WorldCargo news

Sea Tech Panama Satellite System

A Swedish company has come up with a shipping concept that focuses on flexibility and direct calls

It goes without saying that the dominant idea in container shipping is that big is beautiful. Containership sizes have continued to increase inexorably since APL boldly broke the panamax envelope with its C10s in 1986.

Every subsequent step-up in capacity has been interpreted by some as "the limit," but the industry has continued to move on, to the extent that today's 15,000 EMMA class ships are physically too big for the new sets of Panama Canal locks, so they are post-NPX even before NPX becomes a reality after 2014.

So far Maersk has confirmed orders for 20 18,000 TEU "Triple-E" ships and still has an option on another 10. These ships will be 400m long, have a 59m beam and a depth of 73m, while draft will be 14.5m. In addition to shipping efficiency, Maersk has cited a number of environmental arguments in support of the ships.

On the basis of full nominal intake, they account for 20% less CO_2e per container moved compared even to the EMMA class, and 35% less fuel per container moved than ships in the 13,000-13,500 TEU range recently delivered to other shipping lines.

A holistic approach

One can dispute some assumptions behind these calculations (*WorldCargo News*, May 2011, pp49-50), but even if one accepts that the case is "watertight," it is strictly *qua* the ships themselves.

But ships do not exist in isolation from ports and their landside access capabilities. What is not quantified or accounted for is the public cost, in the broadest sense to include environmental as well as economic aspects, of building new deep water berths, dredging new fairways, extra handlings for transhipment and feedering, landside distribution over long distances from hub ports, "cascading" existing ships into north-south trade lanes that are just not ready for them, and so on. Big may indeed be beautiful, but not necessarily all the time.

Another approach is being advocated by a Swedish company, Sea Technology AB, which has developed a concept for a submersible dockship (called the "mothership") that carries smaller ships or motorised or simple barges (the "satellites") in transoceanic trades. "The purpose," says naval architect Bengt Lundquist, a director of Sea Technology, "is to avoid mega hubs and have a direct international sea connection between small and medium-sized terminals and inland ports and river systems."

Flexible approach

The Sea Technology concept can be adopted for a number of shipping types, including dry bulk, ro-ro and light oil cargoes, as well as containers and customised types, including geared satellites, are also possible. To start with, the company has proposed what it terms the Sea Tech Panama Satellite system, designed to take maximum advantage of the NPX envelope after 2014 for container shipping.

Two sizes of mothership are proposed: a long type (365m) and a short type (310m). The latter would carry four 130m long by 23m beam satellites and the former would carry six 105m long by 23m beam satellites.

The satellites have a depth of 11m and a speed of 10-12 knots. They would be constructed with strong bottoms enabling them to be docked dry with full cargo inside the mothership. This means the bottoms can be treated with new paint coatings at any time.

Float on and off

The satellites would normally operate over short distances and with small crews. The mothership transports the satellites over the ocean and float on/float off the satellites in strategic and sheltered locations close to the ports. The mothership will be dynamically positioned and take in or pump out ballast water for submerging only when it is on station. (Ballast water will not be transported between oceans, so the "invasive species" problem will be avoided).

The concept has resonances of the 12,000 TEU (6 x 2000 TEU barges) Jumbo Barge Carrier (JBC) dockship system proposed in the 1990s by the man who created the car transportation business at Wallenius more than 50 years ago, the late Capt Bengt Tornqvist (JBC report in *WorldCargo News,* July 1997, pp34-35).

Lundquist himself designed the first and second generation of ACL con-ros when he was technical director of Wallenius Lines in Stockholm - ATLANTIC SONG (1967) and ATLANTIC CINDERELLA (1970) were both Wallenius' ships.

Easy on infrastructure

Operationally Sea Tech is very flexible. It can serve a number of smaller/medium sized ports on a given range that may be closer to the cargo origin/destination points and does not impose huge costs to upgrade existing port infrastructure or deepen fairways in order to "stay in the game."

In addition, ro-ro, dry bulk and special purpose (eg project cargo or dedicated reefer or reefer container) satellites can be combined in a mothership; cargo weight disparities would be adjusted by the mothership's ballast system The mothership can also provide emergency docking services, or used to transport fishing vessel, ocean cleaning or survey vessels; they can used as floating depots or supply bases.

From an organisational point of view, Sea Tech is also very flexible. The mothership and satellites could be built in different parts of the world, and owned and operated by different entities. Several satellite owners or operators could participate in a given transoceanic voyage, and they could exchange slots with satellite operators using a mothership in a different trade lane. Similarly, it is possible to combine flags of convenience with state flags, for example to meet US Jones Act requirements.

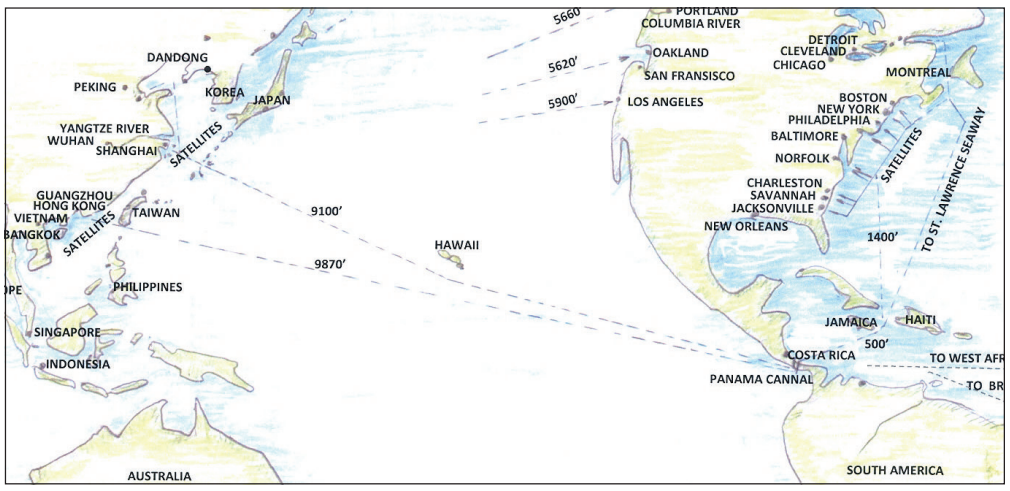
Clearly that is a key consid-

Estimates of Wuhan to Baltimore shipping costs: Sea Tech Panama Satellite versus conventional 14,000 TEU NPX ship

Estimated cost/days related to 1 TEU Freight, cranage, in-port moves	Conventional		Sea Tech Satellite Panama system			
	Cost US$	Days	Cost US$	Days	Total slot cost short mothership	Total slot cost long mothership
Port costs Wuhan plus loading in Wuhan	100	1	100	1		
Sea voyage costs, Wuhan-Shanghai, freight	1000	6	1000	6	6 x 20 = 120	6 x 20 =120
Discharge in Shanghai	100	1	0	0		
Float on/float off, Satellite at sea	0	0	50	1		
Storage in Shanghai and port handling	100	2	0	0		
Loading in Shanghai for ocean shipping	100	3	0	0		
Sea voyage Shanghai to Costa Rica, freight	2000	22	0	0		
Discharge in Costa Rica	200	2	0	0		
Storage and port handling in Costa Rica	200	2	0	0		
Loading in Costa Rica	2000	1	0	0		
Sea voyage Costa Rica-Baltimore, freight	1000	5	0	0		
Sea voyage Shanghai-Baltimore, freight	0	0	2000	26	26 x 30 = 780	26 x 26 = 676
Panama Canal costs included in freight	0	0	0	0		
Discharging in Baltimore	100	2	100	1		
Float on/float off, at sea Satellite	0	0	50	1		
Storage and port handling in Baltimore	100	1	100	1		
Inland transport costs 50 miles rail or truck	500	2	400	2		
Total cost and time	**5700**	**50**	**3800**	**39**		
Estimated port congestion delays		2		0		
Total time		**52**		**39**		

Source: Sea Technology AB, Stockholm, Sweden

One of today's leviathans, the 15,500 TEU EDITH MAERSK is 397m long and 56m wide and has a maximum draft of around 14.9m. The forthcoming Triple-Es measure 400m long, 59m wide and 73m deep and have a draft of 14.5m



Left: Illustration of an end to end operation: From Wuhan via Shanghai or from Bangkok, Philippines or Indonesia to USEC or Great Lakes, or to Brazil or West Africa. (Sea Technology AB)

eration for the Sea Tech Panama Satellite system. This has an intake of between around 6400 TEU and 7400 TEU depending on the mothership and satellite configuration. The satellites are in the 12,000-15,000dwt range and a loaded mothership is up to 120,000dwt.

The satellites stack just 9-wide, 5-high on deck and 4-deep below the pontoon type hatch covers. This is easily within the compass of most ports, using even relatively small mobile harbour cranes. There is no technical reason why the satellites could not be geared. This "universality" is even more pronounced when it comes to draft. The satellites have a maximum draft of just 6-7m. This opens up service to many river ports and creates a real possibility, based on lower overall cost and/or total time, for modal shift from road to inland waterway.

Costings are provided by Sea Technology for building, crewing, operating and running both types of mothership/satellite combination. They are not shown in this article, but Lundquist believes prices for building will drop with long series orders and he calculates that the number of working hours will drop by 40-50% from the fifth vessel onwards.

A long series would also attract the interest of the ship machinery companies, while the satellites can be built anywhere in the world, according to the preferences of the owners, although they will be built to the highest environmental standards to meet anticipated future as well as current requirements.

Cost comparison

Most NAEC and US Gulf ports will be unable to accommodate the *ca*. 14,000 TEU NPX ships that will be able to transit the new locks after 2014. There is a good chance that ports that receive deep sea calls today will become feeder outports for hubs in Central America and the Caribbean.

The table on the previous page shows a comparison of costs and overall transit time between a 6400-6600 TEU Sea Tech Satellite Panama and a "conventional" 14,000 TEU NPX ship for an end to end voyage between Wuhan (Yangtze River) and Baltimore (MD). This compares direct service with transhipment over Costa Rica. The figures indicate that the overall TEU cost is much cheaper with Sea Tech Satellite Panama, even though its nominal intake for the transoceanic leg is less than half the 14,000 TEU NPX ship, while the time saved is 13 days (25%). Even this may be an underestimate, says Lundquist, given congestion levels in hub ports.

For docking, the mothership has a 20m. Sailing draft is 9m and service speed is 20 knots. The new Panama locks have a dimension of 427m by 55m beam by 18.3m depth. As previously discussed in *WorldCargo News*, the Panama Canal Commission (ACP) has determined an NPX ship limit of 366m loa, 49m beam and 15.2m draft (tropical fresh water).

In the existing locks, the sides of maxipanamax ships (ca 4500 TEU) are just 2ft from the lock walls and thus impose huge compressive forces on them, and this has led to extensive cracking and costly repairs. Furthermore, in the absence of room for tugs, powerful electric locos ("mules") have to be used, and these are very expensive to operate.

Far less pressure

The Sea Tech Panama Satellite mothership has a beam of 52m, so is nominally too wide for the ACP's new operating limits. However, it would not be imposing anything like the same forces on the lock walls as its draft is only 8m. Sea Technology adds that tugs will be positioned fore and aft and in Lundquist's view, most likely only aft as the mothership has highly functional steering in terms of thrusters and navigational aids. The bow thrusters are effective up to around 5 knots.

The machinery will fulfil all IMO regulations from 2015 for sulphur content in marine oils and MARPOL regulations for NOx emissions. As noted, the system fulfils all rules for ballast handling. The satellites will use diesel-electric machinery and operate on LS (0.1%) marine oil or LNG. Hence they fulfil all IMO regulations for the Baltic Sea SECA, Turkish, US and Canadian coastal waters.

Good reception

The Sea Tech Panama Satellite system, its projected capital requirements and operating costs compared to 14,000 TEU NPX ships were presented in China last November to a leading shipping company, following a preliminary presentation at the Chinese Embassy in Stockholm last year. The feedback was encouraging, says Lundquist, and some other shipping lines have started to show interest. Meanwhile, the technical aspects continue to be worked on.

The Panama satellite is one of a number of variations. This article has touched on the range of cargoes that satellites could carry, but there are many geographical areas characterised by myriad small ports, such as the Philippine or Indonesian archipelagos, that could be served by the Sea Tech system.

Liquid roads

Other possibilities include St Lawrence Seaway/Great Lakes ports, the Mississippi/Missouri system, West African, River Plate/Paraná, and Brazilian ports. Of some interest at present is the Yangtze River Mississippi River Strategic partnership Forum, which in the past two years has begun to explore new ideas for shipping and multimodal distribution linking economic centres on two of the world's most important "water roads." A cooperation agreement was signed recently between the port of Wuhan and America's Central Port (St Louis, Mo).

One shipping executive has described Sea Tech as a "step that the industry needs to take." Shippers and 3PLs, too, need to think about the way their existing supply chains are organised. Sometimes it is necessary sometimes to think "outside the box."

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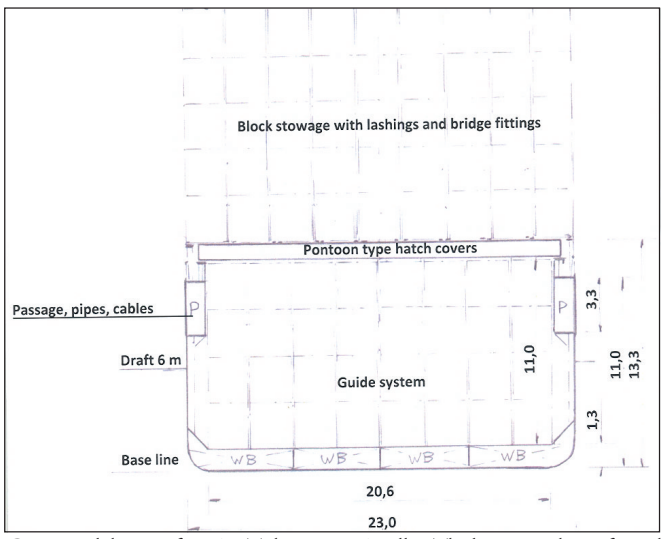
The system is not presented as a competitor to existing shipping lines, but as a concept that they can embrace. Lundquist is upbeat: "Mega ships and mega hubs will handle alot of cargo, but often the overall costs and time taken will be too high." This is the opportunity for Sea Tech.

So far, Lundquist has presented it to a number of major lines. He also has an agent in the US, Michael McCarthy of Earth Ship International in Ft Lauderdale, Florida, who is also acting as a consultant on the project. ❑



Conceptual drawing for a Sea Tech Panama Satellite. The layout can be configured for any container sizes including 45ft and 53fts. Capacity per satellite is in the 1100-1400 TEU range, depending on length. Sea Technology has designs for a number of satellites, such as for dry bulk, light oils, ro-ro, project cargoes, dedicated reefer container carriers or reefer cargo, geared container carriers, etc

Conceptual drawing for a Sea Technology dock-type mothership - 365m loa version with six satellites