МИНИСТЕРСТВО ОБРАЗОВАНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

Белорусский национальный технический университет

Кафедра английского языка № 2

О.Н. Кобяк
Н.А. Финская

SHIPBUILDING

Кораблестроение

Пособие

Минск
БНТУ
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по английскому языку для студентов специальности
1-37 03 02 «Кораблестроение и техническая эксплуатация
водного транспорта»

*Рекомендовано учебно-методическим объединением
по образованию в области транспорта и транспортной деятельности*

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Рецензенты:
кандидат филологических наук, доцент кафедры лексикологии английского языка УО «МГЛУ» *Т. Н. Руденко*;
кандидат филологических наук, доцент БГАТУ *Л. И. Копань*

Кобяк, О. Н.

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Пособие написано в соответствии с типовой программой по иностранным языкам для неязыковых вузов и состоит из четырех разделов, построенных по единому принципу, направленных на развитие языковых и коммуникативных умений и навыков в профессиональной сфере, а также на формирование навыков понимания, перевода и реферирования текстов по специальности.

Материалом послужили оригинальные тексты, которые предназначены как для аудиторного чтения, так и для самостоятельной работы.

Пособие предназначено для студентов, обучающихся по специальности 1-37 03 02 «Кораблестроение и техническая эксплуатация водного транспорта». Может быть использовано широким кругом читателей, желающих повысить и расширить уровень владения иностранным языком в области эксплуатации водного транспорта.

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ПРЕДИСЛОВИЕ

Пособие имеет профессиональную направленность и предназначено для студентов 1-го и 2-го курсов заочной формы обучения специальности 1-37 03 02 «Кораблестроение и техническая эксплуатация водного транспорта», имеющих базовую подготовку по английскому языку. Пособие подготовлено в соответствии с требованиями типовой программы по иностранным языкам для высших учебных заведений.

Целью пособия является систематизация и совершенствование знаний и умений студентов, расширение их словарного запаса по предлагаемой тематике, формирование навыков понимания, перевода и реферирования оригинальных текстов по специальности.

Учебное пособие состоит из четырех разделов, построенных по единому принципу. Основной структурной единицей является лингвометодический комплекс, который представляет собой тематически завершенный блок (Unit). Каждый блок соответствует определенному этапу обучения (Unit I – первый семестр, Unit II – второй семестр, Unit III – третий семестр, Unit IV – четвертый семестр).

Каждый раздел включает профессионально ориентированные тексты для обучения различным видам чтения и упражнения к ним. Система упражнений способствует усвоению профессиональной лексики и повторению основных грамматических явлений.

В пособие включены тексты для дополнительного чтения, которые могут быть рекомендованы как для самостоятельного изучения, так и для других учебных целей, например, обучения переводу, работе со словарем, грамматическому анализу и т. п.

Работу с устными темами рекомендуется организовать по усмотрению преподавателя, как с точки зрения методики, так и форм проведения.

Проверка изученного материала осуществляется преподавателем на практических занятиях.

Авторы выражают искреннюю благодарность всем тем, кто способствовал созданию и изданию этого пособия.

Авторы

UNIT I

WATER TRANSPORT

VOCABULARY

1. Read and memorize the active vocabulary.

Nouns and noun phrases

barge – *баржа*
bulk carrier – *сухогруз*
cargo – *груз*
combined tonnage – *общий тоннаж*
compass – *компас*
container vessel – *контейнеровоз*
craft – *судно*
destination – *пункт назначения*
distance – *расстояние*
engine – *двигатель*
equipment – *оборудование*
foodstuff – *продукты питания*
freight transport – *грузовые перевозки*
fuel – *топливо*
galley – *галера*
ice-breaker – *ледокол*
improvement – *улучшение*
loading – *погрузка*
movement – *движение*
paddle – *гребное колесо*
passenger ship – *пассажирское судно*
power – *мощность*
protection – *защита*
raft – *плот*
raw materials – *сырье*
safety – *безопасность*
sail – *парус*
steam turbine – *паровая турбина*
steamship – *пароход*
tanker – *танкер*
terminal – *терминал*
trading activity – *торговая деятельность*
unloading – *разгрузка*
vessel – *судно, корабль*

Verbs and verbal phrases

to accompany – *сопровождать*
to develop – *разрабатывать, развивать*
to equip – *оборудовать*
to focus on – *сосредотачиваться*
to improve – *улучшать*
to include – *включать (в себя)*
to increase – *увеличивать*
to launch – *спускать судно на воду*
to oversee – *наблюдать, следить*
to own – *владеть*
to promote – *способствовать*
to register – *регистрировать*
to regulate – *регулировать*
to weigh – *весить*

Adjectives

atomic – *атомный*
clumsy – *неуклюжий*
diesel – *дизельный*
magnetic– *магнитный*
negligible –*незначительный*
powerful – *мощный*
rapid – *быстрый*
reliable – *надежный*

Proper Names

the International Labor Organization (ILO) – *Международная организация труда (МОТ)*
the United Nation's International Maritime Organization (IMO) – *Международная морская организация при Организации Объединённых наций*

2. Read the following international words and guess their meaning.

transformation	revolution	radiation
telecommunication	turbine	international
magnetic	motor	territorial
compass	nuclear	terminal
industrial	reactor	operate

3. Match the words and their transcriptions.

compass	['kɑːgəu]
barge	[lɔːnʧ]
cargo	[bɑːʤ]
engine	['kʌmpəs]
freight	['neglɪʤəbl]
launch	[freɪt]
diesel	['enʤɪn]
negligible	['diːz(ə)l]

4. Look at the following list of nouns. Write down the corresponding verb in the space provided. The first one has been done for you.

NOUN	VERB	NOUN	VERB
development	*develop*	product	_____
equipment	_____	promotion	_____
improvement	_____	protection	_____

inclusion	_____	registration	_____
increase	_____	regulation	_____
introduction	_____	replacement	_____
movement	_____	transportation	_____
operation	_____	weight	_____

5. Look at the following list of nouns. Write down the corresponding adjectives in the space provided. The first one has been done for you.

NOUN	ADJECTIVE	NOUN	ADJECTIVE
atom	*atomic*	reliability	_____
diesel	_____	magnet	_____
power	_____	safety	_____
rapidity	_____	mariner	_____

6. Match the terms and their definitions.

a) engine	*c) compass*	*e) waterway*	*g) steam*
b) ship	*d) vessel*	*f) tanker*	*h) cargo*

1) A passenger or freight-carrying ship, boat, etc.

2) Any machine designed to convert energy, esp. heat energy, into mechanical work.

3) A river, canal, or other navigable channel used as a means of travel or transport.

4) An instrument for finding direction, usually having a magnetized needle which points to magnetic north swinging freely on a pivot.

5) A large sailing vessel with three or more square-rigged masts.

6) A ship, lorry, or airplane designed to carry liquid in bulk, such as oil.

7) Freight carried by a ship, aircraft, etc.

8) Pressurized water vapor used to provide mechanical energy.

7. Combine the words from the column on the left with the suitable nouns from the column on the right.

1) main	a) engine
2) long	b) distances
3) small	c) turbine

4) floating	d) craft
5) ancient	e) advantage
6) magnetic	f) compass
7) raw	g) reactor
8) diesel	h) effort
9) steam	i) materials
10) nuclear	j) times
11) negligible	k) radiation
12) powerful	l) quantities

8. Combine the words with the help of the preposition *of*.

1) the movement		a) freight transport
2) the means		b) products
3) the advantage		c) the magnetic compass
4) the introduction		d) water transportation
5) the middle	of	e) goods
6) the size and power		f) the 19th century
7) great quantities		g) the engine
8) the capacity		h) ships
9) the operation		i) the services
10) the nature		j) the nuclear reactor

9. Choose the right word or word-combination.

1) The introduction of the magnetic … allowed long voyages to be made with much greater safety.
a) equipment *b) compass* *c) material*

2) The rapid … in the size and power of ships was promoted by the industrial revolution.
a) drop *b) decrease* *c) increase*

3) Improved ports permitted larger ships to use them and to make … faster.
a) speed *b) loading and unloading* *c) motor ships*

4) In the late 1950s a few ships were being built which were … with nuclear reactors for producing steam.
a) equipped *b) installed* *c) protected*

5) In spite of the …. of her engine being 44,000 h.p., it will need only a few grams of atomic fuel a week.
a) power *b) capacitive* *c) capacity*

6) National governments control movements within … waters, register vessels, and regulate the nature of the services.
a) local *b) international* *c) territorial*

7) Local governments own and control … that form the terminals for shipping operations.
a) ports *b) harbors* *c) vessels*

10. Fill in the words listed below.

Assignment 1

a) more *d) container* *f) approximately*
b) ferry *e) ships* *g) tonnage*
c) carries

In the early XXI century the international shipping industry [1)]_____ about 90 % of global trade by weight. Shipping also provides important [2)]_____ and passenger services. In 2005 globally there were [3)]_____ 42,200 registered ships with a combined [4)]_____ of nearly 600 million gross tons. Of these [5)]_____ than 20,000 were general cargo vessels, 6,100 bulk carriers, 3,200 [6)]_____ vessels, 11,300 tankers, and nearly 5,700 passenger [7)]_____.

Assignment 2

a) influence *c) roads* *e) development*
b) seas *d) transportation* *f) navigable*

Shipping is [1)]_____ of passengers and goods on waterways. From prehistoric times shipping has had a major [2)]_____ on human social [3)]_____. Water routes, unlike [4)]_____, did not need building, and the difficulties and dangers were less than those offered by mountains, marshes, and enemy tribes. Therefore many early civilizations developed on [5)]_____ rivers or on the coasts of warm [6)]_____.

11. Give the comparative and superlative of the following adjectives.

slow, expensive, heavy, long, great, large, smooth, efficient, reliable, powerful

12. Give the three forms of the following verbs.

to be, to use, to build, to become, to begin, to do, to introduce, to drive, to equip, to launch, to regulate, to oversee, to bring, to produce, to accompany

13. Choose the sentences with Passive Voice and translate them.

1) Water transportation is generally used to transport heavy products over long distances.
2) The small effort is needed to move floating craft.
3) The raft was made of logs of wood.
4) The water transport in ancient times developed on great rivers.
5) One of the earliest steamboats was tested at the end of the 18th century.
6) The first steamship to cross the Atlantic was the *Savannah*.
7) A great deal was done to improve ports.
8) The largest ships are still generally driven by steam turbines.
9) In the late 1950s a few ships were being built which were equipped with nuclear reactors for producing steam.
10) The world's first atomic ice-breaker was launched in Leningrad.
11) The atomic ice-breaker has three nuclear reactors.
12) The engine will need only a few grams of atomic fuel a week.
13) The United Nation's International Maritime Organization oversees safety and environmental matters.
14) The ILO focuses on labor standards in the shipping industry.
15) Ports form the terminals for shipping operations.

14. Complete the sentences with an active or passive form.

ACTIVE	PASSIVE
1) The industrial revolution promoted the rapid increase in the size and power of ships.	1) The rapid increase in the size and power of ships ***was promoted*** by the industrial revolution.
2) The industrial countries _____ great quantities of goods.	2) Great quantities of goods are produced by the industrial countries.
3) Ships carried products to all parts of the world.	3) Products _____ to all parts of the world by ships.
4) Powerful radiation_____ the operation of the nuclear reactor.	4) The operation of the nuclear reactor is accompanied by powerful radiation.
5) Shipping also provides important ferry and passenger services.	5) Important ferry and passenger services _____ by shipping.
6) Local governments also _____ shipping.	6) Shipping is also regulated by local governments.

15. Choose the right answers to the following questions.

- What means of transportation is the most ancient?

a) air b) water c) rail

- What is the earliest type of boat?

a) barge b) galley c) raft

- What are the main advantages of water transportation?

a) high cost d) low cost
b) high speed e) low speed
c) high safety f) low safety

16. Discuss these questions.

Where did the water transport develop most rapidly? Why?
What influenced the development of water transportation?
What allowed long voyages to be made with much greater safety?

READING

17. Read the text and translate it into Russian.

TEXT A

Water Transport

Transportation concerns the movement of products from a source such as a plant, factory, or work-shop to a destination such as a ware-house, customer, or retail store. Transportation may take place via air, water, rail, road, pipeline, or cable routes, using planes, boats, trains, trucks, and telecommunications equipment as the means of transportation.

Water transportation is the least expensive and slowest mode of freight transport. It is generally used to transport heavy products over long distances when speed is not an issue. The main advantage of water transportation is that it can move products all over the world.

The small effort is needed to move floating craft. A heavy boat or a barge weighing several tons can be moved through the water, slowly but steadily, by one man.

The raft made of logs of wood is the earliest type of boat. It seems to be clumsy vessels, although the Norwegian scientist Thor Heyerdahl and his five companions in 1947 made a voyage on the raft from Peru to Tuamotu Islands – a distance of 4,500 miles.

The water transport in ancient times developed most rapidly on great rivers. The ancient Romans used vessels to carry their armies and supplies to colonies. These ships, usually called galleys, continued to be used in the Mediterranean till 1750.

The introduction of the magnetic compass allowed long voyages to be made with much greater safety. At the end of the 15th century, sailing vessels carried men from Europe to America and round Africa to India.

One of the earliest steamboats was tested at the end of the 18th century. The first steamship to cross the Atlantic was the *Savannah,* 98-foot ship built in New York, which made the crossing in 1819. Like all the early steamships, it had sails as well as paddles. By the middle of the 19th century it became possible to build much larger ships as iron and steel began to replace timber.

The rapid increase in the size and power of ships was promoted by the industrial revolution. The industrial countries produced great quanti-

ties of goods which were carried to all parts of the world by ships. On their return voyages, the ships brought either raw materials such as cotton, metals, timber for the factories, or grain and foodstuffs for the growing population.

During the same period, a great deal was done to improve ports, and that permitted larger ships to use them and to make loading and unloading faster.

Improvements introduced in the 20th century included the smoother and more efficient type of engines called steam turbines and the use of oil fuel instead of coal. Between 1910 and 1920 the diesel engine began to be introduced in ships. These diesel-engined ships are called motor ships. The largest ships, however, are still generally driven by steam turbines. In the late 1950s a few ships were being built which were equipped with nuclear reactors for producing steam.

In 1957 the world's first atomic ice-breaker was launched in Leningrad. This atomic ice-breaker is equipped with an atomic engine owing to which her operating on negligible quantities of nuclear fuel is possible. In spite of the capacity of her engine being 44,000 h.p., it will need only a few grams of atomic fuel a week.

The atomic ice-breaker has three nuclear reactors. The operation of the nuclear reactor is accompanied by powerful radiation. Therefore, the ice-breaker is equipped with reliable means of protection.

In the early XXI century the international shipping industry carries about 90 % of global trade by weight. Shipping also provides important ferry and passenger services. In 2005 globally there were approximately 42,200 registered ships with a combined tonnage of nearly 600 million gross tons. Of these more than 20,000 were general cargo vessels, 6,100 bulk carriers, 3,200 container vessels, 11,300 tankers, and nearly 5,700 passenger ships.

The shipping industry is regulated at several levels – most notably at the global level by the United Nation's International Maritime Organization (IMO) that oversees safety and environmental matters and the International Labor Organization (ILO) that focuses on labor standards in the shipping industry. National governments control movements within territorial waters, register vessels, and regulate the nature of the services that can be used for their trading activities. Shipping is also regulated by local governments that often own and control ports that form the terminals for shipping operations.

COMPREHENSION CHECK

18. Decide whether the following statements are true or false according to the text.

1) Transportation concerns the movement of products from a destination to a source.
2) Water transportation is the most expensive and slowest means of freight transport.
3) The first steamship built in New York had sails and paddles.
4) In the late 1950s a few ships with nuclear reactors for producing steam were being built.
5) Although the capacity of the engine is 44,000 h.p., it will need only a few grams of atomic fuel a day.
6) Powerful radiation accompanies the operation of the nuclear reactor.
7) Local governments control movements within territorial waters.

19. Complete the following sentences according to the text.

1) Transportation may take place via …
2) The raft made of logs of wood is the earliest …
3) One of the earliest steamboats was tested ...
4) The rapid increase in the size and power of ships was promoted by ...
5) Shipping also provides important ferry and ...
6) The shipping industry is regulated at the global level by …
7) The United Nation's International Maritime Organization oversees …
8) The International Labor Organization focuses on ...

20. Answer the following questions.

1) What is water transportation generally used for?
2) What is the main advantage of water transportation?
3) Where did the water transport in ancient times develop most rapidly?
4) What allowed long voyages to be made with much greater safety?
5) Why did it become possible to build much larger ships by the middle of the 19th century?
6) What did the improvements introduced in the 20th century include?

7) Did the diesel engine begin to be introduced in ships between 1810 and 1820?

8) Is the ice-breaker equipped with reliable or unreliable means of protection?

9) What is the shipping industry regulated by?

10) What does the United Nation's International Maritime Organization oversee?

11) What does the International Labor Organization focus on?

12) What do national and local governments control?

21. What parts of the text can you define? Do they correspond to the paragraphs? Name each part.

1. _____ 4. _____
2. _____ 5. _____
3. _____ ... _____

22. Find key words and phrases which best express the general meaning of each part.

23. Make a short summary of Text A. Do it according to the following plan.

1. The title of the text is … .
2. The text is devoted to … .
3. It consists of … (parts / passages).
4. The first passage deals with … .
5. The second (third, forth, etc.) passage deals with … .
6. The main idea of the text is … .

VOCABULARY

24. Practice saying the following words.

archipelago [ˌɑ:kɪ'peləgəu] maneuver [mə'nu:və]
canal [kə'næl] nautical ['nɔ:tɪk(ə)l]
fairway ['fɛəweɪ] occur [ə'kɜ:]
harbour ['hɑ:bə] piloting ['paɪlətɪŋ]

25. Read and memorize the active vocabulary.

Nouns and noun phrases

archipelago – *архипелаг, группа островов*
bay – *залив*
canal – *канал*
coast – *побережье*
depth – *глубина*
fairway – *фарватер, проход*
harbour – *гавань*
icebreaking – *вскрытие ледяного покрова*
maneuvering ability – *способность к маневрированию*
marking of lanes – *обозначение морских путей*
nautical chart – *навигационная карта*
open-sea shipping – *судоходство в открытом море*
open-water entrance – *выход в открытые воды*
piloting – *лоцманская проводка судна*
port – *порт*
river shipping – *речное судоходство*
rule – *правило*
shipping lane – *морской путь*
strait – *пролив*
surrounding waters – *прибрежные воды*
traffic intensity – *интенсивность движения*
traffic separation system – *система разделения судопотока*
underwater topography – *рельеф дна*
weather conditions – *погодные условия*
width – *ширина*

Verbs and verbal phrases

to affect – *влиять, воздействовать*
to approve – *одобрять*, *утверждать*
to connect – *соединять*
to maintain – *поддерживать, обслуживать*
to occur – *происходить*, *случаться*
to perform – *выполнять*, *исполнять*

Adjectives

considerable – *значительный*
narrow – *узкий*
unfavourable – *неблагоприятный*

Proper Names

the Sea Security Agency of the United Nations – *Агентство безопасности на морях при Организации Объединённых Наций*

READING

26. Read the text and answer the questions below.

TEXT B

Shipping

Seas, rivers and lakes have been trafficked by boats and ships since the earliest times. Today shipping is larger than ever. The great majority of all freight transport to, from and between the countries in sea areas occurs on ships. In addition to transportation of goods there is a considerable passenger transport.

The infrastructure of shipping consists of the shipping lane system maintained by the state and harbour service. Shipping lanes connect the harbours and give prerequisites for shipping through the supplied service of nautical charts, marking of lanes, piloting and ice breaking.

Shipping may be divided into open-sea shipping, river shipping and inland shipping. The river traffic, mostly with barges, is considerable on many of the larger world rivers. Lakes are trafficked similarly with the rivers or canals that connect them with surrounding waters.

Along the coasts traffic is focused in the ship lanes close to the ports. Little commercial shipping is performed in the protected fairways, especially in archipelago areas. The marking of fairways on open-water entrances and over straits and bays is usually narrow. There is thus a limit to the size of the ships in such waters. A number of factors, such as vessel size and manoeuvering ability, traffic intensity, exposure to weather and wind and over- and underwater topography affect the width of the fairways. The use of the archipelago fairways is limited by water depth.

The traffic separation system is a rout system approved by the International Maritime Organization (IMO), the Sea Security Agency of the United Nations. The traffic separation system is marked on nautical charts. It is mainly used by coastal and through traffic. Ships longer than 20 meters shall, according to the shipping rules, use traffic routes. Smaller ships are obliged to use the water between land and the actual traffic separation system.

Smaller fishing boats exhibit a transport pattern between the open sea and the port. When weather conditions are unfavourable, the fishing boats use the protected fairways along the coasts.

1) Today shipping is smaller than ever, isn't it?
2) What does the infrastructure of shipping consist of?
3) What do shipping lanes do?
4) What may shipping be divided into?
5) What factors affect the width of the fairways?
6) What is the use of the archipelago fairways limited by?
7) Is the river traffic significant on many of the larger world rivers?
8) What is a rout system approved by?
9) Where is the traffic separation system marked on?
10) What are smaller ships obliged to?
11) When do the fishing boats use the protected fairways along the coasts?

VOCABULARY

27. Practice saying the following words.

bulkhead ['bʌlkhed]
chronometer [krɔ'nɔmɪtə]
gyrocompass ['ʤaɪərəu¸kʌmpəs]
latitude ['lætɪt(j)uːd]
longitude ['lɔnʤɪt(j)uːd]
pier [pɪə]
radar ['reɪdɑː]
sextant ['sekstənt]

28. Read and memorize the active vocabulary.

Nouns and noun phrases

aid – *вспомогательные средства*
automatic pilot – *автоматическая система управления судном*
bulkheads – *переборки*
chronometer – *хронометр*
collision – *столкновение*
distress signal – *сигнал бедствия*
docking pilot – *лоцман, совершающий проводку судна*
electronic navigation equipment – *электронное навигационное оборудование*
fire-fighting equipment – *пожарное оборудование*
gyrocompass – *гирокомпас*
high seas – *открытое море, глубокие воды*
latitude and longitude – *широта и долгота*
lifeboat – *спасательная шлюпка*
lifejacket – *спасательный жилет*

lights – *огни*
local harbour pilot – *местный портовый лоцман*
loran, for long-range navigation – *Лоран (импульсная дальномерная радионавигационная система),дальняя навигация*
navigator – *штурман, навигатор*
obstacle – *препятствие*
pier – *пирс, причал*
Plimsoll mark – г*рузовая марка, диск Плимсоля*
radar – *радиолокатор, радар, радиолокационная установка*
rudder – *руль*
sand bar – *песчаная отмель*
sextant – *секстант*
ship officer – *боцман*
tugboats – *буксирное судно, буксир*
visibility – *видимость*

Verbs and verbal phrases

to accept – *принимать, допускать*
to calculate – *высчитывать*
to determine – *определять*
to follow – *следовать*
to guide – *вести, проводить*
to link – *соединять*
to measure – *измерять*
to navigate – *вести, плавать*
to prevent – *предотвращать*
to pull – *тянуть*
to reach – *достигать*
to require – *требовать*
to set on course – *стать на курс*
to transmit – *передавать*

Adjectives

accurate – *точный*
lifesaving – *спасательный*
remarkable – *замечательный*
successful – *успешный*
tried-and-true – *проверенный*
watertight – *водонепроницаемый*

READING

29. Read the text and speak on navigation equipment and safety standards for ships.

TEXT C

Navigating a Ship

When a large ship leaves port, three or four small tugboats pull it from the pier into the harbour. A docking pilot directs the tugs and the ship until the vessel clears the pier and is underway in the harbour. Every merchant ship enters and leaves port with a local harbour pilot aboard.

The harbour pilot guides the ship into the harbour or out into open water. The harbour pilot must know every channel, turn, sand bar, or other obstacle that could endanger the vessel. After a ship reaches open sea, a small boat carries the pilot back to port. The ship officers then navigate the vessel to its destination.

As sailors have done for thousands of years, the navigator checks the position by observing the sun, moon, planets, and stars. For hundreds of years, the most important navigation devices have included a compass to tell direction, a chronometer to tell the exact time and help to determine a ship's longitude, and a sextant to calculate a ship's latitude by measuring the angle of the sun or of a star above the horizon.

At present time modern ships also have highly accurate electronic navigation equipment. One system determining their position through radio signals is called loran, for long-range navigation. With loran, an accurate position can be obtained in bad weather and poor visibility without a compass, chronometer, or sextant. Many ships also can determine their position by signals that are transmitted from orbiting satellites.

Modern ships also carry radar. At night and in bad weather, a ship's radar can spot icebergs, rocks, and other vessels in time to prevent a collision. Some modern ships also have an automatic pilot, which, after a ship has been set on course, holds it there. This device is linked to gyrocompass, which determines direction, and it operates the rudder automatically. In spite of all these remarkable devices, navigators still also use the tried-and-true compass, chronometer, and sextant.

Many ships have automatic navigation aids and automatic devices to speed up the loading and unloading of cargo.

To provide successful navigating some measures and safety standards for ships have been set up by International Safety of Life at Sea conventions, which were held in 1914, 1929, 1948, 1960, and 1972. The standards require that ships have watertight bulkheads, fire-fighting equipment; and enough lifeboats, life jackets, and other lifesaving equipment. In addition, ships must follow the International Rules of the Road which deal with such points as the rights of way of ships on the high seas, the lights ships must show, and the signals that ships must give in fog and during times of distress.

In 1930, all the leading seafaring countries accepted rules set up by the International Load Convention to keep ships from being overloaded. These rules require that cargo ships have a series of short lines painted

on their side to show the depth to which the vessels may be safely loaded. The lines are called Plimsoll marks. They are named after Samuel Plimsoll who brought about their adoption in Great Britain's Merchant Shipping Act of 1876. In 1966, the world's maritime nations agreed to new rules that raised the limits to which ships may be safely loaded.

VOCABULARY

30. Practice saying the following words.

acidification [ə¸sɪdɪfɪ'keɪʃən]
anchor ['æŋkə]
cause [kɔ:z]
combustible [kəm'bʌstəbl]
discharge [dɪs'ʧɑ:ʤ]
exhaust [ɪg'zɔ:st]
liquid ['lɪkwɪd]
quay [ki:]
repository [rɪ'pɔzɪt(ə)rɪ]
prohibit [prə'hɪbɪt]

31. Read and memorize the active vocabulary.

Nouns and noun phrases

acidification – *окисление*
anchoring – *постановка на якорь*
coastguards – *береговая охрана*
construction – *строительство*
dredging – *дноуглубительные работы*
emission – *выделение*
environment – *окружающая среда*
exhausts – *выпуск, выхлоп, выхлопные газы*
fumes – *дым, газы, испарения*
hazard – *опасность*
impact – *влияние*
lead – *свинец*
leakage – *течь, просачивание, утечка*
liquid – *жидкость*
pollution – *загрязнение*
quay – *причал*
rags – *ветошь*
repository – *контейнер*
rescue service board – *спасательная лодка*
resources – *ресурсы*
responsibility – *ответственность*
solid-waste disposal – *удаление, сброс твердых отходов*
spill – *пролитая жидкость*
substance – *вещество*
surface water – *поверхностная вода*
threat – *угроза*
waste – *отходы*

Verbs and verbal phrases

to allow – *позволять*
to cause – *вызывать*
to constitute – *составлять*
to discharge – *разгружать, участие*
to disinfect – *дезинфицировать*
to imply – *предполагать*
to involve – *включать*
to leak – *иметь течь, просачиваться*
to mean – *значить*
to participate – *принимать освободить*
to prohibit – *запрещать*

Adjectives

chemical – *химический*
combustible – *горючий*
harmless – *безвредный*
hazardous – *опасный*
nautical – *морской*
poisonous – *ядовитый*
protective – *защитный*

READING

32. Read the text and say what hazards substances are taken into the UN Act on measures against water pollution and how they are classified. Translate the text into the Russian language.

TEXT D

Pollution by Ships

Shipping represents a serious threat to the environment, nature and biological life. This is due to its infrastructure (in some harbours), to traffic itself, and to exhausts and spills from ships and harbours. Some of the major hazards are:

1) presence(disturbance of wildlife in coastal areas through boat traffic, landings and spills);

2) physical impact (on coasts, shorelines and bottoms by wave actions, anchoring, and on coastal areas during construction, dredging, etc.);

3) waste / solid-waste(solid-waste disposal along coasts and disposal of toilet and kitchen wastes);

4) chemical pollution (oil-spills along coasts and in open waters; oil leakage from motors and fuel tanks; accidents especially involving oil tankers).

Many types of discharge from ships are prohibited and regulated, according to the UN Act on measures against water pollution by ships.

The substances prohibited for discharge includes: oil; large volumes of hazardous liquid substances; packed hazardous substances; toilet waste; solid waste.

One might believe that tanker accidents constitute the major threat but, in fact, they represent a few percent of the oil spills. But the less well-recognized daily leakage from motors of small boats is the largest threat to surface water from shipping.

As for the large volumes of hazardous substances, they are divided into four categories: A, B, C and D.

Category A includes poisonous substances that, if discharged into the sea, would constitute a severe risk to marine resources or human.

Category B implies hazardous liquid substances that may constitute a risk to marine resources.

Category C means less hazardous liquid substances.

The substances of the category D are practically harmless to life in water but cause decreases in the beauty of the area.

The discharge of packed hazardous substances is strictly prohibited altogether.

The rules for the discharge of toilet waste imply that ships are only allowed to make a discharge more than 12 nautical miles from the nearest land and the waste must be ground into finer particles and disinfected.

Prohibited for discharge solid wastes include plastic materials, paper products, rags, glass, metal, bottles, covering and packing materials. The discharge of leftovers should be done as far away from land as possible.

Emission of fumes from ships also presents a serious problem as they participate in acidification.

Responsibility concerning protective measures against the ecological threats to water environment is spread out over many different authorities: environmental protection agencies, coast guards, rescue service boards, maritime administrations and even meteorological and hydrological institutes. As close as possible to the quay there should be an environmental station for attending waste from ships. The environmental station should include at least one container for combustible waste and three containers for barrels and other waste that may leak. There must be a repository for oily rags as well as for lead batteries and accumulators.

FOLLOW UP

33. Read the texts of Unit I again, make notes under the following headings. Then use your notes to talk about *Water Transportation*.

1. What is water transportation?
2. The history of water transport development.
3. Modern and tried-and-true navigation aids.
4. Ship navigation.
5. Pollution by ships.

UNIT II

TYPES OF VESSELS

VOCABULARY

1. Read and memorize the active vocabulary.

Nouns and noun phrases

aluminum – *алюминий*
arm – *рука, стрела*
bow – *нос (судна)*
canoe – *каноэ, челнок, байдарка*
concrete – *бетон*
craft – *судно*
dhow – *одномачтовое араб. каботажное судно*
dory – *рыбачья плоскодонная лодка*
dugout – *каноэ, узкая лодка, выдолбленная из бревна*
edge – *край, кромка*
fiberglass – *стеклопластик*
fishing boat – *рыболовное судно*
flat-bottomed skiff – *небольшая плоскодонная гребная лодка*
float – *поплавок, буй*
gondola – *гондола*
half-deck – *палуба, закрывающая переднюю или заднюю половину*
hollowed-out log – *выдолбленное бревно*
hull – *корпус*
iron – *железо*
junk – *джонка (судно)*
kayak – *лодка у эскимосов из тюленьей кожи, управляется с помощью двухлопастного весла*
layer – *слой*
light alloy – *легкий сплав*
main machinery – *основное оборудование*
oar – *весло*
outrigger– *утлегарь*
planking – *обшивка досками*
plywood – *фанера*
poop – *полуют*
propulsion device – *движитель*
purpose – *цель*
sail – *парус*
sampan – *сампан (небольшая плоскодонная лодка)*
screw propeller – *гребной винт*
shore – *берег*
skiff – *ялик*
steel – *сталь*
stern – *корма*
umiak – *большая эским. лодка с широкими вёслами, покрытая шкурами*
vane propeller – *крыльчатый движитель*
water jet – *водомет*
waterway – *водный путь*
whaleboat – *китобойное судно*

Verbs and verbal phrases

to mold – *формовать*
to propel – *приводить в движение*
to refer to – *ссылаться на, относиться к*

Adjectives

architectonic-structural – *архитектурный*
carvel-built – *с обшивкой досками вгладь*
clinker-built – *обшитый внакрой*
coastal – *береговой, прибрежный*
deckless – *беспалубный*
elevated – *приподнятый*
flush – *идущая на одном уровне от носа до кормы (о корабельной палубе); не имеющий надстроек над такой палубой (о корабле)*
fore-and-aft planks – *обшитый тёсом вдоль всего корпуса*
inner – *внутренний*
lateen-rigged – *оснащенный латинским (треугольным) парусом*
outer – *наружный*
overhanging – *с нависающими (выступающими) краями*
overlapping – *перекрывающий внахлест*
pole-driven – *управляемый шестом*
projecting – *выступающий*
rugged – *массивный, прочный*
seaworthy – *обладающий хорошими мореходными качествами*
versatile – *универсальный*

2. Read the following international words and guess their meaning.

classify	diagonally	gondola
modern	parallel	prehistoric
principle	stabilize	term

3. Match the words and their transcriptions.

acacia	[edʒ]
aluminum	[ə'keɪʃə]
dhow	[lə'tiːn rɪgd]
edge	[ə'luːmɪnəm]
lateen rigged	['pɜːpəs]
Mediterranean	[dau]
outrigger	['prɔdʒekt]

project	[ˌmedɪt(ə)'reɪnɪən]
purpose	['vɜːsətaɪl]
versatile	['autˌrɪgə]

4. Look at the following list of nouns. Write down the corresponding verb in the space provided. The first one has been done for you.

NOUN	VERB	NOUN	VERB
development	*develop*	elevator	_____
building	_____	fishing	_____
construction	_____	living	_____
deck	_____	planks	_____
drive	_____	propeller	_____
dwelling	_____	stability	_____

5. Match the terms and their definitions.

a) seaworthy	*g) poop*
b) gondola	*h) propeller*
c) oar	*i) waterway*
d) whaleboat	*j) layer*
e) outrigger	*k) hull*
f) planking	*l) alloy*

1) A long shaft of wood for propelling a boat by rowing, having a broad blade that is dipped into and pulled against the water; were used for steering certain kinds of ancient sailing boats.

2) The act of covering or furnishing with planks.

3) Any projecting framework attached to a boat, aircraft, building, etc., to act as a support.

4) A long narrow flat-bottomed boat with a high ornamented stem and a platform at the stern where an oarsman stands and propels the boat by sculling or punting: traditionally used on the canals of Venice.

5) In a fit condition or ready for a sea voyage.

6) A narrow boat from 20 to 30 feet long having a sharp prow and stern, formerly used in whaling.

7) The main body of a ship or other vessel, including the bottom, sides, and deck but not the masts, superstructure, rigging, engines, and other fittings.

8) A sheet, quantity, or thickness of material, typically one of several, covering a surface or body.

9) The aftermost and highest deck of a ship, esp. in a sailing ship where it typically forms the roof of a cabin in the stern.

10) A mechanical device for propelling a boat or aircraft, consisting of a revolving shaft with two or more broad, angled blades attached to it.

11) A river, canal, or other rout for travel by water.

12) A metal made by two or more metallic elements, esp. to give greater strength or resistance to corrosion.

6. Combine the words from the column on the left with the suitable nouns from the column on the right.

1) edges	a) float
2) molded	b) vessels
3) lateen-rigged	c) logs
4) paralleled	d) times
5) flat-bottomed	e) waters
6) nautical	f) flush
7)simple	g) craft
8) hollowed-out	h) boats
9) ancient	i) dhow
10) stormy	j) dugouts
11) fishing	k) seas
12) coastal	l) fiberglass

7. Match the synonyms.

1) shore	a) form
2) device	b) external
3) versatile	c) multipurpose
4) outer	d) sea
5) propel	e) coast
6) mold	f) machine
7) marine	g) traditional
8) conventional	h) drive

8. Choose the right word or word-combination.

1) Boat is a small, open … vessel propelled by sail, oar, pole, paddle, or motor.
a) sea *b)nautical* *c) versatile*

2) A number of special types of boat are generally … to by their individual names rather than by the generic term.
a)referred *b) called* *c) classified*

3) Modern … boats are built in four ways.
a) aluminum *b) steel* *c) wooden*

4) Many boats are now … of molded fiberglass or of aluminum.
a)built *b) divided* *c) constructed*

5) … or half-decked, with elevated bow and stern, these early boats took the Norsemen to all the coasts of Europe and across the Atlantic.
a) decking *b) deck* *c) deckless*

6) Whaleboat was developed from the Viking type of construction and came to be used for numerous … .
a) goals *b) purposes* *c) aims*

7) The Viking boats were more … and they were believed to be the first clinker-built boats.
a) seaworthy *b) nautical* *c) traditional*

8) Dory is a small, versatile, … craft easily transported on shipboard and used in the entire North Atlantic.
a) carvel-built *b)clinker-built* *c) flat-bottomed*

9. Fill in the words listed below.

Assignment 1

a) steel *c) self-propelled* *e) river and lake*
b) classified *d) propulsion* *f) equipped*

A great variety of ships may be [1)]_____ into: civil shipsand war ships. All they may be classified according to place of navigation, hull material, propulsion system, propulsion.

According to the place of navigation ships may be divided into (a) ocean and sea-going ships, (b)[2)]_____ ships and (c) coasters.

According to the hull material ships may be: wooden, [3)]_____, reinforced, from aluminum alloys, plastic and compound.

Referring to propulsion system ships are divided into non-propelling ships (such as barges, sailors) and [4)]_____ ships (such as steamships, motorships [5)]_____ with internal combustion engine, electric propulsion ships, nuclear propulsion ships).

According to [6)]_____ ships are divided into floating, gliding, hydrofoil craft and hovercraft (air-cushion ships).

Assignment 2

a) weather	*c) developed*	*e) speeds*
b) shipyards	*d) fast*	*f) engines*

Torpedo boat is a small [1)]_____ warship built specially for using the torpedo as a means of attack. The first modern torpedo boat was the Lightning, built for the British navy in 1877 by the [2)]_____ of Sir John Isaac Thornycroft. Torpedo boats were adopted by most of the world's major navies, but as they increased in size the destroyer was [3)]_____ as an effective defense against them. During World War II torpedo boats, often referred to as PT boats, were commonly used in attacking enemy coastal shipping and light naval forces under cover of darkness and bad [4)]_____. They were usually wooden vessels 22.8–38.1 m long, powered by gasoline or diesel [5)]_____ and capable of very high [6)]_____.

Notes:
torpedo boat – торпедный катер
destroyer – эскадренный миноносец, эсминец

10. Translate the following phrases paying attention to Participle I and Participle II.

Vessel propelled by sail; dugouts made from hollowed-out logs; boats made of acacia wood and held together with pegs; fore-and-aft planks laid with their edges flush; overlapping edges; planks running diagonally; planking consisting of large sheets of plywood; molded fiberglass; a parallel float attached by projecting arms; overhanging bow; a skiff having a mat-covered cabin with living quarters; elevated bow and stern; the

fishing boats built on Viking principles; flat-bottomed craft easily transported on shipboard and used in the entire North Atlantic.

11. Choose the correct translation of the sentence.

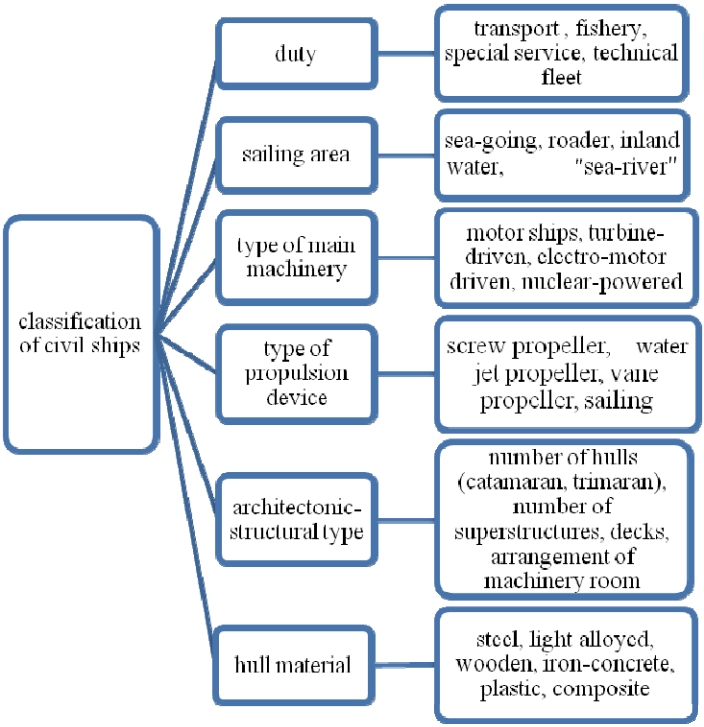
The Viking boats were believed to be the first clinker-built boats.

a) Викинги считали, что их лодки были первыми лодками, обшитыми внакрой.

b) Считают, что лодки викингов – первые лодки, обшитые внакрой.

c) Считали, что лодки викингов были первыми лодками, обшитыми внакрой.

12. Study the following chart and according to it complete the sentences below.



- According to the type of main machinery ships are classified into …
- According to type of propulsion device ships may be with ...
- All ships can be classified into … and war ships.
- The main indications of ship's classification are …
- According to their duties all civil ships may be …
- According to sailing area civil ships are divided into …
- … are taken into account according to architectonic-structural type.
- Kind of material employed in hull structure may include …

READING

13. Read the text and translate it into Russian.

TEXT A

The Varieties of Boats

Boat is a small, open nautical vessel propelled by sail, oar, pole, paddle, or motor. The use of the term boat for larger vessels, although common, is somewhat improper, but the line between boats and ships is not easy to draw. A number of special types of boat are generally referred to by their individual names rather than by the generic term, e.g., the canoe, the kayak (Eskimo decked canoe), and the umiak (Eskimo open boat). Simple dugouts, made from hollowed-out logs, have been known since prehistoric times to all peoples dwelling on waterways. The ancient Egyptians used boats made of acacia wood and held together with pegs. Modern wooden boats are built in four ways: with fore-and-aft planks laid with their edges flush (carvel-built); with fore-and-aft planks laid with overlapping edges (clinker-built); with inner and outer layers of planks running diagonally in opposite directions; and with planking consisting of large sheets of plywood. Many boats, however, are now made of molded fiberglass or of aluminum. Primitive boats in many parts of the world are stabilized by an outrigger – a parallel float attached by projecting arms. The varieties of boats in modern use are almost infinite. The Chinese junk, with high poop and overhanging bow, is large enough to be classified as a ship; the junk, together with the sampan (a wide,

flat-bottomed skiff, often having a mat-covered cabin with living quarters), is a familiar sight in the rivers and coastal waters of East Asia. The lateen-rigged dhow, in which energetic Arab merchants of the Middle Ages plied their trade along all the shores of South Asia and East Africa, is still in use today. A familiar local craft on the Mediterranean is the flat-bottomed, canoelike, pole-driven gondola of the Venetian canals. A typical Mediterranean vessel of ancient times was the galley, usually propelled by oars. Because the northern seas were stormier, the Viking boats, which the Norsemen were building by the 5th century AD, were more seaworthy; they were believed to be the first clinker-built boats. Deckless or half-decked, with elevated bow and stern, these early boats took the Norsemen to all the coasts of Europe and across the Atlantic. The later rugged whaleboat was developed from the Viking type of construction and came to be used for numerous purposes. The fishing boats of the North and Baltic seas, also built on Viking principles, are roughly similar to whaleboats. Another important fishing boat is the dory, a small, versatile, flat-bottomed craft easily transported on shipboard and used in the entire North Atlantic.

COMPREHENSION CHECK

14. Decide whether the following statements are true or false according to the text.

1) The use of the term boat is also common for larger vessels.

2) There are special types of boat named historically, which do not referred to a long row of boats with the similar characteristics.

3) Prehistoric boats were made of skins of animals, wood or hollow-out logs.

4) The ancient Egyptians wooden boats were built in four ways.

5) A parallel float attached to the projecting arms gave the stability to the boat.

6) Some kinds of boat of the Middle Ages are still in use today.

7) The galleys were more seaworthy; they were believed to be the first clinker-built boats.

8) A lot of later rugged boats were built on Viking principles and came to be used for numerous purposes.

15. Complete the following sentences according to the text.

1) Boat is a small nautical vessel…
2) The line between boats and ships is…
3) A number of special kinds of boat are generally referred to…
4) Since prehistoric times all peoples dwelling on waterway have known…
5) Modern wooden boats are made in four ways: carvel-built,…
6) Many boats are made of…
7) The Chinese junk, together with a sampan is the familiar sight…
8) The familiar local craft of the Mediterranean is the…
9) Because the northern seas were stormier, the Viking boats were…
10) The fishing boats of the North and Baltic seas are also built on…

16. Answer the following questions.

1) What kind of vessel is a boat?
2) Why the use of the term boat is improper for larger vessels?
3) Some types of boat are generally referred to by their individual names, aren't they?
4) What materials are boats made of?
5) How are modern boats built in?
6) Where is the difference between the carvel-built and clinker-built methods?
7) What for device was used to stabilize the primitive boats?
8) What Chinese boat, large enough to be classified as a ship is still in use in rivers and coastal waters of East Asia?
9) Is the Mediterranean local craft – gondola popular nowadays as well?
10) Why were the Viking boats more seaworthy? What features of ship structure allowed Norsemen to reach the coasts of Europe and go across the Atlantic?

17. What parts of the text can you define? Do they correspond to the paragraphs? Name each part.

1. _____ 4. _____
2. _____ 5. _____
3. _____ ... _____

18. Find key words and phrases which best express the general meaning of each part.

19. Make a short summary of Text A. Do it according to the following plan.

1. The title of the text is … .
2. The text is devoted to … .
3. It consists of … (parts / passages).
4. The first passage deals with … .
5. The second (third, forth, etc.) passage deals with … .
6. The main idea of the text is … .

VOCABULARY

20. Practice saying the following words.

hydrofoil ['haɪdrəufɔɪl]
cushion ['kuʃ(ə)n]
vehicle ['viːɪkl]
catamaran [ˌkætəmə'ræn]
knot [nɔt]
estuary ['estjuərɪ]

21. Read and memorize the active vocabulary.

Nouns and noun phrases

air cushion vehicle – *транспортное средство на воздушной подушке*
car ferry – *паром*
drag – *сопротивление, торможение*
estuary – *устье реки*
fan – *вентилятор, винт*
foil – *подводное крыло*
hovercraft – *судно на воздушной подушке*
hull – *корпус*
hydrofoil – *гидрокрыло, судно на подводных крыльях*
knot – *узел*
propeller – *движитель, пропеллер, винт*
surface – *поверхность*
thrust of air – *напор воздуха*
water resistance – *сопротивление воды*
wave – *волна*
wing – *крыло*

Verbs and verbal phrases

to cross – *пересекать*
to exceed – *превышать*
to mount on – *устанавливать*
to perform – *выполнять, исполнять, делать*
to pierce – *пронзать, прокладывать, проходить*
to provide – *обеспечивать*
to remain – *оставаться, находиться*

Adjectives

kit-built – *собранный из готовых деталей*
marine – *морской*
marshy – *болотистый*
military – *военный*

Adverbs

completely – *полностью*

READING

22. Read the text and answer the questions below.

TEXT B

Short-Distance Vessels

Vessels for carrying passengers on short distances over water have become increasingly important. Such short-distance vessels include car ferries, hydrofoils, and air cushion vehicles.

Car ferries have carried automobiles, passengers, and even railroad passenger cars across harbors, lakes, rivers, and other small bodies of water for many years. Like cargo ships, ferries have become bigger and bigger. Today, the biggest ones cross such large bodies of water as the Adriatic and Baltic seas and the English Channel. The largest car ferries can hold up to 800 passengers and 360 cars. They have dining rooms, lounges, and bars.

Hydrofoils provide high-speed transportation over relatively short distances. These vessels are mounted on foils (wings that skim near the surface of the water). The hull remains completely out of the water, greatly reducing the drag caused by water resistance. Hydrofoils can reach speeds greater than 80 knots. These vessels have carried passen-

gers across New York Harbor, on the Nile River of Egypt, across the Strait of Messina in Italy, and over other bodies of water in many parts of the world.

Air cushion vehicles also provide fast trips for short distances. Such vehicles are also called hovercraft or ground effect machines. Air cushion vehicles have a powerful horizontal fan that produces a strong, continuous thrust of air between the vehicle and the water or ground beneath it. The craft, which is driven by airplane-style propellers, rides on this cushion of air and can do almost 70 knots. Some are able to exceed speeds of 95. These are normally called flare craft. Air cushion vehicles are especially popular in Great Britain, where they have carried passengers on the River Thames, along the coasts, and cars and passengers across the English Channel from Dover to Calais in France.

There is an increasing number of small homebuilt and kit-built vehicles used for fun and racing purposes, mainly on inland lakes and rivers and also in marshy areas and in some estuaries. In spite of alternative over-water vehicles such as wave piercing catamarans, which use less fuel and can perform most of the hovercraft's marine tasks, they are still being developed in the world for both civil and military purposes.

1. What do short-distance vessels include?
2. What are car ferries used for?
3. What is a hydrofoil?
4. What is the working principle of an air cushion vehicle?
5. What is the difference between an air cushion vehicle and a flare craft?
6. Where are air cushion vehicles popular?
7. Where are small homebuilt and kit-built vehicles used?
8. What are the advantages of wave piercing catamarans?

VOCABULARY

23. Practice saying the following words.

freighter ['freɪtə]
schedule ['ʃedjuːl]
hatch [hætʃ]
haul [hɔːl]
facilities [fə'sɪlətɪ]
modernize ['mɔd(ə)naɪz]

24. Read and memorize the active vocabulary.

Nouns and noun phrases

cell – *отсек*
container ship – *контейнерное судно*
derrick – *грузовая стрела*
dockworker – *докер*
dry bulk carrier – *балкерное судно, сухогруз*
elevator – *грузоподъёмник*
engine room control – *система управления машинным отделением*
facilities – *оборудование, приспособления*
framework – *структура*
guide rails – *направляющие полозья*
hatch – *люк, отсек*
hold – *трюм*
iron ore – *железная руда*
LASH ship – *судно для перевозки груженных барж (на борту)*
lifting equipment – *грузоподъёмное оборудование*
liner – *лайнер, рейсовое судно*
oil tanker – *танкер, нефтеналивное судно*
opening – *проем*
package – *упаковка, упаковочная тара*
petroleum – *нефть*
ramp – *слип, трап*
roll-on/roll-off ship – *ролкер, трейлерное судно, трейлеровоз*
schedule – *расписание*
trade route – *торговый путь*
truck trailer – *грузовой автомобиль с прицепом*
upriver port – *порт, находящийся в верховьях реки*
warehouse – *склад*
wheel – *колесо*

Verbs and verbal phrases

to stack – *складывать*
to tow – *буксировать, тянуть*
to roll – *катить, везти*
to divide into – *делить, разделять*
to haul – *перевозить транс, портировать*
to load – *грузить*
to measure – *измерять*
to eliminate – *устранять, исключать*

Adjectives

giant – *гигантский*
multipurpose – *универсальный*

Adverbs

aboard – *на борту*
in bulk – *без упаковки, насыпью, навалом*

READING

25. Read the text and speak on the classification, types and usage of general cargo ships.

TEXT C

General Cargo Ships

Cargo ships, or freighters, can be divided into four groups, according to the kind of cargo they carry: general cargo ships, tankers, dry bulk carriers, and multipurpose ships. General cargo ships carry goods that are put in packages or that form a package in them. Packaged items include such products as chemicals, foods, furniture, machinery, motor vehicles, steel, textiles, etc. Tankers carry petroleum or other liquid cargo. Dry bulk carriers haul coal, grain, iron ore, and similar products that can be loaded in bulk (loose) on the vessels. Multipurpose ships carry different classes of cargo – for example, liquid and general cargo – at the same time.

Cargo ships can also be divided into two types according to the service they offer shippers – liner service or tramp service. Cargo liners run on fixed schedules along certain trade routes and charge published rates. They usually transport only general cargo. Some cargo liners also carry passengers. Large shipping companies operate cargo liners. Tramp ships do not sail on regular trade routes or have regular schedules. They wander the sea-lanes like taxicabs and can be hired to haul almost anything, anywhere, anytime. Small shipping companies and private individuals operate these ships.

Today cargo ship has powerful, electrically driven cranes and derricks. It can be loaded at the side and stern as well as at the hatches. It has automatic engine room controls and automatic navigation equipment.

Revolutionary versions of the general cargo freighter have also been developed: container ships, roll-on/roll-off ships, and LASH ships.

The largest container ships measure about 210 m long. They can carry over a thousand 6-meter containers that hold a total of about 12,000 tons of cargo. Container ships eliminate the individual hatches, holds, and derricks of the traditional general cargo vessel. The hull of a container ship is simply an enormous warehouse divided into cells by vertical guide

rails. The cells are designed to hold cargo in prepackaged units called containers. Most containers consist of a standard sized aluminum box that measures either 20 or 40 ft long. A 40-foot container is about the size of a railroad car.

Roll-on/roll-off ships take containers mounted on a framework of wheels like a truck trailer. These ships have a stern opening and side openings. Dockworkers drive the containers up ramps onto the ships and then, by way of inboard ramps or elevators, take them to their assigned places. Roll-on/roll-off ships also haul cars, buses, house trailers, trucks, and any other cargo that can be rolled aboard. The world's largest roll-on/roll-off ships are 292 m long, can do 18 knots and can carry about 1,100 12-meter containers and about 1,000 cars and trucks.

LASH ships (Lighter Aboard Ship) are huge freighters that carry preloaded seagoing lighters (barges) stacked one upon the other. The lighters are loaded at upriver ports with any kind of cargo and then towed by tugs to the seaport. There, cranes on the carrier ship lift the barges on board. The freighter then carries the barges to a seaport across the ocean. There, the barges are lowered into the harbor and then towed upstream to their final ports. LASH ships measure up to 267 meters long and 33 meters wide and can travel at 20 knots. They can hold from 70 to 90 barges, each of which can carry 370 tons of cargo.

All these modern ships need special port facilities. Throughout the world, ports are being built or modernized to handle these vessels. The new facilities have giant cranes and other lifting equipment because container ships have few or no derricks. In port, the ships chiefly need large open areas where their thousands of containers can be left while waiting loading or pickup.

VOCABULARY

26. Practice saying the following words.

design [dɪ'zaɪn]
ocean ['əuʃ(ə)n]
salvage ['sælvɪdʒ]
rescue ['reskju:]
dangerous ['deɪndʒ(ə)rəs]
maneuverable [mə'nuvərəbəl]
strengthen ['streŋθ(ə)n]
reefer ['ri:fə]

27. Read and memorize the active vocabulary.

Nouns and noun phrases

assistance of divers – *помощь водолазов*
bow – *нос (судна)*
cable layer vessel – *кабельное (кабелепрокладочное) судно*
capability – *способность, возможность*
foam – *пена*
high seas – *море за пределами территориальных вод, открытое море*
inshore fishing craft – *прибрежное рыболовное судно*
lighthouse – *маяк*
momentum – *скорость движения*
naval fleet – *военно-морской флот*
perishable commodities – *скоропортящиеся товары*
pilot ship – *лоцманское судно*
reefer – *судно-рефрижератор*
refrigerator ship – *рефрижераторное судно*
salvage ship – *спасательное судно*
seiner – *сейнер*
stranded ship – *судно, сидящее на мели*
strengthened hull – *усиленный корпус*
trawler – *траулер*
tugboat – *буксирное судно, буксир*

Verbs and verbal phrases

to assist – *помогать, способствовать*
to offer – *предлагать*
to require – *требовать*

Adjectives

articulated – *сочлененный*
conventional – *традиционный*
giant – *гигантский*
heavy-lift – *большой грузоподъёмности*
immense – *огромный, обширный*
inseparable – *неотделимый, неразрывный*
integrated – *комплексный*
invaluable – *бесценный, неоценимый*

Adverbs

in distress – *терпящий бедствие, в бедственном положении*

READING

28. Read the text and say for what specialized vessels are used. Translate the text into the Russian language.

TEXT D

Specialized Vessels

Many ships and boats have been designed to do particular jobs. Refrigerator ships, tugboats, salvage ships, train ferries, icebreakers, oceanographic ships and of course fishing vessels of different types has become an inseparable part of the world fleets.

Fishing vessels range in size from small inshore fishing craft (motor-powered cobles) to large, freezer-factory ships, they differ in the supposed area of fishing (deep-sea, inshore and middle-water fishing) and the model of operating (trawlers, seiners, drift net vessels, whale factories, etc.).

Salvage ships are an invaluable part of any naval fleet, and their capabilities cover many areas. When a ship becomes disabled on the high seas, a salvage vessel can assist by towing or by using its heavy-lift equipment. In addition, it will remove stranded ships from shorelines, and offer the assistance of divers for rescue operations. These ships can also provide firefighting help, using either foam or seawater.

Service ships are designed for a particular kind of job. They include tugboats, pilot ships, refrigerator vessels, icebreakers, fire-fighting ships, cable layers, floating lighthouses and a lot of other types.

Tugboats provide assistance to large vessels heading into port. Without their help, the giant ships would find maneuvering in shipping lanes to be very difficult. In addition, tugboats can tow massive vessels in distress, bringing them out of dangerous areas. Tugboats are quite strong for their size and maneuverable.

There are two groups of tugboats, either Inland (harbour and river tugs) or Oceangoing (the conventional tug, the notch tug, the articulated tug and barge (ATB), the integrated tug and barge (ITB)).

An icebreaker is a special purpose ship or boat designed to move and navigate through ice-covered waters. As for a ship to be considered an icebreaker it requires three components: a strengthened hull, an ice-

clearing shape, and the power to push through, none of which are possessed by most normal ships. To pass through ice-covered water, an ice-breaker uses its great momentum and power to drive its bow up onto the ice, breaking the ice under the immense weight of the ship.

The reefer (or refrigerator ship) is a type of ship typically used to transport perishable commodities which require temperature-controlled transportation, mostly fruits, meat, fish, vegetables, dairy products and other foodstuffs.

As for the other ships like cable layers pilot vessels, fire fighting ships, floating lighthouses their functions are quite obvious.

FOLLOW UP

29. Read the texts of Unit II again, make notes under the following headings. Then use your notes to talk about *Types of Vessels*.

1. The varieties of boats in modern use.
2. Short-distance vessels.
3. General cargo ships.
4. Specialized vessels.

UNIT III
SHIPBUILDING

VOCABULARY

1. Read and memorize the active vocabulary.

Nouns and noun phrases

adjustment – *настройка, сборка, согласование*
berth – *причал, якорная стоянка*
bulwark – *фальшборт, волнолом*
casting – *литьё, отливка*
circuit – *цепь*
drawing – *план, чертёж*
island – *остров*
jig – *шаблон, зажимное устройство*
lofting – *развертка (трехмерного объекта)*
mast – *мачта*
mechanization – *автоматизация*
mooring line – *швартов, причальный трос*
rigging – *такелаж*
rudder – *руль*
screw – *винт*
seam – *шов, стык, спай*
sequence – *очерёдность, последовательность*
shipyard – *верфь*
sternpost – *старнпост*
subdivision – *подразделение*
superstructure – *надпалубные сооружения*
wheel – *колесо*
winch – *лебёдка*

Verbs and verbal phrases

to bobble – *качаться, прыгать по волнам*
to bolt – *прикрутить болтами*
to drive – *приводить в движение, запускать*
to enable smth. to float – *оставаться на плаву*
to flood – *затапливать*
to increase – *увеличивать*
to jut out – *выступать*
to keep in touch – *поддерживать связь, быть в контакте*
to knife through – *разрезать*
to pitch – *испытывать килевую качку*
to pump out – *откачивать*
to roll – *испытывать бортовую качку*
to turn – *поворачивать*
to wedge – *закреплять клином*

Adjectives

ascending – *восходящий, поднимающийся*
auxiliary – *вспомогательный*
bladed – *с лопастями*
descending – *нисходящий*

geared-drive – *приводимый в движение с помощью передачи*
hinged – *подвешенный*
longitudinal – *продольный*
power-driven – *электрический*
prefabricated – *заводской*
watertight – *водонепроницаемый*

2. Read the following international words and guess their meaning.

engine	ballast	maneuver
propeller	structure	crane
pump	modern	stabilizing systems
turbine	electricity	radiotelegraph

3. Match the words and their transcriptions.

surface	['ʤen(ə)reɪtə]
compartment	['enʤɪn]
generator	['sɜːfɪs]
engine	[kɔːz]
cause	[naɪf]
gear	['fɜːðə]
knife	['æksɪd(ə)nt]
accident	[rɪ'djuːs]
watertight	[gɪə]
anchor	['wɔːtətaɪt]
further	[kəm'pɑːtmənt]
reduce	['æŋkə]

4. Look at the following list of nouns. Write down the corresponding verb in the space provided. The first one has been done for you.

NOUN	VERB	NOUN	VERB
connection	*connect*	loading	_____
flooding	_____	point	_____
generator	_____	pumping	_____
knife	_____	stability	_____
equipment	_____	prevention	_____
production	_____	design	_____
reduction	_____	roll	_____
usage	_____	creation	_____
revolver	_____	rotation	_____

5. Look at the following list of nouns. Write down the corresponding adjectives in the space provided. The first one has been done for you.

NOUN	ADJECTIVE	NOUN	ADJECTIVE
electricity	*electric*	pumping	_____
diesel	_____	stability	_____
horizon	_____	tooth	_____
power	_____	point	_____

6. Match the terms with their definitions.

a) hull *c) bow* *e) rudder*
b) helm *d) screw* *f) boiler*

1) A tank for generating steam under pressure in a steam engine.
2) A tiller or wheel for steering a ship or boat.
3) A ship's or aircraft's propeller.
4) The forward end or part of a vessel.
5) The main body of a ship or other vessel, including the bottom, sides, and deck but not the masts, superstructure, rigging, engines, and other fittings.
6) A flat piece hinged vertically near the stern of a boat or ship for steering.

7. Combine the words with the help of the preposition *of*.

1) a number		most modern ships
2) the shell		metal
3) stabilizing systems		many larger vessels
4) the upward moved fin		the descending side of the ship
5) the bladed wheels	of	hulls
6) a pointed bow		the turbine
7) seawater as ballast instead		cargo
8) a large flat piece		a ship
9) the operation		horizontal surfaces
10) additional screws		loading and unloading cargo

8. Match the English and Russian equivalents.

1) watertight shell	*a) уменьшить крен*
2) pointed bow	*b) вращать лопастное колесо*
3) underwater fin	*c) зубчатое колесо, шестерня*
4) merchant ships	*d) рассекать воду*
5) to spin the bladed wheels	*e) лебёдка с механическим приводом*
6) to supply current to a motor	*f) подводный стабилизатор*
7) toothed wheel	*g) заострённый нос*
8) to reduce rolling	*h) выхлопные газы*
9) to bobble like a cork	*i) торговые суда*
10) power-driven winches	*j) водонепроницаемый корпус*
11) to knife through the water	*k) подводить ток к двигателю*
12) exhaust fumes	*l)качаться на воде как пробка*

9. Combine the words from the column on the left with the suitable nouns from the column on the right.

1) watertight	a) stern
2) pointed	b) winch
3) rounded	c) shell
4) underwater	d) wheels
5) descending	e) side
6) bladed	f) fume
7) propeller	g) bow
8) exhaust	h) piece of metal
9) advanced	i) equipment
10) flat	j) shaft
11) power-driven	k) ship
12) radiotelegraph	l) fin

10. Choose the correct word or word-combination.

1) Bulkheads form…
a) compartments *b) decks* *c) shell of a ship*

2) … compartments enable a ship to float even with a hole in its hull.
a) pervious *b) permeable* *c) watertight*

3) Most ships … seawater as ballast.
a) supply *b) utilize* *c) are interested in*

4) On turboelectric ships, the turbine turns a generator that produces … for a motor.
a) electricity *b) steam* *c) fuel*

5) On a diesel-electric ship, the engine … a generator that supplies current to an electric motor connected to the propeller shaft.
a) involves *b) uses* *c) revolves*

6) The engine turns a shaft that … out underwater from the stern.
a) projects *b) estimates* *c) hinges*

7) When the helm is turned to the left, the rudder and bow … to the left.
a) fall *b) rotate* *c) lean*

11. Fill in the words listed below.

Assignment 1

a) cargo *c) immerse* *e) longitudinally*
b) opposite *d) deformation* *f) withstand*

The hull of going vessel must [1)]_____ water pressure tending to collapse it from sides, while the heavy masses of [2)]_____ together act from inside. These cargo masses with the hull weight directed vertically downwards tend to [3)]_____ the hull into water, while water sustaining forces directed vertically upwards tend to force it up. Thus being subjected to the diametrically [4)]_____ forces the hull tends to bend [5)]_____: in addition stresses caused at rolling display tendency to transverse section [6)]_____.

Assignment 2

a) bending *c) machinery* *e) hull*
b) construction *d) is* *f) stresses*

When grounding or resting in dry deck the [1)]_____ is subjected to new stresses from [2)]_____ and engine room operation. Thus the principal stresses to which the hull of a vessel [3)]_____ subjected depend on the longitudinal [4)]_____ of the hull overall, its transverse defor-

mation and various [5)]_____ acting in different parts of a vessel. The hull [6)]_____ therefore must be strong and rigid enough to withstand all indicated stresses.

12. Make up the Participle I and Participle II from the following verbs.

To turn, to use, to create, to supply, to screw, to push, to steer, to swing, to discharge, to hold, to load, to produce, to drive, to close, to float, to design, to pitch, to stabilize, to increase, to carry, to take.

13. Translate the following sentences paying attention to Participle II.

1) It is divided into a number of horizontal surfaces called decks.
2) Each compartment has special doors that, when closed, make it watertight.
3) Steam produced in the boilers spins the bladed wheels of the turbine.
4) Hulls have a pointed bow so they can knife swiftly through the water.
5) Vessels propelled by diesel engines are called motor-ships.
6) Power-driven winches also operate the cranes for loading and unloading cargo.

14. Translate the following sentences paying attention to Participle I.

1) Bulkheads are walls built between the decks, forming compartments.
2) Most modern ships also use stabilizing systems to reduce rolling.
3) The fin moves upward on the descending side of the ship and downward on the ascending side and so reduces the roll.
4) When the sailor at the helm turns the wheel to the right, the rudder moves to the right, causing the stern to swing left and the bow to swing right.
5) The rudder is connected to the helm (steering wheel) on the ship's bridge.

15. Translate the following sentences paying attention to Infinitive.

1) Watertight compartments enable a ship to float even with a hole in its hull.

2) The overall shape of a hull is designed to make the ship as stable as possible.

3) A ship must not roll (rock from side to side) or pitch (rock from front to back) too much.

4) Most modern ships also use stabilizing systems to reduce rolling.

5) On a geared-drive ship, the engine works through gears to turn the propeller.

6) Other parts and equipment of a ship include funnels (smokestacks) to discharge smoke and exhaust fumes, an anchor on the left and right sides of the bow, and enough lifeboats to hold all persons on board.

7) Modern ships have power-driven winches to raise or lower the anchors and to bring in or let out the mooring lines used to tie vessels at a pier.

16. Translate the sentences. Find the examples with the Gerund.

1) Closing the doors will trap the water there and prevent it from flooding other compartments.

2) Most modern ships also use stabilizing systems to reduce rolling.

3) Power-driven winches also operate the cranes for loading and unloading cargo.

17. Discuss these questions.

1) On what stage of construction are the problems of hull safety discussed?

2) What engines do the most modern ships have? How do they work?

3) Whether you know the most important parts of the ship equipment?

READING

18. Read the text and translate it into Russian.

TEXT A

Ship Structure

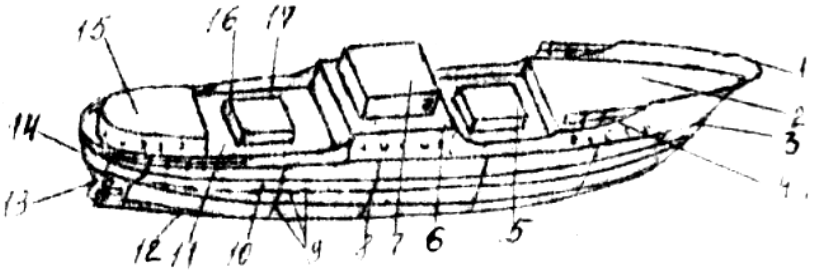
The chief parts of a ship are the hull, the engines, the propellers, and the rudder.

The hull is the watertight shell of a ship. It is divided into a number of horizontal surfaces called decks. Bulkheads are walls built between the

decks, forming compartments. Each compartment has special doors that, when closed, make it watertight. If water floods one compartment because of an accident, closing the doors will trap the water there and prevent it from flooding other compartments. Watertight compartments enable a ship to float even with a hole in its hull.

The deck at the top of the hull is called the main deck. Several more decks may be above it. All the structures above the main deck make up the superstructure.

Hulls have a pointed bow so they can knife swiftly through the water. Most hulls also have a rounded stern, which helps the water close smoothly behind as the ship cuts through the water. The overall shape of a hull is designed to make the ship as stable as possible. A ship must not roll (rock from side to side) or pitch (rock from front to back) too much. Most modern ships also use stabilizing systems to reduce rolling. One such system has a horizontal underwater fin on each side of the hull. The fin moves upward on the descending side of the ship and downward on the ascending side and so reduces the roll.



Pic. 1. Elements of Hull Structure:
1 – bow; 2 – forecastle; 3 – stem;4 – life-rails; 5 – hatch cover; 6 – bridge; 7 – wheel house; 8 – butt;9 – seams; 10 – side; 11 – upper deck; 12 – bottom; 13 – sternpost; 14 – stern; 15 – poop; 16 – hatch coaming; 17 – bulwark

To increase stability further, ships carry extra weight called ballast. Without ballast, an empty cargo ship would bobble about in the ocean like a cork. Most ships use seawater as ballast. As a ship takes on cargo, the ballast water is pumped out.

The engines of most ships are steam turbines, gas turbines, or diesel engines. The largest and fastest ships have steam turbines. Steam pro-

duced in the boilers spins the bladed wheels of the turbine. The turbine, through a series of gears (toothed wheels), drives the propeller shaft and makes the propeller revolve. On turboelectric ships, the turbine turns a generator that produces electricity for a motor. The motor, in turn, drives the propeller. Almost all merchant ships use oil as the fuel to heat the boilers that create the steam. On nuclear-powered ships, a nuclear reactor creates the steam. Many of the most advanced ships have gas turbines. Gas turbines work much like steam turbines but use hot gases instead of steam.

Vessels propelled by diesel engines are called motor-ships. They have either geared-drive or diesel-electric machinery. On a geared-drive ship, the engine works through gears to turn the propeller. On a diesel-electric ship, the engine turns a generator that supplies current to an electric motor connected to the propeller shaft. The propellers, also called screws, move a ship through the water. The engine turns a shaft that juts out underwater from the stern. The propeller is bolted to the end of the shaft. Most propellers have four blades. As a propeller turns, it screws itself through the water and so pushes the ship forward. Most small ships have one propeller. Many larger vessels have two propellers, and very big ships have four. Additional screws increase a ship's power and make the vessel easier to maneuver.

The rudder is a large flat piece of metal that steers a ship. It is hinged to the stern and so can be swung like a door. The rudder is connected to the helm (steering wheel) on the ship's bridge. When the sailor at the helm turns the wheel to the right, the rudder moves to the right, causing the stern to swing left and the bow to swing right. When the helm is turned to the left, the rudder and bow swing to the left.

Other parts and equipment of a ship include funnels (smokestacks) to discharge smoke and exhaust fumes, an anchor on the left and right sides of the bow, and enough lifeboats to hold all persons on board. Modern ships have power-driven winches to raise or lower the anchors and to bring in or let out the mooring lines used to tie vessels at a pier. Power-driven winches also operate the cranes for loading and unloading cargo. Radiotelegraph equipment keeps ships in constant touch with the rest of the world.

COMPREHENSION CHECK

19. Decide whether the following statements are true or false according to the text.

1) The hull is the permeable shell of a ship.
2) The overall shape of a hull is designed to make the ship as steady as possible.
3) Stabilizing systems are used to increase rolling.
4) The fin moves upward on the ascending side of the ship and downward on the descending side.
5) Steam turbines work similar to gas turbines and they use steam.
6) Vessels propelled by diesel engines have geared-drive and diesel-electric machinery.
7) The rudder causes the stern to swing left or right and the bow swings right or left.
8) An anchor is either on the left or right side of the bow.
9) Power-driven winches raise or lower the anchors, bring in or let out the mooring lines and operate the cranes for loading and unloading cargo.
10) The world is in constant touch with vessels by means of radiotelegraph equipment.

20. Complete the following sentences according to the text.

1) The hull is divided into ...
2) The main deck is …
3) A rounded stern helps …
4) A ship must not … or … too much.
5) A horizontal fin is located ...
6) The engines of most ships are ...
7) …move a ship through the water.
8) Additional screws increase … and make the vessel easier ...
9) Funnels (smokestacks) are used to …
10) … are used to hold all persons on board.

21. Answer the following questions.

1) Do doors of each compartment are waterproof? Why? Why not?
2) What makes up the superstructure?

3) Why do hulls have a pointed bow?
4) Why do ships carry ballast?
5) What does steam produced in the boilers spin?
6) What does the turbine drive?
7) What type of fuel is used to create steam on almost all merchant ships / on nuclear-powered ships?
8) How many propellers do different ships have?
9) Where is the propeller bolted to?
10) What is a rudder?

22. What parts of the text can you define? Do they correspond to the paragraphs? Name each part.

1. _____ 4. _____
2. _____ 5. _____
3. _____ ... _____

23. Find key words and phrases which best express the general meaning of each part.

24. Make a short summary of Text A. Do it according to the following plan.

1. The title of the text is … .
2. The text is devoted to … .
3. It consists of … (parts / passages).
4. The first passage deals with … .
5. The second (third, forth, etc.) passage deals with … .
6. The main idea of the text is … .

VOCABULARY

25. Practice saying the following words.

engineering [ˌendʒɪ'nɪərɪŋ] representative [ˌreprɪ'zentətɪv]
purchasing ['pɜːʧəsɪŋ] chief [ʧiːf]
specification [ˌspesəfɪ'keɪʃ(ə)n] technological [ˌteknə'lɔdʒɪk(əl)]

requirement [rɪ'kwaɪəmənt]
completion [kəm'pli:ʃ(ə)n]
joint [ʤɔɪnt]
berth [bə:θ]
sequence ['si:kwən(t)s]
volumetric [ˌvɔlju'metrɪk]

26. Read and memorize the active vocabulary.

Nouns and noun phrases

advisability – *выгодность, целесообразность*
assembling – *сборка*
building berth – *стапель, кораблестроительная верфь*
degree of completion – *уровень завершённости*
delivery – *доставка*
design stage – *стадия проектирования*
extent – *степень, размер*
fitting out – *оснащение*
installation – *установка*
launching – *спуск на воду*
lofting – *развёртка (трёхмерного объекта)*
number of the ships in the series – *количество выпущенных судов этого класса*
placing – *установка*
requirement – *требование*
specification – *техническая характеристика*
template drawings – *шаблонные чертежи*

Verbs and verbal phrases

to alter – *изменять*
to approve – *одобрять, утверждать*
to be agreed – *быть согласованным*
to decide upon in advance – *решать заранее*
to float out – *держаться на плаву*
to lay off – *выкладывать*
to mark off – *размечать, раскраивать*
to perform – *выполнять*
to satisfy – *удовлетворять*

Adjectives

complicated – *завершенный*
dispatched – *отправленный*
particular – *особый*
purchasing – *платёжный*
volumetric – *объёмный, волюметрический*

READING

27. Read the text and answer the questions below.

TEXT B

Modern Principles of Shipbuilding

Ships are extremely complicated engineering structures and high requirements are made of the materials and technological processes employed in ship construction.

In modern shipbuilding, the principal technological problems in constructing a ship are solved in the design stage. The materials and structure of the hull must satisfy the technological requirements. The following must be decided upon in advance: 1) the optimum subdivision of the hull into sections (or blocks); 2) the method of assembling the ship on the building berth; 3) the sequence in which the hull is to be assembled and welded in every stage of construction; 4) the extent to which sections (or blocks) should be completed before placing them in position on the building berth, so that the optimum amount of work is performed beforehand; 5) the combined sequence of hull and fitting operations; 6) the degree of completion of the ship before launching; 7) the amount and sequence of work left to be done after launching (afloat); 8) the economic advisability of using a particular technology for constructing a ship depending on the number of ships in the series.

The basic work of shipbuilding is performed in the 'following sequence: 1) the lines of the ship are laid-off (full size) to make the templates, patterns, etc.; 2) the hull components are marked off on the metal, or set out on template drawings; 3) the hull components are fabricated; 4) the flat elements are assembled and welded; 5) the flat and volumetric sections are assembled and welded, and the necessary installation work on them is done; 6) the sections are fitted up together on the building berth, the welds made, and the installation work in the region of the butt joints is done; 7) the structure is tested for leaks; 8) the ship is launched or floated out; 9) fitting out is performed afloat (the amount of this work should be reduced to a minimum); 10) delivery trials are performed.

At modern shipyards, lofting operations and the prefabrication of hull parts are done with the aid of computers and electronically controlled

machines, which means improvement in the quality of the work done at every stage in the building of a ship, also reduction in work times, labour and costs.

Special technological offices are organized at shipyards for working out these technological processes. These specifications, which are also called the "technological processes", are despatched to the shops, which must comply with them. These documents must indicate all the operations in the technological process, the methods by which the work is to be done and the sequence for its performance, the jigs and tools to be used, the special training required by the workers, the labour required for operations, the time which they should take, and where they should be performed, also the basic delivery requirements. The technological processes must be agreed in advance with the technical staffs of the shops and design office, representatives from the purchasing organization, and the Technical Inspection Department of the shipyard. Once it has been approved, the technological process cannot even be partly altered by the shops unless this is agreed with the technological office and approved by the chief engineer.

1) Why are so high demands made to the process of construction a ship?

2) What must be decided at the preparation stage for optimal developing in production of a ship?

3) Is there any order of performance of a ship?

4) What improved the quality of the work done at every stage in the building of a ship?

5) What is meant under the term "technological process"?

6) What is organized at shipyards for working out technological process?

7) What do the documents produced by the technological office include?

8) Who must the technological processes be agreed with and approved by?

9) Can the technological process be changed by the shops in working order?

28. Practice saying the following words.

rigidity [rɪ'ʤɪdətɪ]
accomplish [ə'kɔmplɪʃ]
transverse ['trænz'vɜːs]
stringer ['strɪŋə]
bulkhead ['bʌlkhed]
secure [sɪ'kjuə]
superstructure ['s(j)uːpəˌstrʌkʧə]
longitudinal [ˌlɔnʤɪ'tjuːdɪn(ə)l]
arrangement [ə'reɪnʤmənt]
girder ['gɜːdə]
guarantee [ˌgær(ə)n'tiː]
partial ['pɑːʃ(ə)l]

29. Read and memorize the active vocabulary.

Nouns and noun phrases

aft – *корма*
afterpeak – *отсек в кормовой части*
arrangement – *размещение, расположение, устройство*
bow – *нос*
carling – *опорная балка настила и вокруг люков*
forecastle – *бак, полубак, носовой кубрик*
forepeak – *форпик (носовой отсек на судах, расположенный непосредственно у форштевня*)
hatch – *люк*
hull – *корпус*
keel – *основной продольный структурный элемент судна, к которому прикрепляется каркас, уходит в воду для обеспечения боковой стабильности*
keelson – *продольная балка, прикреплённая к килю для обеспечения прочности и жёсткости*
promenade deck – *прогулочная палуба*
sequence – *очерёдность, последовательность*
shell – *кожух, оболочка*
stem – *корма*
sternpost – *ахтерштевень*
stringer – *особо прочная балка, металлическая конструкция, проходящая через весь корпус корабля для придания устойчивости и прочности*
transverse bulkhead – *поперечная переборка*
trolley – *тележка, устройство для передвижения*

Verbs and verbal phrases

to accomplish – *завершать, совершенствовать, выполнять*
to cover – *покрывать*

to introduce – *представлять, вводить*
to place in position – *устанавливать в требуемое положение*
to prefabricate – *изготовлять заводским способом*
to provide – *обеспечить*
to secure – *обеспечивать, гарантировать*
to stiffen – *закреплять*
to subdivide – *подразделять*

Adjectives

additional – *дополнительный*
entire – *целый*
external – *внешний*
forward – *передний*
longitudinal – *продольный*
lower – *нижний*
middle – *средний*
partial – *частичный*
permanent – *постоянный*
prefabricated – *построенный заводским способом*
subsequent – *следующий, последовательный*
transverse – *поперечный*
upper – *верхний*

Adverbs

amidships **–** *в центре судна*
downwards – *вниз*
previously – *предварительно*
transversely – *поперёк*
upwards – *вверх*

READING

30. Read the text and speak on three kinds of hull construction, their advantages and disadvantages.

TEXT C

Hull Works

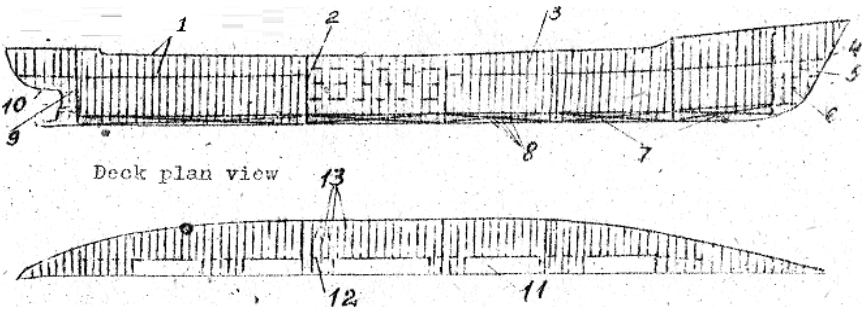
In any kind of vessel the principal problem is the hull construction corresponding to strength and rigidity requirements.

The hull is subdivided into the following main parts: hull, superstructures, subdivision members (compartments, castings).

Properly the hull consists of the framing and shell. The shell is subdivided into a bottom shell, side shell and deck plating. The framing and

the shell are the main structural members of the hull. They include the following members: bottom framing and shell; side framing and shell; deck framing and deck plating.

Typical superstructures are: 1) The forecastle in the forward part of the ship which begins from stem. 2) The bridge is located amidships to protect the ship from getting water through openings in the machine and other castings. 3) The poop is a superstructure in the aft to protect the rudder arrangement and to cover the machine and boiler castings if they are arranged in the stern.



Pic. 2. General arrangement of framing:
1 – deck; 2 – transverse bulkhead; 3 – side frame; 4 – stem; 5 – forepeak; 6 – side stringer; 7 – double bottom; 8 – floor; 9 – afterpeak; 10 – sternpost; 11 – hatch; 12 – carling; 13 – deck beam

The space between all these superstructures of the upper deck is usually protected by with bulwarks.

Subdivision members of the ship serve to provide unsinking of the ship, fire- proof safety and the strength of the ship. Subdivision members are accomplished with the arrangement of decks and partial decks and with the arrangement of transverse and longitudinal bulkheads. They make compartments of the two kinds: decks of the hull and decks of the superstructures. Decks of the hull are as follows: upper deck, middle deck, lower deck and platform.

The decks of superstructure are the following: bridge deck, lower promenade deck, upper promenade deck and boat deck.

Taking into consideration all this the hull construction of a modern vessel is composed of (1) longitudinal framework, keel, keelsons, string-

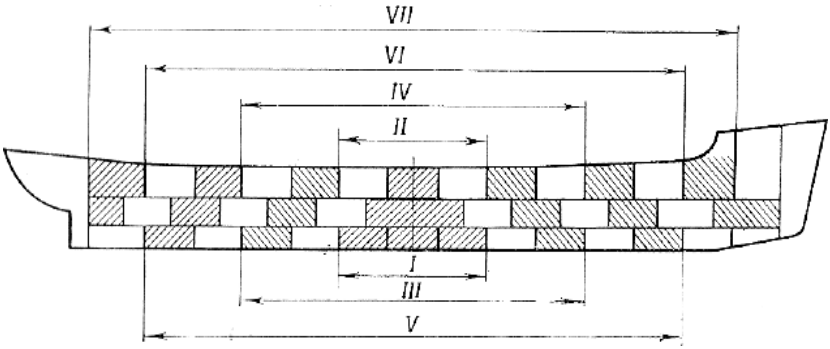
ers, deck girders, longitudinal bulkheads, hull and deck plating; and (2) transverse framework, beams, transverse bulkheads, wooden deck, etc.

As for the external shell plating and deck plating they also stiffen the hull transversely. At interconnections of longitudinals and transversals additional ties are introduced such as in the form of brackets and straps.

Rigidity stability and permanent depth of hull is guaranteed by floors, side plating longitudinal and transverse bulkheads as well as by pillars. Local rigidity at the ends of the hull is also secured by stem and stern.

There are different methods of hull shaping.

1) Pyramid method of building up hulls from prefabricated sections.

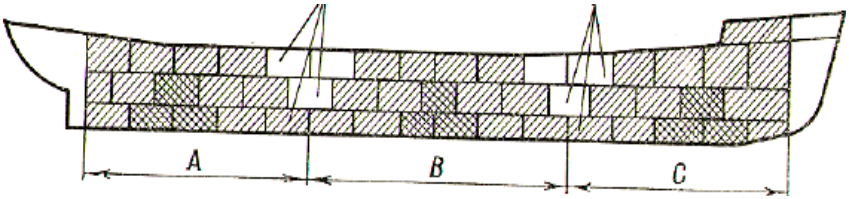


Pic. 3. Pyramid method:
I–V11 – pyramid Nos.; the sections for pyramids I, III, V and VII are shaded

Building up the hull on the building berth starts with the assembly and welding of the first pyramid, with the sections in the subsequent pyramids butt-assembled to it. The entire hull is assembled and welded successively forward and astern from the centre of the prefabricated bottom section of the first pyramid, and to the sides and upwards.

2) The "island" method of building up the hull froт sections.

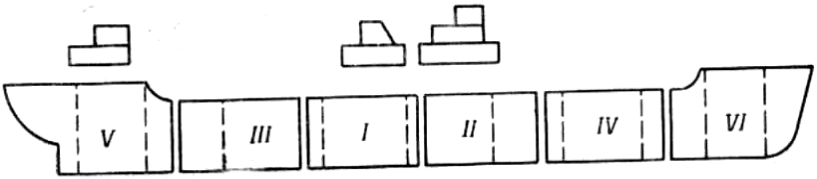
When this method is used, sections are simultaneously placed in position at two or three zones along the hull (for instance, at the midship, bow, and stern zones).



Pic. 4. The "island" method:
A, B and C–the stern, midship and bow islands; the sections for the initial pyramids in each island arc shown by the criss-cross shading

The difficulty of building a hull by this method lies in joining the islands together. If the islands are assembled on movable trolleys, they can be joined together by moving the trolleys. If the islands are assembled on keelblocks, connecting sections should be installed along the entire perimeter of the hull to join the islands together.

3) The block method of hull construction.



Pic. 5. The block method:
I–VI – hull blocks Nos., in the sequence of installing

In the block method the "blocks" (completed parts of the hull between sections parallel to the midship plane) are assembled from previously fabricated sections in which installation work has already been done. The finished blocks are despatched to the building berth, where they are butt-assembled; the installation work in the regions of the butt joints is then completed.

30. Practice saying the following words.

partition[pɑː'tɪʃ(ə)n]
commence [kə'men(t)s]
piping ['paɪpɪŋ]
liquid ['lɪkwɪd]
pressure ['preʃə]
tarpaulin [tɑː'pɔːlɪn]
purpose ['pɜːpəs]
insulation [ˌɪnsjə'leɪʃ(ə)n]
rudder ['rʌdə]
machinery [mə'ʃiːn(ə)rɪ]
temperature ['temp(ə)rəʧə]
awning ['ɔːnɪŋ]
curtain ['kɜːt(ə)n]
receive [rɪ'siːv]

31. Read and memorize the active vocabulary.

Nouns and noun phrases

accommodation – *жилое помещение*
assembling – *сборка*
auxiliary machinery – *вспомогательное оборудование*
awning – *навес, тент*
boat handling gear – *механизм (устройство) управления кораблём*
boat handling gear – *механизм управления судном*
boiler room – *бойлерная*
boiler shop – *бойлерный цех, отсек*
bracing – *держатель, крепление, элемент жёсткости*
bracing – *крепёж*
bracket – *скоба, зажим*
cable boxes – *короб для проводов*
device – *прибор, устройство*
evaporator – *выпариватель*
fitting out – *подгонка, оснащение, монтаж, сборка*
fitting out work – *пригонка, установка*
foundation – *основание, фундамент*
frame – *каркас, ферма*
grinder or milling machines – *шлифовальное оборудование*
housing – *ниша, паз, футляр*
insulation – *изоляция*
integrating – *объединение, интегрирование*
labour – *работа, объём работ*
laying the cables – *прокладка кабеля*
life-jacket case – *спасательный жилет*
light partitions – *лёгкие перегородки*
mooring – *постановка на якорь, швартовы*
mooring equipment – *швартовое оборудование*

outlets – *выпускное или выходное отверстие*
partitions – *перегородка, переборка*
piping – *система труб*
plant – *оборудование, установка, агрегат*
propulsive machinery – *движущее оборудование*
quarter – *помещение, отсек*
receiving and transmitting devices – *принимающие и передающие устройства*
rigging – *такелаж, снасти*
sail-making work – *навигационные работы*
spacing pieces – *просторные поверхности*
stepping the mast – *установление мачты*
support – *опора*
tarpaulin – *брезент, парусина*
to file to a checking templates – *регистрация контрольных образцов*
working units – *рабочие блоки*
calculations – *расчёты*

Verbs and verbal phrases

to apply – *применять*
to carry out – *проводить, завершать*
to commence – *начинать*
to cover – *покрывать*
to fasten – *крепить*
to file – *отделывать, вкладывать*
to fit up – *оснащать, монтировать*
to fix – *фиксировать*
to handle – *обращаться с ч.-л., регулировать*
to insert – *вставлять, вкладывать*
to install – *устанавливать*
to involve – *включать (в себя)*
to machine – *обрабатывать*
to mount – *монтировать*
to receive – *получать*
to separate – *отделять*
to set in position – *устанавливать на место*
to simplify – *упрощать*
to speed up – *ускорять*
to tow – *тянуть, буксировать*
to transmit – *перемещать*
to treat – *обрабатывать*
to weld – *приваривать*

Adjectives

portable – *портативный, переносной*
pneumatic – *пневматический*
standing – *статический*
running – *подвижный*
excellent – *прекрасный*
completed – *завершённый*
immense – *громадный*
moving – *движущийся*

auxiliary – *второстепенный, вспомогательный*
propulsive – *приводящий в движение*
common – *общий, обычный*
certain – *определённый*

Adverbs
merely – *только, просто; единственно*

READING

32. Translate the text into the Russian language.

TEXT D

Installations

1) Hull Installation Work:

The term "installation or fitting out work" means the combination of very wide range of different operations included in equipping and fitting out ships, performed after the principle hull structures have been assembled and welded. This work includes: the installation of light partitions, bulkheads and various types of bracing, the painting and insulation of the ship, the installation of the machinery, systems and devices, the equipment of the accommodation and quarters, etc.

The first stage in the work of installation on a ship is installing fittings in the sections. This enables the work to be carried out by parallel method, with the installation work commenced at an early stage in building the ship.

With modern methods of shipbuilding the installation of fittings (rudder, anchor and hoisting equipment, boat handling gear, towing and mooring equipment, etc.) begins while sections are being fitted up and welded, and the most of the work is performed on the building berth.

Installing of the systems on a ship includes piping, machinery and instruments for moving liquids, steam or air, and controlling their temperature, pressure and so on.

The rigging and sailmaking work is done by the rigging shop as follows: making and installing the standing and running rigging, stepping

the masts, assembling the anchor fittings and installing the rigging of the boat handing gear.

The sail making work consists of producing awnings, tarpaulins and sails, covers for deck machinery, gear and instruments, flags, life-jacket cases, stair carpets, curtains, etc., and installing all these on board ship.

When all metal parts have been assembled, welded and fitted they are specially treated to protect them against corrosion.

2) Electrical Installation:

Every year the amount of electrical equipment on all types of ship, and the amount of electrical installation work performed during their construction, are increasing. Automatic control and mechanization are developing rapidly, and there are excellent prospects for using electric drives on a large scale and for the complete electrification of machinery and fittings on ships.

Tens of kilometers, and in large ships hundreds of kilometers, of cable are used for connecting up the great number of different types of plant, apparatus, receiving and transmitting devices and instruments at different points on board ship. Immense numbers of adapters, bridges, panels, brackets, packing boxes, cable boxes and pipes, installation frameworks, and different types of fastening device have to be made and installed for the purpose of laying the cables. A great numbers of foundations, frames, brackets, supports, outlets, etc., also have to be made and installed to take the different types of plant, apparatus, receiving and transmitting devices and instruments. Tens of thousands of cable ends have to be separated, marked, fixed, channeled, insulated and earthed in order to create the closed electrical circuits. The total amount of work involved in installing the electrical equipment now amounts to about 10% of all the work in building a ship.

3) Installation of the Auxiliary Machinery:

According to the method by which it is installed, the auxiliary machinery can be subdivided into four categories:

1) machinery supplied to the ship in the form of individual complete assemblies; these have to be aligned on the ship and fixed to the foundations on wedges (for instance, the steering machinery); 2) machinery including power and working units in the same housing (for instance, turbine and electric pumps); 3) machinery mounted on one foundation frame by means of which it is connected to the ship's foundations (diesel

generators and compressors, etc.); 4) machinery with no moving parts (ejector pumps, filters, evaporators, etc.).

Before the auxiliary machinery is installed a check is carried out to ensure that the foundation for the machinery is correctly positioned relative to the base planes and that the dimensions of the supporting surfaces correspond to those shown on the drawings.

The supporting surfaces of the foundations for machinery in the first and second categories are machined using portable (pneumatic) grinders or milling machines, and are filed to a checking template in the same way as the foundations for shaft-line bearings or the main propulsive machinery.

Machinery of the third and fourth categories is usually mounted on hardwood spacing pieces (oak, ash or teak), and the supporting surfaces of the foundations are not machined, merely dressed. The wooden spacing pieces made in the shop, with an allowance for adjustment on the spot. The spacing pieces are fitted to the dressed supporting surface of the foundation and set in position on studs.

4) Installation of Boilers:

The principle of integrating into combinations greatly reduces the labour and time required for installing boilers. To simplify and speed up the installation of boilers a considerable amount of work which was previously performed on the building berth or while prefabricating the blocks is now performed in the boiler shop (or at the boiler making works); this includes the adjustment and installation of fittings and fireboxes; the installation of the piping in the boiler; the installation of base plates, insulation of the boilers, etc. The boilers are supplied to the ship fully fitted out for installation, i.e., in the form of integrated combinations of equipment. Installation of the main boilers can commence as soon as the basic hull welding is complete and the watertightness tests have been made in the boiler room region.

New methods of installing water tube boilers as integrated combinations of equipment have therefore been worked out; with these methods there is no need for machining the supporting surfaces of the boiler foundations: the boiler is installed using an intermediate frame or intermediate parts in the foundation. In this case the boiler foundation pedestals are as it were separated into two parts in depth; the upper parts of these pedestals are connected together by box girders into a separate frame called the "intermediate frame". When the intermediate frame has

been assembled and welded, the supporting surfaces of its pedestals are machined. The frame is now transported to the assembly stand, and when it has been checked and fixed in position the boiler is fully assembled on it. The boiler supports are finally fixed to the frame pedestals, and spacing pieces are inserted into the gaps at the moving supports in order to fix their position.

At present the principle of integrating into combinations is applied to auxiliary machinery and the apparatus and devices associated with it, which are mounted on the same foundation frame; the principle is also applied to integrating machinery and devices in common housings. Calculations have shown that, in certain cases, the integration of auxiliary machinery on common foundation frames reduces the weight of the foundations by 20–25 %, reduces the amount of labour required for their fabrication by 75 %, and reduces the labour required for their installation on board ship by 60–70 %; the amount of piping used is also reduced.

FOLLOW UP

33. Read the texts of Unit III again, make notes under the following headings. Then use your notes to talk about *Shipbuilding*.

1. Ship structure.
2. Methods of hull shaping.
3. Devices to be installed.

UNIT IV

MODERN WORLDWIDE SHIPBUILDING INDUSTRY

VOCABULARY

1. Read and memorize the active vocabulary.

Nouns and noun phrases

capacity – *мощность*
certification – *сертификация*
commitment – *поручение. обязательство*
condition – *состояние, условие*
creation – *создание*
elaboration – *усовершенствование, детальное уточнение*
enterprise – *предприятие, фирма, компания*
expansion – *расширение*
facility – *средство, устройство*
interaction – *взаимодействие*
investment – *вложение*
joint venture – *совместное предприятие*
leadership – *лидерство, руководство*
patronage – *покровительство*
realization – *получение, реализация*
restriction – *ограничение*
satisfaction – *соответствие, удовлетворение*
treatment – *обработка*

Verbs and verbal phrases

to affect – *влиять, воздействовать*
to conclude – *заключать, завершать*
to consider – *считать, полагать, рассматривать*
to draw up – *выпрямляться, вытягиваться*
to ensure – *обеспечивать, гарантировать*
to lease – *сдавать в аренду*
to meet the needs – *соответствовать требованиям*
to represent – *представлять, изображать*
to strive – *стараться, прилагать усилия*
to tug – *тянуть, буксировать*

Adjectives

advanced – *усовершенствованный*
appropriate – *соответствующий, подходящий*

bordering – *приграничный*
dramatic – *яркий, впечатляющий*
foreign – *посторонний, иностранный*
intergovernmental – *межправительственный*
navigable – *судоходный*
neighboring – *прилегающий, соседний*
significant – *значительный, важный*
speedy – *скоростной*

Geographical names
Rechitsa – *Речица*
Mozyr – *Мозырь*
Pripyat – *Припять*
WestDvina – *Западная Двина*
the Dnepr-Bug Canal – *Днепро-Бугский канал*
the "Belarusian Inspection of River Register" – *Инспекция речного реестра Беларуси*
Belarusian River Navigation Inspection – *Судоходная речная Инспекция Беларуси*
"Sea Belarusian Steam Navigation and Belarusian Navigable Company" – *Судоходная и навигационная морская компания Беларуси*

2. Read the following international words and guess their meaning.

network	design	company
product	submarine	financial
formation	realization	policy
effective	passenger	optimal
service	export	pontoon
crane	portal	ministry
excavation	profession	legal base
commercial	transit	patronage

3. Match the words and their transcriptions.

enterprise	[sɪg'nɪfɪkənt]
science	[ə'prəuprɪət]
ensure	[haɪ'drɔːlɪk]

suburb	[ˌsɪm(ə)l'teɪnɪəs]
sluice	[sluːs]
hydraulic	[ɪn'ʃuə]
significant	['saɪən(t)s]
appropriate	['sʌbɜːb]
commercial	[kə'mɜːʃ(ə)l]
simultaneous	['entəpraɪz]
issue	['ɪʃuː]

4. Look at the following list of nouns. Write down the corresponding verb in the space provided. The first one has been done for you.

NOUN	VERB	NOUN	VERB
connection	*connect*	realization	_____
aim	_____	provision	_____
handling	_____	organization	_____
operation	_____	interaction	_____
adoption	_____	excavation	_____
creation	_____	installation	_____
consideration	_____	conclusion	_____

5. Match the terms with their definitions.

a) maritime	*c) repair plant*	*e) capacity*
b) navigation	*d) passenger*	*f) fleet*

1) Availability of technical facilities, qualified workers, proper materials and enough orders to produce ships at a shipbuilding plant.

2) A person travelling by any kind of transport(train, ship).

3) A general number of ships and boats belonging to any country or nation.

4) Possibility of transporting any cargoes or passengers on water.

5) Special places where a ship can be technically served, painted, restored and rebuilt.

6) Professions linked with a work on sea (i.e. sail-making work).

6. Combine the words with the help of the preposition *of*.

1) a network		a) vessels
2) carrying out the program		b) population demands
3) satisfaction		c) passengers
4) building and repair		d) the rivers for navigation
5) transportation	of	e) developing sea shipping
6) million tons		f) repair plants
7) significant efforts in the field		g) sea and inland transport development
8) the capacity		h) river navigable routes
9) the required depth		i) products
10) wide range		j) cargo

7. Combine the words from the column on the left with the suitable nouns from the column on the right.

1) paint	a) mat
2) bordering	b) pontoon
3) concrete	c) states
4) waterside	d) tank
5) speedy	e) facilities
6) bottom-deepening	f) passenger ships
7) hydraulic	g) sluices
8) navigation	h) installations
9) dead	i) professions
10) trade	j) weight
11) maritime	k) condition
12) technical	l) fleet
13) intergovernmental	m) base
14) treaty-legal	n) agreement
15) sea-shipping	o) navigation
16) inland	p) department
17) Belarusian	q) floating and portal cranes
18) high-performance	r) patronage

8. Match the English and Russian equivalents.

1) a river navigable route 2) water transport enterprises 3) wide range of products 4) high-performance cranes 5) displacement 6) pushed and tugged rolls 7)pre-treatment process 8) underutilized shipyards	*a) толкачи и тягачи* *b) широкий спектр продукции* *c) речной судоходный путь* *d)стадия предварительной обработки* *e) краны с высокой производительностью работы* *f) предприятия водного транспорта* *g) судоверфи с низким коэффициентом использования, незагруженные* *h) водоизмещение*

9. Fill in the words listed below.

a) vessels	*e) competition*	*i) freight*
b) transports	*f) development*	*j) to*
c) shipyard	*g) according*	*k) cargo*
d) authorities	*h) sea*	*l) year*

Nowadays Belarus has a quite good [1)]_____ base. Experts estimate that [2)]_____ flows from this country with use of sea transport exceed 15 million tonnes a [3)]_____. Part of them are directed [4)]_____ the Baltic Sea, part to the Black Sea, and today between ports of the countries surrounding Belarus there is a serious [5)]_____ for serving the Belarus export, namely among Kaliningrad (Russia), Ventspils (Lithuania), Klaipeda (Latvia), Nikolayev (Ukraine).

Though Belarus is not a [6)]_____ state, its government has accepted the program of [7)]_____ of sea transport. [8)]_____ to this program 10 «river – sea» type [9)]_____ are to be built. The vessel "Nadezhda" has already been constructed at the [10)]_____ in Gomel-city. This vessel [11)]_____ potash fertilizers to Nikolaev. Belarus [12)]_____ plan to use their fleet for work on Danube routes.

10. Translate the sentences paying attention to the Complex Subject and the Complex Object.

1) Navigation routes are known to go along the rivers Sozh, Berezina, Dnepr, Pripyat, Neman, West Dvina and the Dnepr-Bug Canal. 2) Their main tasks are considered to be (a) elaboration and carrying out the program of sea and inland transport development; (b) organization, formation, realization of economic and science and technical policy. 3) Our own sea trade fleet expects at least two vessels of 25 thousand tons displacement to be either leased or bought. 4) As for the Navy development, the President stated Belarus to be considering «taking one surface ship and a submarine under Belarusian patronage.»

11. Complete the sentences with Complex Subject.

1) Navigation routes go along the rivers Sozh, Berezina, Dnepr, Pripyat, Neman, West Dvina and the Dnepr-Bug Canal. We know it.	Navigation routes <u>are known to go</u> along the rivers Sozh, Berezina, Dnepr, Pripyat, Neman, West Dvina and the Dnepr-Bug Canal.
2) The Water Transport enterprises consider that their main tasks are (a) elaboration and carrying out the program of sea and inland transport development; (b) organization, formation, realization of economic and science and technical policy.	The main tasks of the Water Transport enterprises _____ to ____ (a) elaboration and carrying out the program of sea and inland transport development; (b) organization, formation, realization of economic and science and technical policy.
3) We suppose that design of vessels and floating means are carried out at Republican National Unitary Enterprise "Belsudoproekt" (Gomel).	Design of vessels and floating means _____ to ___ at Republican National Unitary Enterprise "Belsudoproekt" (Gomel).
4) The Transport ministry reports that the Republic of Belarus already has a sea-shipping department.	The Republic of Belarus _____ to ____a sea-shipping department.
5) It is expected by planning that at least two vessels representing our own sea trade fleet of 25 thousand tons displacement would be either leased or bought.	At least two vessels representing our own sea trade fleet of 25 thousand tons displacement were _____ to ___ either leased or bought.

12. Discuss these questions.

1) What is the reason for the Water Transport enterprises to produce a wide range of products besides building ships?

2) Is satisfaction of national economy and population demands the primary aim of the Belarusian Water Transport enterprises?

3) Whether the leading shipbuilding enterprises are involved in creation jobs for citizens with maritime professions?

READING

13. Read the text and translate it into Russian.

TEXT A

Belarusian Water Transport

Belarus has a network of river navigable routes with the length of about 2,000 km that connects the country with bordering states. Navigation routes are known to go along the rivers Sozh, Berezina, Dnepr, Pripyat, Neman, West Dvina and the Dnepr-Bug Canal.

The Water Transport enterprises provide design, building and repair of vessels, cargo transportation along the rivers of the Republic of Belarus. Besides, the enterprises of the **branch** produce wide range of products: launches, boats, waterside pontoons, 5-200 liter paint tanks and flexible concrete mats.

Their main tasks are considered to be (1) elaboration and carrying out the program of sea and inland transport development; (2) organization, formation, realization of economic and science and technical policy aimed at creation necessary conditions for effective work of sea and inland water transport enterprises, for satisfaction of national economy and population demands in cargo and passenger transportation; (3) ensuring optimal interaction between different types of transport and increasing transport export service.

Enterprises of the river fleet fully meet the needs in transportation of passengers by the water transport of the Republic. Passenger carriage is **affected** in the towns of Gomel, Brest, Pinsk, Mozyr, Grodno, Mogilev and Loev.

The river fleet of Belarus today includes modern speedy passenger ships of Polessye type (hydrofoil craft) with the capacity of 53 persons, suburban passenger ships, tug fleet, tugged cargo ships and special ships.

The port facilities are equipped with high-performance floating and portal cranes and mechanized cargo lines designed for fast handling of ships.

Ten river ports of the Republic of Belarus (Mikashevichi, Mogilev, Pinsk, Rechitsa, Vitebsk, Grodno, etc.) are capable of transporting and handling about 22 million tons of cargo. River ports of Gomel, Bobruysk, Brest and Mozyr have railway approach lines and can be used for handling of cargo transported in different directions.

Four waterway enterprises (Gomel, Pinsk, Mozyr, Bobruysk) maintain the required depth of the rivers for navigation of pushed and tugged rolls with the capacity up to 2,000 tons. They have the required bottom-deepening and excavation **facilities**, modern navigation sluices and hydraulic installations as well as navigation equipment.

The Republic of Belarus has 4 shipbuilding and repair plants (Pinsk, Rechitsa, Gomel, Petrikov) the **capacity** of which allows building new ships with the dead weight up to 3,000 tons of any class as well as repair of ships in operation.

Design of vessels and floating **means** are carried out at Republican National Unitary Enterprise «Belsudoproekt» (Gomel).

The control over technical conditions of vessels, certification of items used in shipbuilding is fulfilled by the «Belarusian Inspection of River Register» Republican Unitary Enterprise (Pinsk).

The control over fulfilling shipping rules in water ways, ensuring safe navigable conditions as well as holding of State Vessel Register are carried out by Belarusian River Navigation Inspection (Gomel).

Transport forwarding companies Republican Unitary Enterprise «Sea Belarusian Steam Navigation and Belarusian Navigable company», «Belarusian Transport forwarding and Chartering Company» working in the system of the Water Transport provide sea cargo transportation.

Although Belarus is an inland state, it strives to create its own sea trade fleet. Our government sees a lot of advantages in creating its national fleet. One of them is to create jobs for its citizens with maritime professions, another – it will be more convenient for Belarus to transport its production itself.

The year of 2004 saw significant efforts in the field of developing sea shipping in accordance with the instruction of the Belarusian president. The efforts are still **underway**. The appropriate treaty-legal base was drawn up for the sea shipping activities. In particular, the Inland Water Transport Code and the Commercial Navigation Code were adopted;

intergovernmental agreements with Ukraine, Lithuania and Latvia were concluded on the development of inland navigation and transit shipping through ports.

The transport ministry of the Republic of Belarus already has a sea-shipping department. Simultaneously the Belarusian sea lines company is being setting up to carry out sea activities under the government's Program of Inland and Sea Water Transport Development till 2010, which was adopted back in 2003. Our own sea trade fleet expects at least two vessels of 25 thousand tons displacement to be either leased or bought. They enable sea transportation to be carried out under the Belarusian flag. Now the financial issues are being considered. As for the Navy development, the President stated Belarus to be considering "taking one surface ship and a submarine under Belarusian patronage."

COMPREHENSION CHECK

14. Choose the contextual meaning of the words written in bold in Text A.

1) branch

a) ветвь
b) отрасль
c) рукав (реки)
d) группировать

2) affect

a) осуществлять
b) предпочитать
c) оказывать влияние
d) делать вид

3) facility

a) возможность
b) учреждение
c) средство обслуживания
d) оборудование

4) capacity

a) объем
b) способность
c) мощность
d) грузоподъемность

5) means

a) средства
b) аппаратура
c) возможности
d) значить, означать

6) underway

a) дорожный
b) двигающийся
c) начиная движение
d) в процессе разработки

15. Decide whether the following statements are true or false according to the text.

1) A network of river navigable routes of Belarus connects the country with bordering states.
2) Enterprises of the river fleet fully provide transportation of passengers by the water transport.
3) There are railway approach lines that can be used for handling of cargo in every river port.
4) The waterway enterprises in Gomel, Pinsk, Brest, Bobruysk have the bottom-deepening and excavation facilities, modern navigation sluices and hydraulic installations and navigation equipment.
5) "Belsudoproekt" carries out the design of vessels and floating means.
6) Belarus has its own sea trade fleet.
7) In 2004 the Inland Water Transport Code and the Commercial Navigation Code were adopted; intergovernmental agreements with Ukraine and Latvia were concluded on the development of see side navigation and transit shipping through ports.

16. Complete the following sentences according to the text.

1) Navigation routes go along the rivers ...
2) Their main tasks of the Water Transport enterprises are …
3) The port facilities are equipped with …
4) The capacity of each shipbuilding and repair plant allows …
5) The control over technical conditions of vessels, certification of items used in shipbuilding is performed by …
6) Belarus has the following advantages in creating its national fleet …

17. Answer the following questions.

1) What does the Water Transport enterprises provide and produce?
2) What does the river fleet of Belarus today include?
3) What are ten river ports of Belarus capable of?

4) How many shipbuilding and repair plants are there in Belarus? And where?

5) What does Belarusian River Navigation Inspection deal with?

6) What companies provide sea cargo transportation?

18. Fill in the correct prepositions, translate the phrases.

1) river navigable routes ___ the length ___ about 2,000 km; 2) transportation ___ the rivers; 3) wide range ___ products; 4) to carry___ the program ___ sea and inland transport development; 5) to be aimed ___ creation necessary conditions; 6) interaction ___different types of transport; 7) meet the needs ___ transportation ___ passengers; 8) to be equipped ___ high-performance floating and portal cranes; 9) to be designed ___ fast handling; 10) tugged rolls ___ the capacity ___ 2,000 tons; 11) ships ___ the dead weight ___ 3,000 tons; 12) ships ___ operation; 13) intergovernmental agreements ___ Ukraine, Lithuania and Latvia; 14) to conclude ___ the development ___ inland navigation and transit shipping ___ ports; 15) to carry ___ sea activities ___ the government's Program of Inland and Sea Water Transport Development; 16) to carry ___ sea transportations ___ the Belarusian flag.

19. What parts of the text can you define? Do they correspond to the paragraphs? Name each part.

1. _____ 4. _____
2. _____ 5. _____
3. _____ ... _____

20. Find key words and phrases which best express the general meaning of each part.

21. Make a short summary of Text A. Do it according to the following plan.

1. The title of the text is … .
2. The text is devoted to … .
3. It consists of … (parts / passages).
4. The first passage deals with … .
5. The second (third, forth, etc.) passage deals with … .
6. The main idea of the text is … .

VOCABULARY

22. Practice saying the following words.

Asian ['eɪʃ(ə)n]
Chinese ['ʧaɪ'ni:z]
European [ˌjuərə'pi:ən]
inevitably [ɪ'nevɪtəblɪ]
shipyard ['ʃɪpjɑ:d]
tonnage ['tʌnɪʤ]
vexing ['veksɪŋ]
Beijing [ˌbeɪ'ʤɪŋ]
concert ['kɔnsət]
figure ['fɪgə]
merchant ['mɜ:ʧ(ə)nt]
surpass [sə'pɑ:s]
underutilized [ʌndə(r) 'ju:tɪlaɪzd]
Washington ['wɔʃɪŋtən]

23. Read and memorize the active vocabulary.

Noun and noun phrases

a major maritime power – *ведущая морская держава*
busiest port next to – *ближайший порт с большой загрузкой*
capacity expansion – *увеличение мощностей*
commitment – *обязательство, соглашение*
concerted effort – *совместные усилия*
container ship traffic – *движение грузовых(контейнерных) судов*
corruption – *коррупция*
dramatic improvements – *существенные улучшения*
engineering skills – *инженерные навыки*
export – *экспорт*
flag merchant fleet – *торговый флот под флагом*
foreign knowledge – *иностранные технологии*
full advantage – *полный успех*
hardware and software – *техническое оборудование и программное обеспечение*
import – *импорт*
joint ventures – *совместное предприятие*
know-how – *новые технологии*
lack of technical knowledge – *недостаток технической квалификации*
leadership – *лидерство*
naval architect – *судовой архитектор*
obstacle – *препятствие*
opportunities offered – *предложенные возможности*
political mandate – *политическая поддержка*
prerequisite – *предпосылка*
production methods – *методы производства*
productivity – *производительность*
share – *доля*

shipbuilding industry – *кораблестроительная промышленность*
state-owned enterprise – *государственное предприятие*
trading nation – *торговая нация*
upgrading – *модернизация, повышение качества*
warship – *военный корабль*
world's largest trading nation – *крупнейшая торговая держава в мире*

Verbs and verbal phrases
to aid – *помогать*
to catch up – *схватить, подхватить*
to exist – *существовать*
to expand – *расширять(ся)*
to limit – *ограничивать*
to merge – *сливать(ся), объединять(ся)*
to predict – *предсказывать, прогнозировать*
to represent – *представлять*
to surpass – *превосходить, превышать*
to undermine – *подрывать, подкапывать, подмывать*

Adjectives
commercial – *коммерческий*
concerted effort – *совместные усилия*
merchant – *торговый*
naval – *военный*
particular – *особый, специфический, определённый*
proficient – *искусный, опытный, умелый*
significant – *значительный*
underutilized – *с низким коэффициентом использования*

Adverbs
inevitably – *неизбежно, неминуемо*

Geographical and Proper Names
Asian – *азиатский*
Beijing – *Пекин*
Shanghai – *Шанхай*
Singapore – *Сингапур*
the Asia and Pacific Region – *Азиатский и Тихоокеанский регион*
the European Commission – *Европейская комиссия*
the United Nation's Economic and Social Commission – *Экономическая и социальная комиссия при ООН*

READING

24. Read the text and answer the questions below.

TEXT B

The Chinese Shipbuilding Industry

China is making a concerted effort to establish itself as a major maritime power. It is now the world's third largest shipbuilder in terms of gross tonnage, surpassed only by Japan and South Korea. The high volume of these three Asian countries comes from commercial, not naval (military), construction.

Commercial shipbuilding has, however, always been considered a strategic industry, and not only because its infrastructure can also support warship construction. England at the dawn of the industrial revolution, and Japan as it strove to catch up with the West in the 19th century, both used shipbuilding as a catalyst for wider economic development.

Workers in a shipbuilding base in Yichang, Hubei. China became the world's largest shipbuilder in terms of contracts volume in the first half of 2010.

China is the world's tenth largest trading nation, accounting for 4 percent of world trade and the World Bank estimates that China could be-

come the second largest trading state by 2020. The Chinese-flag merchant fleet numbers more than 1,500 ships, over 700 of which have a displacement over 10,000 deadweight tons. In comparison, U.S.-flagged merchant ships over 10,000 dwt number less than 470, with a third of these owned by the U.S. government.

Less than 3 percent of America trade is carried in U.S.-flag ships, and American ships represent less than 1 percent of world commercial tonnage (down from 9 percent 20 years ago).These low shipping figures persist despite the fact that U.S. imports account for 18.5 percent of total world imports and U.S. exports make up 12.4 percent of the global total. Washington has not followed a policy to leverage its position as the world's largest trading nation into leadership in maritime commerce or industry.

A study of the Chinese shipbuilding industry by the European Commission found that Beijing has managed to expand its share of world shipbuilding to 7 percent. «There has been significant capacity expansion in recent years both through the construction of new facilities and the upgrading of existing shipyards,» reports the EC. The United Nation's Economic and Social Commission of the Asia and Pacific Region predicts container ship traffic in the region will double over the coming decade, with Shanghai replacing Singapore as the second busiest port next to Hong Kong.

China's shipbuilding industry still has obstacles to overcome before it can take full advantage of the opportunities offered. Beijing's goal of sourcing 80 percent of ship components from Chinese industry by 2000 was not met. The actual use of Chinese-made equipment is very limited due to its poor quality. This is most vexing in the area of propulsion systems. China has also been importing advanced production methods and capital equipment, including complete production lines. Using foreign sourced computer-aided design and computer-aided manufacturing (CAD/CAM) hardware and software, Chinese naval architects are becoming more proficient in designing ship hulls, compartment layouts, and propeller-rudder combinations that improve speed, efficiency and structural integrity.

Inefficiency is another pressing problem. Many of China's 800 shipyards are underutilized. A typical Chinese yard employs 9,000–12,000 workers, but these workers are not always kept busy. Poor management, corruption, lack of technical knowledge and political mandates to use particular suppliers undermine operations. In recent years, Beijing has been trying to reform the industry's structure by merging yards and making administrative changes.

Joint ventures between the developing Chinese shipbuilding industry and established Japanese and Korean yards will inevitably transfer technology, engineering skills and production know-how to Beijing. Hundreds of Chinese engineers are being trained by their Japanese and Korean partners. Such transfers are a prerequisite for doing business with any state-owned enterprise in China. Both Japan and South Korean shipbuilders were able to make dramatic improvements in productivity, running as high as 15 percent a year, in their earlier periods of development. With a strong commitment to the industry from Beijing and the inflow of foreign knowledge, it can be expected that Chinese shipyards will also make great strides over the next 5–10 years.

1) What is the China's position in the shipbuilding industry in terms of gross tonnage?
2) Can the shipbuilding industry support the national economics?
3) Does the U.S. take the leading place in maritime trade?
4) Are there in China any obstacles to take full advantage of the opportunities offered?
5) What are the prospects of China's shipbuilding?
6) Is the collaboration with other shipbuilding nations competitive or helpful for Chinese shipbuilding industry?

VOCABULARY

25. Practice saying the following words.

analysis [ənæ̰lɪsi:z]
automation [ˌɔ:tə'meɪʃ(ə)n]
employee [ɪm'plɔɪi:]
objection [əb'dʒekʃ(ə)n]
pursue [pə'sju:]
simulation [ˌsɪmjə'leɪʃ(ə)n]
succeed [sək'si:d]
announce [ə'naun(t)s]
breakthrough ['breɪkθru:]
Japan [dʒə'pæn]
occur [ə'kɜ:]
scrupulous ['skru:pjələs]
solicit [sə'lɪsɪt]
utilize ['ju:tɪlaɪz]

26. Read and memorize the active vocabulary.
Noun and noun phrases
breakthrough – *прорыв*

competitiveness – *конкурентоспособность*
dock floating – *плавучий док*
error – *ошибка*
fact-finding survey – *расследование, установление фактов, деталей, обстоятельств*
further spur development – *дальнейшее отраслевое развитие*
high value-added – *дорогой в обработке*
implementation – *реализация, внедрение, ввод в эксплуатацию, разработка*
inter-company experts – *внутренние эксперты*
interior infrastructure – *внутренняя инфраструктура*
next-generation – *следующие поколения*
objection – *препятствие*
overseas leakage – *утечка за рубеж(технологий)*
participant – *участник*
restriction – *ограничение*
safety – *безопасность*
shipbuilding boom – *кораблестроительный бум*
the project's first-phase – *начальная стадия проекта*

Verbs and verbal phrases

to announce – *сообщать, извещать, заявлять*
to confidence – *доверять, уверять*
to deal with – *иметь дело с кем-л., обсуждать что-л.*
to face – *столкнуться*
to occur – *происходить, случаться*
to point out – *указывать, обращать внимание*
to pursue – *проводить (напр. политику); преследовать (цель)*
to relate to – *относиться к ч.-л.*
to resolve the problem – *решить проблему*
to schedule – *работать по расписанию(по графику)*
to share ideas – *разделять идеи*
to solicit – *просить, упрашивать*

Adjectives

available – *доступный, имеющийся в наличии*

Adverb

consequently – *в результате, вследствие*
frequently – *часто*

Geographical and Proper Names

Community of Practice – *технический (экспериментальный) отдел*

Hyundai Heavy Industries (HHI) – *комплекс тяжёлого машиностроения корпорации «Хёндай»*
Samsung Heavy Industries (SHI) – *комплекс тяжёлого машиностроения корпорации «Самсунг»*
the International Shipbuilding Association – *Международная ассоциация судостроения*
the Korean Cooperative of Shipbuilding Technology Research – *Корейский отдел развития судостроительных технологий*

READING

27. Read the text and speak on the undertaken measures and new technologies which allow Korea to be at the top of shipbuilding industry.

TEXT C

Shipbuilding Industry of Korea

Since the start of the latest shipbuilding boom in 2000, ship orders have flooded into Samsung Heavy Industries (SHI). Yet, the orders only provided a moment of pleasure for SHI because docks to build the ships were in very short supply and expansion of production facilities would not be easy due to the limited available free space at its shipyard. Faced with objections from Europe and Japan based on restrictions set by the International Shipbuilding Association, moreover, SHI was not able to construct new docks either. To resolve the problem, SHI solicited management innovation ideas from all employees in 2001.

The Production & Operation Team submitted a creative idea, suggesting – "build ships on the sea utilizing barges" as well as the then-idle 3,000-ton marine crane at the company's Goeje Shipyard. Nevertheless, doing welding or painting work while dealing with the high waves of the sea was difficult work. Furthermore, ship owners did not have confidence in building ships at a dock floating on the sea. At that time, a CoP (Community of Practice) composed of inter-company experts began to pursue breakthroughs.

After thorough and scrupulous checks of problem areas pointed out by ship owners that could potentially occur with such a shipbuilding process by field, such as design, research, production and quality control, the CoP started to suggest answers. The CoP members met frequently and exchanged and shared ideas and knowledge. SHI's research institute also added a theoretical foundation to the ideas to prevent even a small error in the process of building ships on the sea through analysis of ship structures, 3D simulations and tests. Consequently, SHI succeeded in building better quality ships on the floating dock than those built in land. Here, the CoP's strength in creating knowledge played an important role.

Led by the Korean Cooperative of Shipbuilding Technology Research, Hyundai Heavy Industries (HHI), Daewoo Shipbuilding & Marine Engineering (DSME), Samsung Heavy Industries (SHI), STX Shipbuilding and Korea Marine Equipment Research Institute plan to develop various technologies for next-generation, high value-added ships. These technologies are related to interpretation of functions, low vibration/low noise, safety, interior infrastructure, equipment & materials, etc.

The project's first-phase is scheduled for 10 months, running from September 1, 2007 to June 30, 2008. In May this year, the participants will announce implementation results and launch a fact-finding survey on the Korean shipbuilders' plan to further spur development of technology, the original source of competitiveness, while pursuing activities to prevent the overseas leakage of their shipbuilding technologies as well.

Five shipbuilding companies have been involved in technology development tasks of a third-phase project (July 1, 2007-June 30, 2008) led by the Korean Cooperative of Shipbuilding Technology Research, with DSME responsible for ship block internal pre-treatment & post process automation; SHI ship block internal painting automation system; HHI for ship block internal painting drying automation system; and SHI for new concept painting/methods and pre-treatment process.

VOCABULARY

28. Practice saying the following words.

competitive [kəm'petıtıv]
dredger ['dredʒə]
environment [ın'vaıər(ə)nmənt]
genuine ['dʒenjuın]
purchase ['pɜːʧəs]
turnover ['tɜːnˌəuvə]
consumer [kən'sjuːmə]
dynamic [daı'næmık]
finance ['faınæn(t)s]
leadership ['liːdəʃıp]
recent ['riːs(ə)nt]
yacht [jɔt]

29. Read and memorize the active vocabulary.

Noun and noun phrases

business – *дело, бизнес*
cargo handling – *управление судном*
civilian ship – *гражданское судно*
competitive sector – *конкурентоспособный сектор*
consumer – *потребитель*
environmental and safety systems – *системы безопасности и защиты окружающей среды*
ferry – *паром*
global leadership – *мировое господство, превосходство*
mega-yacht – *мега-яхта*
on a global scale – *в глобальном масштабе*
purchase – *покупка*
sea-going commercial vessels – *океанское торговое судно*
substantial investments – *значительные вложения*
the global market – *мировой рынок*
turbulence – *болтанка, турбулентность*
turnover – *товарооборот*
vessels for the long term – *суда дальнего плавания*

Verbs and verbal phrases

to have a strong position – *занимать прочную позицию*

to cancel – *отменять*

to drop – *падать*

to finance – *финансировать*

to focus on – *сконцентрировать(ся)*

to have a backlog – *иметь портфель заказов, невыполненные заказы (проведенные по счетам, но еще не выполненные)*

to repair and maintenance – *ремонтировать и поддерживать техническое состояние*

to strengthen – *укреплять*

to take into consideration – *принимать во внимание*

to triple – *утраивать*

to underline – *подчёркивать*

Adjectives

innovative – *инновационный, передовой*

Adverbs

equally – *одинаково, равным образом, поровну*

directly – *напрямую, прямо, непосредственно*

on average – *в среднем*

Prepositions

in terms of – *показателях, в единицах, в исчислении*

in response to – *в ответ на*

Geographical and Proper Names

the European marine equipment industry – *Европейская промышленность судостроительного оборудования*

READING

30. Translate the text into the Russian language.

TEXT D

The European Shipbuilding Industry

The European shipbuilding industry is a dynamic and competitive sector both in the EU and on a global scale. It has great importance from both an economic and a social perspective, and also involves other areas including transport, security, research and the environment.

The European shipbuilding industry is the global leader in the construction of complex vessels such as cruise ships, ferries, mega-yachts and dredgers. It also has a strong position in the building of submarines and other naval vessels. Equally, the European marine equipment industry is world leader for a wide range of products from propulsion systems, large diesel engines, environmental and safety systems to cargo handling and electronics.

There are around 150 large shipyards in Europe, with around 40 of them active in the global market for large sea-going commercial vessels. Around 120,000 people are directly employed by shipyards in the European Union. Some shipyards focus on new building of ships, others on repair and maintenance. Some shipyards focus on specific innovative ship types, others focus on process innovation, building a variety of ship types. Some shipyards build for commercial clients, others for consumers or governments. With a market share of around 15 % in volume terms, Europe is still vying with South Korea for global leadership in terms of the value of civilian ships produced (15 billion Euros in 2007).

In response to the economic turbulence following the 9/11 attacks, the EU developed the LeaderSHIP 2015 strategy for the shipbuilding sector, seeking to strengthen its competitiveness in the global market. It takes into consideration the high-tech nature of this sector and the substantial investments made by yards on research, development and innovation.

In the period from 2003 up until the economic crisis struck the sector in 2008, the strategy had much success. European yards' orders more than tripled in value between 2002 and 2005; growing at a faster rate than those of any other region.

Recent years have seen huge increases in the number of ships ordered – particularly of the tanker, bulk cargo and containership types – many by financial speculators rather than traditional ship-owners. Indeed, many shipyards across the world still have a backlog of orders to deliver in the next two to three years. But since the end of 2008, new orders have fallen close to zero across all ship types. The amount of cargo carried around the world has dropped off dramatically. Many ship-owners are laying up vessels for the long term because there is no business for them, so they now have little interest in bringing new ships into their fleets. Some orders will be cancelled, and some yards will complete vessels and find their buyers can no longer finance the purchase.

Europe's competitive advantage has been and will continue to be based upon its ability to construct the most advanced vessels. And they bear witness to the fact that European shipyards are genuine engineering power-houses. The high-tech nature of the shipbuilding industry is further underlined by the fact that yards, on average, invest more than 10% of their turnover on research, development and innovation.

FOLLOW UP

31. Read the texts of Unit IV again, make notes under the following headings. Then use your notes to talk about *Modern Worldwide Shipbuilding Industry.*

1. Belarusian Water Transport
2. The Chinese Shipbuilding Industry
3. Shipbuilding Industry of Korea
4. The European Shipbuilding Industry

SUPPLEMENTARY READING MATERIAL

TEXTS TO UNIT I

Text 1

Belarus has recently made active efforts for the development of inland waterways and cargo transportation by water. Since 2000 part of the Belarus export by waterways is carried out via Ukraine. One of the main directions is the transportation of potash fertilizers by inland waterways to Nikolayev Merchant Sea Port where they are overloaded on the seagoing vessels.

Nowadays Belarus has a quite good cargo base. Experts estimate that freight flows from this country with use of sea transport exceed 15 million tonnes a year. Part of them are directed to the Baltic Sea, part to the Black Sea, and today between ports of the countries surrounding Belarus there is a serious competition for serving the Belarus export, namely among Kaliningrad (Russia), Ventspils (Lithuania), Klaipeda (Latvia), Nikolayev (Ukraine).

Though Belarus is not a sea state, its government has accepted the program of development of sea transport. According to this program 10 «river – sea» type vessels are to be built. The vessel "Nadezhda" has already been constructed at the shipyard in Gomel-city. This vessel transports potash fertilizers to Nikolaev. Belarus authorities plan to use their fleet for work on Danube routes.

In Belarus there is an extensive system of inland waterways: about 2000 km in length and 10 river ports in operation. The big role is played by the Dnepro-Bugsky channel. During former Soviet times there passed up to 30 vessels a day. Now the waterway which may participate in connecting the East and the West is almost abandoned. Nevertheless, if some ideas related to the linkage the Black Sea – the Baltic Sea will be realized, one can expect a rise of interest to this waterway too. First of all consider the route the Black Sea – Dnepr – Dnepro-Bugsky channel – Vistula – Oder – the Baltic Sea which is in discussion since end of 90's of the last century. This waterway is the shortest route from the Black Sea up to the Baltic Sea but its arrangement needs serious investments to construct or renew several locks in Brest (Belarus) and on the river Bug (Poland). Meanwhile in Belarus some

the reconstruction of locks on the Dnepro-Bugsky channel according to European standard has already started.

Transportation of cargoes from Belarus via Pripyat, Dnepr and Southern Bug initially was carried out by some Ukrainian shipping companies. Besides, there is an opportunity to renew river transportation of the Belarus wood, peat, and with return loading – the Ukrainian rolled steel.

In Ukraine there are all conditions to increase cargo volumes through Dnepr ports. For this purpose there is no need to build new expensive construction. Constructed during the Soviet time about 80 quay walls in all river industrial cities, six locks and more than thousand kilometers of equipped waterway have a sufficient reserve of throughput.

Text 2

The engineering discipline is concerned with the machinery and systems of ships and other marine vehicles and structures. Marine engineers are responsible for the design and selection of equipment and systems, for installation and commissioning, for operation, and for maintenance and repair. They must interface with naval architects, especially during design and construction.

Marine engineers are likely to have to deal with a wide range of systems, including diesel engines, gas turbines, boilers, steam turbines, heat exchangers, and pumps and compressors; electrical machinery; hydraulic machinery; refrigeration machinery; steam, water, fuel oil, lubricating oil, compressed gas, and electrical systems; equipment for automation and control; equipment for fire fighting and other forms of damage control; and systems for cargo handling. Many marine engineers become involved with structural issues, including inspection and surveying, corrosion protection, and repair.

Marine engineers are generally mechanical engineers or systems engineers who have acquired their marine orientation through professional experience, but programs leading to degrees in marine engineering are offered by colleges and universities in many countries.

Text 3

On the last day of her visit to Copenhagen, the world's most environmentally friendly ship, the Viking Lady, impressed mayors of the

world with her significant reductions of harmful carbon and NOx emissions. Richard Branson, the founder of Virgin Group was equally impressed by the Viking Lady when he toured the vessel yesterday, and encouraged politicians to set targets for the transportation industries. The consortium behind the Viking Lady confirms that technology to significantly reduce emissions from shipping is already available, and say they welcome tighter regulation of the industry.

Copenhagen, 17 December 2009 – The world's most environmentally friendly ship, the Viking Lady, continued to impress international decision makers on the last day of her visit to Copenhagen. Earlier today, the Norwegian supply ship, ordinarily in operation in the North Sea, set out on a Copenhagen cruise to showcase cutting edge environmental technology to a group of mayors from major international cities. The mayors are currently visiting the Copenhagen Climate Summit for Mayors. The mayors' cruise, hosted by Copenhagen's Lord Mayor Ritt Bjerregaard, took place less than 24 hours after Virgin Group founder Richard Branson encouraged politicians to decide on targets for the transportation industries. The consortium behind the ship welcomes the idea of tighter regulation.

"We don't need a new moon landing to be able to cut emissions from shipping considerably. What the industry needs are regulatory incentives to implement new, environmentally friendly technology. Actually the considerable growth that is expected in shipping over the next 40 years can be achieved without additional CO2 emissions – by using technology already available. Add to that the likelihood that new technologies will be invented during that time, and shipping can actually continue its expected growth and still cut emissions to half its current level," said Per Wiggo Richardsen from FellowSHIP, the consortium behind the Viking Lady.

Shipping is by far the most cost and environmentally effective means of transportation of goods, and currently transports 85 % of the world's trade. The CO2 emissions from shipping total 3 % of the world's total CO2 emissions. The Viking Lady's advanced technology cuts CO2 emissions by 20 % and reduces harmful NOx emissions by amounts equal to the emissions from 22,000 cars in a year. Environmentally friendlier ships also consume less fuel and hence contribute to cut operational costs.

"Seeing that it is indeed possible for the shipping industry to reduce air pollution so significantly, is good news for major ports and coastal

cities like Copenhagen. Air pollution is a major concern in cities all over the world, and eliminating emissions from ships will impact significantly on air quality and public health. Add to that the benefits to our global climate, and there is no doubt that we should place stricter requirements on which ships we allow near our cities and what they are allowed to emit," said Ritt Bjerregaard, Lord Mayor of Copenhagen.

After her visit to Copenhagen, the Viking Lady will return to active duty in the North Sea.

Text 4

Eco-Friendly Ship To Cross Ocean Powered By Waves

by Steve Levenstein

Mermaid II shows off its unusual wave-propulsion system while being lowered into Honolulu harbor

First there was the air-powered car, now here comes a wave-powered boat! The three-ton catamaran Suntory Mermaid II may not set any speed records on its May 2008 voyage from Hawaii to Japan but as the Tortoise once said, "slow and steady wins the race".

This particular race is all about making alternative energy work economically and practically. So, how does wave power work? A pair of side-by-side fins in the ship's bow absorb wave energy and express it in a dolphin-like "kick".

An added benefit is that since the fins react to the waves, the ship as a whole remains remarkably steady. Sort of like driving over a bumpy road – your car's tires jounce and bounce yet the passenger cabin does not. Hmm, why isn't anyone working on recovering energy from shock absorber action?

The Suntory Mermaid II is the latest of a number of Japanese eco-powered, recycled aluminum construction watercraft sponsored by Asahi News, supported by Suntory Co. and built by the Tsuneishi Shipbuilding Company.

Kenichi Horie's 1993 ocean-crossing, pedal-powered craft.

Kenichi Horie, veteran of a number of eco-voyages over the past decade and a half will captain – and crew – the vessel. On its May 2008 inaugural voyage, Horie will sail the 4,350 miles from Honolulu, Hawaii

to Kii Suido, Japan on wave power alone. Literally, as it's to be a solo voyage.

Horie has long been associated with these eco-power initiatives, most notably in 1993 when he set a world record for the longest distance (4,660 miles) ever traveled by a pedal-powered boat. Gee, I bet his legs were really tired by the time he reached Japan!

This time Horie will be resting his legs while captaining a much larger craft. Unlike pedal-power, the Mermaid II's innovative wave propulsion system shows the way for large cargo shops to go green. And, go slow – but that's not a huge problem for bulk cargo carriers. The Mermaid II has a maximum speed of just five knots and will take two to three months to make the trip from Hawaii to Japan. A diesel-powered craft can cover that distance in just a single month.

The recycled-aluminum hulled catamaran is equipped with 8 solar panels producing 560 watts (under optimal conditions) with which to run electrical lighting and Horie's computer & phone. The ship does have an outboard motor engine and a sail, but they're only there for use in case of emergency or perhaps when the sailing gets a little too smooth.

"Oil is a limited power source, but there is no limit to waves," says Kenichi Horie. You don't have to be a surfer dude to agree!

TEXTS TO UNIT II

Text 5

Passenger Liners

The great age of the ocean liner came in the early 1900s. It reached its height in the 1930's with the launching of three of the most luxurious ships ever built. They were the *Normandie* of France and the *Queen Mary* and *Queen Elizabeth* of Britain. These giants, each almost 1,000 feet (300 meters) long, crossed the Atlantic Ocean in just over four days. In 1942, a fire destroyed the *Normandie* as it lay in New York Harbor.

In designing the hull of the ocean liners the dimensions of fashion and luxury sometimes dominated over sea worthiness. Huge surface volume in bow part of the liner hull caused navigation with free yaw on a course, which did not admit by bulb. The wide aft deck essentially lim-

ited opportunities of a storm rate choice. As a whole the storm safety depended mainly on reliability of engines and experience of helm's watch.

Today, the only luxury liner to make transatlantic crossings is Britain's *Queen Elizabeth 2,* which was launched in 1967. It crosses the Atlantic from April until December and it carries passengers on a cruise around the world during the winter months. Most liners today are used as cruise ships to the Mediterranean, the Caribbean, and other vacation areas. Norway's *Sovereign of the Seas,* a cruise ship that began service in the Caribbean in 1988 can carry more passengers than any other ship. The *Sovereign* can carry almost 2,700 passengers and 750 crewmembers.

Text 6

Submarine is a ship which can operate completely submerged in the water. The term formerly applied to any ship capable of operating completely underwater, but now usually describes a ship built for military purposes. The term "submersible" usually is applied to small, underwater vehicles that are built for research, rescue, commercial work, or pleasure.

By the end of World War II, antisubmarine warfare had progressed significantly by exploiting the limited underwater endurance and speed of the diesel-electric designs of that era. The application of nuclear power to submarines after World War II reestablished the near-invulnerability of the submarine to antisubmarine warfare from surface ships and aircraft. Nuclear power depends on nuclear fission rather than the oxidation of fossil fuels and thus requires no oxygen source as do diesel engines, allowing the submarine to operate submerged for very long periods. However, advances in submarine technology and nonnuclear propulsion cause the nonnuclear submarine to remain highly attractive to the navies of many nations.

Submarines can be classified by their primary military missions. Attack submarines are fast, long-range ships equipped with torpedo tubes or cruise missile launch tubes. They carry sensitive underwater sound receivers and transmitters (sonar) used to detect enemy submarines. They may be armed with torpedoes of various kinds, cruise missiles, mines, and equipment for deployment of small units of clandestine troops.

Ballistic-missile submarines carry long-range missiles fitted with nuclear warheads that can be launched while submerged. The submarine

can remain submerged and undetected for many days and, on command, launch missiles on any target within range. The missiles are stowed in and launched from vertical tubes.

Experimental submarines are occasionally built to test new designs of hull shape, deeper depth capability, power plants, or controls.

Submersibles are usually small, deep-diving vehicles. Their use is for exploration and study of the ocean depths, development of equipment, rescue, or commercial work. Some designs take advantage of the forces of gravity and buoyancy for vertical motion. Other designs use vertically oriented propellers to propel the craft up and down. Movement is restricted to short distances and slow speed because of small size and small battery capacity.

Compared with surface ships, the submarine has features that enable it to submerge and resist great sea pressure. Submarines have a pressure hull and a nonpressure hull. The pressure hull is the watertight, pressure-proof envelope in which equipment operates and the officers and crew live. In certain areas of the submarine there is a nonpressure hull of lighter structure, forming the main ballast tanks. A nonwatertight superstructure provides a smooth, fair envelope to cover pipes, valves, and fittings on top of the hull. Above the superstructure the fairwater similarly encloses the bridge, the periscope, and multiple mast supports.

The principal means of detecting the presence of a submerged submarine is to listen for sounds which may have been generated on board or by its movement through the water. Very small amounts of acoustic energy can be detected by sophisticated sonars. Therefore, modern submarines are designed with multiple features to greatly reduce the amount of noise they generate.

Text 7

Developing Environmentally Friendly Ships

Ships in operation produce a range of different types of waste – solid, liquid and gas – which used to be discharged into the environment and which include rubbish, grey water from sinks, washbasins, dishwashers and washing machines, black water from toilets, bilge water containing or free from hydrocarbons, water from vessel cleaning, exhaust fumes and emissions from tank and hold ventilation systems. But times have

changed. Environmental concerns have been translated into increasingly restrictive norms and regulations, supported in particular by the International Maritime Organization. "Clean shipping" has today become a statutory obligation for those working in merchant and naval shipbuilding and repair. For ship owners, possessing an environmentally friendly fleet is a question of image and represents a commercial advantage, enabling them to approach their markets differently and to operate in all maritime zones.

Existing ships are currently equipped with various types of waste storage and treatment systems. Equipment add-ons, which vary depending on the type of transportation, do not allow a global overview of emissions for each ship, and often result in cumbersome and even inappropriate systems being installed in what are necessarily confined spaces.

NACRE offers a global environmental approach, comprising both diagnostic and technological solutions. It involves initial measurement of the overall environmental footprint of different types of ships in operation, taking account of all their emissions, as well as their specific operational conditions. NACRE then puts forward economically viable technical solutions to suit the space available and the operational methods of different types of vessels: compact format, low energy consumption and compatibility with platform movements. The equipment will go beyond existing waste norms in anticipation of changes to the regulations. Tested in real-life situations on merchant and naval ships, this innovative equipment will be incorporated into existing ships and, more particularly, into ships under construction.

Between now and 2020, the 45 000 merchant ships which make up the commercial shipping fleet worldwide will have to be brought into line with regulations. As with CONVENAV, HYCARE and PAINTCLEAN, the NACRE project is a response to environmental and economic challenges shaping the future globally of maritime transport and ship repair and maintenance. The involvement of major stakeholders in this project is evidence of their desire to anticipate changes in evolving markets and in services and equipment manufacture relating to environmentally friendly maritime transport.

Text 8

The construction of large vessels which travel over seas, lakes, or rivers. Many different approaches have been used in the construction of ships. Sometimes a ship must be custom-built to suit the particular requirements of a low-volume trade route with unique cargo characteristics. On the other hand, there are many instances where a significant number of similar ships are constructed, providing an opportunity to employ procedures which take advantage of repetitive processes.

The building of a ship can be divided into seven phases: design, construction planning, work prior to keel laying, ship erection, launching, final outfitting, and sea trials.

The construction planning process establishes the construction techniques to be used and the schedules which all of the shipbuilding activities must follow. Construction planners generally start with an erection diagram on which the ship is shown broken down into erection zones and units. To facilitate the fabrication of steel, insofar as possible, the erection units are designed to be identical. The size (or weight) of the erection units selected is usually limited by the amount of crane capacity available. Once the construction planners have established the manner in which the ship is to be erected and the sequence of construction, the schedules for construction can be developed. Working backward from the time an erection unit is required in the dock, with allowances made for the many processes involved, a schedule of working plans and for procurement of purchased equipment is prepared.

Before the keel of a ship is laid (or when the first erection unit is placed in position) a great deal of work must have been accomplished for work to proceed efficiently. The working drawings prepared by ship designers completely define a ship, but often not in a manner that can be used by the construction trades people. Structural drawings prescribe the geometry of the steel plates used in construction, but they cannot be used, in the form prepared, to cut steel plates. Instead, the detailed structural drawings must be translated into cutting sketches, or numerical-control cutting tapes, which are used to fabricate steel. Several organizations have developed sophisticated computer programs which readily translate detailed structural drawings into machine-sensible tapes which can be used to drive cutting torches.

If all of the preceding work has been accomplished properly and on schedule, the erection of a ship can proceed rapidly; however, problem areas invariably arise. When erecting a ship one plate at a time, there are no serious fitting problems; but when 900-metric-ton erection units do not fit (or align) properly, there are serious problems which tend to offset some of the advantages for this practice.

A ship is launched as soon as the hull structure is sufficiently complete to withstand the strain. Ships may be launched endwise, sidewise, or by in-place flotation (for example, graving docks). The use of a graving dock requires a greater investment in facilities than either of the other two methods, but in some cases there may be an overall advantage due to the improved access to the ship and the simplified launch procedure.

The final outfitting of a ship is the construction phase during which checks are made to ensure that all of the previous work has been accomplished in a satisfactory manner; and last-minute details, such as deck coverings and the top coat of paint, are completed. It is considered good practice to subject as much of the ship as possible to an intensive series of tests while at the dock, where corrections and final adjustments are more easily made than when at sea. As a part of this test program, the main propulsion machinery is subjected to a dock trial, during which the ship is secured to the dock and the main propulsion machinery is operated up to the highest power level permissible.

When a comprehensive program of dockside tests have been completed, the only capabilities which have not been demonstrated are the operation of the steering gear during rated-power conditions and the operation of the main propulsion machinery at rated power; these capabilities must be demonstrated during trials at sea.

Text 9

An Introduction to Ship's Turbine Generator

Turbine generator is a popular source of clean power generation on ships as they don't use any type of fuel i.e. heavy or diesel oil. Steam is used for power production in case of turbine generators. Steam is an easy, environmental friendly and cheap form of fuel on ships. For turbine generators, the steam comes from the ship's steam boiler plant.

In turbine generator, steam is used with high pressure to rotate turbine wherein the thermal energy of the steam gets converted into rotary motion. The turbine is connected to the alternator's rotor; hence the rotary notion of the turbine is utilized to generate electric power.

Alternate Uses of Steam Turbine

On ships, the steam turbine can also be used as a direct propulsion plant, in which, the turbine shaft is connected to propeller shaft of the ship. Since the speed will be in thousand rpm, reduction gears and reduction systems are used to get a drop in propeller rpm.

The propelling plant of the ship can be driven by steam turbine through a slow speed motor. The turbine generator directly supplies power to these slow speed motors which are connected to the propeller shaft of the ship.

Understanding the Construction of Turbine Generator system:

Turbine Prime Mover

A turbine will act as a prime mover in turbo generator and is fitted on the same shaft as of the alternator's rotor.

Alternator

The alternator is used to convert the rotary motion of the turbine to electrical energy and its output is supplied to the main switch board of the ship.

Steam Control Governor

The governor is used to control the speed of the turbine generator during starting, normal operation and shutting down. It controls the quantity of the steam inlet to the turbine generator.

Steam Control Valve

Different pressure control valves are fitted in the steam line and are controlled using governor for the flow of steam from the ship's boiler system.

Condensate pump

The condensed steam, after the turbine is further cooled down, is pumped back to the cascade tank by condensate pump.

Vacuum pump for glands

The steam turbine shaft is provided with glands wherein steam is sprayed at a pressure of 0.3 ~ 0.5 bar so that the vacuum inside the turbine casing doesn't drop.

Condenser

The heat exchanger acts as a condenser to cool down and condense all the steam from the turbine into water so that it can be pumped back to the hot well.

Vacuum pump header tank

A vacuum pump header tank is provided to cool down the vacuum pump as the later deals with high temperature steam.

Text 10

Coronav: High-Definition Corrosion Control

How can corrosion be detected on the most inaccessible parts of a ship, such as the outer painted hull, decks concealed by thick surface treatments, double hulls and complex piping carrying liquids? How can accurate and thorough checks be done avoiding dismantling or damage and ensuring no speck of rust has escaped detection?

The major company, DCN Brest, along with two small businesses, RoboPlanet and TE2M, are joining forces with the ENSIETA lab to design and produce the only detection system of its kind on the market. It will be more reliable and easier to deploy than any other inspection sampling systems currently available. Combining the areas of expertise of the two smaller companies – ultrasound and electromagnetic technology – the projected system involves plotting a dense network of inspection points across the entire surface of any type of naval or merchant vessel.

CORONAV will be offering an innovative solution to major problems encountered by ship repair yards, classification companies and also ship owners who, given increasingly stringent regulations governing maritime safety, will find it more and more in their interests to anticipate potential corrosion and maintenance problems in their fleets.

Text 11

Why 2-Stroke Engines Are Used More Commonly Than 4-Stroke on Ships?

When a ship is being constructed in a shipyard, the most important machinery that is to be selected is the main propulsion machinery. Both 2 stroke and 4 stroke engines are widely available in the market but for large ocean going merchant vessel, a 2 stroke engine is more commonly used as main engine and has much better market.

Even with wide variety of advantages that 4 stroke engine offers like compact size of plant, much more RPM or speed etc, a 2 stroke engine outshines with few but vital advantages.

Some of the important reasons why 2 stroke engines are more popular than 4 stroke engines as main propulsion engine on ships

Fuel Selection: The fuel prices have gone sky high and better grade fuel is adding higher costs to vessel operation. A two stroke engine can burn low grade fuel oil and hence reduce running cost of the ship.

Efficiency: The thermal and engine efficiency of 2 stroke engine is much better than that of a 4 stroke engine.

Power: Most of the 2 stroke engines are now large stroke engines that produce more power. Hence they have high power to weight ration as compare to 4 stroke engine.

More Cargo: Ship can carry more weight and hence more cargo with 2 stroke engines because of high power to weight ratio.

Reliability: Two stroke engines are more reliable in operation as compare to 4 stroke engine.

Less Maintenance: The maintenance requirement of two stroke engine is much lesser than 4 stroke engine.

Direction control: Direct starting and reversing is easier with two stroke engine.

No reduction attachments: As two stroke engines are low speed engine, there are no requirement of reduction gear or speed reduction arrangement as required for high speed four stroke engine.

However, the ease-of-manoeuvring a two stroke engine is less than that of a four stroke engine and the initial cost of installation of a two stroke propulsion plant is also much higher than running and maintenance cost of a 4 stroke engine. In 2 stroke engine, the amount saved on high grade fuel can compensate all other disadvantages and also reduce the whole operating cost of a ship.

Text 12

Starting Procedure for Turbine Generator on Ship

Like every other machinery, the turbine generator of the ship also needs to start under sequential starting procedure to avoid trouble free operation of the whole system. The correct procedure ensures that no

part of the machinery goes through any kind of stress- thermal or mechanical. It also helps the ship to operate without wasting any extra time.

The correct starting procedure for steam Turbine Generator onboard ship is as follows:

1) Check turbo generator lube oil sump level and drain it for water. Replenish it if level is less than normal.
2) Start the lube oil priming pump from the local station and check the lube oil pressure. Put the priming pump on auto.
3) Check and fill up the Turbine Generator vacuum pump operating water tank to normal level.
4) Check vacuum condenser condensate level from the condensate pump. Put the pump on auto so that the level is maintained all the time.
5) Operate the steam drain valve to drain any condensed water from the steam line to avoid excessive hammering and vibration while starting turbo generator.
6) Open the main steam inlet valve for turbo generator.
7) Adjust the gland steam pressure to normal level.
8) Check and open the sea water valves for vacuum pump cooler, T/G lube oil cooler and vacuum condenser are opened.
9) Start the vacuum pump and bring up the vacuum in the condenser.
10) Open condensate pump valves and switch on the pump.
11) Check whether the condensate vacuum, gland steam pressure, steam inlet pressure, and lube oil pressure are normal.
12) Start turbo generator from the local station and close the drain in the steam line.
13) Check first and second stage steam pressure.
14) Check condenser vacuum and water level.
15) Check lube oil pressure and vibration levels.
16) Check turbo generator speed, voltage, frequency, vacuum, condenser level and other parameters.
17) Give control to remote station from the local control and take the TG on load.

Text 13

Community of European Shipyards Associations represents the shipbuilding industry from 17 Member States (Belgium, Bulgaria, Croatia, Denmark, Finland, France, Germany, Greece, Italy, Lithuania, The Netherlands, Norway, Poland, Portugal, Romania, Spain and United Kingdom).

CESA has a long tradition as representative organization and could look back proudly to decades of fruitful cooperation and constructive dialogue.

Starting in 1937 as "International Shipbuilding Conference", it was re-established after the war as "West European Shipbuilders Informal Contacts" and renamed in 1965 to "Association of West European Shipbuilders", AWES. In the 1980ies, AWES established an EC-linking committee, which later on, mainly for administrative reasons, became a separate sister organization under the name of CESA.

In 2004, AWES and CESA decided to go back to the initial one-organization structure – the COMMUNITY OF EUROPEAN SHIPYARDS' ASSOCIATIONS or, CESA, which had become a well-established trademark in the maritime world as well as in the predominant field of EC related activities.

Industry in numbers:

- More than 300 shipyards producing, converting, maintaining merchant and naval ships and other hardware for maritime applications.
- Approximately € 30 billion turnover each year, close to 75 % of ships build are for export markets.
- Provides more than 500.000 jobs in Europe and has secondary effects over life of 60 million citizens from 36 European regions.
- Invests approximately 10 % of turnover in Research Development and Innovation every year.

Text 14

Environmentally Friendly Antifouling Paint

Every year, 20 000 tonnes of marine antifouling paint are used to protect the hulls of ships and all submerged equipment against the organ-

isms which adhere to them, encourage deterioration and corrosion and lead to increased energy consumption. These products do however pose a threat to flora and fauna. Moreover, the terms of the European and international regulations governing them are shortly to become much more stringent. Tin, which is an ingredient in 80% of products currently available, will be banned as from 2008.

The new generation of antifouling paints will be composed of active, and in some instances marine-sourced, molecules designed not only to effectively limit the adherence and growth of unwanted organisms, but also to disperse safely and completely along with any dirt when subject to friction in water.

Text 15

Every ship is installed with fresh water production unit which produces fresh water from sea water. The efficient water production unit of the ship helps the vessel owner to save on additional fresh water expenses that are incurred by purchasing water from port suppliers.

Two popular methods for production of fresh water on ships include:

1) Fresh water generator,

2) Reverse osmosis process.

Reverse osmosis is one of the modern methods used by the shipping industry to produce fresh water from sea water. This method of water production does not use waste heat source, unlike fresh water generator, to desalinate the sea water to convert it into fresh water with low salt ppm. As the name suggest, this methods works on reversing the osmosis principle. When a chemical solution is separated from pure water by a semi permeable membrane (allowing passage of water not salt) then the pure water flows through the membrane until all the pure water has passed through or until the hydrostatic pressure head of the salt solution is sufficiently big enough to arrest or stop the process.

Reverse osmosis is the use of this phenomenon in reverse direction. This results in water being forced through the membrane from the concentrated solution toward the more dilute one. This is achieved by applying pressure of the osmotic pressure of the concentrated solution.

The osmotic pressure of sea water is 28 bars but to overcome system losses and the fact that the sea water concentration increases as it passes

through the length of the membrane, much higher pressure around 40–70 bar, depending upon the plant size, is required.

A triplex plunger pump is popularly used to produce high pressure across the membrane. The membrane used has a very fine barrier of dense holes which only allows water and gases to pass through, while preventing the passage of solutes such as salt and other impurities.

The fresh water produced after this stage is treated with chemicals and ultraviolet treatment to make it drinkable and useful for other purpose.

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