



Offshore ports

Ports worldwide — including those in the developing markets with their vast mineral resources to export — have a need to accommodate larger ships. However,

the cost to build terminals, as well as dredging and maintaining channels to reach them are undoubtedly enormous.

Thus engineering firm Bechtel has proposed an innovative solution — instead of bringing the ship to the port, bring the port to the ship.

In Africa, for example, Marco Pluijm, Bechtel's senior ports specialist, said "there is a huge demand for developing ports for the mining industry.



Pluijm

"These are all shallow water coasts, so there is a restrictive draft," he added. "Instead of dredging long channels to a coastal port, we think it's more profitable to bring the port out to deeper water and build an offshore port at a reasonable water depth, say 25 meters (82 feet), which is sufficient for receiving Cape sizes and Valemax ships, which are the biggest types of vessel." (Cape size is generally used to refer to drybulk ships with capacities of 100,000-180,000 deadweight tons, while Valemax ships — named after Brazilian mining company Vale — can move 380,000-400,000 deadweight tons of cargo.)

Ore or coal can be shuttled to the offshore terminal using barges.

Pluijm said there are several regions in Africa where "multi-user offshore hubs" could be built — for example in West Africa at the Guinea-Liberia region or around Cameroon and Gabon.

African Minerals, which operates a large iron mine in Sierra Leone, has Beltship Management transshipping ore from the mainland to larger bulk ships offshore using three Panamax-size self-unloaders.

Bechtel is not involved in the Sierra Leone project, but Pluijm said "we see it as one of the test cases from which we can learn."

He also noted CSL Australia — an affiliate of the Montreal-based Canada Steamship Lines — transloads iron ore in

Spencer Gulf to large ships.

"On the east side of Africa, in Mozambique, we have run a business case that shows the investment cost could go down 45 percent when compared to a traditional mine-to-rail-to-port scenario, and the operational cost can go down even 50 percent or more," Pluijm said. There, he envisions smaller barges with capacities of about 10,000 deadweight tons being used to carry coal for export.

In Africa, Bechtel believes steel or concrete structures could be built offshore and anchored to the seafloor where large ocean-going ships could tie up and receive cargo from barges that would bring materials from a transfer point on the coast or along a river.

While these platforms might be located a couple of miles offshore (the distance would depend on the profile of the ocean floor) where ships could be subject to considerable wave action. Pluijm said it would not be necessary to protect the barges or the ship they are loading from the sea with breakwaters.

"You can build the barges in such a way that they are suitable for both river and offshore navigation, and, of course, the bigger vessels are suitable for offshore navigation," he said. What may be required are dynamic response mooring systems, he said, that can control ship movements.

The company is also leading a three-year joint-industry research project to improve the safety of mooring large cargo ships off the coast of West Africa, called Transwell, (a term that combines the words "transshipment" and "swell").

Pluijm said such a facility might cost \$2 billion, compared to \$3.5-\$4 billion for a conventional onshore facility. That cost would include barges and other facilities that might be needed in addition to the offshore platform and loading equipment.

While African government involvement in such facilities might help stalled mining projects get underway, Pluijm thinks it's

more likely that offshore facilities will be funded by the private sector, perhaps Chinese companies that are major consumers of African minerals, like iron ore and coal.

Pluijm also said offshore terminals have application in the container industry, though he added there would probably be a need to build an artificial island or expand existing offshore land as was done with the Yangshan terminal near Shanghai. Yangshan is connected to the mainland by the 20-mile-long Donghai Bridge.

In Abu Dhabi, Bechtel managed the planning, design, and construction of the Khalifa Port and Khalifa Industrial Zone Abu Dhabi, which includes a one-square-mile terminal located on an island three miles offshore and connected to the mainland by a causeway and bridge.

Pluijm plans to speak on this subject at a conference in Dubai next month, and said there's been some interest in the United States by Ports America.

He said as bigger ships are deployed in the African trade, they could potentially be served by offshore multi-user terminals that receive containers shuttled to and from the mainland by barge.

"What we see is barging being a crucial element in the whole logistics chain, and for Africa that can mean you create a hub that's feeding with the coastal feeders to the rest of the coast or at least a large part of the coast which means the current ports can stay at their current level in terms of cranes and port conditions, water depth, quay wall, while those facilities are then being used for barging either import or export containers."

Such a facility in the United States could be built, for example, at the mouth of the Mississippi River.

"I think it would be extremely viable and worth the effort to look into an artificial island solution somewhere in the mouth of the Mississippi to load large carriers, especially now the new post-Panamax ships," he said.

The concept might also be attractive to other countries such as Vietnam.

While barging cargo to and from an offshore facility would drive up container-handling costs, Pluijm also noted there are savings that could be realized—lower infrastructure costs on the mainland and the ability to move containers inland at lower cost than by road or rail.