NEW GENERATION ALLOY DUMP BARGE

BY KEITH INGRAM

The recent launching and delivery of a purpose built 1200 gross tonne spoil dump barge has certainly turned some heads.

Traditionally these dumb barges have been made of steel with mechanical bomb doors, and because of the nature of their work end up looking like a bucket of rust and an ugly dung heap in a very short time. Because they look like a dog's breakfast throughout their working lives they get abused, mistreated and generally unloved.

The mechanical doors and operating systems on these dump barges slowly deteriorated, it was not uncommon that a leaky barge from the time of departure to the dump site could lose half its load in transit. Not so now, with the strict Resource Management Act and monitoring requirements required by law before any dumping at sea – a marine permit is issued.

The dredging of our ports and sheltered waterways for commercial use has been a requirement since we developed safe havens for our ships and vessels. Be it a working port, local wharves or a marina, most require some form of maintenance dredging from time to time and Auckland's Pine Harbour marina is no different.

Pine Harbour was dug out of low lands accessed by a long dredged channel leading to the deeper water of the Tamaki Strait on the approaches to Auckland's harbour. Surrounded by mud flats, the need for annual maintenance dredging is just part of doing business for Pine Harbour and many other marinas in Auckland.


The two barge sections as they emerge from the shed

Unfortunately the days when we had dredges and hopper barges on standby are long gone. All too often when a marina company is planning its dredging programme, they are finding out that the required tugs or large barges and diggers are in Australia working on lucrative mining infrastructure projects and will not be back in New Zealand for some time. "Time and tide" waits for no man and with each flood of the tide a bit more silt is deposited into our draft sensitive waterways, a creeping enemy from mother nature.

Today most dredging is done by converted long reach excavator diggers mounted on a dumb barge from where it can operate and either dump into a small hopper on the barge or operate alongside a larger dump barge when in open water. In Pine Harbour's case, the dredging digger and spoil transfer barge is operated by Coastal Resources Limited and while the transfer pond can hold some hundred tonnes of wet spoil on a good day with the digger on board, it is not suitable or economic to face the 60nm tow to the spoil grounds outside the 12 mile territorial limit beyond Great Barrier Island. Gone are the days when one could dump dredged spoil in the Waitemata Harbour or Hauraki Gulf.

Faced with this pressing problem, the decision was made by Coastal Resources to commission a purpose built 40 metre split hopper barge with a capacity of some 1000 tonnes to aid in disposing maintenance dredgings for various marinas. The brief was for a vessel of a nominal two metre draft so it could be loaded within the sheltered marina basin itself, but still large enough for the economical trip to the disposal ground. Most marinas give a depth of two to three metres at chart datum so ongoing maintenance costs are a critical factor in the management of any marina.

There has always been a good supply of smaller tugs and digger barges from the local workboat sector to do this sort of confined space work and while maintenance dredging is by its nature regular, there has not been a reliable supply of the right


The two halves ready for join up

sized split hopper barges suitable for a long open passage to an approved dump site. This is partly due to the resources boom in Australia taking up a lot of the existing vessels and Maritime New Zealand calling an end to its old disposal site east of Cuvier Island.

Coastal Resources Limited has received a 20 year permit for a new disposal site outside the 12 mile limit that is able to be monitored, and commenced its first loads to the site in early 2013.

The unique feature of this particular barge design is that the construction material is almost entirely marine grade aluminium alloy. In a vessel such as this, where deadweight capability is crucial to the viability of operation, we are advised by the designer Nic de Waal that it made perfect sense to use aluminium instead of steel, which is the customary building material. An additional 20 percent capacity (approximately 160 tonnes) has been added to the carrying ability of the vessel as a result of utilising this lightweight alternative. "Aluminium also features the added benefit that it does not need to be treated by a protective coating to prevent corrosion, and therefore significantly reduces the long term maintenance cost of the vessel," he said.

"The design has a hull length of 40 metres, with a carrying capacity of 1000 tonnes, she is a non propelled vessel with an efficient hull shape so that it can be towed by a relatively lightweight tugboat," says Nic.

It is ideally suited for work in shallow water inlets, boat marinas and river areas where shipping channels need to be kept open, and can operate at a draft of only two metres whilst still carrying more than 600 cubes of material. "As the barge is designed to be unmanned, the operation of the hydraulic rams is performed by a remote control system from the towing vessel either whilst stationary or underway," he said.

Built by Q-West boat builders in Whanganui, essentially the barge is in two halves, each a mirror image joined by two super large five leaf hinges mounted on deck, fore and aft. Below at both ends down in the sealed voids is the hydraulic locking system and large double acting hydraulic rams that open and close the barge like a large inverted clamshell.

Up on the bow, besides the anchor points for the towing bridle and mooring bits, there are twin hydraulic winch drums holding wire to cable to anchor bottom tackle, plus a mast for the prescribed navigation lights, which have light sensitive operation that is solar powered.

Down aft on the starboard quarter is a large tool and stowage box, while lashed on deck is the emergency tow line already rigged and secure in preparation for any emergency if the main tow parts, or is ever lost.

Dominating the port quarter is a large weatherproof power ▶


On board are the twin anchoring systems


Loading the barge with mud

The power pack, note the small aerial for remote control

case protecting the Yanmar water cooled industrial 4TNV88-EPP with an EC-150 controller delivering 46.9hp @ 3000rpm. This power pack was installed and commissioned by Whiting Power Limited. The engine drives the Brevini NZ hydraulic pump system, which then delivers motive power to all hydraulic rams, locking pins and winch motors utilizing the Parker compact spiral hose system known for its high pressure and tight radius capability. Something that is essential when installing long service runs and requiring tight radiuses on vessels.

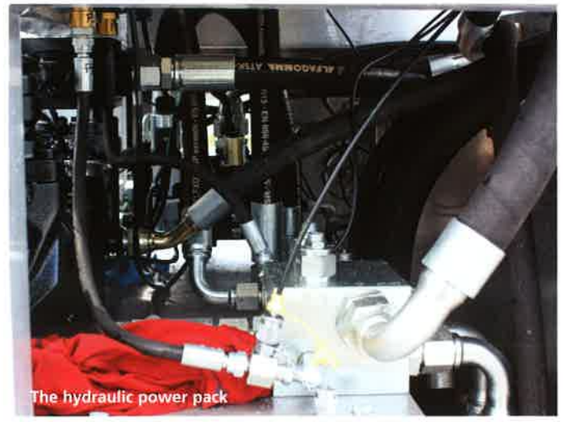
Looking at the hull form, the bow although somewhat bluff is shaped and moulded to assist in sea-keeping abilities when under tow. Get this wrong and trouble can quickly manifest into an ugly unwanted tow. Likewise at the stern of the barge, the fins require good water to give assistance to a stable towing track. Because the designer has ventured into the unknown for a vessel this size by using an alloy construction and dispensing with a ballast system along with all of its associated problems such as pumps and internal tank maintenance, only time will tell if he has got it right. Failing this, or with any compromise in performance, the task is then left to the tug master to control his charge and to recognize and handle its various foibles.

Coastal Resources have contracted one of Auckland's leading independent towing companies Thomson Towboats Limited, which makes sound business sense. When the barge is lying idle or being loaded the tow boats are not required and as such are not a cost against the job. Clearly using specialized professionals when required is a win-win for both parties.

Once at sea the barge remains totally unmanned and the operation of the dump mechanism is carried out by radio control from the towboat, in this case the 14 tonne bollard pull, 1000hp, twin screw *Christine Mary*. Once underway from the marina, it takes about 10 hours to reach the dump site, both the tug and barge are on AIS and when the dump button is hit, the point of dump is recorded on GPS in accordance with the resource consent rules.

As the barge is nearing or is on station the motor is started remotely and allowed to run for 10 minutes to warm up and build up hydraulic pressure. Once the dump is triggered and


The hopper barge opens like an inverted clam


The hydraulic power pack

the locking pins release to open the clamshell barge, there is no holding back. It takes about 10-15 seconds for the barge to empty and pop up. To close and bring the hulls together takes around a further four to five minutes during which time the hopper is flushed before the locking pins engage once again sealing the barge. Once the green lights register that the pins are safely re-engaged and the barge locked close, the hydraulics and motor may be shut down and the trip home begins. This takes about 10 hours depending on the weather.

In observing the tow when leaving the marina, we note the barge appears to be a bit lively on a short 50m tow, necessitating the use of a second smaller towboat for both close quarters control and safety. Once clear of the inner islands the tow is lengthened to 200m, which includes a section of 14m of 38mm stud link in the centre, at which stage the barge tends to settle on one quarter depending on the prevailing weather.

Clearly, the flat bottom nature of the barge slides well, even when loaded with 1000 tonnes of wet gooey spoil. Once empty the 80 tonne lightweight barge becomes lively again, but makes for an easy lightweight tow as long as there is a substantial vessel in charge upfront. The trap for young players would be to attempt such a long tow into open water and varying sea conditions with a lightweight tug, even if it had coastal survey limits. I can well recall my earlier experience when as a young tow boat master I bit off a bit more than I could chew on Auckland's harbour in a very stiff northerly with a loaded barge in tow and could not stop my track astern. Embarrassing yes, fortunately help was at hand in the form of a port tug who hauled us clear of danger just as the squall abated. Was my foo-foo valve puckering? Of course it was, but a lesson was learnt with no damage.

During the 120nm round trip the tug master not only has to contend with tides, wind and the notorious Colville passage, he must also control a heavy barge one way and a lightweight on the way home.

This is the first of the new generation alloy dump barges we have been fortunate to review and it is hugely engineered, the internal framing and structure is immense. At this stage images of such remain commercially sensitive, and rightly so.

For a dumb clamshell split hopper barge she has appealing lines and a functionality about her that sets her up for the job at hand. As a light ship this barge punches well above her weight, she can carry some 1000 tonnes before creeping towards the load line. This is no mean feat given her size. Her light un-laden weight offers both pluses and negatives, but as in all vessels where a compromise develops, as long as the pluses outweigh the negatives, one has got to be on the right side of the ledger.

SPECIFICATIONS

Vessel Name	T.R. Healy
Owner	Pacific Plant Limited
Home port	Auckland, New Zealand
Builder	Q-West Boat Builders Limited
Designer	Teknicraft Design Limited
Launched	January 2013
Construction	Marine Grade Aluminium
Length (LOA)	40.2m
Beam	12.5m
Depth	3.85m
Draft	2.05m
Hopper Capacity	620m³
Total load capability	800 tonnes