

HEAVY-LIFT TRANSPORT SHIPS – OVERVIEW OF EXISTING FLEET AND FUTURE DEVELOPMENTS

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ABSTRACT

After a relative long period of status quo, the heavy-lift transport fleet is in process of rapid expansion. In 2006 and 2007, 4 new semi-submersibles heavy-lift ships have been added and 15 additional ships are to be delivered by 2011. In addition 12 dock ships and at least 25 project cargo ships are on firm order for delivery between 2008 and 2011, with options for 10 more. Most of these new transport ships are for fleet expansion, rather than replacement of old tonnage. Some of these ships are operated by new shipping companies, adding new competitors to the heavy-lift industry.

INTRODUCTION

The fleet of heavy-lift ships (limited here to semi-submersible ships, dock ships, module and crane carriers, and geared project cargo ships) is suddenly rapidly expanding. Existing heavy-lift companies are expanding their fleets by adding new or converted ships. New companies have been formed to operate new or converted ships (converted tankers and converted cargo barges). Older heavy-lift ships have been undergoing life extensions, and some were jumboised to be able to handle ever larger cargoes, see figure 1. Some have been scrapped, and others put into different services. This paper provides a comprehensive overview of these developments, as known and understood by late December 2007.

BRIEF HISTORY

Semi-submersible heavy-lift ships have been around since the introduction of the purpose designed and built *Docklift 1* in 1972, followed by the open deck *Super Servant 1* in 1979 [2]. Many ships followed, some of which were copies of the *Super Servant 1*, such as the *Dan Lifter* and *Dan Mover* (later renamed *Super Servant 5* and *6*) or larger ships of similar design, such as the *Mighty Servant 1, 2, and 3*, introduced in 1983. An alternative design was introduced in 1981 when the *Dyvi Swan* (later renamed *Sea Swan* and *Swan*) came on the market, the first of 4 combined heavy-lift ship/product tankers. Also 2 heavy-lift ships were created in 1982 by converting

existing oil tankers of which the tanker hull midsections were removed and replaced by shorter, lower depth cargo deck midsections. These were the *Sibig Venture* (scrapped in 1994) and the *Ferncarrier* (since renamed *American Cormorant* and more recently *Asian Atlas*). The initially Russian owned *Transshelf* signaled a temporary stop in 1986 for new heavy-lift ships. In 1999, after a 13 year pause, the purpose designed *Black Marlin* came on the market, followed by its sister ship the *Blue Marlin* a year later. In 2002, the *Tai An Kou* and its sister ship the *Kang Sheng Kou* were introduced. The latter were similar in design as some of the earlier open deck ships, but smaller, going against the trend of ever bigger. Shortly after its delivery however, the *Tai An Kou*'s beam was increased from 32.2 m to 36.0 m to boost its deadweight capacity and stability. The *Kang Sheng Kou* is scheduled to be also widened to 36.0 m in the course of 2008.



Figure 1 Jumboised *Blue Marlin* transporting the 59,500 t heavy *Thunder Horse* PDQ platform [1]

Some of the existing heavy-lift ships were modified over the years. In 1999, the *Mighty Servant 1* was extended by 30.0

m in length and widened by 10.0 m to 50.0 m total width. Its submersion draft was increased to 26.0 m (at aft casings), resulting in a maximum of 14.0 m of water over deck. Its 250 t Stuelcken mast was removed a few years later. The *Blue Marlin* was jumboised in 2004 by widening it with 21.0 m to 63.0 m total width. This modification included adding two additional 4,500 KW retractable thrusters, and an increase of submersion draft to 28.4 m (at aft casings) resulting in 15.1 m of water over deck.

In December 2006, the *Mighty Servant 3* accidentally sank after discharging a drilling rig off the coast of West Africa. It was salvaged and taken to South Africa for surveys and then towed to the Bahamas for repairs and upgrades. It is scheduled to be back in service by the end of 2008 in its original form [1].

A niche segment within the semi-submersible vessel fleet is formed by the dock ships. Introduced in 1972 with the *Docklift 1*, these ships combined a submersible dry-dock shaped cargo hold with ginpoles to load cargoes over the stern, using two portal cranes that traveled over the dock walls. A Ro-Ro ramp closes the hold. The larger *Dock Express 10* followed in 1979. This and its sister ships became very active on the container crane market, as its outriggers (after extension) could be used to forklift complete container cranes on and off. The largest ship of the series, the *Dock Express 20*, was converted into a dynamic positioned cable laying ship in 1993, and more recently, in 2005, into a subsea diamond mining ship and renamed *Peace in Africa*. With the container cranes increasing in size and weight, the *Dock Express 12* is now used to transport luxury yachts. Other dock ships, such as the *Dock Express 10*, *Enterprise* (ex *Smit Enterprise*) *Condock IV* and *V*, *Eide Trader* (ex *Spruce*) and *Developing Road* (ex *Mammoth Willow*) are still active in the heavy-lift market.

Non-submersible open deck ships are mostly used for the transportation of modules and container cranes. Most of the first generation open deck ships have been converted into offshore construction and crane ships, such as the ex *Snimos King* (now 2,500 t crane vessel *Saipem 3000*) and ex *Sunrise* (now flexible pipe line laying vessel *Sunrise 2000*). ZPMC Shipping operates a fleet of crane carriers, converted from bulk carriers. Although mainly used to deliver ZPMC container cranes, these ships are also occasionally used to transport other non-floating cargoes, such as bridge sections, see figure 2.



Figure 2 *Zhen Hua 4* loaded with bridge sections

The more traditional project cargo ships were developed in the mid fifties, with cargo handling gear that steadily increased in capacity. Starting with a cargo ship with 4 x 12 t derricks [3], these ships now have cranes capable of lifting 900 t each. In 1984, the *Happy Buccaneer* introduced the first large project cargo ship with relatively large lifting capacity. Its two mast cranes of 550 t capacity each, were the most powerful for nearly 20 years. In 2006, these cranes were upgraded to 700 t each.

In 2004, the *Jumbo Javelin* came on the market with 2 mast cranes of 800 t capacity each, since upgraded to 900 t each, or 1,800 t in tandem. In 2005, it was refitted with a DP2 propulsion system, making it suitable for a number of offshore installation tasks, in addition to transporting conventional heavy cargoes. Its non-DP sister ship, the *Fairpartner*, is shown in figure 3 lifting a 1,800 t piece of cargo.



Figure 3 *Fairpartner* lifts and loads a 1,800 t heavy J-Lay tower [4]

To meet the ever growing cargo demands, ship cranes of existing ships have been upgraded (see above) or replaced with bigger cranes to increase their capacity.

Most project cargo ships have large cargo holds with movable tween decks to accommodate a wide range of cargo shapes and sizes. Typically, the holds and hatch covers are dimensioned and equipped to also carry standard containers.

SEMI-SUBMERSIBLE HEAVY-LIFT SHIPS

By 2000, after a number of mergers and acquisitions, the number of heavy-lift companies operating semi-submersible ships had dwindled down to just two: Dockwise Shipping BV and NMA Maritime & Offshore Contractors. Competition thus was limited. The resulting higher day rates, combined with the increase in crude oil prices and the consequent boost of activities in the oil drilling industry and oil drilling equipment newbuildings, enticed new companies to enter this booming market. And these new companies needed ships.

One of the first to (re-)enter in late 2006 was Offshore Heavy Transport AS (OHT) out of Norway, with the commercial management of the two converted tankers *Willift Eagle* (ex *Lucky Lady*) and *Willift Falcon* (ex *Nilos*), owned by

Ocean HeavyLift ASA. OHT owned and operated the custom designed and built *Black Marlin* and *Blue Marlin*, until these were sold to Dockwise in 2001. The *Willift Eagle* and *Willift Falcon* are 42.0 m wide with a deadweight of 31,809 t each. The maximum water depth over deck is 8.5 m. This makes them suitable to carry most, if not all, jack-up drilling rigs, or even two at the time, see figure 4. However, they may be too small to carry the new (5-th and 6-th) generation of large semi-submersible drilling rigs, coming on the market in the next few years. These very large semis typically have a transport weight well in excess of 35,000 t.



Figure 4 Willift Eagle transporting 2 jack-up rigs [5]

By early 2008, two more converted tankers, the *Ancora* (ex *Songa Ancora*) (figure 5) and *Hawk* (ex *Front Transporter*) will join the OHT fleet. With a beam of 44.5 m, these ships are larger, with a reported deadweight of 54,000 t. The submersion draft allows for a maximum of 10.5 m of water over deck for the *Ancora* and *Hawk*. The transit speed of these converted tankers is relatively high, in excess of 14 knots in loaded condition. Bow and stern tunnel thrusters assist in maneuvering.



Figure 5 Ancora out of dry dock after conversion [5]

Another new company, founded by some heavy-lift transportation veterans, was SeaLift Ltd., which planned to operate a fleet of up to 6 ex Frontline Ltd. Suezmax tankers to be converted in 2007 – 2009. Before delivery of the first converted ship, the new company merged with Dockwise, which took over management of the to be converted ships. The first converted tanker named *Transporter* (ex *Front Sunda*)

(figure 6) was delivered in May of 2007, followed by the *Target* late December of that same year. The *Treasure* and *Talisman* are scheduled for completion in late 2008, followed by the *Trustee* and *Triumph* in 2009. These are all identical ships, single hull Suezmax tankers, of which the midship section with all cargo tanks is (to be) removed and replaced with a custom built shorter cargo deck section with a reduced hull depth, strong deck, and a customized ballast tank configuration. By adding these converted tankers to their fleet, Dockwise can use their open deck ships for applications that specifically require an open unobstructed stern, such as deck mating, SPAR hull transports, etc.



Figure 6 Transporter loaded with a dredger [1]

Targeting a different market, but using conventional open deck semi-submersible heavy-lift ships, is the new company SeaMetric International AS from Norway. This company developed their Twin Marine Lifter (TML) system, using two DP3 classed ships, each outfitted with four large telescopic lift arms which are operated by (de)ballasting integrated ballast and buoyancy tanks, see figure 7. With these pivoting arms, large structures such as topsides, weighing up to 20,000 t, can be lifted off a transport ship or cargo barge and installed onto its jacket structure. In reverse, this system can be used to remove the topsides from a decommissioned platform. With the lift arms removed and buoyancy casings installed aft on the stern, these ships transform into 25,000 dwt semi-submersible heavy-lift ships. By the end of 2007, SeaMetric had 4 of these ships on order (2 complete lift systems) plus two transport ships of 35,000 dwt each, all for delivery in 2009 – 2010. These ships will be outfitted with helidecks.



Figure 7 Twin Marine Lifters lifting a topside structure [6]

The Dutch towing company Fairmount Marine BV which owns and manages a number of submersible barges, including the 50,000 dwt *Gavea Lifter* (ex *Zhong Ren 3*), spun off a new company named Fairstar Heavy Transport NV (FHT) to manage 2 semi-submersible self-propelled heavy-lift ships converted from cargo barges, by adding propulsion systems, forecastle, accommodation block, navigation bridge, bulbous bow, etc. The converted ships were renamed *Fjord* (ex *Boa Barge 19*) and *Fjell* (ex *Boa Barge 20*). The *Fjord* also had a 12.0 m long deck section inserted. The longer *Fjord* with its 45.5 m beam has a deadweight of 24,500 t, compared to 19,300 t for the 36.0 m wide *Fjell*. Both conversions were done at Malta Shipyards Ltd., starting in November 2005. The *Fjord* completed its sea trials in late December 2007, see figure 8. Delivery of the *Fjell* is scheduled for end of 2008.



Figure 8 *Fjord* after conversion out for sea trials [7]

NMA has the commercial management of the COSCO Shipping Co., Ltd. (COSCOL) heavy-lift ships *Tai An Kou* and *Kang Sheng Kou*. In November 2007, COSCOL ordered 2 new heavy-lift ships from the Guangzhou Shipyard International in China, for delivery in 2010 and 2011. These 50,000 dwt ships will have an open cargo deck of 177.6 x 43.0 m, see figure 9. The aft buoyancy casings are movable, which allows for the loading of large cargoes over the unobstructed stern. With a maximum of 13.0 m of water over deck when submersed, large, deep draft floating cargoes can be loaded, using the float-over method.



Figure 9 NMA/COSCOL 50,000 dwt newbuilding [8]

The existing and future semi-submersible ships are compared in the figure 10 which shows the main particulars of each of the individual ships (or series of ships in case of sister ships). Compared are: a) Deck length, b) Beam, c) Deadweight, and d) Water over deck. The largest heavy-lift ship, the jumboised *Blue Marlin*, stands out in most of the plots.

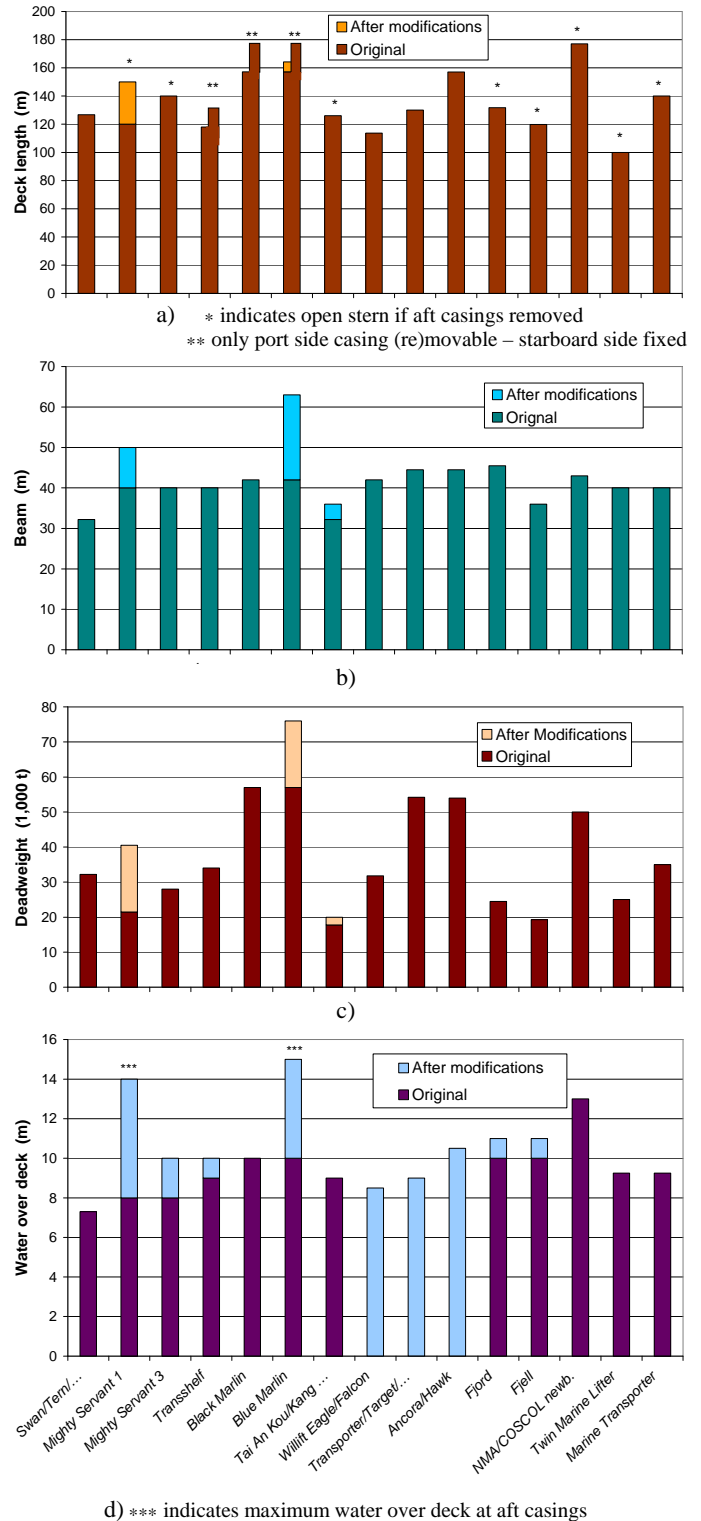


Figure 10 Comparison semi-submersible heavy-lift ships

Figure 11 shows the age of the semi-submersible ships. Most of the older ships have undergone extensive life extension programs. Many onboard systems of the converted tankers have been rebuild or upgraded during the conversion period.

More details on the semi-submersible heavy-lift ships are provided in table I.

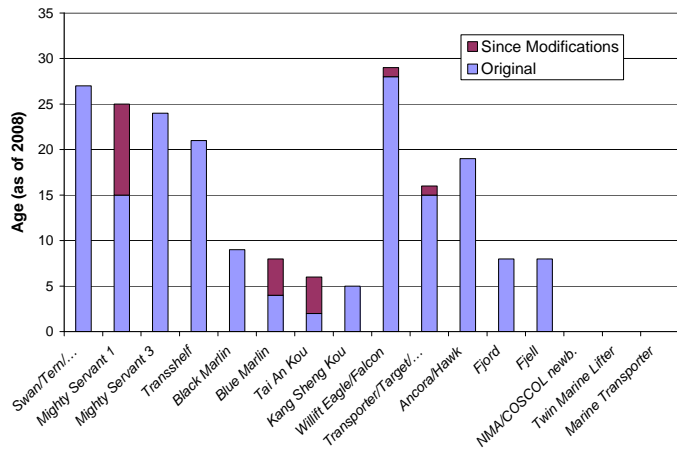


Figure 11 Comparison age of heavy-lift ships

Figure 12 shows the fleet of semi-submersible heavy-lift ships (excluding the dock ships and yacht carriers, see below) since 2000, with 19 new ships added to the fleet between 2006 and 2012, almost tripling the fleet of 2005.

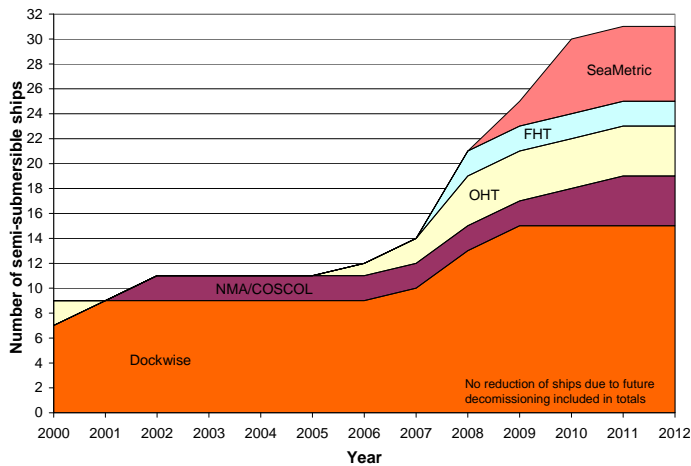


Figure 12 Number of semi-submersible ships on the market

YACHT CARRIERS

Some of the original semi-submersible heavy-lift ships have been transferred to the yacht transport business, a specialized niche market segment. As a joint venture between Wijsmuller Transport and Dock Express, United Yacht Transport (UYT) started in 1992 with the trans-Atlantic transport of luxury yachts using the *Super Servant 3*. In 1995 the *Super Servant 4* was converted for the yacht trade by adding a 30.0 m long midship section and wing walls. The *Dock Express 12* and the *Explorer* (ex *Smit Explorer*) were also added to the fleet of yacht carriers. The company was later renamed Dockwise Yacht Transport (DYT).

In October 2007, the first custom designed yacht carrier *Yacht Express* was delivered to DYT, see figure 13. It is semi-submersible in order to float-on the yachts inside its 31.0 m wide dock bay, protected by spray covers on each side. The 11,000 dwt *Yacht Express* has a length of 209.0 m and a beam of 32.2 m, thus able to transit the Panama Canal. With its 2 x 8,700 KW diesel electric propulsion plant, the design transit speed is 18 knots.



Figure 13 *Yacht Express* loaded with luxury yachts [9]

DOCK SHIPS

With some of the existing dock ships moving away from the heavy-lift market (see above), a new Dutch company, RollDock NV identified the need for new dock ships and ordered a series of 8 identical 8,300 dwt dock ships for delivery between 2008 and 2011, with options for more ships. These ships are semi-submersible up to 6.0 m of water over the 19.0 m wide dock deck. They are outfitted with 2 x 350 t Liebherr cranes, allowing them to compete with the project cargo ships. The full width dock door acts as a stern ramp which can be adjusted in height to accommodate various quay heights for roll-on operations, see figure 14. The cargo capacity of the stern ramp is 1,600 t.



Figure 14 Computer rendering of the RollDock ship [10]

CombiLift, a joint venture between Denmark's Poulsen Group and Germany's Harren & Partners ordered 4 each 11,000 dwt dock ships, outfitted with 3 cranes: 2 x 350 t plus 1 x 200 t. These are to be delivered in 2008 and 2009.

Eide Marine Services AS from Norway operates a fleet of cargo barges and ships, including the dock ships *Eide Trader* (ex *Spruce*), *Eide Transporter* (ex *Kitt*), see figure 15, and the 40,796 dwt *Eide Carrier*, an ice breaking lash carrier. This 1989 built ship is to be converted into a heavy-lift ship.



Figure 15 The 11,306 dwt dock ship *Eide Transporter* [11]

PROJECT CARGO SHIPS

Project cargo ships are non-submersible multi-purpose heavy-lift ships, outfitted with one or more cranes to lift cargo off the quay and stow it in their cargo hold or on top of the hatch covers. Cargo holds have tween decks that can be secured at different heights, or (partly) removed. Some ships are allowed to sail at reduced draft with the upper deck cargo hatches open, allowing for tall cargoes to be stowed inside the holds. Hatch covers can be used to extend the deck area for the support of cargoes with large foot prints.

BigLift Shipping BV (ex Mammoet Shipping) operates a large fleet of project cargo ships, including the 13,740 dwt project cargo ship *Happy Buccaneer*, which has been in service since 1984, see figure 16.



Figure 16 *Happy Buccaneer* transporting 3 cranes [12]

In mid 2007, BigLift ordered 2 new heavy-lift ships from Larsen & Toubro of India for delivery in 2009 and 2010, see figure 17. These 18,680 dwt ships will be outfitted with 2 mast cranes of 900 t each, for a tandem lift capacity of 1,800 t. The upper deck hatch covers will be hydraulically operated. To accommodate very tall cargoes, these new ships can sail with the upper deck hatch covers partially or completely open. The ships will have a 1A Finnish Ice classification.

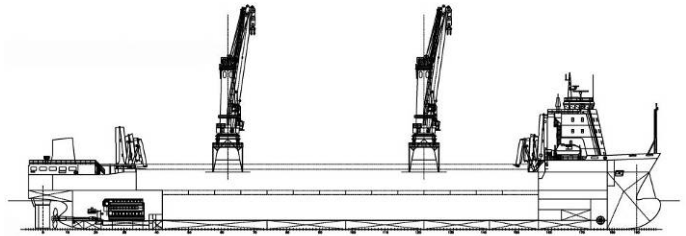


Figure 17 The BigLift 18,680 dwt newbuilding [12]

Jumbo Shipping introduced their so called J-1800 class ships in 2004: the *Jumbo Javelin* and *Fairpartner*. The 13,278 dwt *Jumbo Javelin* was upgraded with a Dynamic Positioning 2 system, which allows it to work offshore and assist with the offshore installation of suction anchor piles, (see figure 18), deep water manifolds, risers, etc. After re-reeving the crane hoist wires, loads up to 600 t can be lowered as deep as 1,000 m below the water surface. Because of their success, both in conventional transportation as well as in offshore installation, two more ships of this same class were ordered for delivery in 2008 (*Fairplayer*) and 2009 (*Jumbo Jubilee*). Of these, the *Fairplayer* will be DP 2 classed.



Figure 18 *Jumbo Javelin* installing a suction pile offshore [4]

A relatively young company in this sector is Beluga Shipping GmbH out of Germany, which started in 1995 with a few chartered ships and focused on containers and project cargo. The company rapidly grew and started investing in their own ships, operating a fleet of 10 container feeder ships plus 46 heavy-lift ships in 2007, see figure 19.



Figure 19 *Beluga Endeavour* with 3 RTGs on deck [13]

The Beluga heavy-lift ships are outfitted with 2 or 3 cranes, ranging from 40 to 350 t each. Two of the larger ships, the 11,934 dwt *Beluga Intonation* and *Beluga Indication* were upgraded in mid 2007 to 13,630 dwt, by lengthening the hulls by 28.0 m and increasing the crane capacity from 150 to 350 t each. In order to deal with the increased heeling moments, a special anti-heeling system for filling and emptying ballast tanks was installed. This company ordered 6 more container feeder ships plus 39 more heavy-lift ships, including 6 of 20,000 dwt each, outfitted with 2 x 700 t cranes plus 1 x 120 t crane. Some of these new ships will be outfitted with the innovative SkySails system to reduce the fuel consumption, see figure 20.



Figure 20 *Beluga SkySails* outfitted with a SkySails system [14]

A well established German company, Schiffahrtskontor Altes Land GmbH & Co. KG (SAL) is exclusive agent for a fleet of 15 heavy-lift ships with cranes ranging from 250 t to 350 t. Most ships have 3 cranes (2 x 350 t plus 1 x 250 t). With these medium range cranes, these ships can load a variety of cargoes. In 2007 this company joint ventured with the Japanese company K-line, providing access to the K-line fleet of 440 ships.

In order to expand its fleet of multi-purpose heavy-lift ships, SAL ordered 6 new ships, 4 of which will be 12,000 dwt with 2 cranes of 700 t each plus 1 crane of 350 t. Sailing speed will be 20 knots. These ships are scheduled for delivery in 2008. The other 2 newbuilding ships will have a deadweight of 12,500 t and will be outfitted with 2 cranes of 1,000 t each, and a DP2 system, see figure 21. These ships are scheduled for

delivery in late 2009 and SAL has an option for 2 additional ships of this series.

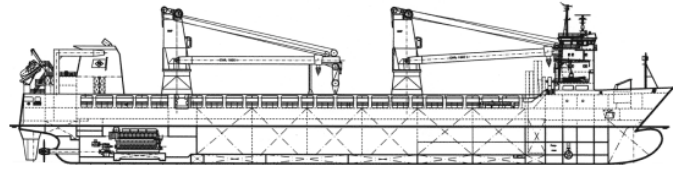


Figure 21 SAL newbuilding with 2 x 1,000 t cranes [15]

Chipolbrok, the Chinese-Polish Joint Stock Shipping Company [16], founded in 1951, operates a multipurpose fleet of 22 geared, semi-container triple-decker project cargo ships. To further expand this fleet, 6 new 30,000 dwt each ships were ordered for delivery in 2009 – 2010. Each ship will be outfitted with 2 cranes of 320 t capacity, for a tandem capacity of 640 t.

BBC Chartering & Logistics [17] operates a fleet of more than 90 project cargo ships, outfitted with cranes ranging from 35 to 325 t. As of 2007, BBC has 35 new ships on order, 4 of which will be equipped with 2 cranes of 400 t each, for a combined lifting capacity of 800 t. These ships will have a deadweight of about 11,000 t. In late 2007, BBC signed an alliance agreement with DYT for the worldwide delivery of luxury yachts, using the lift-on/lift-off method.

SE Shipping Lines of Singapore ordered 4 heavy-lift ships, with options for 8 more. These ships are to be used for transportation of windmills for Suzlon Energy. These 25,000 dwt ships are to be outfitted with 2 x 400 t cranes. The double screw propulsion of 9,000 KW enables a transit speed of 16.5 knots. Delivery is expected at the end of 2009.

Wind power company Enercon GmbH has ordered a 130 m long project cargo ship that will be power assisted by four 27 m high, 4 m diameter Flettner Rotors, for delivery in 2008.

Details of the project cargo ships are provided in table II.

MODULE AND CRANE CARRIERS

For the transport of modules and container cranes, non submersible heavy-lift ships are used. The 11,000 dwt Korean owned *DongBang Giant No 1* and *No 2* are open deck carriers with no obstructions other than two small funnels aft.

The HYK-Hinode Ltd operated 10,377 dwt *Sea Baron* (ex *Sea Bridge*) has a cargo deck with 2.5 m high walls and funnels along its sides [18]. Its 450 t revolving cargo crane was removed a few years ago. HYK-Hinode has 2 new module carriers on order for delivery in 2009 - 2010.

The container crane manufacturer ZPMC typically delivers its cranes to clients worldwide using ships of its own shipping company. Their first ship, the *Zhen Hua I*, was converted from an old bulk carrier in 1994. The bulk carriers and tankers are converted by lowering the main deck in way of the cargo section, and adding sponsons to increase the deck width, thus allowing for the stowage of the larger, Post Panamax cranes athwardships. These cranes are loaded/offloaded over the side. To meet increasing demand, ZPMC has so far converted 23

ships (3 of which have since been scrapped). Figure 22 shows the *Zhen Hua 7* delivering 4 container cranes to two different terminals in Long Beach, one of which required a low bridge passage.



Figure 22 *Zhen Hua 7* with 4 container cranes for Long Beach [19]

These ZPMC carriers are almost exclusively used for transportation of container cranes. Occasionally however, they do transport other heavy cargoes, in particular large bridge sections. All the bridge deck sections for the new Carquinez bridge in the San Francisco Bay area were transported by four ZPMC ships from Japan, see also figure 2. In 2009, all the steel tower sections and bridge deck sections for the new Oakland to San Francisco Self Anchored Suspension Bridge will be transported by ZPMC ships from the fabrication site in China.

CONCLUSION

The marine heavy-lift industry is going through a lot of changes. Many new semi-submersible transport ships are entering this market. Some of these are converted tankers, others are purpose designed and built open deck ships. As of 2008, the original fleet of heavy-lift ships is more than 22 years old, and in need of either life extension services or replacement. Without taking older ships off the market, the semi-submersible fleet could grow to 31 ships by 2012, with 19 new or converted ships added since 2006. There is relatively little innovation in these new ships. By converting existing tankers, heavy-lift ships can quickly be put into service. The Twin Marine Lifter, outfitted with lift arms, provides an alternative to large offshore cranes.

The fleet of project cargo ships is continuously growing with ever larger ships coming on the market. The ship's cranes are getting more powerful. SAL has two ships on order which are to be outfitted with two cranes, each with a lifting capacity of 1,000 t, totaling 2,000 t in tandem operation. These ships are also DP2 equipped, allowing them to operate offshore, a trend started by the Jumbo J-1800 class ships, of which 2 more will be delivered in 2008 and 2009, one of which will be outfitted with a DP2 system.

BigLift Shipping, BBC Chartering & Logistics, SE Shipping, Chipolbrok, and Beluga Shipping also have a number of large project cargo ships on order for delivery in 2008 – 2011 plus options for more. These will have cranes in the 320 – 1,000 t range. Firm orders total at least 31 ships.

Some of these new project cargo ships include wind power assist options, such as the innovative SkySails or the in 1922 patented Flettner Rotors.

A brand new custom built yacht carrier, the *Yacht Express* entered the market in late 2007.

A series of 8 new dock ships, outfitted with 2 x 350 t cranes, is on order by RollDock for delivery between 2008 and 2011. CombiLift has 4 larger dock ships with 2 x 350 plus 1 x 200 t cranes on order, for delivery in 2008 and 2009.

New container cranes built by ZPMC are delivered by its own fleet of converted bulk carriers and tankers that has grown to 20 crane carrier ships.

NYK-Hinode has ordered 2 new module carriers for delivery in 2009 and 2010.

With all these new ships coming on the market in the next few years, the heavy-lift market demand can hopefully keep up with the supply.

Finding qualified crews to man all these new ships could be a challenge for the operating shipping companies.

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Table I - Particulars of semi-submersible ships

Semi-submersible Heavy-lift Ship	Length bp m	Beam m	Depth m	Draft m	DWT t	Propulsion KW	Sub draft m	Built/ Converted
<i>Asian Atlas</i>	213.90	41.15	13.55	10.55	47,500	14,800	20.05	1975/1982
<i>Swan, Tern</i>	170.95	32.26	13.30	9.97	32,650	9,642	20.60	1981,82
<i>Swift, Teal</i>	170.95	32.26	13.30	9.97	32,187	9,642	20.60	1983,84
<i>Mighty Servant 1</i>	174.70	50.00	12.00	8.77	40,910	4 x 3,100	26.00*	1983/1998
<i>Mighty Servant 3</i>	165.70	40.00	12.00	9.06	27,720	4 x 3,100	22.00	1984/2008
<i>Transshelf</i>	162.00	40.00	12.00	8.80	34,030	2 x 6,750	22.00	1987
<i>Black Marlin</i>	206.50	42.00	13.30	10.10	57,021	12,640	23.30	1999
<i>Blue Marlin</i>	206.50	63.00	13.30	10.30	76,410	21,640	28.40*	2000/2004
<i>Tai An Kou</i>	145.00	36.00	10.00	7.50	20,101	2 x 5,000	19.00	2002/2004
<i>Kang Sheng Kou</i>	145.00	36.00	10.00	7.50	20,101	2 x 5,000	19.00	2003/2008
<i>Willift Falcon, Eagle</i>	191.30	42.00	11.00	8.00	31,809	15,300	29.50	1981/2006,07
<i>Transporter, Target, ... (6)</i>	209.30	44.50	14.00	10.44	54,240	13,365	23.00	1992/2007-09
<i>Ancora, Hawk</i>	214.07	44.50	13.00	10.10	54,000	13,550	23.50	1989/2008
<i>Fjord</i>	155.15	45.50	9.00	6.00	24,500	3 x 3,840	20.00	2000/2008
<i>Fjell</i>	137.02	36.00	9.00	6.40	19,300	3 x 3,840	20.00	2000/2008
<i>NMA/COSCOL newb. (2)</i>	~215.00	43.00	13.00	9.85	50,000	~15,000	26.00	2010,11
<i>Twin Marine Lifter (4)</i>	~135.00	40.00	10.75	8.00	25,000	4 x 3,000	20.00	2009,10
<i>Marine Transporter (2)</i>	~175.00	40.00	10.75	8.00	35,000	4 x 3,000	20.00	2009,10

*) at aft casings

Table II - Particulars of project cargo ships

Project Cargo Ship	Length bp m	Beam m	Depth m	Draft m	DWT t	Propulsion KW	Lift cap t	Built/ Converted
<i>Happy Buccaneer</i>	134.00	28.30	14.80	8.27	13,740	2 x 4,000	2 x 700	1984/2007
<i>Stellaprima</i>	93.50	20.98	13.32	7.42	7,572	3,300	400 + 250	1991
<i>Kibi, Kamo</i>	~114.50	21.00	11.60	7.50	9,433	3,773	450	1994,98
<i>Happy River, Rover, ...</i>	127.90	22.88	12.95	9.50	15,634	8,775	2 x 400	1997,98
<i>Jumbo Vision, Fairlane</i>	101.85	20.85	13.90	7.72	7,000	4,900	2 x 400	2000,01
<i>Beluga Intonation, Indic.</i>	154.25	20.40	11.10	7.88	11,320	7,800	2 x 350 + 1 x 150	2000/2007
<i>BBC Asia, Africa, ...</i>	113.50	20.20	9.70	7.60	7,530	6,300	2 x 250	2003,05,06,07
<i>Panagia, Pantanal, ...</i>	113.50	20.20	9.70	7.59	7,821	6,300	2 x 250	2004
<i>Jumbo Javelin, Fairpartner</i>	133.80	26.50	14.10	7.50	12,870	2 x 4,320	2 x 900	2004
<i>Fairplayer, Jumbo Jubilee</i>	133.80	26.50	14.10	7.50	12,870	2 x 4,320	2 x 900	2008,09
<i>BBC newbuildings (4)</i>					11,000		2 x 400	2008,09
<i>SAL type 176 newb. (4)</i>	~147.80	24.00	13.30	9.00	12,000	9,500	2 x 700 + 1 x 350	2008
<i>SAL type 179 newb. (2/2)</i>	~154.80	27.50	13.80	9.20	12,500	9,500	2 x 1,000	2009,10
<i>Chipolbros newb. (6)</i>	~194.00	27.80		11.00	30,000	16,520	2 x 320	2009,10
<i>BigLift newbuilding (2)</i>	145.20	26.50	14.30	9.50	18,680	8,775	2 x 900	2009,10
<i>SE Shipping newb. (4/8)</i>	157.30	26.00	14.30	11.00	25,000	2 x 4,500	2 x 400	2009,10
<i>Beluga P2-1400 newb. (6)</i>	155.79	25.20	13.85	9.50	19,700	9,800	2 x 700 + 1 x 120	2009,10,11

Particulars listed in above tables believed to be correct but not guaranteed and subject to changes