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Asian Shipyards Respond to Arctic Opportunities

VIJAY SAKHUJA

The Arctic sea ice has refrozen after a relatively longer summer this year compared with 2011. During the season, there were three significant shipping events. First, the navigation conditions during the year were favourable and a tanker was in transit as on 30 November, compared to 18 November 2011when the last voyage had been completed. Second, 46 vessels transited through the Northern Sea Route (25 eastbound and 21 westbound) which compares favorably to 34 transits in 2011 and only four in 2010. In terms of cargo, 1.26 million tons were moved in 2012 which is a 53 per cent increase over 0.820 million tons in 2011. Bulk of the cargo constituted energy products such as diesel, jet fuel, gas condensate, LNG and other petroleum products which were moved by 26 vessels (18 tankers west-east direction and 8 in the opposite) accounting for 8,94,079 tons. The largest consignment was of 66,552 tons of jet fuel from Korea to Finland onboard the Norwegian tanker *Marika*. The route is yet to see a super tanker undertake a voyage.

Third, for the first time in the history of Arctic sailings, a LNG tanker Ob *River* carrying 66,342 tons of gas sailed from the Norwegian gas liquefaction plant on the Barents Sea coast at Hammerfest. It covered more than 6,000 miles through the Northern Sea Route to Tobata Port in Fukuoka Prefecture in southwestern Japan thus saving nearly 20 days if the vessel had followed the route through the Indian Ocean i.e. via the Suez Canal and Straits of Malacca.[1]

These are encouraging reports for the shipping industry and it is believed that similar navigation conditions can be expected in the future due to global warming and shrinking of the Arctic ice cap during summer. However, it is the availability of icebreakers and ice-class ships will determine the future shipping activity through the Northern Sea Route. In fact the icebreakers hold the key to a successful voyage through the Arctic Ocean. These vessels are designed to plough through the ice and crack open a path. The others vessels follow the icebreaker in its wake and navigate though harsh icy sea conditions.

Global Icebreaker Fleet

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According to a study, the world's icebreaker and ice breaking supply vessel fleet (supply vessels do not perform escort duties but undertake various tasks at offshore oil and gas fields) was more than 80 ships in 2011.[2] These are owned by Argentina (1), Austria (1), Britain (1), Canada (8), Chile (1), China (1) , Denmark (3), Estonia (2), Finland (6), Germany(3), Japan (4), Kazakhstan (3), Latvia (1), Norway (1), Russia (35), South Africa (1), Sweden (4), and USA (4).

Russia has the largest inventory of icebreaker and ice breaking supply vessels. There are six nuclear powered icebreakers: *Russia, Taimyr, Soviet Union, Vaigach, Yamal* and *50 Years of Victory* and among these *Taimyr* and *Vaigach* are of 8.1 meters draft and meant for operations in shallow waters.[3] The other four vessels are of the Arctic class and have a draught of 11 meters. Most of these were built during the Soviet era and are at the end of their service life. For instance, *Russia* and *Taimyr* will need to be taken out of service by 2018. Likewise, several diesel-electric icebreakers will be due for decommissioning by 2017-2019.[4]

Russia has drawn plans to replace its aging fleet of icebreakers and allocated Rubles 100 billion (US $3.2 billion) to construct three nuclear-powered icebreakers in the coming years.[5] It will be useful to mention that the construction time for an ice breaker is about eight years and the operational life is nearly 25 years. In August 2012, the Russian state nuclear power company Rosatom signed a contract with Baltiysky Zavod shipyard in St Petersburg for the construction of a new generation icebreaker LK-60. The vessel is scheduled for delivery by 2017.[6] Likewise, in February 2012, the Ministry of Industry and Trade issued tenders for building Arctic compatible vessels and infrastructure : (a) Light and heavy Arctic surface-effect ships: 458 million rubles/$15.7 million; (b) Ground effect vehicles for the Far North: 70 million rubles $2.4 million; (c) High-speed sea and river catamarans ("Alligators"): 25 million rubles/$857,000; and (d) Floating Production Storage Offloading vessels (FPSOs): 40 million rubles/$1.37 million.[7]

In 2012, an article from the Russian International Affairs Council noted that Scandinavian countries such as Norway, Sweden and Finland, and a number of countries that have interest in Antarctica (Australia, Argentina, Great Britain, Germany, Holland, Spain, France, Chile, South Africa) possess icebreaker capabilities. The EU countries too plan to build Aurora Borealis, a multifunction heavy icebreaker capable of doing a number of such as activities drilling and research.

Asian Interest in Arctic Shipping and Shipbuilding Capability

Among the Asian countries, China, Japan and South Korea are in the forefront and possess Arctic capable commercial and research vessels. India has drawn plans to build a polar research vessel. Also, Asian shipbuilders are keenly watching the ongoing trends in shipping operations through the Northern Sea Route and see several opportunities in the emerging ice class vessel market. China, Japan, and South Korea are global shipbuilding giants and have built or are building ships for operations in the Arctic waters.

South Korea

The Republic of Korea government recently announced its plans to invest KRW 3.6 trillion (US $ 3.1billion) by 2020 to strengthen research for new offshore industries and the Arctic shipping sector.[8] The Korea Institute of Ocean Science & Technology (KIOST) is the lead agency for Arctic research and also for fostering new offshore industry. It plans to build a 5,000-tonne advanced offshore research vessel and develop a 6,000-meter deep submarine by 2015 to develop R&D foundation for deep sea research and exploration.

The Hyundai Heavy Industries (HHI), the Samsung Heavy Industries (SHI) and Daewoo Shipbuilding & Marine Engineering (DSME) are the world's three biggest shipyards. These shipbuilders focus on high-priced vessels such as liquefied natural gas (LNG) carriers and offshore platforms.

The Hyundai Heavy Industries (HHI) is engaged in R&D to build a new icebreaker- transporter capable of carrying 190,000 tons cargo which is nearly a double of the carrying capacity of any large commercial vessel. The available data suggests that the vessel will have a speed of up to six knots and capable of sailing through 1.7 meters thick ice. Besides, it will be fuel efficient and save nearly 5 per cent of fuel compared to other vessels of similar tonnage. This is in line with the HHI's approach of building 'biggest, safest and greenest' vessels. However, experts argue that "icebreaking-equipped ships are expensive," and would have to be laid off during winters. Further, there is no 'economic sense to use them for the southern route the other half of the year'.[9] As regards the cost and time for construction, a ship with same specification but without ice-breaking capabilities would be about US $46 million and can be built in less than a year.

Likewise, the DSME, is building the world's first arctic drill ship capable of withstanding extreme cold environments as low as minus 40 degree centigrade. The vessel is 'specifically designed for the ship's crew to be able to operate effectively and safely while consuming the least amount of energy.'[10]

The Samsung Heavy Industries (SHI) has constructed the bi-directional 'Arctic shuttle' tankers which is a new-concept ship designed for high fuel efficiency.[11] The unique feature of the vessel is that it 'moves forward by breaking ice like an ordinary icebreaker, but rotates its motor 180 degrees to move backward, break the ice and maneuver by itself to a new path if caught in iceberg.' These are expensive vessels and cost nearly three times more than ordinary ships of the same size and class.

Korea is planning to join hands with other shipbuilding nations such as Norway to build ice class vessels. Both sides have signed an MOU on cooperation in eco-friendly shipbuilding. Importantly, shipbuilding industry accounts for half of the total trade between Korea and Norway and 70 percent of Korean exports to Norway.[12]

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Japan

Japan is the Asian leader in terms of Arctic related research and was the first nation to undertake transportation feasibility studies through the Northern Sea Route. The icebreaker Soya, acquired from the Soviet Union in 1938, was the first Japanese flagged vessel to take part in the Antarctic expedition. It continued in service till 1978 and today it is preserved as a museum.[13] The most modern Japanese icebreaker is the *Shirase* and was built by the Universal Shipbuilding Corporation. It was handed over to the Japanese Ministry of Defense on May 20, 2009 and has supported the Japanese polar research programme in Antarctica. The first voyage to Antarctica was from November 2009 to April 2010.

The Japanese shipyards are well known for building sophisticated and eco-friendly ships. Though expensive, several international shipping companies prefer Japanese built ships. For instance, in October 2012, Fednav Limited and Canadian Royalties announced plans to acquire a Polar Class 4 ice-breaking bulk carrier to transport nickel/copper from Nunavik to markets in Europe.[14] The ship will be designed by Sunitomo Corporation and Universal Shipbuilding Corporation and built at the Universal's Tsu shipyard. It will be classed by Det Norske Veritas (DNV) and delivered by December

2013.

China

China has emerged as one of the leaders in shipbuilding industry and poses a challenge to shipbuilding giants such as Japan and South Korea. The Chinese shipyards are capable of constructing sophisticated vessels like the LNG carrier and Hudong-Zhonghua Shipbuilding, a subsidiary of state-owned China State Shipbuilding, built its first LNG carrier in 2008.

China currently operates the icebreaker Xuelong which was built in Ukraine in 1993. The vessel has been strengthened to Class B1 and retrofitted at a cost of 31 million yuan for undertaking polar research.[15] It can navigate in 1.1 meters ice, including 0.2 m thick snow, at 1.5 knot. It can host a helicopter and is fitted out with laboratories to support research on meteorology, marine physics, chemistry and biology, and has a data processing center. The vessel operates under the Polar Research Institute of China (PRIC).

China has announced plans to build another icebreaker.

China has announced plans to build another icebreaker. It will be jointly designed by the Finland-based Aker Arctic Technology Inc and the Chinese Arctic and Antarctic Administration (CAA), under the State Oceanic Administration (SOA) and the Polar Research Institute of China.[16] The vessel is expected to be of 8,000 tons dwt, an endurance of 20,000 nautical miles and capable of navigation through 1.5 meters of ice. It will be ready for operators in 2014. According to Chen Lianzeng, deputy director of the State Oceanic Administration (SOA), "This marks a giant step toward the goal of building a completely domestic icebreaker,"

The Chinese shipyards are also building ice-class commercial vessels. In November 2012, the Hudong-Zhonghua Shipbuilding Co. Ltd launched M.V. Thamesborg, a 21,000 tonnes 1A ice-class multi-purpose vessels for the Dutch company Royal Wagenborg.[17] The same shipping company has also received the 17,500 dwt M.V. Alaskaborg from the Shanghai shipyard. Likewise, China Shipbuilding Trading Co and Jiangnan Shipyard under the CSSC are building two ice-class panamax bulkers for a Greek shipping company at a cost of US$58 million.[18]

Singapore

Singapore is another Asian shipbuilding nation, though much smaller as compared to Japan, Korea and China. Keppel Singmarine, the Singapore based company has built icebreakers and ice-class AHTS/rescue vessels.[19] It is notable that the company is able to construct ice-class vessels in tropical conditions. Its first Arctic joint venture was with the Finnish designers ILS OY, and the company delivered two icebreakers to LUKOIL-Kaliningradmorneft (LUKOIL). The two vessels, Varandey and Toboy were built to the specifications of Russian Maritime Register of Shipping's standard and are propelled by integrated diesel electric propulsion system. They can cut through 1.5 meters of ice and operate in minus 45 degrees Celsius conditions. Besides, the vessels are eco-friendly and are 'tailored strictly to the 'clean design" and 'zero discharge' standards to help mitigate the impact of icebreaking operations'. The vessels are currently operational in Barents Sea and are deployed for a variety of purposes including fire fighting, emergency rescue, mooring of tankers, towing and supply duties. Likewise, Keppel Singmarine has built four ice-class AHTS/rescue vessels for LUKOIL-Kaliningradmorneft and are deployed in the Caspian Sea. These vessels can operate in temperatures as low as minus 20 degree Centigrade and ice thickness of up to 70 centimeters and can perform a number of operations including search and rescue and supply duties.

Technological Considerations

According to the Tromsø Declaration, "increased marine access and navigation in the Arctic Ocean calls for development and implementation of suitable national and international regulations, where appropriate, to advance the safety of Arctic marine shipping, including marine pollution prevention, reduce accident risk and facilitate effective emergency response." Further, the declaration has also urged that the IMO Guidelines for Ships Operating in Arctic Ice-covered Waters needs to be completed, with "its relevant parts be made mandatory and global IMO ship safety and pollution prevention conventions be augmented with specific mandatory requirements or other provisions for ship construction, design, equipment, crewing, training and operations aided at safety and protection of the Arctic environment."

The IMO has set out stringent technical, technological, environmental and safety requirements, guidelines and recommendations for vessels operating in the Arctic

In the above context, ship design, its construction, and onboard equipment are important issues at hand. The IMO has set out stringent technical, technological, environmental and safety requirements, guidelines and recommendations for vessels operating in the Arctic and/or Antarctic areas. These would help safe and secure movement of cargo through the Northern Sea Route.

Concluding Remarks

By all accounts, sea commerce through the Arctic will increase in the coming years. This is likely to provide a number of opportunity to Asian shipbuilding nations to meet the demand of international shipping companies who are keenly watching the emerging prospects of movement of cargo particularly oil and gas, minerals and ore, and in due course container shipping through the Northern Sea Route. However, the challenge is to build eco-friendly and fuel efficient ships at a reasonable cost.

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