



**Studia i Materiały. Miscellanea Oeconomicae**  
Rok 18, Nr 2/2014  
Wydział Zarządzania i Administracji  
Uniwersytetu Jana Kochanowskiego w Kielcach

**The Arctic and Nordic  
Countries in the World of Economy and Politics**

**Krzysztof Kubiak<sup>1</sup>**

**RUSSIAN DOUBLE ACTION SHIPS.  
ARCTIC SHIPPING REVOLUTION  
OR COSTLY EXPERIMENT**

Melting of the ice cover in the Arctic has initiated numerous discussions about the significant increase in shipping on the Northern Sea Route (NSR). Many experts underline that in 2012 the summer shipping season was closed on November 28, which means that a new record was broken. 48 NSR crossings by cargo ships between Asia and Europe took place since the beginning of 2012 season - almost 12 times more than two years earlier. The total cargo transported along the NSR accounted for 1 261 545 tons – 53 percent more than in 2011, when 820 789 tons of freight were transported using the route. 25 of the vessels sailed the NSR from west to east, starting from Murmansk, Arkhangelsk or Baydaratskaya Bay. 21 ships sailed in the opposite direction. Petroleum products constitute the largest cargo group. A total of 894 079 tons of diesel fuel, gas condensate, jet fuel, LNG and other petrol products were transported by 26 vessels in 2012. 18 of the tankers sailed from West to East, eight in the opposite direction<sup>2</sup>.

There were no super tankers on the NSR this season – the largest tankers were Norwegian vessels “Marika”<sup>3</sup> and “Palva”. Each transported between 60 -70,000

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<sup>1</sup> Krzysztof Kubiak, Ph.D. hab., professor at the Jan Kochanowski University in Kielce, Poland.

<sup>2</sup> Barents Observer, Record number of vessels pass through the Northern Sea Route in 2012, <http://www.oilandgasurasia.com/news/record-number-vessels-pass-through-northern-sea-route-2012>, web. January 3 2012.

<sup>3</sup> Owned by Norwegian firm and managed by Miarinvest, which operates six tankers with Ice Class IA: “Marilee”, “Maribel”, “Mari Ugland”, “Mariann” and “Marika”.

tons of jet-fuel. In total, the three tankers (the third was “Stena Poseidon”<sup>4</sup> - the first oil-tanker that season to sail the Northern Sea Route without visiting any Russian port) transported 129,000 tons of jet-fuel from Yeosu in Korea to Parvoo in Finland. The second largest cargo group was iron ore and coal, which were transported along the route six times, mainly by ships owned by Danish firm Nordic Bulk Carriers A/S<sup>5</sup>.

Table 1. Ice thickness in different areas.

Area	Ice thickness (m)
Baltic Sea – Gulf of Finland	0,4
Baltic Sea – Gulf of Bothnia	0,8
Caspian Sea	0,7
Azov Sea	0,8
White Sea	0,8
Barents Sea (Arctic)	1,2
Sea of Okhotsk (East Siberia, Sakhalin)	1,4
The Kara Sea (Arctic)	1,8

Source: J. V. Koren, *Winterization of LNG Carriers*, <http://www.thedigitalship.com/powerpoints/nors07/lng/jan%20koren,%20dnv.pdf>, web January 3 2013.

It should be noticed that the Northern Sea Route was used for transportation of LNG for the first time in history last autumn. The tanker “Ob River” transported 66 342 tons (134 738 m<sup>3</sup>) from Statoil’s gas plant in Hammerfest to Tobata in Japan<sup>6</sup>.

On the other hand, despite the increasing cargo volume Arctic shipping is still conducted only during the summer season and with an assistance of icebreakers. Additionally, according to Russian shipping regulation only the ships with Finnish 1A ice class are allowed to sail through the NSR. World shipowners association has only a few such vessels and it will probably limit growth in Arctic shipping. Also this kind of enterprise remains very hazardous.

<sup>4</sup> “Palva” and “Stena Poseidon” (both with Ice Class IA) owned to Swedish Company Stana Bulk. The firm has also several vessels with high ice class, among them three Aframax bulk carrier (“Stana Arctica”, Stena Antarctica” and “Stena Atlantica” – Ice Class IA Super).

<sup>5</sup> The firm has two 75.000 dwt panamax bulk carrier with Ice Class IA (“Nordic Odyssey” and “Nordic Orion”) and two 43,000 dwt handymax bulk carrier “Nordic Barents” and “Nordic Bothnia”.

<sup>6</sup> Barents Observer, 46 vessels through Northern Sea Route, <http://barentsobserver.com/en/arctic/2012/11/46-vessels-through-northern-sea-route-23-11>, web. December 30 2012.

Table 2. Approximate correspondence between Ice Classes of the Finnish Ice Class Rules (Baltic Ice Classes) and the Ice Classes of other Classification Societies.

Classification Society	Ice Class				
Finnish-Swedish Ice Class Rules	IA Super	IA	IB	IC	II
Russian Maritime Register of Shipping (Rules 1995)	ULA, UL	L1	L2	L3	L4
Russian Maritime Register of Shipping (Rules 1999)	LU 7, LU 6, LU5	LU4	LU3	LU2	LU1
American Bureau of Shipping	IA SUPER	IA	IB	IC	D0
Bureau Veritas	IA SUPER	IA	IB	IC	ID
China Classification Society	B1*	B1	B2	B3	B
Det Norske Veritas	ICE-1*	ICE-1A	ICE-1B	ICE-1C	ICE-C
Germanischer Lloyd	E4	E3	E2	E1	E
Korean Register of Shipping	IA Super	IA	IB	IC	ID
Lloyd's Register of Shipping	1AS FS (+)	1A FS (+)	1B FS (+)	1C FS (+)	1D, 1E
Nippon Kaiji Kyokai	IA Super	IA	IB	IC	ID
Polish Register of Shipping	L1A	L1	L2	L3	L4
Registro Italiano Navale	IAS	IA	IB	IC	ID
(IACS) <sup>7</sup>	P7	P6	PC4, PC5	PC3	PC2

Source: HELCOM Recommendation 25/7, [http://www.helcom.fi/Recommendations/en\\_GB/rec25\\_7/](http://www.helcom.fi/Recommendations/en_GB/rec25_7/), web. January 3 2013; Maritime Safety Regulations. Finnish Ice Classes Equivalent to Class Notations of Recognized Classification Societies and Documentation Required for the Determination of the Ice Classes of Ships, Helsinki, Finland, 23 November 2010.

<sup>7</sup> International Association of Classification Societies (IACS) is a technically based organization consisting of thirteen marine classification societies headquartered in London. IACS was founded on September 11, 1968, in Hamburg, Germany. At present its members are the thirteen largest marine classification societies in the world. More than 90% of the world's cargo carrying ships' tonnage is covered by the classification standards set by the thirteen member societies of IACS. Although IACS is a non-governmental organization, it also plays a role within the International Maritime Organization (IMO), for which IACS provides technical support and guidance and develops unified interpretations of the international statutory regulations developed by the member states of the IMO. IACS has consultative status with the IMO, and remains the only non-governmental organization with observer status which also develops and applies technical rules that are reflective of the aims embodied within IMO conventions. The link between the international maritime regulations, developed by the IMO and the classification rule requirements for a ship's hull structure and essential engineering systems is codified in the International Convention for the Safety of Life at Sea (SOLAS).

Table 3. Polar Class Descriptions according to IACS.

Polar class	Ice description (based on WMO Sea Ice Nomenclature)
PC 1	Year-round operation in all Polar waters
PC 2	Year-round operation in moderate multi-year ice conditions
PC 3	Year-round operation in second-year ice which may include multiyear ice inclusions.
PC 4	Year-round operation in thick first-year ice which may include old ice inclusions
PC 5	Year-round operation in medium first-year ice which may include old ice inclusions
PC 6	Summer/autumn operation in medium first-year ice which may include old ice inclusions
PC 7	Summer/autumn operation in thin first-year ice which may include old ice inclusions

Source: International Association of Classification Societies, Requirements Concerning Polar Class, [http://www.iacs.org.uk/document/public/Publications/Unified\\_requirements/PDF/UR\\_I\\_pdf410.pdf](http://www.iacs.org.uk/document/public/Publications/Unified_requirements/PDF/UR_I_pdf410.pdf), web. January 06 2013.

#### Typical hazards for vessels operating in cold climate:

- extreme low temperatures ( - 50 C°),
- icing:
  - risk for vessels stability,
  - safety functions failures (for example malfunction of firefighting systems),
  - malfunction of cargo operations devices,
- overstress of hull:
  - absence of good ice reports and routing,
  - ice restriction vs. commercial pressure on a ship’s master,
- propulsion failure:
  - stuck in ice,
  - crushing of hull or drifting aground,
  - remote distance from rescue centers and spare parts warehouses,
- risk of collision in a convoy lead by icebreakers (using by ships the same “ice” radio channel)
- crew fatigue:
  - additional work load,
  - low temperature,
  - noise and vibrations,
  - 24 hours of darkness.

The only country which is able to conduct a year around shipping in the Arctic is Russia. There are three most important factors, which determine its capacity:

- fleet of nuclear powered and conventional icebreakers,
- numerous vessels fleet with Ice Class,
- very rich experience.

Among Russian Arctic merchant vessels there are a few very untypical ships, which belong to a special class called “double action ships” (DAS). The technical characteristics of these ships is presented in further in the paper.

### **Double action ship – the birth of the concept**

The concept of double action ship was developed in the early 1990s by Finnish company Kværner Masa-Yards Arctic Technology Centre (now: Aker Arctic Technology Inc). The idea was to build the icebreaking merchant ships, which would be able to operate independently in severe ice conditions without icebreaker assistance. Additionally, they were supposed to constitute seaworthiness and higher seakeeping characteristics than classic icebreakers.

Traditionally, ice breaking ships have been quite poor in open water. Their total efficiency has been 20-40% lower than a good open water vessel. This low efficiency results from the bow forms, whose primary function is to break ice. But also the experience with Arctic icebreakers showed better performance in severe ice conditions when running astern.

Kværner Masa-Yards Arctic Technology Centre used an old idea but the new technologies allowed to transfer it into practice. The Azipod<sup>8</sup> (electric podded propulsion system) appeared the key of success. The new solution brought the following advantages:

- hull form can be optimised for all conditions,
- better cost-effectiveness,
- increased manoeuvrability,
- more freedom for design.

The development of the prototype started in 1989 and the first unit was ready for installation in the following year. The 1.5 MW unit, dubbed "Azipod" was installed on the 1979-built Finnish buoy tender vessel *Seili*.

The success of the project resulted in converting Finnish product tankers “Uikku” and “Lunni” to Azipod propulsion in 1993 and 1994 respectively. The performance of the subsequent vessels fitted with Azipod proved the superiority of podded propulsion in icebreaking merchant ships, especially when running astern.

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<sup>8</sup> Azipod is the ABB Group's registered brand name for their azimuth thruster. Originally developed in Finland jointly by Kvaerner Masa-Yards dockyards and ABB, these are marine propulsion units consisting of diesel-electric-driven propellers mounted on a steerable pod. In the traditional azimuth propulsion system the motor is inside the ship's hull and the propeller is driven through shafts and gearboxes. In the Azipod system the electric motor is inside the pod, and the propeller is connected directly to the motor shaft. The alternating current motor of the pod is driven by electricity from the ship's generator by a cycloconverter. By avoiding the use of a traditional propeller shaft, the propeller can be further below the stern of the ship in a clear flow of water providing greater hydrodynamic and mechanical efficiency. Azipod became such popular that the name is used as the synonym of all such solutions, despite the fact that, for example Rolls-Royce produces its own azimuth thruster system called Mermaid. Por. The World's First Azimuthing Electric Propulsion Drive, [http://www04.abb.com/global/seitp/seitp202.nsf/0/589ea2a5cd61753ec12570c9002ab1d1/\\$file/AzipodNew.pdf](http://www04.abb.com/global/seitp/seitp202.nsf/0/589ea2a5cd61753ec12570c9002ab1d1/$file/AzipodNew.pdf), web. January 04 2012.

Table 4. First ships with Azipod propellers.

Vessel's name	Type	Flag	Year	Power (kW)	Number of Azipods units
„Seili”	Buoy tender	Finland	1990	1,300	1
“Uikku”	Product tanker	Finland	1993	11,800	1
“Lunni”	Product tanker	Finland	1994	11,800	1
“Röthelstein”	River icebreaker	Austria	1995	1,100	2
“Arcticaborg”	Icebreaking supply vessel	Kazakhstan	1998	3,300	2
“Antarcticaborg”	Icebreaking supply vessel	Kazakhstan	1998	3,300	2
“Botnica”	Multi-purpose icebreaker		1999	8,000	2

Source: K. Juurmaa, T. Mattsson, G. Wilkman The Development of the New Double Acting Ships for Ice Operation, [www.akerarctic.fi/publications/pdf/Poac01XNewDAS.pdf](http://www.akerarctic.fi/publications/pdf/Poac01XNewDAS.pdf), web. January 02. 2013; R. Kurimo, Improved Double-Acting Ship, “Arctic Passion News”, March 2011, p. 3.

The first big Double Action Tankers - Finnish “Tempera” (awarded the Ship Of The Year 2002 by the Society of Naval Architects of Japan) and “Mastera” – were delivered from Yokosuka shipyard in 2002-2003. Originally, they were designed not to sail in the Arctic but to transport oil from a newly opened Russian seaport in Primorsk (the largest Russian port on the Baltic Sea , 137 kilometers west of St. Petersburg, at the northern coast of the Gulf of Finland) to Neste Oil refineries in Porvoo (situated on the southern coast of Finland approximately 50 kilometres east of Helsinki and Naantali (in south-western Finland, 14 kilometres west of Turku). The exploration performed by both tankers at frozen Baltic raised an interest of Russian biggest shipowner – Sovcomflot (SCF).

SCF (Sovcomflot) Group is Russia’s largest shipping company. One hundred percent of its shares are owned by the state. The SCF Group’s fleet is amongst the five leading tanker companies in the world and operates 147 vessels with a total deadweight (dwt) of more than 10 million tonnes. The average age of vessels in the tanker fleet is about six years (the world average age is 12 years). The company owns the largest ice-class fleet, being number one in the segment of the Arctic shuttle tankers and ice-classed LNG tankers. SCF Group is also a world leader in the product carrier segment, it is also the second largest in the Aframax tanker segment and the fourth largest in the Suezmax tanker sector. The company’s services include not only transporting hydrocarbons for its customers, but also trans-shipping crude oil via FSO (Floating, Storage and Offloading) facilities, terminal management and developing effective logistics for transporting energy, and providing supply vessels services to drilling rigs and offshore platforms.

SCF Group participates in the development of projects for the complex servicing offshore oil and gas fields, including the construction and the operation of the offshore drilling equipment. By today the company remains a major customer in Russia's merchant shipbuilding. The line of vessels ordered by Sovcomflot from Russia's yards includes product carriers of MR (Medium Range) class, unique shuttle tankers of enhanced ice class for servicing oil and gas offshore fields in the Arctic region as well as port tugs. Sovcomflot develops cooperation both with the enterprises being a part of the United Shipbuilding Corporation (the Admiralty Shipyards) and private yards (Pella Shipbuilding Yard)<sup>9</sup>.

### **Russian Double Action Tankers**

Samsung Heavy Industries (SHI) built three of the pioneering Arctic tankers for the Russian owner Sovcomflot, the first vessel of this series - "Vasily Dinkov" – was officially delivered on 1 January 2008. The next two - "Kapitan Gotsky" and "Timofiej Guzenko"- on 27 May 2008 and 24 February 2009. These icebreaking shuttle tankers are designed to transport crude oil in Russian Arctic region - from the Varandey port, in the new oilfields of the Pechora Sea, to Murmansk without icebreaker's assistance. Naryanmarneftegaz - a joint venture with LUKoil and ConocoPhillips for onshore oil production in Timan Pechora region - started in early 2005 developing a direct marine export system together with Aker Arctic. These extensive studies and model testing led to the preliminary design of the vessels which were constructed by Samsung Heavy Industries. The icebreaking and open water performance have been verified by the model ship tank test in the Finnish AARC's (Aker Arctic Technology Inc.) and the Swedish SSPA's (Statens Skeppsprovning Anstalt) model basins. The vessels are typical "Double Action" – they combine two functions, the breaking of ice and carrying oil using the technology introduced by Aker Arctic.

Further to a developed concept design, Samsung Heavy Industry signed a cooperation agreement with the Finnish consultancy Aker Arctic Technology in 2005, in order to implement the double-acting concept. Finally, SHI won the first contract for the developed 70,000 dwt vessels, which are capable of carrying 85,300 m<sup>3</sup> of oil and breaking ice both forward and astern. Vessels of "Vasily Dinkov" class have ice-enhanced hull structures in compliance with LU6 (1A Super) ice-class and are prepared to operate in temperatures of minus 40 degrees Celsius. They are also able to break ice of up to 1.5 m thickness with a 0.2- metre-thick snow cover at a speed of 3 knots either forward or astern. The vessels are fitted with a helicopter pad as well<sup>10</sup>.

Primary power is supplied by three main diesel-alternators. Two other generators are also installed, a 1,000- kW- set for harbor use and a 640- kW-

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<sup>9</sup> SCF Sovcomflot, About Us, <http://www.scf-group.com/pages.aspx?cs=1&cid=147&cs2=1>, web. January 07 2013.

<sup>10</sup> "Timofey Guzenko" is sailing on, <http://www.maritimemarket.ru/article.phtml?id=31&lang=en>, web. January 03 2013.

emergency unit. Electricity is generated at 6.6 kW but transformed to 440V and 220V, 60 Hz, for some duties. Individual deepwell pumps are installed in all 10 cargo tanks (10 x 800 m<sup>3</sup>/h) and the two slop tanks (2 x 400 m<sup>3</sup>/h). Stainless steel heating coils are fitted in all these spaces, and the bottom and deck head of each tank is coated with pure epoxy, while loading will take place over the bow at a rate of 10,000 m<sup>3</sup>/h<sup>11</sup>.

All the tankers of the series, will be registered at the Russian International Register of Shipping, the port of registry being St. Petersburg, and will be flying the State flag of the Russian Federation.

It was mentioned that “Vasily Dinkov” class carrier is responsible mainly for transporting oil from in shore oil drills situated near Pechora Sea to Murmansk. Oil is loaded in the Varandey port. The world scale unique Varandey facility consists of an onshore tank farm with a total rated capacity of 325,000 m<sup>3</sup> and a fixed ice-resistant oil terminal 14 miles offshore. Its height is over 80 m and a weight of over 11,000 metric tons, including living quarters and a mooring cargo handling system with a jib and a helicopter platform. The tank farm and terminal are linked by two underwater pipelines, which measure 812 millimeters in diameter. The facility also consists of oil metering station, auxiliary tanks, pumping station and power supply facilities. An auxiliary icebreaker and an icebreaking tug are on duty in the vicinity of the terminal. The environmental safety system at Varandey has three levels of security and is fully automated. The terminal was designed to operate with zero discharge, which means that all industrial and domestic waste is collected in special containers and transported onshore. The terminal started its operations on 9 June 2008. The tanker “Vasily Dinkov” was headed for the Canadian port Come By Chance in Newfoundland. The capacity of Varandey still increases. In 2008 crude shipments using the terminal totaled 1.7 mln tons, in 2009 - 7.5 mln tons, in 2010 - 7.44 mln tons. Shipments of crude in the period from January to October 2012 increased by 33.8% to 2.31 million tons. In October 2012 Russia exported from Varandey offshore facility 421,400 tons of oil, which is 1.5 times more than in October previous year.

Two “Michail Ulyanov” vessels are the result of cooperation involving an Aker Arctic DAS and Russian shipbuilder. The 70,000 deadweight ships are owned by OAO Sovcomflot and were delivered by OAO Admiralty Shipyards<sup>12</sup>. The extraordinary design of the vessel completed by Aker Arctic Technology, will play a vital role shuttling oil from the Prirazlomnoye oil field (in the Pechora Sea, operated by Sevmornrftegaz, the subsidiary of Gazprom) to a Floating Storage and Offloading (FSO) unit anchored in Kolska Bay. The area of ships’ exploitation is

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<sup>11</sup> 70.000 tdw Arctic Shuttle Tanker MT “Vasily Dinkov”, [http://www.akerarctic.fi/publications/pdf/SHI\\_tanker.pdf](http://www.akerarctic.fi/publications/pdf/SHI_tanker.pdf), web. January 03 2013.

<sup>12</sup> Admiralty Shipyards is the oldest shipyard in Russia, established by Peter the Great on 5 November 1704. It is the part of OAO United Shipbuilding Corporation. Today the yards are engaged in the design, construction and in modernisation of merchant marine vessels, as well as in construction and rebuilding of ships for the Navy. Over three centuries, more than 2,600 navy and merchant ships have been built by the Admiralty Shipyards.

covered by ice during the entire winter navigation season. During hard winter seasons temperatures can fall as low as minus 40 degrees Celsius and ice can form over 1.2 metres in thickness. Hull structures for ice strengthening of the ships are in compliance with Russian Maritime Register of Shipping ice category Arc 6. All equipment is designed to be exposed to ambient temperature of minus 40 degrees Celsius. The underwater hull design incorporates an icebreaking bow for operation ahead in young ice and thin first year ice conditions. The bow shape is derived from a compromise of both ice operational performance as well as open water seakeeping and performance. The propulsion solution comes from ABB Marine, in the shape of twin Azipods. The azimuthing thrusters enable the ships to penetrate cross ridged ice when running astern with a continuous slow speed, where conventional ships ram when running ahead<sup>13</sup>.

Table 5. Main dimensions of Russian Arctic tankers “Vasily Dinkov” class.

Names of vessels	“Vasily Dinkov”, “Kapitan Gotsky”, “Timofiej Guzenko”
Shipyard	Samsung Heavy Industries, Korea
Delivery Date:	1 January 2008, 27 May 2008, 24 February 2009
Flag:	Russian
Notation:	ICE CLASS IA SUPER (Russian LU6)
Lenght (m):	256,00
Breadth (m):	34,00
Draught (Loading, m):	14,00
Propulsion:	Diesel-electric, two ABB Azipod units (2 × 10,000 kW)
Installed power:	2 × Wärtsilä 16V38B (2 × 11,600 kW), Wärtsilä 6L38B (4,350 kW)
Deadweight (t):	71294,00
GRT (t):	49597,00
NRT (t):	20486,00
Speed (knots):	16,0

Source: SCF Sovcomflot, Our Fleet, <http://www.scf-group.com/pages.aspx?cs=4&cid=3&cs2=1>, web. January 02 2013

“Mikhail Ulyanov” and “Kirill Lavrov” are able to achieve 3 knots speed astern in first year level ice, 1.2 m in thickness with 0.2 m of snow layer and 3 knots speed ahead in first year level ice, 0.5 m in thickness. They will also need to

<sup>13</sup> Mikhail Ulyanov Ice-Class Tanker, [http://www.ship-technology.com/projects/mikhail\\_ulyanov/](http://www.ship-technology.com/projects/mikhail_ulyanov/), web. January 03 2013.

shuttle at speeds of up to 16 knots, with occasional voyages to Atlantic destinations. The bridges have been fitted with state of the art equipment, supplied by Transas. The electronics include communication equipment for GMDSS (Global Maritime Distress and Safety System)<sup>14</sup> area A4<sup>15</sup>, two radars for extreme temperatures, two ECDIS 3000-I systems (Electronic Chart Display and Information System)<sup>16</sup>, six information displays with Navi-Conning, Automatic Identification System, Voyage Data Recorder, log and echosounder<sup>17</sup>.

Table 6. Main dimensions of Russian Arctic tankers “Kiril Lavrov” class.

Names of vessels	“Mikhail Ulyanov”, “Kirill Lavrov”
Shipyard	Admiralty Shipyards, St.Petersburg,Russia
Delivery Date:	26 February 2010, 10 September 2010
Flag:	Cyprus
Notation:	ICE CLASS IA SUPER (Russian LU 6)
Lenght (m):	257,00
Breadth (m):	34,00
Draught (Loading, m):	13,60
Propulsion:	Diesel-electric, two ABB Azipod units (2 x 8,500 kW)
Installed power:	4 x Wartsila 9L38 (4 x 6,525 kW)
Deadweight (t):	70053,00
GRT (t):	49866,00
NRT (t):	21303,00
Speed (knots):	16,0

Source: SCF Sovcomflot, Our Fleet, <http://www.scf-group.com/pages.aspx?cs=4&cid=3&cs2=1>, web. January 02 2013.

The Prirazlomnoye oil field is located south of Novaya Zemla on the Pechora Sea shelf, at a distance of 60km from the shore. The water depth in this area is

<sup>14</sup> The Global Maritime Distress and Safety System (GMDSS) is an internationally agreed-upon set of safety procedures, types of equipment, and communication protocols used to increase safety and make it easier to rescue distressed ships, boats and aircraft.

<sup>15</sup> These are essentially the polar regions, north and south of about 76 degrees of latitude.

<sup>16</sup> The Electronic Chart Display and Information System (ECDIS) is a computer-based navigation information system that complies with International Maritime Organization (IMO) regulations and can be used as an alternative to paper nautical charts.

<sup>17</sup> 70.000 tdw Arctic Shuttle Tanker MT “Mikhail Ulyanov” and MT “Kirill Lavrov”, [http://www.akerarctic.fi/publications/pdf/prirazlomnoye\\_tanker.pdf](http://www.akerarctic.fi/publications/pdf/prirazlomnoye_tanker.pdf), web. January 02.2013.

19m to 20m. This area is characterised by extremely low temperatures and strong ice loads. It is ice-free for 110 days of the year and the cold period lasts for 230 days. Ice thickness is up to 1.7m. Oil is provided by a single stationary platform at the centre of the field. This offshore fixed installation is the first construction of this kind in Russia. The topsides of the platform are based on the former UK North Sea Hutton tension leg platform, bought by Rosneft in 2002 and upgraded for its new work at the FSUE Sevmash military shipyard in Severodvinsk. The yard was also responsible for the offloading complex, platform towing and the accommodation module. The topsides sit on a 126m<sup>2</sup>, 97,000 t caissons. Two other caissons – 1 and 4 were constructed nearby, in the Severodvinsk yard, of Zvyozdochka. The technological module was built in the Vyborg shipyard and other parts of superblocks and piping were built at the Tsentrenergomontazh facilities. The platform has 14 oil storage tanks with a capacity of 113,000 m<sup>3</sup> and two oil offloading systems with capacities of up to 10,000m<sup>3</sup>/hr, as well as two water storage tanks with a total capacity of 28,000m<sup>3</sup>. The operating life of the new platform, Prirazlomnaya, is 50 years. The platform cost is approximately 800 million USD. The platform was towed to working area in August 2011. There will also be two 16MW multifunctional icebreakers for assisting the tankers as well as carrying out safety and environmental tasks<sup>18</sup>.

After numerous postponements, production was due to start in 2012. Now, production is unlikely to start before late 2013<sup>19</sup>. “Mikhail Ulyanov” and “Kirill Lavrov”, special tankers built to transport oil from Prirazlomnoye oilfield to Kola Bay operate in other areas.

Oil from Varandey terminal and Prirazlomnoye oil field is and will be transported by special ice breaking tankers to Kola Bay, where Oil Terminal “Belokamenka”<sup>20</sup> is located.

## Conclusion

The double action vessels (tankers) present very high level of shipbuilding technology and they are – without any doubts – the most modern merchant ships at the Arctic. But there is no simple answer to the question if they really caused a “revolution” in northern shipping. They are more expensive and more complex than “classic” vessels and they require highly skilled crew. The high cost is the

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<sup>18</sup> Prirazlomnaya: monstrous pioneer of Arctic drilling, <http://platformlondon.org/2011/09/12/prirazlomnaya-arctic-oil-suspicion/>. Web. January 04 2013.

<sup>19</sup> Barents Observer, At Prirazlomnoye, more scandals but no oil, <http://barentsobserver.com/en/energy/prirazlomnoye-more-scandals-no-oil-19-09>, web. January 06 2013.

<sup>20</sup> “Belokamenka” is Floating Storage and Offloading (FSO) vessel, located in Kola Bay near Murmansk. It has been converted from a Very Large Crude Carrier. The vessel was originally built by Mitsui Eng. & Shipbuilding Co. Ltd., Chiba Works, on 1980. Its previous name was “Berge Pioneer”. Now she is chartered by Rosneftflot, a subsidiary of Rosneft, on a long term basis and is operated by the Oil Terminal “Belokamenka” L.L.C. Length 340.5 m, beam 65.06 m, draught 23,20 m, deadweight 360.700 tons. At 2011 6.29 million tons of oil was exported through the “Belokamenka”. Crude Oil Exports via Belokamenka FSO Set to Rise – Rosneftflot, <http://www.rzd-partner.com/news/different/378034/>, web. January09 2013.

main reason why they were built not for typical commercial shipping but to cover needs generated by two Arctic oil enterprises. It seems that only a few shipowners, who run the business at the seas covered by ice are ready to pay extra money for such tankers (and another cargo vessels) with icebreaking capacity. To conclude – Russian double action tankers are probably only the “side branch” of the modern vessels’ main stream development. They are very modern, with advanced technology solutions applied and very well prepared for Arctic shipping, however the primary transport role in the North will probably be played by “classical” vessels (with Ice Class of course).

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### **Abstract**

Double Action Ships (DAS) are special units in the history of world shipbuilding. They combine the features of tankers and icebreakers, which allows them all-year-round independent shipping in Arctic waters. They were designed to specific requirements tailored to oil drilling in the Far North of Russia. Despite the technological advancement and seaworthiness they should be considered as a side branch of modern shipbuilding rather than a solution determining a common trend.

### **Rosyjskie statki podwójnego zastosowania.**

#### **Rewolucja w arktycznym transporcie morskim czy kosztowny eksperyment**

Statki podwójnego zastosowania są jednostkami szczególnymi w dziejach światowego budownictwa okrętowego. Łączą one cechy zbiornikowców i lodolamaczy, co umożliwi im całoroczną samodzielną żeglugę na wodach arktycznych. Powstały one w związku z konkretnymi przedsięwzięciami związanymi z wydobyciem ropy na Dalekiej Północy realizowanymi przez Rosję. Mimo zaawansowania technologicznego i dobrych własności żeglugowych należy je jednak uważać za boczną linię współczesnych konstrukcji okrętowych nie zaś za rozwiązanie wyznaczające powszechny trend.

Krzysztof Kubiak, Ph.D. hab., professor at the Jan Kochanowski University in Kielce, Poland.