Marlborough Sounds need to be shallow to access the shallow waters off Havelock, so the vessels tend to be beamy and shallow, which suits the sheltered water of the sounds. But when light (unladen) these vessels are prone to rolling and pitching in the rough sea conditions experienced in open water, making work on deck tiring and sometimes dangerous.

"It has been found that after loading 20 or so bags of product, the motions of the vessels slow down and working conditions on deck improve," said Richard. "Therefore, Scott asked about the possibility of water ballast tanks. We had discussed the idea in the past, and were keen to incorporate them in to this vessel. The ballast tanks are based on the mass moment of inertia theory," he said.

To be the most effective, the required ballast (24 tonnes) was to be located as furthest from the axis of rotation (the vessel's centreline). The fact that MacLab wanted a vessel of 8.5m beam made this even more effective. Another attribute of the ballast tanks is the extra longitudinal strength they provide.

But the ballast tanks caused some interesting construction and plumbing challenges which were solved by the design team at OceanTech. In practice, the system has turned out to be very effective.

"Once we had the design nailed down, we went out to tender," said Scott.

He advised that being a family-owned company, and after reading some of the horror stories surrounding some recent builds in *Skipper* magazine, the company took a risk-averse approach and carried out significant due diligence on all tenderers – most of whom were competitive.

They awarded the contract to Q-West Boatbuilders in Whanganui, and he said they were not disappointed with this decision.



Looking aft at the huge deck



Looking forward with the seeding machine in the foreground

### Q-WEST

In talking with Colin Mitchell CEO of Q-West, Colin advised that they had been looking to build a mussel harvester for about 10 years, but other projects kept getting in the way, and the timing never seemed to fit. Adding to the downside was that because Q-West hadn't built a harvester, they were not on the mussel marine farmers' radar. That would change when the Fullers Ferries contracts were delivered and Q-West was able to devote some time just as MacLab went out to tender.

"Three of the respected tenders were very competitive," said Scott. "So as part of due diligence we visited each yard, and were impressed with what we saw at Q-West. Unfortunately the CEO was absent. But what we saw was an impressive boat building facility, one where all the staff were empowered to

make decisions in areas of their responsibilities.

"Q-West's Operations manager Chass Wardle took us through the systems, stock and time management, and the construction processes. The fact the company has very good staff retention with most being consistent longevity was comforting," Scott said.

"On our return to Nelson, Q-West's CEO Colin followed a week later, calling for a meeting with all potential local suppliers and sub trades, including us as client," he continued.

In what may be a first for the Nelson marine precinct, Colin Mitchell, representing the potential builder, sat down and went through the whole contract with all involved from Nelson.

Identifying who was supplying what, and what was required from a builder's perspective to make sure things flowed. This ►



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Underway one gets a good perspective of the size of the vessel

one step alone eliminated the horrible surprises later – and any potential cost over-runs. He also identified a number of holes in arrangements where confusion around who was supplying what? might have caused folk to duck for cover, if they had not allowed for something.

For example, the important links between the hydraulics and the machinery were clearly identified – so that the suppliers and sub trades knew exactly who was doing what. And so on.

This for MacLab, sealed the deal for Q-West, as they knew

their go-to man would be Chass. The fact that Chass was a qualified boatbuilder and marine engineer (and has been with Q-West since an apprentice over 20 years) and he would be coordinating the project also instilled confidence.

### CONSTRUCTION

Constructed in 5083 marine aluminium, the hull has twin keels with 32mm keel bars with 8mm alloy plate to the hull and deck, and the superstructure in 6 and 5mm plate.

Unlike some of Richard's and OceanTech's other vessels, Q-West chose to construct the twin keels over the hull plates – to avoid having open keels that can be difficult to clean.

The bilges and all internal sealed and potential wet areas are fully painted to help with galvanic protection.

One key feature is the incorporation of the ballast tanks mentioned earlier, which can hold 12-tonnes-per-side on the beam, to reduce motion when working on the farm or transiting when empty. Fully painted inside, these tanks are proving to create a very stable work platform.

The general layout of the vessel is similar to other recent harvesters, with accommodation forward, followed by the tank room, engine room, then lazarette.

The harvesting machinery is aft on deck, with a lowered section of the deck keeping the pick-up and de-clumper closer to the water. Because the vessel will be used for a wide variety of work, it has been fitted with five davits instead of the usual four.

The bridge and accommodation are air conditioned. Accommodation is provided for six crew with a complete galley down below. Crew comforts were high on the spec list with spacious, insulated and air conditioned accommodation areas.

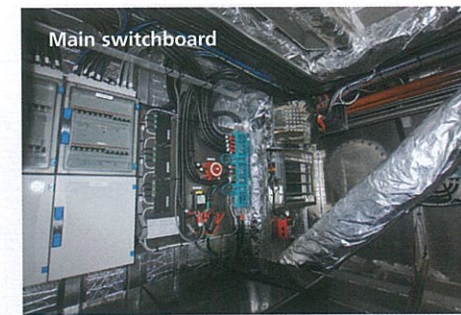
The interior is extremely well-finished with a durable commercial finish and high quality marine fittings such as Windows West, window and doors and Kontrail hatches.

The separate galley is below, so the skipper or watchkeeper are not disturbed when steaming while others are cooking. This is another plus, and night-time safety feature.

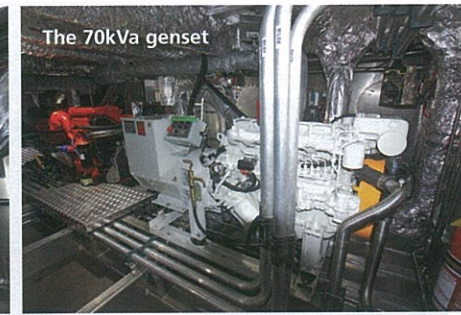
There are two internal helm chairs so that two can be watchkeeping at once or the skipper is able to train crew.

The main command station is fitted with a comprehensive navigation and Simrad electronics package.

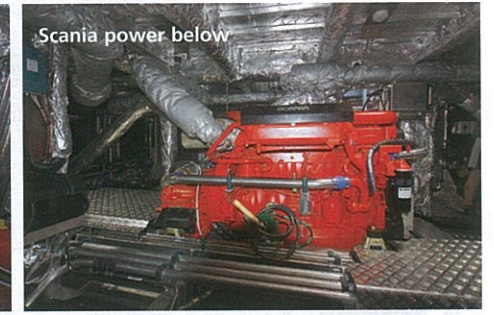
The vessel has three helm stations, one in the wheelhouse starboard side, one aft on deck, and one on the starboard side bridge wing.



Main switchboard



The 70kVa genset



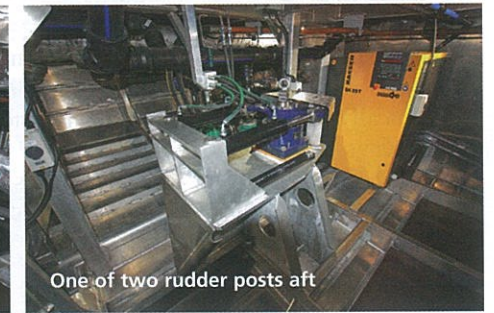
Scania power below



The Scania powered hydraulic pack



Large machinery space



One of two rudder posts aft

This bridge wing station is often used by the skipper when manoeuvring around mussel lines as there is very good visibility and no need to remove wet weather gear.

On the small foc's'l we find a Muir anchor winch hosting a large Sarca engineered anchor with a chain rode recommended and supplied by Chains, Ropes & Anchors.



### MULTIPLE POWER

Below Vanguard's machinery layout is fairly conventional,

she is powered by twin Twin Scania DI13 073 405kW (550hp) driving ZF 360A 2.609:1 reduction gearboxes driving 39-inch four-bladed Veem propellers.

The drive shafts are provided with thrust bearings. The Scania's are noted for their robust design with a strength-optimised cylinder block containing wet cylinder liners that can easily be exchanged. Individual cylinder heads with four valves per cylinder promote repairability and fuel economy.

The engines are equipped with a Scania-developed Engine ▶

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Crew rest area in wheelhouse



Galley and dining below



Showers

Management System, EMS, in order to ensure the control of all aspects related to engine performance. Also included is an electronically-controlled fuel injection system that offers low exhaust emissions with good fuel economy.

Another DI 13 rated at 285kW powers the hydraulic and water pumps, and a 70kVA gen-set supplies all the electricity requirements.

### ON DECK

The fitting of a colour grader on deck necessitated the fitting of air compressors and air tanks below, but room was found for these, and all the water ballast plumbing, without over crowding.

The builders at Q-West and the engineers from Fluid Power Systems have done a great job of economically fitting all the machinery and connecting pipework – while still providing easy access everywhere.

Dave Hockey and Raymond Simmons and the team at AnSCO designed and built the deck machinery. It's impressive when machinery such as this is fabricated in one town, and then trucked to another, and fitted in two days.

As part of the 'no surprises' policy, Owen Little and the team at Fluid Power Systems were commissioned to supply and install a purpose-built hydraulic system which included: a 185kW

engine-driven pump set, a 1600 litre hydraulic oil reservoir, all required valving for the five double-winch davits, the bow thruster, anchor winch, a 30kW water pump, the crane, all the deck machinery, the heat transfer system – and 740 metres of pipe and tube work.

All components, where necessary, were supplied in stainless steel versions that FPS have designed and manufactured over the years specifically to withstand the harsh marine environment.

The twin rudder, twin engine, three-speed steering system was also part of FPS's supply.

All components were designed and built in FPS's Port Nelson workshop, then delivered – and installed by a team of FPS's hydraulic engineers in Q-West's premises in Whanganui.

Owen Little said, "FPS are always looking for new ways to increase energy efficiency, component life, and minimise disruption of hydraulic componentry. To reduce fuel consumption, FPS used load-sensing technology to run the davits, bow thruster, and anchor winch. This fuel-conscious system saves fuel usage by working the hydraulics 'on demand' only."

"FPS also specially designed and installed isolating rubber bulkhead penetrations to keep the pipe and tube work separate from the hull, reducing hull noise".

### HARVEST GEAR

*Vanguard* has a colour sorter that works by vision scanning the material passing through it, and rejecting any waste. Although this is not new to the industry, it's the only vessel that will have one in Golden Bay and Tasman Bay.

The mussel de-clumper is the first piece of machinery in the harvesting process. This is an AnSCO tested-and-proven de-clumper with a few minor modifications to suit the vessel. On the end of the de-clumper is a grill with adjustable grill plates so it can be easily set up for harvesting small (seed) mussels or fully grown mussels for the factory.

The rope passes through a high pressure washer to clean it. The seawater used for washing the mussels is expelled overboard through hull pipes – which keeps the deck clean and clear.

Next the mussels travel through an adjustable size grader that pre-grades spat or crop from small marine waste, before it sees the optical colour sorter. This is to help increase the throughput of the colour sorter by first removing waste that can be differentiated by size.

The colour sorter is a Tomra Genius D-640. It works on both spat and adult size mussels. It can be programmed to reject by colour or by size.

The machine images the product as it travels through, and then rejects (by a shot of compressed air) anything that is programmed to be rejected.

The rejects can either be kept, or returned back to the sea. The sorter can also be operated as a belt only if they are harvesting clean product and choose not to use it.

After this point the mussels are bagged and stowed on the deck. The deck is capable of holding 76 one tonne bags in a single layer, while keeping safe walkways on deck for crew.

A key point that differentiates this vessel is that it has the ability to separate what is deemed to be a 'Nutraceutical-grade' mussel and 'half-shell grade' mussel at sea.

Through this, the company expects to be able to achieve greater value from the crop; gain efficiencies in farming and harvest selection; and reduce costs such as freight.

Scott believes this is a big step in the right direction, and will even be a game changer.

Different to some harvesters, *Vanguard* moves backwards down lines when harvesting – enabling the crew to remove floats from the line as they go, which avoids the need for another vessel to do this job post-harvest.

### SEEDER

The seeder is designed so that full one tonne bags of mussel seed can be loaded into the machine without having to lift the bag into a high seeding bin. Instead, it can be slid up a ramp, avoiding bags swinging as the vessel moves – keeping things safe.

AnSCO walking wheels are also installed to move the vessel forward down the line when seeding, so that the crew are able to add floats as they go.



Owners sea trials was to harvest 80 tonnes two days after arrival

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### CRANE

Amidships, mounted on its own raised pedestal, is a Palfinger PK 23500M marine crane. This has a reach of 16.3m and is capable of lifting 950kg at full reach. This means they can pick up and place a loaded fadge *anywhere* on the vessel's deck, or unload it to shore.

### LIFTING DAVITS

There are five stainless steel lifting davits. Each davit has two winches capable of lifting 1500kg. We note the growing use of stainless steel lifting davits and gear. No longer are they cost prohibitive, and when one considers their through-life performance, any modest added cost for using stainless steel at this stage is a sound investment for future peace of mind.

### SAFETY RAILS

*Vanguard* has soft safety rails on the working side, which can be taken down when required on the farm – at either the seeding end of the vessel or the harvesting end – and quickly re-installed when leaving the farm to keep crewmembers safe.

Scott said, “We are finding that they can be left up more than we expected because they are flexible and don’t do damage like some hard rail systems on mussel boats do.”

### THE LAST WORD

“Colin Mitchell and Chass Wardle and the team at Q-West have done an amazing job of this vessel,” said Scott Gillanders.

“Their mission statement, ‘Excellence in alloy’ is an

understatement. This vessel is truly world class. You can see this on your first step onboard. Q-West delivered what we class as a truly remarkable vessel – on time and within budget – that was able to go straight to work,” Scott said.

“We took delivery of the vessel in Whanganui after four days of sea trialling with the Q-West team, and steamed it to its home port in Nelson approximately 100 nautical miles away.

“After two part-days of training the crew and running up the deck machinery, *Vanguard* harvested 80 tonnes of mussels and delivered them into Port Nelson for the MacLab factory.

“The vessel is operated by Michael (Stoney) Bourke, who is our farming partner in Tasman and Golden Bay and has a vast experience in mussel farming in open water. The vessel will operate 7 days per week with two crews of four working a four days on and four days off rotation,” said Scott.

### SPECIFICATIONS

LOA	30.6m
Beam	8.8m
Draft	2.5m laden
Power	Twin Scania DI13 073 405kW (550hp)
Fuel	12,000 litres
Fresh water	2,000 litres
Harvest gear	ANSCO
Hydraulics	Fluid Power Systems
Service speed	12 knots
Designer	OceanTech
Builder	Q-West Boatbuilders

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