O. L. Nikoulina

ENGLISH FOR MARITIME SCIENTIFIC RESEARCH

Textbook

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АНГЛІЙСЬКА МОВА НАУКОВИХ ДОСЛІДЖЕНЬ У МОРСЬКІЙ ГАЛУЗІ

Навчальний посібник

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У посібнику представлено сучасний підхід до вивчення матеріалів та останніх розробок в області морських інженерних технологій, а також комплекс морфологічних, синтаксичних, лексичних та лінгво-стилістичних вправ, які націлені на вироблення та закріплення навичок читання та розуміння прочитаного тексту з подальшим письмовим та усним реферуванням.

Навчальний посібник відповідає вимогам ІМО щодо вільного володіння англійською мовою у вирішенні робочих професійних питань з морської практики.

Посібник призначений для курсантів та студентів вищих морських навчальних закладів напряму підготовки “Морський та річковий транспорт”.

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ЗМІСТ

ПЕРЕДМОВА

Навчальний посібник підготовлений відповідно до вимог навчальної програми курсу і методичних вимог вищої школи, а також згідно з вимогами ІМО щодо вільного володіння англійською мовою у вирішенні робочих професіональних питань у морській практиці. Він призначений для курсантів, студентів п'ятих курсів і магістрів судномеханічного і електромеханічного факультетів і є навчальним посібником з навчання читанню і реферуванню технічних та наукових текстів із сучасної морської технічної періодики. Треба особливо зазначити, що методичної літератури з викладання таких питань до цього часу не було, таким чином цей посібник є першим у викладанні англійської мови наукових досліджень з напрямку підготовки "Морський та річковий транспорт".

Основна ціль практичного курсу – навчити майбутнього суднового інженера і наукового робітника користуватися науковою і технічною літературою із спеціальності, а саме – вміти прочитати текст англійською мовою, зрозуміти його зміст і реферовано викласти його ідеї.

Посібник складається з 10 розділів/уроків, однакових за структурою викладення матеріалу і організованих за наростаючим ступенем складності. Кожний розділ/урок починається введенням термінологічних одиниць, які є ключовими до розуміння тієї статті, яка розглядається в даному уроці. Ці термінологічні одиниці подані у двох списках – англійському та російському. Задача вправи співвіднести оригінальну термінологію статті англійською мовою з еквівалентною термінологією російською мовою.

Другим блоком розділу є сама стаття, робота з якою може бути організована у вигляді двох типів вправ: а) підібрати підзаголовок з наведеного списку до кожного абзацу статті і б) логічно завершити кожний абзац реченнями, що подані в окремому списку. Далі подана група вправ, пов'язаних із оволодінням граматичними і синтаксичними структурами, які є характерними для науково-технічного стилю мовлення. Тут розглядаються такі типові для технічного тексту явища, як структури пасивного стану, особливості вживання артиклів, скорочень, умовні речення тощо. Особлива увага приділяється навчанню читанню графіків, таблиць і креслень, що є надзвичайно важливою навичкою при читанні науково-технічних текстів.

Третій блок – це тестові вправи, які розвивають навички пошуку конкретизованої детальної інформації в тексті, щоб знайти вірну відповідь на поставлене запитання із варіантів A, B і C.

Заключне завдання цього комплексу вправ – написання реферату статті обсягом 150-200 або 200-250 слів залежно від обсягу статті. На початковому етапі тому, хто навчається, надається допомога у вигляді запропонованого першого речення абзацу, а на просунутому етапі він вже пише реферат статті самостійно.

Посібник був апробований протягом двох років на старших курсах і показав свою методичну доцільність, практичну корисність в оволодінні навичками читання і реферування науково-технічної літератури та був з інтересом сприйнятий курсантами та студентами.

UNIT 1

TASK 1. Match the English terminological word combination in column A with its Russian equivalent in column B. Learn the words by heart.

A	B
1) temperature sensors	a) неисправность, поломка
2) bearing sleeve	b) датчики улавливания включений
3) clutch	c) установленный промежуток времени
4) malfunction	d) ряд, порядок, схема
5) temperature monitoring	e) сканировать/искать характер вибрации
6) lubricant condition monitoring	f) модуль определения вибрации
7) viscosity content	g) разработчик устройства
8) particle and water content	h) применение
9) particle counting sensors	i) контролирование нагрузки
10) lubricating piping	j) абсолютное отклонение
11) wear-producing	k) датчики подсчета включений
12) operating conditions	l) датчики температуры
13) preset intervals	m) контролирование смазки
14) detection of failures	n) условия работы, вызывающие износ
15) propagating failures	o) определение неисправностей
16) array	p) круг, сфера
17) adjacent	q) выделять
18) scan the vibration pattern	r) уровень вибрации
19) spectra/spectrum	s) характер нагрузки
20) absolute amplitudes	t) опорная муфта
21) vibration range	u) трубопровод смазки
22)vibration monitoring module	v) распространение неисправностей
23) incorporated	w) встроенный
24) highlight	x) фланцы, измеряющие момент
25) load monitoring	y) смежный, прилегающий
26) torque measuring flanges	z) сцепление, муфта
27) load profile	A) контроль температуры
28) gear designer	B) коэффициент вязкости
29) application	C) содержание включений и воды
30) pod drive	D) условия работы
	E) привод устройства

Wright your answers below:

1) _____2) _____3) _____4) _____5) _____6) _____7_____8) _____9) _____
10) _____11) _____12) _____13) _____14) _____15) _____16) _____17) ___
18) _____19) _____20) _____21) _____22) _____23) _____24) _____25) ___
26) _____27) _____28) _____29) _____30) _____

TASK 2. You are going to read an article about Monitoring Methods. Choose the most suitable beginning from the list **A-I** below for each paragraph **1- 9** of the article.

A. Lubricant Condition Monitoring
B. The technique has been put to use
C. Load Monitoring
D. Temperature Monitoring
E. One of the strength of selective sensors
F. Vibration Monitoring
G. When it is first installed
H. Significantly, the system does not
I. The first selective vibration

MONITORING METHODS

1.

involves using temperature sensors on each bearing sleeve, clutch, electric motor or any other component, which show malfunction in the form of temperature change.

2.

involves regular analysis of the lubricant with special regard to viscosity, particle and water content following recognized standards like ISO4406 or NAS1638. Automatic particle counting sensors can be installed in the lubricating piping. These record wear-producing operating conditions and therefore aid the prediction of component breakdown.

3.

on the *Tai An Kou*, a heavy lift carrier belonging to the Chinese shipping company COSCO. The lubrication status of two Schottel SSP 5 pod drives is analyzed at preset intervals, with the results compared to pre-defined criteria to determine the level of lubricant exchange required.

4.

allows the detection of failures or propagating failures in rotating components such as bearings, gears and shafts. Data is gathered by an array of permanently-on selective sensors.

5.

is that they do not need to be installed directly on/or adjacent to each individual component. Provided they are positioned correctly; the sensors can be placed several meters away from the components being monitored. The system is selective in that it will periodically scan the vibration pattern of each individual component. This means only a small number of sensors are needed to monitor a large number of bearings, gears and shafts.

6.

just measure the absolute amplitudes of the vibration signal, but compares relative vibration spectra over time and in relation to other global parameters such as load or speed.

7.

the system has to learn the difference between normal and abnormal vibration conditions, i.e. which (normal) signal levels and vibration spectra are to be expected for which operating condition. Once this learning phase is complete, the system will automatically record, tag and send via PC, details of any events occurring that are outside of the expected vibration range.

8.

monitoring module to be incorporated into a CMS system was designed to monitor the STP 1212 propulsion units on the *Sylt Express*, a ferry owned by the Romo-Sylt Line. The module analyses the vibration experienced by rotating components relative to the vessel's speed and load status, and highlights wear states requiring further attention or maintenance.

9.

works by using torque measuring flanges or by recording the propulsion motors' load signals and classifying them. This continuous stream of data forms a load profile that enables both the operator and the gear designer to verify that the

total load of a system is within the limits of the assumptions that were made in the application phase.

TASK 3. For questions or statements 1-10 chose the correct answer A, B, or C.

1. What is the closest meaning of the word “monitoring”?
A. Operation
B. Maintenance
C. Checking

2. Temperature sensors are placed on any component, which shows _____ in the form of temperature change.
A. defect
B. malfunction
C. disorder

3. Lubricant Condition Monitoring involves regular analysis of the:
A. viscosity
B. particle and water content
C. lubricant

4. The meaning of the word “pre-defined” in the third passage means:
A .predict
B. explain
D. calculated ahead

5. The word “pod” in the third passage means:
A. plant
B. machine
C. mechanism

6. The word “propagating “ in the third passage means:
A. spreading
B. eliminating
C. repairing

7. One of the strength of selective sensors is that they _____ be installed directly on/ or.
A. have to
B. must be
C. do not need to

8. The word “it” in paragraph 5 stands for:
A. pattern
B. system
C. sensor

9. The system performs the following functions:
A. it measures the absolute amplitudes of the vibration system
B. it compares relative vibration spectra
C. both of the above

10. The system will automatically record, tag and send via PC details of any events occurring outside of the expected vibration range when:
A. once it has been switched on
B. once it has learnt the vibration conditions
C. always

11. What is the *Sylt Express*?
A. a vibration monitoring module
B. a Swedish shipping company
C. a ferry

12. The selective vibration monitoring module analyses:
A. the vibration experienced by rotating components
B. the vessels load and speed
C. the level of wear

13. Load Monitoring works by:
A. using torque measuring flanges
B. recording the propulsion motor’s load signals
C. both of the above

14. What enables the operator and the gear designer to verify that the total load of a system is within the limits of the assumptions:
A. stream of data
B. load profile
C. application phase

TASK 4. The English articles are used in a scientific or any other technical text usually in the same function and according to the same rules as they are used in General English. But there is a certain difference. Note how the articles are omitted in the text “Monitoring Methods” in case of the title and headline to each

paragraph. Complete the following sentences with ***the, a/an or zero*** article, then check your answers with the text.

1. _____ Lubricant Condition Monitoring involves _____ regular analysis of _____ lubricant with _____ special regard to _____ viscosity, _____ particle and _____ water content.
2. This technique has been put to ____ use on _____ Tai Au Kou, ____ heavy lift carrier belonging to _____ Chinese shipping company _____ COSCO.
3. One of _____ strengths of _____ selective sensors is that do not need to be installed directly on/or adjacent to _____ each individual component.
4. Provided they are positioned correctly _____ sensors can be placed ___ several meters away from _____ components being monitored.
5. Significantly, ____ system does not just measure _____ absolute amplitudes of ____ vibration signal.
6. Once this learning phase is complete, _____ system will automatically record, tag and send via_____ PC, _____ details of any events occurring that are outside of _____ expected vibration range.
7. _____ first selective vibration monitoring module to be incorporated into _____ CMS system was designed to monitor _____ STP 1212 propulsion units.
8. _____ *Sylt Express* is _____ ferry owned by _____ Romo-Sylt Line.
9. _____ Load Monitoring works by using _____ torque measuring flanges or by recording _____ propulsion motors' load signals and classifying them.
10. This continuous stream of data forms _____ load profile that enables both _____ operator and _____ gear designer to verify that _____ total load of ___ system is within _____ limits of _____ assumptions that were made in _____ application phase.

TASK 5. Questions for Group discussion

1. What is the main idea of the article?

2. What monitoring methods are mentioned in the article?

3. What is the idea of Temperature Monitoring Method?

4. What is the idea of Lubricant Condition Monitoring (L.C.M.) ?

5. Where has LCM been put to use?

6. What is the idea of Vibration Monitoring?

7. What is the strength of selection sensors?

8. How many sensors are needed to monitor a large number of devices and why?

9. What does the system do?

10. Where has the first selective vibration monitoring module was installed?

11. What does this module analyze?

12. What is the idea of Load Monitoring?

TASK 6. Write a summary of the article in 100-130 words. The beginning of the passage presenting different ideas is given for you.

1. Temperature Monitoring involves _____
_____
_____

2. Lubricant Condition Monitoring involves _____
_____
_____

3. Vibration Monitoring allows _____
_____
_____

4. The idea of selective sensors is _____
_____
_____

5. Load Monitoring works by _____
_____
_____

U N I T 2

TASK 1. Match the English terminological word combination in column A with its Russian equivalent in column B. Learn the words.

A	B
1) assessment	a) выход механизма из строя
2) switchboards	b) оценка работы механизмов
3) ultrasonic contact probe test	c) электролитическая камера/емкость
4) ore-bulk-oil	d) запаздывание
5) wastage	e) экономия денежных средств
6) overhaul	f) ультразвуковой тест контактов
7) machinery failure	g) эксплуатация в зависимости от условий
8) condition-based maintenance	h) выравнивание, калибровка
9) misconceptions	i) опора основания
10) esoteric	j) совместно с
11) scheduled	k) оценка
12) comprehensive set of tests	l) дисбаланс тока
13) shock pulse monitoring	m) тайный, скрытый
14) grading	n) механическое повреждение
15) performance evaluation	o) плановый
16) tally	p) электрощит
17) defects and cautions	q) потери от износа
18) ultrasonic thickness test	r) нефтерудовоз
19) unacceptable levels of vibration	s) ложное представление
	t) отчет
20) port to starboard direction	u) перегретые реле и контакторы
21) on-the-spot	v) дефекты и предупреждение о возможных дефектах
22) foundation stool	w) ловушки пара
23) electrolytic cell	x) ультразвуковой тест на толщину
24) in conjunction with	y) отображение, картинка
25) overheated relays and contactors	z) термическая картинка
	A) обшивка
26) current imbalance	B) на месте, немедленно
27) steam traps	C) переборка
28) lagging	D) комплексное тестирование
29) cowling	E) неощутимые выгоды
30) thermal image	F) в направлении от левого до правого борта
31) mechanical distress	G) мониторинг импульса удара
32) saving	H) недопустимый уровень вибрации
33) intangible benefits	

Give your answers here:
1) ____ 2) _____ 3) _____ 4) _____ 5) _____ 6) ____ 7) _____ 8) ____ 9) ____ 10) _____ 11) ____ 12) ____ 13) ____ 14) ____ 15) ____ 16) ____ 17) ____ 18) ____ 19) ____ 20 ____ 21) ____ 22) ____ 23) ____ 24) ____ 25) ____ 26) ____ 27) ____ 28) _____ 29) ____ 30) ____ 31) ____ 32) ____ 33) ____

TASK 2. You are going to read an article about systematic overhaul in a dry dock.

2.1 Read Table 1 in the article and try to figure out what was really performed during the overhaul.
What do you think the word "tally" in the caption to the table may mean:
a. a tale
b. a record of things done
c. a report about the overhaul ?

2.2 Read the article. In each part (1-10) there are some words missing that you can find in the box below. Put the words into the appropriate place.

a) computer b) thermal c) contamination d) limits e) assessment f) study g) mechanical h) vibration i) leaking j) switchboards k) ultrasonic l) accidents m) ore-bulk-oil n) imaging
o) headphones p) wastage q) adopting r) combustion s) chemistry t) equipment u) overhaul v) SOLAS

2.3 Chose the most suitable heading from the list A-J for each part 1-10 of the article.

A. The greatest reason for the wastage.
B. Details on the plant performance.
C. The importance of CBM approach.
D. A dramatic picture is shown where human eye fails.
E. A complex set of tests.
F. The results of the assessment.
G. A record of defects and cautions.
H. What is not understood about CBM method.
I. Modern technique helps where human ear cannot.
J. The study of the wear particles and chemistry provide important information.

SYSTEMATIC OVERHAUL

1

Consider the following: a recent IMO (1) _____ revealed that machinery failure is responsible for a quarter of maritime (2) _____, yet more than a third of maintenance activity is performed unnecessarily. Clearly it is time we – as an industry – reassess our maintenance strategy and moved towards a condition-based maintenance (CBM) approach.

2

Two of the biggest misconceptions surrounding this strategy are that either it is something esoteric or that all that is required is to hook in a (3) _____. Neither is true. As the following case history shows there are compelling safety and commercial reasons for _(4) _____ CBM methods.

3

One month prior to its scheduled dry-docking, the owners of a 150 000dwt (5) _____ (OBO) carrier decided to submit the vessel for a full health check of all machinery systems, electrical and (6) _____. Over a six-day period the OBO underwent a comprehensive set of tests including vibration and shock pulse monitoring, lubricating oil analysis with ISO cleanliness grading of hydraulic systems, (7) _____ imaging of electrical and mechanical systems, diesel engine (8) _____ performance evaluation, passive ultrasonic testing and ultrasonic thickness testing.

4

As can be seen from Table 1 several serious problems were identified. To name but a few: the main engine auxiliary blowers, boiler forced draught fan etc. were found with unacceptable levels of vibration.

Table 1. A tally of the defects and cautions identified onboard the ship.

TECHNIQUE	SERIOUS DEFECTS	CAUTION
Vibration monitoring	12	8
Lube oil analysis	6	12
Thermal imaging (electrical)	6	-

Thermal imaging (mechanical)	4	1
Diesel engine performance	1	2
Ultrasonic contact probe test	1	-
Ultrasonic thickness test	2	1
TOTAL	**32**	**24**

5

An especially interesting find was that the seawater cooling pump for the air conditioning plant recorded unacceptable levels of vibration in the port to starboard direction while exhibiting normal _(9) _____ levels in the forward aft direction. It is quite unusual to see such variance in the same radial plane and an on-the-spot frequency analysis indicated structural weakness. A detailed inspection of the foundation stool (well hidden by pipelines) revealed heavy (10) _____ in the port starboard axis. Further investigation revealed the wastage to have resulted from galvanic corrosion set up by the bronze pump casing, seawater (11) _____ from the gland and the steel fabricated stool forming an electrolytic cell.

6

When lube oil analysis is carried out in conjunction with vibration analysis, a detailed study of the wear particles found in the oil as well as the state of its additive (12) _____ can provide invaluable information on the state of the machine. Fuel (13) _____ in life saving equipment, such as the emergency generator and life boat engines, heavy wear indications in the cargo pump drive gear box and deck cranes were some of the important findings.

7

Thermal (14) _____ was carried out on every electric panel in the vessel. This identified overheated relays and contactors in (15) _____ as well as a current imbalance across the three phases of electric motors. Several steam traps were identified as non-functional, and several areas of exhaust leaks were identified. On an auxiliary engine, the exhaust pipe had no lagging but just the cowling covering it. While difficult to see with the naked eye, the thermal image showed a dramatic picture where the temperature reading went beyond the upper end of the scale. A clear violation of the (16) _____ regulation on exposed high temperature surfaces and a good candidate for vessel detention by Port State Control. Establishing the tightness of seawater valves was another major exercise.

8

Engine performance analysis indicated a very poor power balance on one auxiliary engine. Further investigation of maintenance records revealed that the turbocharger gas casing had worn beyond (17) _____. One of the ballast pumps had a seawater suction line, which was worn to more than half its normal limit.

9

Human beings can hear up to 22kHz: mechanical distress always produces noise in the (18) _____ range. All the valves on air compressors and refrigeration and air conditioning compressors were tested for distress. Ultrasonic leak detection was also used, and more than 18 air leaks and two steam leaks were found within a matter of two hours. The smallest of leaks "scream" through the (19) _____and it is possible to home in on the leak with little effort. In our experience on LPG and passenger vessels, gas leaks including LPG, Freon etc are detectable.

10

The final analysis demonstrated the true value of these examinations. The (20) _____ revealed that the saving to the ship owner for this lay between US$54 000 to US$ 158 000, not considering intangible benefits of avoiding detention, delays, fire, loss of life saving (21) _____ etc. In addition several items scheduled for (22) _____ in the dry dock were removed from the dry dock specification as a result of establishing these machines to be in very good condition.

TASK 3. For questions or statements 1-10 chose the correct answer A, B, or C.

1. The owners decided to submit the vessel for a full health check because:
A. its machinery systems were damaged
B. it was a scheduled dry-docking
C. they wanted to try CBM methods

2. What is the meaning of the word "caution" in Table 1?
A. minor defects
B. potential defects
C. unproblematic cases

3. The seawater cooling pump for the air conditioning plant recorded unacceptable levels of vibration in the:
A. starboard to port direction
B. forward aft direction
C. port to starboard direction

4. What can provide invaluable information on the state of the machine?
A. study of the wear particles in oil
B. state of its additive chemistry
C. both of the above

5. Life saving equipment includes:
A. cargo pumps
B. deck cranes
C. emergency generator

6. The thermal image showed:
A. dramatic picture
B. extensive temperature
C. upper end of the scale

7. Thermal imaging can show:
A. electrical defects
B. mechanical defects
C. overheated parts

8. The word “ultrasonic” means:
A. 22kHz
B. below 22kHz
C. above 22kHz

9. The assessment revealed that:
A. it’s reasonable for the owners
B. it’s profitable for the owners
C. it’s recommended for the owners

10. Main idea of the article is about:
A. a tally of the defects and cautions
B. overhauling in dry docks
C. CBM methods are reasonable

TASK 4. While reading a technical text you often come across different specific contractions, which are either well known and need not to be deciphered or they are explained in the text. Below you will find the contractions used in the article you have read and some other conventional contractions. Try to decipher them matching with the full term.

A	B
1) IMO	a) estimated time of departure
2) CBM	b) please
3) OBO	c) International Convention for the Prevention of Pollution from Ships
4) ISO	
5) kHz	d) roll on/roll off
6) SOLAS	e) International Maritime Organization
7) US$	f) International Standard Organization
8) ETA	g) estimated time of arrival
9) HT	h) for the attention of
10) ASAP	i) charter party
11) ETD	j) regards
12) LT	k) International Convention for dangerous bulk cargo carrying
13) FAO	
14) No	l) revolutions per minute
15) pls	m) condition-based maintenance
16) rgds	n) break horse power
17) bhp	o) low tide
18) C/P	p) ore-bulk-oil carrier
19) rpm	q) The International Convention for the Safety of Life at Sea
20) MARPOL	
21) STCW	r) number
2) COLREG	s) kilo Hertz
23) IBC	t) high tide
24) IGC	u) The International Convention on Standards of Training, Certification and Watch keeping for seafarers
25) Ro-Ro	
	v) The International Convention for gas carrying
	w) USA dollars
	x) The Convention on the International Regulations for Prevention Collisions at Sea
	y) as soon as possible

Put in your answers below:

1) ___ 2) ___ 3) ___ 4) ___ 5) ___ 6) ___ 7) ___ 8) ___ 9) ___ 10) ___ 11) ___ 12) ___ 13) ___ 14) ___ 15) ____ 16) ____ 17) ____ 18) ___ 19) ____ 20) ____ 21) ___ 22) ____ 23) ___ 24) ___ 25) ___ 26) ____

TASK 5. Questions for Group discussion

1. What is the main idea of the Article?
2. What did the recent IMO study reveal?
3. Explain the idea of CBM approach.
4. What is not understood about CMB methods.
5. What type of comprehensive tests did the OBO undergo?
6. Describe Table I. What does it show?
7. What was the difference in Vibration levels in the port to starboard direction VS the forward aft direction?
8. What is the reason for such difference?
9. What was the reason for the foundation stool wastage?
10. What important info was found during lube oil analysis?
11. What is the idea of the Thermal imaging?
12. Why a vessel can be a good candidate for detention by Port State Control?
13. What did the engine performance analysi8s indicate?
14. How can modern technique help where human ear cannot?
15. What did the final analysis demonstrate?

TASK 6. Write a summary of the article in 150-200 words. The beginning of the passage presenting different ideas is given for you.

1. The purpose of this article is to show the advantages of
   _____
   _____
   _____
2. A tally of the defects and cautions identified onboard the ship shows that
   _____
   _____
   _____
3. Vibration monitoring is important because
   _____
   _____
   _____
4. Lube oil analysis shows that
   _____

_____
_____

5. Thermal imaging is a technique that shows
_____
_____
_____

6. Engine performance analysis indicated
_____
_____
_____

7. Ultrasonic tests are important because
_____
_____
_____

8. The final analysis clearly proves that _____
_____
_____
_____

U N I T 3

TASK 1. Match the English terminological word combination in column A with its Russian equivalent in column B. Learn the words.

1) database	a) направления поиска дефектов
2) calculate the defect rate	b) наиболее часто повторяющиеся
3) in-service	неисправности
4) defect trends	c) масляный затвор/уплотнение
5) overall engine faults	d) гнездо, седло, место установки
6) by a clear margin	e) набивка упорного подшипника
7) to encounter	f) оболочка, кожух
8) in relation to	g) база данных
9) population	h) иметь дело с, сталкиваться
10) most recurring defects	i) опорный подшипник
11) prone to	j) выдержать испытание
12) journal bearing	k) лопасть, лопатка
13) vane	l) посчитать степень дефектности
14) thrust bearing pad	m) по отношению к
15) compressor impeller	n) крыльчатка компрессора
16) proof-test	o) вместимость, объем
17) survive the test	p) на производстве
18) assessment	q) направляющий аппарат нагнетателя
19) containment	r) лопатка
20) turbocharger	s) основные поломки двигателя
21) oil seal	t) склонный к
22) housing	u) количество
23) shell	v) пробное испытание
24) blade	w) явно, очевидно
25) inducer	x) корпус
26) seating	y) турбонагнетатель
	z) оценка

Give your answers below:

1) _____2) ____3) _____4) _____5) _____6) _____7) _____8) _____9) _____
10) _____11) _____12) _____13) _____14) _____15) _____16) _____17) ___
18) _____19) _____20) _____21) _____22) _____23) _____24) _____25) ___
26) _____

TASK 2. You are going to read an article about the turbochargers defects. Choose the most suitable heading from the list A-H for each part 1-8 of the article.

Targeting two-strokes Main propulsion marine diesel engine turbocharger defects. Lloyd's Register's innovation. Detailing defects. Overspeed investigations. LR and Swedish Club two-stroke defect data LR and Swedish Club data comparison The results of the LR research

INTERROGATING IN-SERVICE PERFORMANCE

Turbocharger defects top a list of 43 potential fault categories as the leading cause of failure on low speed two-stroke engines

1.

In 1991 classification society Lloyd's Register (LR) launched a new ship division database with enhanced capabilities for studying machinery defects. The system can be used to identify the machinery type at risk, determine the period each component had been at risk, find the appropriate defects attached to each component and calculate the defect rate in terms of the number of faults which can occur on one ship in 10 years, or 10 ships in one year.

In order to assess in-service turbocharger defect trends, the technical records in the database were searched to produce a breakdown on overall engine faults and specific turbocharger defects over a 10-year period to October 2005. The search was classified into three groups: for four-stroke and two-stroke main propulsion diesel engines, and for auxiliary diesel engines in all vessels classed with LR.

2.

Two-stroke diesel engines comprised a population of 5025 units, average age 6.1 years, for which a total of 6130 defects were reported in LR database. For contrast a population of 135 defects supplied by marine insurer the Swedish Club were also studied. Figure 1a and 1b show that for the two-stroke main propulsion diesel engines, turbocharger defects comprised 18% and 42.6% of the total defects for the Lloyd's Register's and the Swedish Club's data respectively and were the most recurring defects by a clear margin.

3.

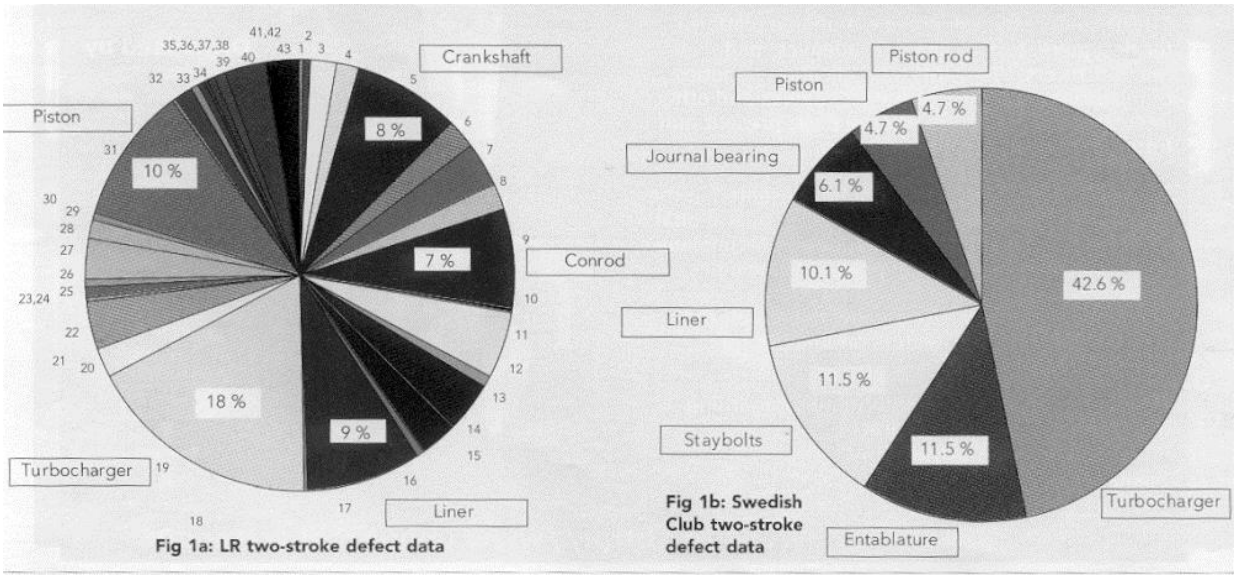


Fig.1a, Fig1b.

4.

The general reliability trends in the data show that in moving from high to medium to slow speed diesel engines the proportion of turbocharger failures over all engine defects increased from 3% to 9% to 18% respectively in the LR data and from 25.6% to 42.6% in the Swedish Club data. This would indicate that the mass produced turbochargers for high speed engines are more reliable in comparison with those fitted to the medium and slow speed marine engines. For the latter two engines, the data shows that turbochargers fitted to slow speed engines are twice as likely to encounter defects as those on the medium speed engines in relation to other engine defects.

5.

Figure 2 shows the percentage of turbocharger defects for the Lloyd's Register's population two- and four-stroke main propulsion marine diesel engine. It also shows that most recurring defects were due to the rotor (11.7-11%) , turbine nozzle (11.7-7.6%) and turbine blade (10-7%) . The bearing lubrication oil pumps on both the compressor and turbine sides of turbochargers on two-stroke engines were more prone to defects (4%) than those on four-stroke engines (1.5%)

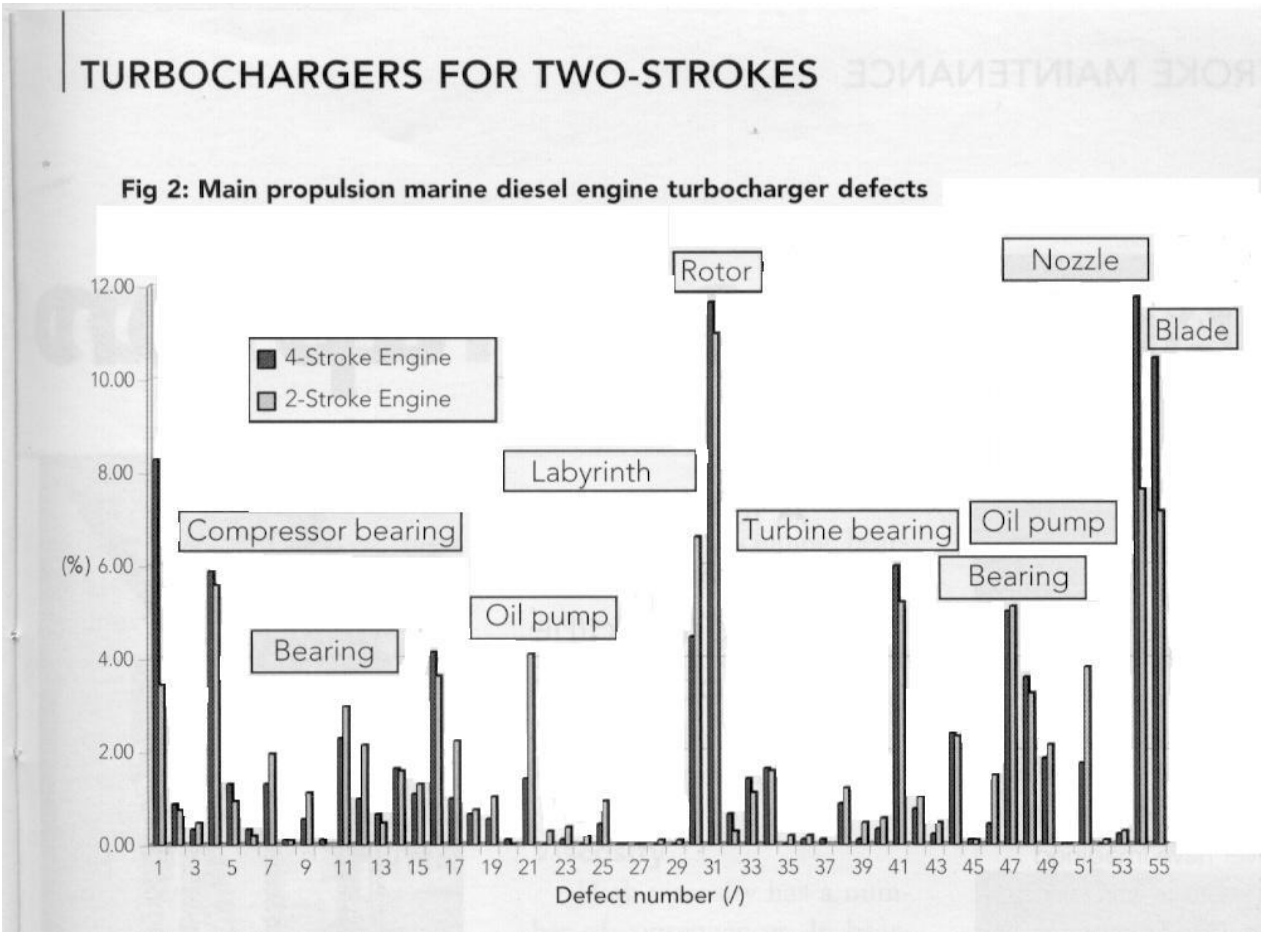


Fig2

6.

Defect number

turbocharger	lubricating oil pipe	turbine
compressor	oil seal	bearing assembly
air filter	center section	journal bearing
bearing assembly	bearing assembly	housing
journal bearing	journal bearing	shell
housing	shell	lining
shell	roller bearing	roller bearing
lining	casing	casing
roller bearings	labyrinth	inlet
housing	rotor	outlet
casing	rotor journal (center)	lubricating oil system
inlet	rotor journal	lubricating oil pump
outlet	(compressor)	lubricating oil pipe
diffuser	rotor journal (turbine)	oil seal
vane	support beam	nozzle

impeller blade inducer blade lubricating oil system lubricating oil pump	seating holding down bolts thrust bearing assembly thrust bearing pad	rotor blade

7.

Of actual turbochargers defects, the most catastrophic is due to overspeeding, which at worst can lead to bursting of the compressor impeller. Due to the high rotational speed of the impeller, large kinetic energies are involved and this means that this type of failure must be contained within the turbocharger casing so as not to compromise the safety of personnel and cause damage to engine room and other machinery.

8.

Lloyd's Register's Rules specifies that for mass produced turbochargers all fully bladed rotor sections and impeller/inducer wheels are to be overspeed tested for three minutes at either 20% above the maximum permissible speed at room temperature, or 10% above the maximum permissible speed at the normal working temperature. This is a proof-test to ensure that the components do not contain defect sizes causing failure at overspeed, as well as prolonging the in-service life of the components which survive the test. Moreover, the manufacturer's turbocharger burst test assessment, showing containment, are required to be submitted in addition to the usual turbocharger plans and particulars in order not to compromise safety from this type of failure.

TASK 3. For questions or statements 1-10 choose the correct answer A, B, C or D.

In 1991 Lloyd's Register launched a new ship division database to study:
A. 2-stroke engines
B. 4-stroke engines
C. machinery defects

The search was classified into the groups to research:
A. 4-stroke engines
B. 2-stroke engines
C. auxiliary engines
D. all of the above

For contrast the research was based on :
A. turbocharger data
B. 2-stroke LR and Swedish Club data
C. LR and Swedish Club data
D. 4-stroke LR and Swedish Club data

According to the research made what item tops the list of the defects?
A. turbocharger
B. rotor
C. nozzle
D. all of the above

Which defects were greater with 4-stroke engines in comparison to 2-stroke?
A. oil pump
B. compressor bearing
C. bearing

Which defects were greater with 2-stroke engines in comparison to 4-stroke?
A.turbine bearing
B. blade oil pump
C. nozzles

Which defects were slighter with 4-stroke engines in comparison to 2-stroke ?
A. labyrinth
B. compressor bearing
C. turbocharger

Which defects were slighter with 2-stroke engines in comparison to 4-stroke ?
A. bearing
B. oil pump
C. rotor

Of actual turbochargers defects the most catastrophic is due to:
A. bursting of the compressor impeller
B. overspeeding
C. turbocharger casing

What are the tests recommended by the Lloyd's register Rules?
A. working temperature
B. service life of the components
C. overspeed
D. all of the above

TASK 4. Comprehension of graphs and figures is very important while reading a technical or scientific article. When we describe a graph or a chart we need to know how to compare figures and data.

4.1. In the box below find the pairs of antonyms (words that mean the opposite) .

Fall decrease remain stable drop higher grow increase much less differ much more go up is bigger is practically the same is dramatically different is lower lower

Write you answers below

_____
_____
_____
_____

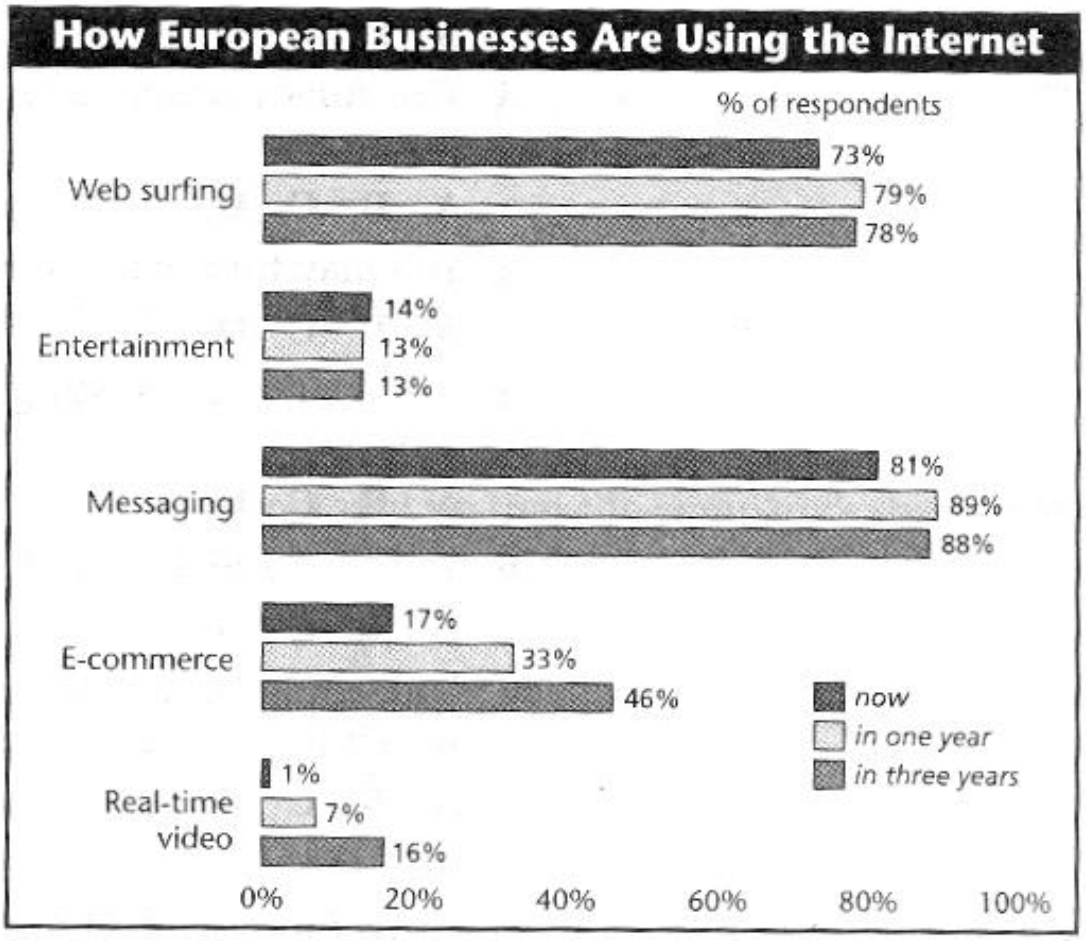
4.2. Analyze Figures 1a and 1b and Figure 2 in the article and fill in the gaps in the given sentences with one of the appropriate words from the box above in Task 4.1.

1. In comparison with 1a in 1b the turbocharger defect percentage is _____.
2. In 1b the piston defect data is _____ than that in 1a.
In 1a the liner defect percentage is _____ as in 1b.
In 4-stroke engine the compressor bearing defects are _____ than those in 2-stroke engine.
The nozzle defects in 2-stroke engine is _____ than in 4-stroke engine.
The bearing defects in 2-stroke engine is _____ as those in 4-stroke engine.
In 2-stroke engine we observe the _____ in the turbocharger defects in comparison with 4-stroke engine.
The oil pumps defects in 2-stroke engine _____ in comparison with 4-stroke engine.
The blade defects in 4-stroke engine is _____ than in 2-stroke engine.
The rotor defects in 2-stroke engine are _____ in comparison with 4-stroke engine.

4.3 Study the data in the following graph "How European Business Are Using the Internet". Read the text describing this graph and fill in the gaps with the words from the box below

Slight drop rise fall remain stable much less decreasing substantial growth lowest growth slight drop increase 73%

The comparative figures for how European business are using the Internet show that 1) _____ use the net to surf. The figure is expected to 2) _____ during the next year before 3) _____ slightly during the three following years. The number of people using the Net for entertainment purposes will 4) _____ by 1% next year and then 5) _____ after that. However, in terms of e-commerce, it appears that there will be a 6) _____ next year followed by a period of 7) _____. Real-time video applications will be used 8) _____ than they are at present and represent the 9) _____ rate for all categories of Internet business use. The number of business using messaging service will 10) _____ by 8% next year and then 11) _____ slightly during the following years.



TASK 5. In the following exercise you will have a possibility to check your memory and knowledge of new terminology. In the abstract below there are the gaps that you have to fill in with the words in the list, given below the text.

Lloyd's Register's Rules _____that for mass produced _____all fully bladed rotor sections and impeller/_____ wheels are to be _____tested for three minutes at either 20% above the maximum permissible speed at _____temperature, or 10% above the maximum permissible speed at the normal _____temperature. This is a _____to ensure that the components do not contain defect sizes causing _____at overspeed, as well as prolonging the _____life of the components which survive the test. Moreover, the manufacturer's turbocharger burst test_____, showing_____, are required to be submitted in addition to the usual turbocharger plans and particulars in order not to compromise _____from this type of failure.

a) inducer
b) room
c) specifies
d) proof-test
e) in-service
f) failure
g) overspeed
h) turbochargers
i) assessment
j) working
k) safety
l) containment

TASK 6. Questions for Group discussion

1. What is meant by in-service performance?

2. Which defects top a list of potential fault categories?

3. What can a new ship division database do?

4. What three groups was the search classified into?

5. Compare figures 1a and 1b.

6. Which turbocharges are more reliable for high speed or medium and stow speed engines.

7. Describe Fig. 2

8. Of actual turbochargers defects which are the most catastrophic?

9. What does the LR proof-test ensure?

10. What is the main idea of the article?

TASK 7. Write a summary of the article in 100-150 words. The beginning of the passage presenting different ideas is given for you.

1. The Lloyd's Register classification society launched a new system for _____
_____
_____
_____

2. When targeting two-strokes LR compared the data from two sources: _____
_____
_____

3. When comparing the defects of 2-stroke and 4-stroke engines they found out _____
_____
_____

4. Overspeed investigations showed that _____
_____
_____
_____

5. The results of the LR research give an idea that _____
_____
_____
_____

U N I T 4

TASK 1. Match the English terminological word combination in A column with its Russian equivalent in B column. Learn the words by heart.

A	B
1) fire protection	a) поломка трубопровода
2) lube oil spray	b) законодательные акты по безопасности
3) leaking pipe joints	c) долгосрочное решение
4) casualty database	d) традиционная система с распредвалом
5) a contributory factor	e) двигатели с аккумуляторной системой
6) pipe failure	топливоподачи
7) hazard, n	f) горячий аэрозоль
8) engine manufacturers	g) распыленное смазочное масло
9) enshrine, v	h) база данных о поломках
10) safety legislation	i) изготовители двигателей
11) enclose, v	j) прилагать
12) heat shield (also referred to as	k) представлять большой риск
hot-box	l) переключиться на
13) external pump	m) приближаться
14) represent a high risk	n) предсказывать
15) fine hot spray	o) пульсация давления
16) pressure pulses	p) тщательно разработанная конструкция
17) predict, v	q) тепловой экран/ горячий ящик
18) common rail engines	r) навесной насос
19) permanent solution	s) включать, вводить
20) switch over to	t) соединительная арматура протекающего
21) conventional camshaft systems	трубопровода
22) proximate, v	u) противопожарная защита
23) careful design	v) фактор, способствующий ч-л
	w) опастность

Write your answers below:
1_____ 2_____ 3_____4_____ 5_____ 6_____ 7_____ 8 ____ 9_____ 10 _____
11_____ 12_____ 13 _____14 _____15 _____16____ 17 ____ 18 _____19
_____20 _____ 21 _____22 _____23 _____.

TASK 2.1.

Read the introductory part of the article where the questions of general concern are discussed. After reading answer the following questions.

Judging from your shipboard experience, what was the most frequent trouble and the weakest spot of the machinery? Why?

What may be the most vulnerable part in low pressure piping systems?

You are going to read about the level of fire protection for low pressure piping systems? Do you think it is high enough and that is not a problematic area? Why yes? Why not?

What can you say about the level of fire protection on board your last ship?

TASK 2.2. Choose the most suitable heading from the list A- D for each part 1- 4 of the introduction to the article

A. Leaks in piping as a hazard B. Pressure pulses C. Fires caused by hot fuel or lube oil spray D. Low pressure systems are not of a high risk.

TROUBLESPOT IN MACHINERY SPACE

Is the level of fire protection for low pressure piping systems high enough?

1.

Few marine engineers would deny that fires caused by hot fuel or lube oil spray from leaking pipe joints (including flanges, couplings and valves) continue to be a very real problem. Of the 108 engine room and machinery space fires registered in Lloyd's Register's casualty database for ships built between 1982 and 1997, there were 48 recorded incidents of fuel/lube oil leakage being a contributory factor to the fire, of which 40 were directly linked to pipe failure.

2.

Leaks in piping used for high pressure systems have long been recognized as a hazard, with engine manufacturers introducing double-cased pipes to mitigate the potential risks many years before this practice was formally enshrined in safety legislation.

3.

However, there seems to be less awareness of the danger of low pressure line failure. Engine manufacturers will often enclose such pipes within a heat shield (also referred to as hot-box) , but the fuel lines leading to this box from say an external pump or supply tank will often be less protected. The design here is typically provided by the shipyard and the thinking seems to be low pressure systems do not represent a high risk. Nonetheless, these single-walled pipes still carry high temperature fuel and any leakage will result in a fine hot spray.

4.

An important issue with the protection of low/high pressure piping relates to how the regulations are interpreted. Unfortunately, to date there has been little systematic research into pressure pulses – which could double or triple the normal operating pressure –and this area is still as difficult to predict as ever. It is the subject of debate whether the new generation of common rail engines will provide a permanent solution. Besides it is unlikely that the industry will ever completely switch over to common rail. There will always be some conventional camshaft systems on the market.

For new build projects, unnecessary pipe joints in areas proximate to hot surfaces should be minimized by careful design. Nevertheless, it is impossible to eliminate them completely, and on existing vessels it is possible certain hotspots will not have been considered during the design process.

TASK 2.3. Read the second part of the article “Troublespot in Machinery Space” where a practical case of trouble is being described and reported.
Match the English terminological word combination in **A** column with its Russian equivalent in **B** column.

A	B
1) highlight, v	a) обнаружить распыление жидкости
2) roar passenger ferry	b) вибрация причинила усталостную трещину
3) en route (french)	c) поступление морской воды
4) a routine inspection	d) подверженность поломкам
5) observe a spray of liquid	e) облако распыленной жидкости ворвалось в пламя
6) shooting upwards	f) стрелять вверх
7) ricocheting off	g) выделять, выявлять
8) a cloud of spray erupted into flames	h) люди были выведены, а район
9) the area was evacuated and sealed	

10) fatality, n 11) the vibration induced fatigue fracture 12) source of ignition 13) collapse of the tubes 14) seawater ingress 15) alert, v 16) guidance documents 17) integrity, n 18) vulnerability to damage 19) deflect, v	опечатан i) отрекошетить от j) по пути следования k) источник воспламенения/искры l) тревога m) отклоняться n) обычная/ежедневная проверка p) пассажирский паром Ро-Ро q) смертельный случай r) разрыв труб s) руководящие документы t) целостность, сохранность

Write your answers below:
1_____ 2_____ 3_____4_____ 5_____ 6_____ 7_____ 8 ____ 9_____ 10 _____ 11_____ 12_____ 13 _____14 _____15 _____16____ 17 ____ 18 _____19 _____20 _____.

TASK 2.4. Chose the most suitable heading from the list **A- E** for each part **1- 5** of the introduction to the article

A. Graphical demonstration of what happened on board Queen of Surrey.
B. What happened on board queen of Surrey
C. Reasons for overhauling
D. A report by the TSB.
E. Safety recommendations.

1.

This issue was highlighted in a recent incident involving the ro-ro passenger ferry *Queen of Surrey*. A diesel oil fire broke out on the No2 main engine when the vessel was en route from Horseshoe Bay to Langdale in British Colombia carrying over 300 passengers and 137 vehicles. The third engineer was carrying out a routine inspection of the engine room and as he approached the main engine, observed a spray of liquid shooting upwards and ricocheting off the deckhead and onto the turbocharger casing and engine exhaust. Shortly afterward, a cloud of spray erupted into flames. The area was evacuated and sealed so that the engine room could be flooded with CO2 gas from the fixed smothering system. Fortunately, there were no fatalities.

2.

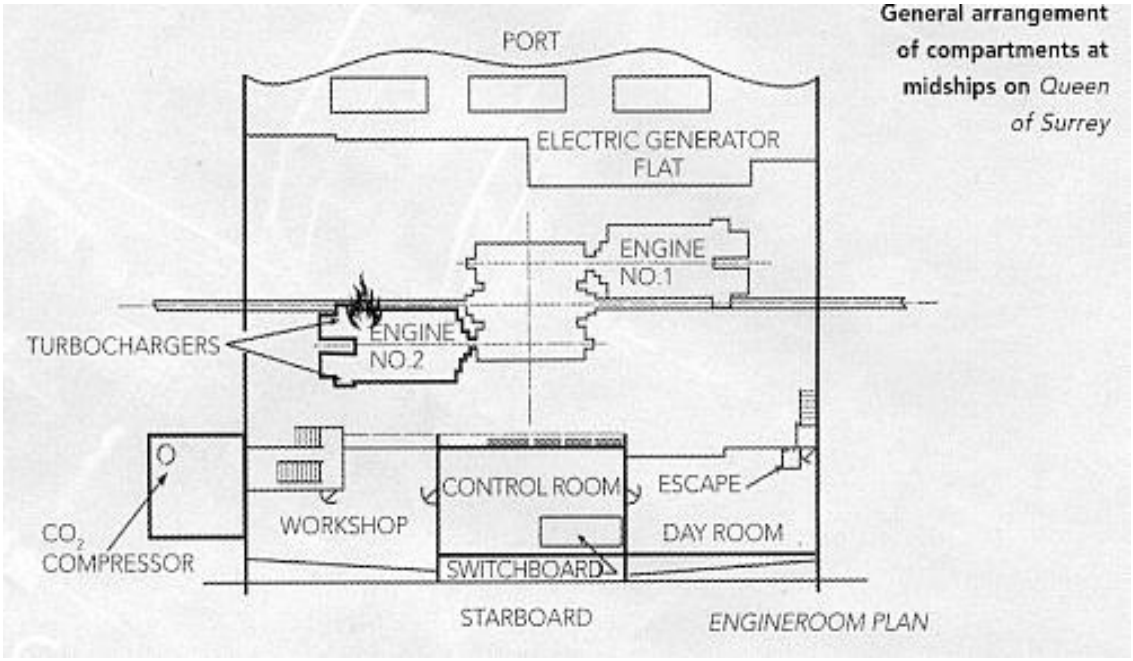


Fig.1. General arrangement of compartments at midships on *Queen of Surrey.*

3.

A report compiled by the Transportation Safety Board (TSB) of Canada into the incident found that:

The fire was the result of the vibration induced fatigue fracture of a fuel oil pressure gauge pipe, which was orientated such that it allowed pressurized fuel to spray onto the hot engine exhaust manifold;

The failed pipe was made of copper, not the prescribed steel;

Prior removal of the heat shield, which protected the engine exhaust manifold from spilled fuel oil, exposed a direct heat source of ignition.

4.

Damage to the *Queen of Surrey* was considerable. The entire No2 main engine had to be overhauled as the collapse of the tubes in the outboard air cooler had allowed seawater ingress into the cylinders. Significantly, however, there was substantial fire and heat damage to the electric cables that were laid out along the engine room deckhead, and large sections of these had to be replaced.

5.

The TSB for its part has investigated other cases of engine room fires caused by diesel oil spraying onto the hot exhaust manifold and has already

issued two *Ship Safety Bulletins* to alert the local maritime community to the problem. Both guidance documents recommended that attention should be given to:

the integrity, vulnerability to damage, and wall thickness of fittings, during inspection of fuel, lubricating and hydraulic oil piping installations;

the possibility of fitting shields at connection, to contain or deflect oil spray in the case of breakage and drainage of any leakage to a drip tray;

the fitting of sheathing around lagging if there is a possibility of oil leaks;

the frequent checking of the condition of lagging, oil pipework and fittings; and

any maintenance or replacement of fuel and lubrication oil pipework.

TASK 3. For questions or statements 1-10 choose the most suitable answer from A, B or C.

1. Fires caused by hot fuel or lube oil spray from leaking pipe joints are:
A. main problems
B. serious problems
C. minor problems

2. Engine manufacturers introduce double-cased pipes to:
A. eliminate the potential risk
B. test the potential risk
C. mitigate the potential risk

3. Designers think that low pressure systems:
A. represent a high risk
B. do not represent a high risk
C. do not suggest any problem at all.

4. Right now there has been _____ systematic research into pressure pulses.
A. little
B. great
C. some

5. According to the article, will the industry soon completely switch over to common rail system?
A. yes
B. no
C. unlikely

6. ***Queen of Surrey*** is a :
A. ro-ro
B. ferry
C. passenger
D. all of the above

7. After the accident on ***Queen of Surrey***:
A. the area was evacuated and sealed
B. the spray of liquid shot upwards
C. a cloud of spray erupted into flames

8. The fire was the result of:
A. the failure of a fuel oil pressure gauge pipe
B. the vibration induced fatigue fracture of a fuel oil pressure gauge pipe
C. the failure of the hot engine exhaust manifold.

9. The entire No2 main engine had to be overhauled because:
A. the boiler tubes collapsed
B. the air cooler was damaged
C. the sea water penetrated into the cylinders

10. The TSB guidance documents recommended that:
A. hydraulic oil piping installations should not be used
B. fitting shields should be placed on passenger vessels
C. frequent checking of the condition of oil pipework should be done.

TASK 4. Read the text below. Use the word given in capitals at the end of each line to form a word that fits in the space in the same line. The words are of the same root, but different in parts of speech.

TROUBLESPOT

The Korean-built ship 1) _____a 61 642kW FEATURE
MAN B&W 12K98ME-C single diesel 2) _____engine TYPICAL
(3) _____, 980mm bore) , aid to be one of CYLINDERS
largest and most technically 4) _____ available, ADVANTAGE

in which the camshaft and 5) _____ timing gear MECHANIC

have been 6) _____ by a computer controlled PLACE
electro-hydraulic fuel 7) _____. The system had SYSTEMATIC
suffered a number of 8) _____problems since TECHNIQUE
9) _____the yard in April 2005 and on the day LEAVE
of the incident, the engineer officers 10) _____ DECIDE
to 11) _____an electronic control unit (ECU) to ABLE
12) _____a back up system to take over after ABLE
the 13) _____ of the last of four pressure sensors FAIL
on the hydraulic system.14) _____, they did EVER
not know that disabling the ECU 15) _____leave TO BE
16) _____hydraulic power available to SUFFICIENT
operate the engine 17) _____s the pump STERN
18) _____to the 100% ahead position. FAULT
19) _____said that while the engineers INVESTIAGTION
were 20) _____and held appropriate STCW EXPEIENCE
certificates, they had been unable to 21) _____ CORECT
diagnose the 22) _____for the engine fault. REASONABLE

TASK **5.** Questions for Group discussion

1. What is the main idea of the article?
2. Why do fires caused by hot fuel or lube oil spray present a real problem?
3. Why do engine manufacturers introduce double-cased pipes?
4. What is a hot-box?
5. What may a leakage result in?
6. Will the new generation of common rail engines provide a permanent solution?
7. How can pipe joints in areas proximate to hot surfaces be minimized?
8. What happened on board the Queen of Surrey?
9. What did the third engineer observe while carrying out a routine inspection of the ER?

10. Why was the area evacuated and sealed?

11. What was the fire the result of?

12. What was the damage to the Queen of Surrey?

13. Why did the TSB issue two Ship Safety Bulletins?

14. What did the two guidance documents recommended?

15. Have you ever encountered with fires on board? What were the reasons for them?

TASK 6. While writing a summary of an article it is very important to convey the most important ideas and not going into the details. Look at the summary of the article you have read. In the extract the most important terms have been excluded. You can find them in the list below the article. Mind, the list contains more of the necessary terms that are missing in the summary. Pick up the most appropriate and fill in the gaps in the summary.

Fires caused by hot fuel or 1) _____ continue to be a very real problem. 2) _____ systems have long been recognized as a hazard, that's why 3) _____ have introduced double-cased pipes to 4) _____ the potential risks. An important issue with the protection of low/high pressure piping relates to how 5) _____ are interpreted.

The recent incident connected with this problem happened on board, 6) _____ where diesel oil fire 7) _____on the No2 main engine. The area was evacuated and 8) _____so that the engine room could be 9) _____with 10) _____from the fixed 11) _____system

A 12) _____was compiled by the TSB of Canada, which reports that:

the fire was the result of the 13) _____induced 14) _____of a fuel oil gauge pipe;

failed pip was made of copper, not the 15) _____Damage to the Queen of Surrey was 16) _____. The entire No2 main engine had to be 17) _____. The guidance documents gave the 18) _____ as for 19) _____ to be periodically checked.

a) engine manufacturers
b) fixed smothering
c) overhauled
d) lube oil spray
e) CO2 gas
f) guidance documents
g) the regulations
h) considerable
i) safety recommendation
j) mitigate
k) flooded
l) prescribed steel
m) vibration
n) leaks in piping
0) Queen of Surrey
p) breaks out
q) fatigue fracture
r) sealed
s) high pressure system

U N I T 5

TASK 1. Match the English terminological word combination in A with its Russian equivalent in B.

A.	B.
1) announcement 2) projecting from the vessel 3) heeling moment 4) claim 5) swing 6) dead upright 7 retractable 8) educing fatigue 9) enhancing their efficiency 10) improving fuel consumption 11) reducing propulsion machinery 12) given level of roll reduction 13) rolled overboard 14) temper 15) frayed 16) snap 17) anticipate the effects of the sea 18) flows under the influence of gravity 19) required phase lag 20) with the ship proceeding slowly or at anchor 21) of lifting hydrodynamic surfaces – fins 22) These fins or tabs extract energy from the flow of water past the vessel	a) судно вернулось в строго вертикальное положение b) сокращать потребление топлива c) течет под действием тяготения d) поднимая гидродинамические поверхности/лопасти e) необходимое отставание по фазе f) выступающий за корпус судна g) объявление, оповещение i) вызывающий усталость j) скатиться за борт k) изношенный от трения l) помощь m) перемещенный назад, втянутый, убирающийся n) эти лопасти /ушки отнимают энергию воды, проходящую вдоль судна o) если судно следует медленно или на якоре p) улучшать их эффективность q) заявка, претензия r) заданный уровень сокращения качки s) с учетом прогнозируемой погоды t) шпонка/ лапка/ушко u) качаться, раскачиваться v) уменьшить обороты двигателя w) шторм, буря

Wright your answers below:
1) _____2) _____3) _____4) _____5) _____6) _____7) _____8) _____9) ____
10) _____11) _____12) _____13) _____14) _____15) _____16) _____17) ___
18) _____19) _____20) _____21) _____22) _____

TASK 2 . You are going to read an article about digital electronics that provide s table platform. In each paragraph of the article the last sentence or phrase is missing. Find it in the box below and insert into the appropriate places. Write your answers right in the text.

A. reducing fatigue and enhancing their efficiency
B. as well as under normal cruise conditions
C. This is an important parameter for stabilizer control system specifiers and designers.
D. especially if the ship has to slow down, reducing hydrodynamic flow.
E. The stabilizers were working – and how!"
F. Fewer tempers, frayed by incessant rolling, would snap.
G. – since this is normally the most troublesome motion.

DIGITAL ELECTRONICS PROVIDE A STABLE PLATFORM

"The Captain made an announcement that they would be conducting stabilizer tests and that everyone should be somewhere where they could hold onto something solid. For this test they made the stabilizers work in reverse to make the ship roll violently and then suddenly activated the stabilizers to stop the roll. I wish I'd been on deck at the time – suddenly the QE2 rolled right over to one side, then gently swung to the other side and did this two or three times and then, just as suddenly as it had started, she stopped dead upright. _1) _____ These impressions of a passenger attest to the power of stabilizer systems, but their benefits are not just limited to passengers on cruise ships. Stabilizers can make life more comfortable for crews on a range of vessels,_____2) _____.

They can influence the bottom line by improving fuel consumption and/or speed, and reducing propulsion machinery stresses – particularly on bearing and rotating parts. Costly breakage and losses are reduced. If ships were steadier, fewer grand pianos would be smashed on cruise ships and fewer containers rolled overboard from cargo vessels. _____3) _____.

Much of the effectiveness of modern systems for countering the roll moment on ships lies in their ability to anticipate the effects of the sea – hence, essentially, on the 'smartness' of their electronics. One way to stabilize a vessel is to shift a substantial mass of water between wing tanks, the movement being in synchronism with the ship's roll but lagging by about a quarter of the roll period. The water flows under the influence of gravity (though it may also be pump

assisted) and the required phase lag is achieved by appropriate design of the tanks and connecting pipework. This system can work with the ship proceeding slowly or at anchor,__4) _____.

More usual, however, is the use of lifting hydrodynamic surfaces – fins on conventional vessels, fins or tabs on fast vessels. These fins or tabs extract energy from the flow of water past the vessel when the ship is travelling at speed, and use it to counter the roll energy. Fins may be fixed - normally projecting from the vessel at an angle from the turn of the bilge – or retractable. Conventional stabilizers only counter a ship's motion in one of its six degrees of freedom – roll - _____5) _____.

Fin stabilizers are expensive and measures of their effectiveness are required. The usual claim by manufacturers today is that they can reduce roll by about 90%. This, while sounding impressive, is meaningless on its own, a major qualification being to what extent this performance drops off in higher Sea States ,_____6) _____.

A generally accepted measure is to specify the maximum equivalent wave slope (EWS) for which the stabilizer can maintain a given level of roll reduction. EWS is a single wave slope that would be the mean of all the individual waves acting on the ship at any particular moment. Given the EWS, the ship's heeling moment can be calculated from its GM and displacement. _____7) _____.

TASK 3. For questions or statements 1-10 choose the most suitable answer from A, B or C.

1. The Captain made an announcement that they would:
A. be conducting stabilizer tests
B. make he ship roll
C. swing the ship from one side to another

2. The benefits of stabilizer system are:
A. limited to passenger on cruise ships
B. stabilizers can make life comfortable for crews on many vessels
C. stabilizers can reduce propulsion machinery stress

3.The effectiveness of modern systems for countering the roll moment on ships lies in:
A. smartness of their electronics
B. their ability to anticipate the effects of the sea
C. pacifying the passengers

4. Hydrodynamic surfaces are:
A. the hull of the ship
B. fins or tabs
C. projection from a vessel at an angle

5. Fins may be:
A. fixed
B. retractable
C. both of the above

6. Rolling is:
A. the ship's movement form fore to aft
B. the ship's movement from side to side
C. both of the above

7 Fins can reduce roll:
A. below 90%
B. above 90%
C. about 90%

8.EWS stands for:
A. estimated wave slope
B. equivalent wave slope
C. expected wave slope

9. EWS is a _____ wave slope that would be the mean of all the individual waved acting on the ship.
A. equivalent
B. estimated
C. single

10. The main idea of the article is:
A. stabilizers provide a stable platform
B. stabilizers are practicable on passenger ships
C. stabilizers are practical in A 1 class ships

TASK 4. In English Grammar there exist 5 different types of Conditional Clauses. Here in this Unit we'll consider the First Conditional and the Second Conditional. The difference between these two lies in the type of condition. If we talk about the real future condition we use the First Conditional
e.g. *If I have time I'll call you.*

This means that when I have time in future, I will give you a call. This condition is real in future. It is formed with Present Simple in the auxiliary clause and Future simple in the main clause. In the auxiliary clause we may use such conjunctions as: *if, when, as soon as.*

The Second Conditional sentences tell us about the unreal or imaginary condition at present.

e.g. *If I had time I would call you.*

This means that right now the person doesn't have time, so he cannot make a call. This type is formed with the Past Simple in the auxiliary clause and 'would + bare infinitive' in the main clause.

Look at the first sentence in your article : '*The Captain made an announcement that they would be conducting stabilizer tests*…' Do you think the situation about the unreal present or real future? Why? Find other examples of Conditionals in the text of the article.

In the following exercise put the verbs in brackets into the appropriate conditional form, first or second, using the information given.

1. You have a $500 overdraft and have just received a letter from the bank asking you to reduce this by $200 by the end of the month, or they will start legal proceedings against you.

If you _____ (not reduce) your overdraft, the bank _____(start) legal proceedings .

2. One of your clients has written to you applying for a personal loan. However, she has not included enough information about her financial situation for you to decide whether or not to approve the load.

If you _____(have) more complete information, you _____(be able to) make a decision.

3.For the second year running, the results of your bank have been very disappointing.

If the situation _____ (not improve) significantly next year, the bank _____ (have to) consider closing some of its branches.

4. The Captain made an announcement that they _____ (to be) conducting stabilizing tests.

5. The Captain said that everyone _____(be) somewhere where they could hold onto something solid.

6. I was not on deck when the collision happened. If I _____ (to be) there, I _____ (be ,see) everything by myself.

7. I'm sorry i don't have time right now. If I _____ (to have) the time I _____(be) definitely visit him.

8. Much of the effectiveness of modern systems for countering the roll moment lies in their ability to anticipate the effects of the sea. If these effects of the sea _____ (cannot) be anticipated, the roll moment _____(to present) a real problem.
9. Fin stabilizers are expensive and measures of their effectiveness are required. If fin stabilizers _____(not be) so expensive the roll moment _____(be) easier to realize both of the above
10. A generally accepted measure is to specify the maximum equivalent wave slope. If not for _____(to be) the healing moment there _____ (be) hardly an important parameter for stabilizer control system specifiers.
11. If they _____ (do) the stabilizer test on board QE2, the passengers _____ (not experience) the real danger in real rolling situation.

TASK 5. Questions for Group discussion

1.What announcement did the captain of QE2 make?

2. Why did the crew make the stabilizers work in reverse?

3. What were the impressions of one of the passengers?

4. What are the benefits of stabilizers?

5. How can stabilizers influence the bottom line?

6. How can the effects of the sea be anticipated on board ship?

7. What is one of the ways to stabilize a vessel?

8. What is the function of fins or tabs?

9. What are the six degrees of freedom?

10. Why is 90% reduce roll is meaningless on its own?

11. What is meant by “ higher Sea States”?

12. What is EWS?

13. What is the ship's heeling moment?

14. Why is the article called “Digital electronics provide a stable platform”?

15. What is the message of the article?

TASK 6. While writing a summary of an article it is very important to convey the most important ideas not going into the details. Look at the summary of the suggested article you have read. In the extract the most important terms have been excluded. You can find them in the box below. Mind the box contains more of the necessary terms that are missing in the summary. Pick up the most appropriate and fill in the gaps in the summary.

On board QE2 there were conducted 1) _____, that proved the reliability of the system and the necessity of such tests. During the tests nobody 2) _____but the passengers realized the vital importance of such 3) _____. The impressions of one of the passengers were given but the 4) _____of stabilizer system are not just limited to passengers on cruise ships. 5) _____can make life safer for crews on different vessels, reducing 6) _____and 7) _____the efficiency.

Much of the of modern systems for countering the 8) _____lies in their ability 9) _____the effects of the sea and mainly in the way the ships' electronic works. The usual way is to use the10) _____– fins on conventional vessels, 11) _____on fast vessels.

Fin stabilizers are 12) _____and measures of their effectiveness are required. The usual 13) _____by 14) _____today is that they can 15) _____roll by about 90%. This is meaningless on its own and 16) _____is of what extent this drops off in 17) _____, especially if the ship has to slow down.

A generally excepted measure is to specify 18) _____which would be the mean of all individual waves acting on the ship at any 19) _____.Given the EWS, the ship's 20) _____can be calculated from its GM and 21) _____. This is an important parameter for stabilizer control system specifiers and designers.

Roll moment , lifting hydrodynamic surfaces , stabilizers tests, was injured , to anticipate fins or tabs , the maximum equivalent rolling moment , drills , benefits , claim , manufacturers, stabilizers , reduce , in previous generation, fatigue , heeling moment , enhancing , expensive, major qualification, higher sea States, angle, displacement

U N I T 6

TASK 1. Match the English terminological words in A with their Russian equivalent in B. Memorize the terms.

A	B
1) bunker fuel tests	a) ключевой показатель
2) to trace the rate of the fuel's release of heat	b) сходимость и воспроизводимость данных
3) release	c) система градуирования/калибровки
4) robin inter-laboratory program	d) задержка зажигания
5) key indicator	e) наносить сильный урон
6) cost-effective	f) принимать форму
7) repeatable and reproducible data	g) индекс включения углерода в химический состав топлива
8) an inter-industry task	h) проверка бункерного топлива
9) calibration system	i) экономичный по цене
10) under the auspices	j) под эгидой
11) cause severe damage	k) смешивание
l2) ignition delay	l) абразивно-каталитические частицы
13) deposit	m) отложение, осадок
14) excessive wear	n) состав топлива
15) aggravating factor	o) совместная межлабораторная программа
16) blending	p) проследить скорость теплоотдачи топлива
17) fuel content	q) межотраслевое задание
18) to take into account	r) усугубляющий фактор
19) compatibility	s) чрезмерный износ
20) abrasive catalyst fines	t) принимать в расчет
21) to take shape	u) недостаточный показатель
22) Calculated Carbon Aromaticing Index	v) соотношение плотности и вязкости топлива
23) the density and viscosity ratios	w) совместимость
24) a weak tool	y) высвобождать
	z) тестирование бункерного топлива

Wright your answers below:

1) ___ 2) _____3) _____4) _____5) _____6) _____7) _____8) _____9) _____
10) _____11) _____12) _____13) _____14) _____15) _____16) _____17) ___
18) _____19) _____20) _____21) _____22) _____23) _____24) _____
26) _____27) _____

TASK 2.1. While reading the article about bunkering you will find that the last sentence in each paragraph has been extracted. Find the appropriate ending to each passage in the box below and write it into the article.

A) Unfortunately the CCAI is perceived to be a weak tool for determining a bunker fuel'' suitability in practice.
B) In the past it has been difficult to study in detail.
C) Perhaps, one day in the future, ignition/combustion parameters may even become part of ISO8217.
D) Obviously all technical and physical conditions are kept constant from test to test.
E) The precision data was established by a round robin inter-laboratory program managed by the Energy Institute.
F) ships' engineers, engine manufacturers, shipowners and the bunker industry to work with.
G) In slow speed engines, this is less of a problem as there is more time for combustion to take place.

BURNING QUESTIONS. BUNKERING.

Despite the advent of new industry standards significant bunkering issues remain.

1) Routine testing of ignition and combustion qualities of bunker fuel still holds something of a mystery even to specialist chemists and bunker fuel testers. This may be somewhat surprising, given the fact it is the amount of heat energy that the fuel releases when it burns that determines how far a ship will travel per tone of fuel. Specific energy is a key indicator as how cost-effective the bunker fuel is and combustion/ignition are important factors. But fuel combustion is an extremely fast process.

_____

2) This is about to change. A new test method – IP541/06 – has been developed by the Energy Institute to look at combustion and ignition characteristics of fuel. And an inter-industry task force, overseen by CIMAC, has been set up to provide ignition/combustion data for

_____

3) Ignition quality does not fall under the auspices of ISO8217 and claims of poor ignition quality have been on the increase over the past few years. To

complicate matters, ignition quality of the fuel itself only plays a part in the ignition and combustion process that goes on within a ship's engine. Fuel that may be suitable for one engine can cause severe damage to another. Medium speed engines in particular are more sensitive to a long ignition delay and along combustion period, especially on low load operation. This may result in a change of process temperature/exhaust temperature and increased deposits on exhaust valves and piston rings. In addition there could be excessive wear of cylinder liner due to increased thermal loads on the liner.

---

4) One of the aggravating factors for poor ignition/combustion qualities in bunker fuel has been blending. Blending has been termed 'part chemistry, part art'. It is a complicated procedure due to the huge variations in fuel content, and there are many parameters to take into account, including ignition/combustion, compatibility and the dangers of abrasive catalyst fines. Luckily as far as ignition/combustion characteristics of bunker fuel are concerned, this quality picture is beginning to take shape.

---

5) The Calculated Carbon Aromaticity Index (CCAI) uses the density and viscosity ratios of a fuel to indicate its aromaticity to predict ignition qualities. The lower the CCAI number the higher the expectant ignition quality.

---

6) As a result of the CCAI's weakness, a new test method for measuring ignition and combustion characteristics has been developed by the Energy Institute – IP test method 541/06 was published in April 2006. The new method was designed as an objective tool to measure and characterize ignition and combustion properties of a bunker fuel. This new method takes into account the entire combustion cycle to determine a fuel's combustion and ignition qualities. Importantly, it uses a universal standardization and calibration system to ensure repeatable and reproducible data.

Table 1. **METHOD OVERVIEW OF IP 541/06**

Process parameters	
Temperature:	approximately 500 C (individual tuning by calibration)
Pressure:	45 bar
Injection pressure:	400 bar, 25 injection/combustion cycles per test
Fuels	
Heavy Fuel Oil:	ISO8217 up to 2000 cSt at 50 C
Sample quantity:	approximately 50 ml per test

Off spec or special fuels
Ultra-high viscosity, emulsions, bio fuels etc
This may require special settings and non-standard operating procedure
Calibration
Based on pure HP compound: Methylcyclohexane (MCH)
2 STEPS:
i – Adjust injection pump to achieve constant injected fuel volume
ii –Adjust process temperature to achieve specific ignition delay for MCS
Verification OF CALIBRATION WTH N-Heptane
Test time
Approximately 45 minutes
Automated operation, so no need for user attendance during test.

The test method measures the ignition delay of fuel. It is possible to trace the rate of the fuel's release of heat by warming the fuel in a chamber under a known pressure. At the point of the fuel's ignition, there is a release of energy, which causes the pressure in the chamber to rise sharply. It is the speed and the shape of the pressure rise that indicates the fuel's combustion properties. The result is recorded as a pressure development curve over time, and further parameters relating to combustion can be extrapolated from the result.

TASK 2.2. Study Table 1 in the article and answer the following questions:

1.What parameters are mentioned in the article?
2.What type of fuel was used?
3.How much fuel was taken?
4.Explain the expression "off spec".
5.What two steps are mentioned in calibration section?
6.What time was allocated for the test?
7.How many people participated in the test?

TASK 3. For statements or questions 1 – 10 choose the most appropriate answer from A, B, C or D.

1. Routine testing of ignition and combustion qualities of bunker fuel present no longer a problem to specialists.

A. yes
B. no
C. not given

2. What determines how far a ship will travel per ton of fuel?
A. the amount of fuel on board
B. the quality of fuel
C. the amount of heat energy that the fuel releases when it burns

3. A new test method has been developed by:
A. the Energy Institute
B. the ISO
C. the CCAI

4. One of the main factor for poor ignition/combustion qualities in bunker fuel has been:
A. chemical qualities of fuel
B. mixing of fuel
C. high viscosity

5. What parameters are taken into account when blending fuel?
A. ignition/combustion
B. compatibility
C. abrasive catalyst fines
D. all of the above

6. What does the CCAI use to predict ignition quality of fuel?
A. density and viscosity
B. density and aromaticity
C. suitability in practice
D. all of the above

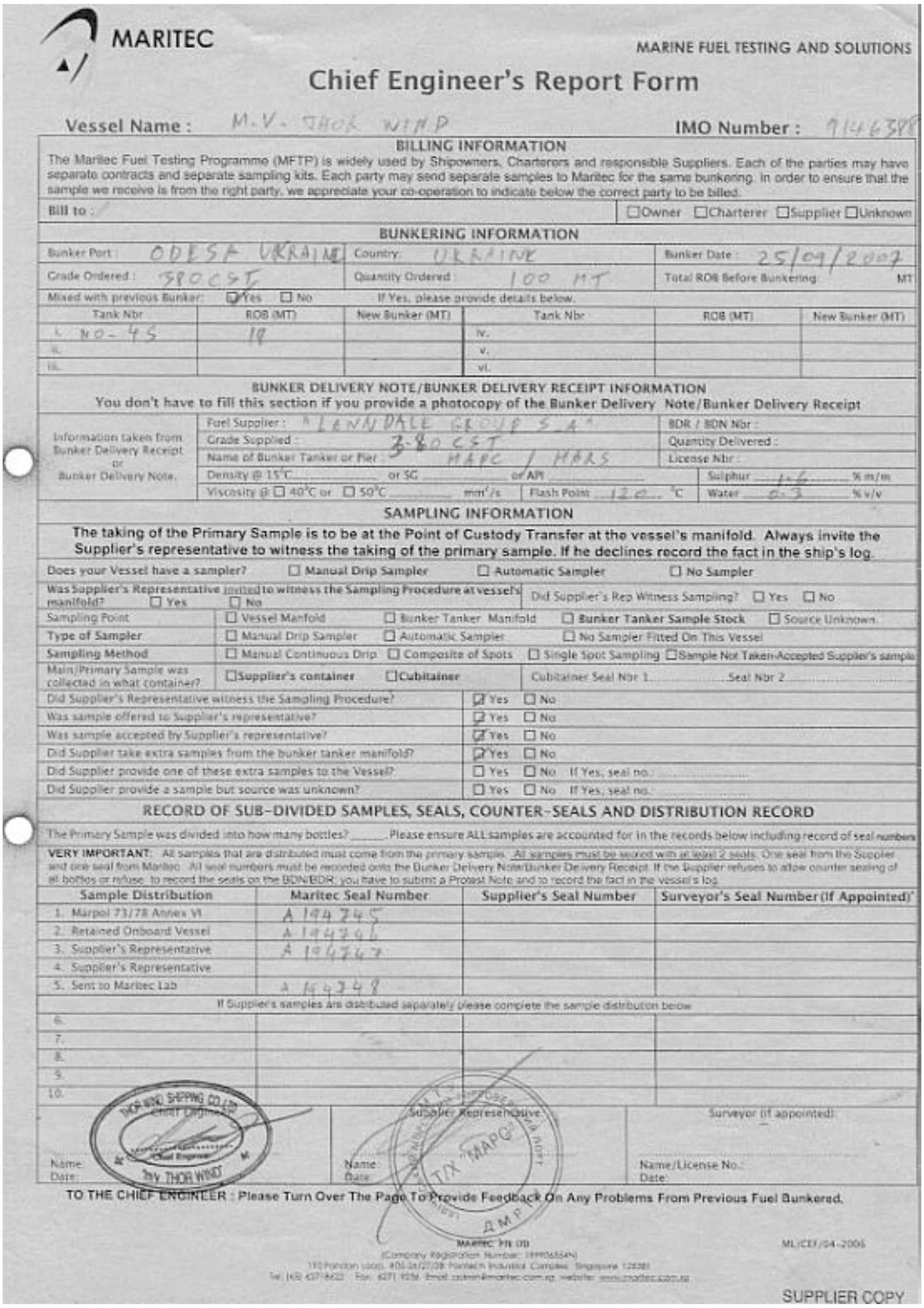
7. the CCAI stands for:
A. calculated carbon aromaticity Index
B. index
C. new type of testing fuel

8. The word “delay” in the last passage of the article means:
A. the increased time of fuel ignition
B. the shorter time of fuel ignition
C. the later time of fuel ignition

9. How is it possible to trace the rate of the fuel’s ignition?
A. to inject the fuel
B. to warm the fuel
C. to cool the fuel

10.How is the result of the test recorded?
A. as a pressure development curve
B. as the speed of the pressure rise
C. as the pressure development

TASK 4.1. Study the Chief Engineer's Report Form made by Maritec given below.



MARITEC — MARINE FUEL TESTING AND SOLUTIONS

Chief Engineer's Report Form

Vessel Name : M.V. THOR WIND — IMO Number : 9146388

BILLING INFORMATION

The Maritec Fuel Testing Programme (MFTP) is widely used by Shipowners, Charterers and responsible Suppliers. Each of the parties may have separate contracts and separate sampling kits. Each party may send separate samples to Maritec for the same bunkering. In order to ensure that the sample we receive is from the right party, we appreciate your co-operation to indicate below the correct party to be billed.

Bill to : ☐Owner ☐Charterer ☐Supplier ☐Unknown

BUNKERING INFORMATION

Bunker Port : ODESA UKRAINE	Country: UKRAINE	Bunker Date : 25/09/2007
Grade Ordered : 380 CST	Quantity Ordered : 100 MT	Total ROB Before Bunkering: MT

Mixed with previous Bunker: ☑Yes ☐No — If Yes, please provide details below.

Tank Nbr	ROB (MT)	New Bunker (MT)	Tank Nbr	ROB (MT)	New Bunker (MT)
i. NO-45	19		iv.		
ii.			v.		
iii.			vi.		

BUNKER DELIVERY NOTE/BUNKER DELIVERY RECEIPT INFORMATION
You don't have to fill this section if you provide a photocopy of the Bunker Delivery Note/Bunker Delivery Receipt

Information taken from Bunker Delivery Receipt or Bunker Delivery Note.

Fuel Supplier : "LENNDALE GROUP S.A."	BDR / BDN Nbr :
Grade Supplied : 380 CST	Quantity Delivered :
Name of Bunker Tanker or Pier : MAPC / MARS	License Nbr :
Density @ 15°C ____ or SG ____ or API ____	Sulphur 1.6 % m/m
Viscosity @ ☐ 40°C or ☐ 50°C ____ mm²/s — Flash Point 120 °C	Water 0.3 % v/v

SAMPLING INFORMATION

The taking of the Primary Sample is to be at the Point of Custody Transfer at the vessel's manifold. Always invite the Supplier's representative to witness the taking of the primary sample. If he declines record the fact in the ship's log.

Does your Vessel have a sampler? ☐ Manual Drip Sampler ☐ Automatic Sampler ☐ No Sampler

Was Supplier's Representative invited to witness the Sampling Procedure at vessel's manifold? ☐ Yes ☐ No — Did Supplier's Rep Witness Sampling? ☐ Yes ☐ No

Sampling Point	☐ Vessel Manifold	☐ Bunker Tanker Manifold	☐ Bunker Tanker Sample Stock	☐ Source Unknown
Type of Sampler	☐ Manual Drip Sampler	☐ Automatic Sampler	☐ No Sampler Fitted On This Vessel	
Sampling Method	☐ Manual Continuous Drip	☐ Composite of Spots	☐ Single Spot Sampling	☐ Sample Not Taken-Accepted Supplier's sample
Main/Primary Sample was collected in what container?	☐Supplier's container	☐Cubitainer	Cubitainer Seal Nbr 1 .... Seal Nbr 2	

Did Supplier's Representative witness the Sampling Procedure?	☑ Yes ☐ No
Was sample offered to Supplier's representative?	☑ Yes ☐ No
Was sample accepted by Supplier's representative?	☑ Yes ☐ No
Did Supplier take extra samples from the bunker tanker manifold?	☑ Yes ☐ No
Did Supplier provide one of these extra samples to the Vessel?	☐ Yes ☐ No If Yes, seal no.:
Did Supplier provide a sample but source was unknown?	☐ Yes ☐ No If Yes, seal no.:

RECORD OF SUB-DIVIDED SAMPLES, SEALS, COUNTER-SEALS AND DISTRIBUTION RECORD

The Primary Sample was divided into how many bottles? ______ Please ensure ALL samples are accounted for in the records below including record of seal numbers

VERY IMPORTANT: All samples that are distributed must come from the primary sample. All samples must be sealed with at least 2 seals. One seal from the Supplier and one seal from Maritec. All seal numbers must be recorded onto the Bunker Delivery Note/Bunker Delivery Receipt. If the Supplier refuses to allow counter sealing of all bottles or refuse to record the seals on the BDN/BDR; you have to submit a Protest Note and to record the fact in the vessel's log.

Sample Distribution	Maritec Seal Number	Supplier's Seal Number	Surveyor's Seal Number (If Appointed)
1. Marpol 73/78 Annex VI	A 194745		
2. Retained Onboard Vessel	A 194746		
3. Supplier's Representative	A 194747		
4. Supplier's Representative			
5. Sent to Maritec Lab	A 194748		
If Supplier's samples are distributed separately please complete the sample distribution below			
6.			
7.			
8.			
9.			
10.			

Chief Engineer	Supplier Representative	Surveyor (if appointed)
Name: Date:	Name: Date:	Name/License No.: Date:

TO THE CHIEF ENGINEER : Please Turn Over The Page To Provide Feedback On Any Problems From Previous Fuel Bunkered.

MARITEC PTE LTD — ML/CEF/04-2006

SUPPLIER COPY

TASK 4.2. Look at another sample of the fuel test. The information that you have to fill in is missing in this document. Fill in the gaps in the Test using the data and facts from any of the ships you have been to.

TASK 4.3. Read another text, which considers the problems of bunkering. In it you will find some terms missing. Fill in the gaps with the words from the list below the text.

The bunker 1) _____ has for too long been the poor 2) _____of the energy industry. Regarded by some as the 'Highwaymen of the sea' holding ship 3) _____to ransom with short 4) _____and occasionally damaging 5) _____ and of course 6) _____. In fact marine fuel oils or 7) _____fuels are often extremely good value energy when 8) _____with other 9) _____fuels. Probably the only lower cost fuel would be 10) _____, but that is not convenient to handle, and so far has met with limited success in marine 11) _____. There is no doubt that bunker fuel will continue to be the energy 12) _____of choice for ships into the foreseeable 13) _____, especially if in future ships are fitted with 14) _____ after treatment to minimize and possibly 15) _____any harm to the 16) _____.

a) their reputation
b) diesel engines
c) industry
d) source
e) environment
f) cousin
g) hydrocarbon
h) bunker
i) owners
j) future
k) quantity
l) compared
m) eliminate
n) quality
p) exhaust filters
q) diesel

TASK 5. Questions for Group discussion

1. Why do routine testing of ignition and combustion qualities of bunker fuels still hold a mystery?
2. What is a key indicator of cost effectiveness of the bunker fuel?
3. What is the idea of a new test method?
4. What are medium speed engines more sensitive to?
5. What may cause increased deposits on exhaust valves and piston rings?
6. What may be the reason of excessive wear of cylinder liner?
7. What may cause poor ignition/ combustion qualities?
8. Why blending is a complicated procedure?
9. Describe the necessity of CCA index?
10. What is the idea of IP test method?
11. What does the test method measure?
12. How can you trace the rate of the fuel's release?
13. What happens at the points of the fuel's ignition?
14. What indicates the fuel's combustion properties?
15. What are the burning questions of bunkering?

TASK6. Write a summary of the first article in 150-200 words. The beginning of the abstracts are given for you below.

1. The main idea of this article lies in
_____
_____
_____
_____

2. Routine testing of ignition and combustion qualities of bunker fuel is
_____
_____
_____
_____

3. The idea of a new test method is that
_____
_____

_____
_____

4. One of the aggravating factors for poor ignition/combustion qualities in bunker fuel has been blending. Blending is important because

_____
_____
_____
_____
_____
_____

5. The test method measures the ignition delay of fuel.

_____
_____
_____
_____
_____
_____

6. It is very important to do the fuel testing because

_____
_____
_____
_____
_____

7. According to the article the burning questions of bunkering are

_____
_____
_____
_____
_____

U N I T 7

TASK 1. Match the English terminological word combination in A with its Russian equivalent in B. The first example is given below the lists. Learn the words by heart.

A	B
1) detract, v	a) под эгидой
2) environmentally conscious vessel design	b) методы, основанные на анализе факторов риска
3) trigger	c) уводить от
4) accelerated phase-out	d) оценивать риск загрязнения
5) preventative measures	e) конечная цель
6) newly implemented study	f) уверенный
7) encompass	g) смягчающие обстоятельства
8) safe transportation of hazardous goods	h) конструкция судна, учитывающая безопасность для окружающей среды
9) evaluate the pollution risk	i) человеческий фактор
10) requisite tools	j) создавать опасность загрязнения
11) ultimate objective	k) объем контролирующих действий
12) surface transport	l) вызывать
13) human element	m) необходимые инструменты
14) under the auspices of	n) наземный транспорт
15) insufficient assessment	o) ускоренное введение
16) inherent risk	p) охватывать
17) convey, v	q) вызывать случаи разлива
18) pose the pollution risk	r) недостаточная оценка
19) evolve spill incident	s) предупредительные меры
20) risk-based pollution prevention methodology	t) присущий фактор риска
21) mitigation, n	u) впервые примененное изучение
22) control framework	v) безопасная перевозка опасных грузов
23) assertive	w) передавать

Wright your answers below:
1) _____2) _____3) _____4) _____5) _____6) _____7) _____8) _____9) ____
10) _____11) _____12) _____13) _____14) _____15) _____16) _____17) ___
18) _____19) _____20) _____21) _____22) _____23) _____

TASK 2. You are going to read an article about a rational approach to Tanker Safety. Choose the most suitable heading from the list A-H for each part (1-8) of the article.

A. The aim is to reduce oil spills.
B. The problem is still not solved.
C. The new development in tanker shipping.
D. The effect of a new vessels' design.
E. The idea of a risk-based methodology.
F. The accidents that started a new thinking.
G. The launching of a new project to evaluate pollution risk.
H. The comparison of single-hull and double-hull tankers.

TANKER SAFETY

Despite significantly improvements in the tankers sector's overall safety record, Europe has suffered several major oil spills in recent years.

1	

The Erika and Prestige incidents are still to the fore in European minds, detracting from the positive development trend in tanker shipping in terms of improved control mechanisms, reduced pollution, and more environmentally-conscious vessel design, and triggering the accelerated phase-out of single-hull tankers.

2	

But EU sponsorship of a large-scale research initiative focused on tanker safety is reflecting the current enthusiasm of the European parliament for exploring and enforcing new, preventative measures. Backing for the newly-implemented study also acknowledges the need for a more rational, scientific approach to issues of tanker design, operation and regulation, which have become increasingly politicized in line with the public mood.

3	

Coordinated by the International Association of Independent Tanker owners (Intertanko) , and encompassing 15 partners from the European maritime technology, research, classification and shipbuilding disciplines, the project entitled "Pollution Prevention and Control - Safe Transportation of Hazardous

Goods by Tankers' (POP&C) has a three-year research timeframe to investigate ways of better evaluating the pollution risk presented both by existing tankers and new designs.

4	

POP&C's remit is to create a risk-based methodology, with the requisite tools, to support decisions relating to the design, operation and regulation of oil tankers. The ultimate objective is to reduce the likelihood and severity of future oil spills, and the impact of the work is intended to be all the greater for its 'first principles' approach to all tankers and for its consideration of the human element as well as technical issues. To this end, the European Commission has authorized funding of 2M for the project, under the auspices of the EU's Sixth Framework Program for research and innovation.

5	

The project is a reflection of concerns within parts of the industry and scientific community that there has been insufficient rational assessment of single-hull tankers in the context of pollution catastrophes and risk, and that service experience with double-hull tankers is an inherent risk related to single hulls, it is argued that the risk must be managed effectively and without delay, since a significant proportion of the oil traffic is conveyed by single-hull tankers.

6	

Giving the seriousness of these issues, there is still an amazing lack of methods and tools to determine which types of oil tankers pose the highest pollution risk ,the relative safety of new tanker designs, or the most appropriate response to an evolving spill incident.

7	

One specific objective of the project is accordingly the development of a risk-based methodology to measure the oil spill potential of specific tankers, applicable to both existing and proposed new designs, considering the probability of collisions, groundings, fire and explosion, and structural failure. Other key aims are the formation of a risk-based pollution prevention methodology, covering design and operational lines of defense, and the development of a risk-based, active, post-accident pollution mitigation and control framework.

8	

Rational design of new vessels utilizing risk-based methodologies will enhance safety cost effectively, thus promoting sustainability of surface transport. Effective pollution mitigation and control management of an oil spill incident will drastically reduce environmental impact.

TASK 3. For questions or statements 1-10, choose the correct answer from A,B or C.

1. The expression "detract from" in line 2 of the article is the closest in meaning to:
   A. neglect
   B. take something of value away from
   C. remind about

2. The newly-implemented study involves:
   A. The new approach to tanker design
   B. The privilege of single-hull to double-hull tankers
   C. The privilege of double-hull to single-hull tankers

3. POP&C project idea is to:
   A. reduce the pollution risk presented by tankers
   B. investigate the pollution risk presented by tankers
   C. exclude the pollution risk presented by tankers

4. The ultimate objective of the project is:
   A. to reduce the likelihood of future oil spill
   B.to reduce the severity of future oil spill
   C. both of the above

5. How much money was subsidized for the project?
   A. 2 billion
   B. 2 million
   C. 2 milliard

6. What was the reason for launching the project?
   A. there has been insufficient rational assessment of single-hull tankers
   B. in the context of pollution catastrophes and risk,
   C. it has been decided to switch to double-hull tankers

7. The most bulk of the oil traffic is conveyed by:
   A. double-hull tankers
   B. single-hull tankers
   C. both of the above

8. Which types of oil tankers pose the highest pollution risk?
   A. single-hull
   B. double-hull
   C. it's hard to determine

9. One specific objective of the project is:
   A. the development of a risk-based methodology
   B. considering the probability of collisions
   C. considering groundings, fire and explosion

10. Rational design of new vessels will:
   A. Exclude oil spillage
   B. enhance safety cost effectively,
   C. switch to double-hull tankers

TASK 4.

In the English language phrasal verbs and idiomatic expressions are very important. Depending on the preposition used after a verb the meaning of the latter may change. The meaning of an idiomatic expression is usually not literal. In the following exercise rewrite the given sentences so that there meaning remains the same, but use the phrasal verbs and idioms from the list given below the sentences.

1.The concept of the new design is ***derived from*** the latest achievements in science.

_____

2. The issue was presented ***in the light of*** the research performed.

_____

3.The captain was ***concentrated on*** plotting the course.

_____

4. You should begin the bunkering ***immediately***!

5. The work was done ***under the leadership*** of the chief engineer.

_____

6. The latest accidents ***are still fresh*** in European minds.

_____

7. Express your ideas ***as to*** the latest ship design.

_____

8. The work was done ***in compliance with*** the rules and regulations.

_____

9. He was persistent ***defending*** his ideas.

_____

10.The new plan was implemented ***under the authority of*** the manufacturer.

_____

a) are still to the fore
b) detracting from
c) related to
d) focused on
e) Backing for
f) in line with
g) under the auspices of
h) in the context of
i) Coordinated by
j) without delay

TASK 5. Questions for Group discussion

1. Why are the Erika and Prestige incidents still ti the fore in European minds?
2. What is important in tankers design now and why?
3. What is Intertanks?
4. What does the project POP&C aim at?
5. What are the “first principles” approach to all tankers?

6. What are the safety concerns of single-hull tankers versus double-hull tankers?

7. What is the majority that oil traffic consists of single- or double-hull tankers?

8. Why types of oil tankers pose the highest pollution risk?

9.What is one specific objective of the project?

10. What are the other key aims of the project?

11. Why are risk-based methodologies in rational design so important?

12. What is the main idea of the article? Do you think it is possible to enchance taker safety to the level of other ship types safety?

TASK 6. Write a summary of the article in 150-200 words. Use the introductory sentences to each passage from the previous units.

U N I T 8

TASK 1. Match the English terminological word combination in A with its Russian equivalent in B. Learn the words by heart.

A	B
1) genset applications	a) преждевременный
2) to boast a raft of	b) достижения в области охраны окружающей среды
3) enhancement, n	c) специфический звук
4) valve stem seal	d) просачивание, капание
5) premature, adj	e) ковкий чугун
6) build up	f) углеродные отложения
7) boost pressure	g) применение генераторной установки
8) back-pressure lip	h) улучшение
9) green credentials	i) давление наддува
10) layout	j) схема, планировка
11) vortex flow	k) вихревая система
12) staggered nozzle	l) проводить, вводить
13) swirl system	m) нитрит
14) squish, n	n) модифицированная система управления
15) in compliance with	o) зазор юбки поршня
16) implement, v	p) хвастаться, гордиться
17) to place emphasis on	q) сальник/уплотнение клапанного штока
18) laser alloying	r) выступ противонаддува
19) dripping, n	s) накапливаться
20) nitride, n	t) вихревой поток
21) upgraded control	u) в соответствии с
22) revamp, v	v) заострять внимание на
23) ductile cast iron	w) форсунка с уступами
24) piston skirt clearance	x) лазерное сплавление/легирование
25) nimonic material	y) жаропрочный никелевый сплав
26) carbon deposits	z) модифицировать, реконструировать

Write your answers below:

1_____ 2_____ 3_____ 4_____ 5 _____ 6 _____ 7 _____ 8 _____ 9 _____ 10_____ 11_____ 12_____ 13_____ 14_____ 15_____ 16_____ 17 _____ 18 _____ 19 _____ 20 _____ 21_____ 22 _____ 23 _____ 24 _____ 25 _____ 26_____

TASK 2. You are going to read an article about combating the problems of contamination of marine engines. Choose the most suitable heading from the list F - J for each part 1- 10 of the article.

A. Variable temperature control.
B. Green credentials.
C. Yanmar has launched a new machine.
D. Innovation of the turbocharger.
E. Piston design.
F. Reducing contamination by unburnt fuel/
G. Reliability emphasis.
H. Combating the level of contamination.
I. Space economy for the new engine.
J. Technical characteristics of the new engine.

ADDRESSING CONTAMINATION

Yanmar has engineered its 6EY18L medium speed to prevent the build-up of contaminants in the combustion chambers

1

Yanmar has expanded its range of medium speed marine engines with the launch of the 6EY18L, a six-cylinder unit with 180mm bore and 280mm stroke capable of generating 400-615kW at 720rev/min and in its (A) version 455-800kW at 900rev/min. The Japanese medium-high speed specialist builder states it is suited to genset applications on Handy size tankers, Panamax, Aframax and Suezmax tankers.

2

The engine boasts a raft of technical enhancements intended to suppress the level of contaminants in the combustion chamber as well as in the lubricant oil (HFO) . Contamination can be caused by oil leakage from the valve stem seal; turbocharger contamination; gas blow-by from the valve seat; wear to piston ring and cylinder liner; wear to moving parts; and premature clogging of the lube oil filter.

3

The cooling water thermostat on the jacket side is designed for various loads and maintaining an optimal combustion chamber temperature in order to prevent impurities from building up. The system seal used for the intake and exhaust valves is made to maintain a constant flow of fuel regardless of the turbocharger boost pressure, and the back-pressure lip protects against excessive oil pressure drop.

4

To enhance its green credentials, Yanmar developed a combustion system that features a staggered nozzle injection system; charging swirl system as well as increased capacity for combustion and intake. Using a staggered layout provides sufficient total area for the nozzle holes despite their small size, leading to improved air utilization. Meanwhile, the shape of the air intake port has been optimized using CFD techniques so that a swirl (or vortex flow) is generated in the combustion chamber as well as ‘squish’ in the compression stroke. According to Yanmar, this promotes fuel/air mixing, resulting in better overall combustion efficiency .

Furthermore, in order to ensure compliance with future environmental regulations, the engine can employ the Miller cycle, the intake valve in the charging stroke is closed earlier than in a conventional cycle. By finishing the charging stroke earlier, it is possible to lower the compression temperature and the ambient temperature prior to combustion, thereby reducing NOx emissions.

5

In addition to the engine’s environmental performance, emphasis was placed on reliability to make sure that any adjustments needed during the engine’s lifetime can be carried out as simply as possible. Technological solutions have been implemented to control contamination, including a low sac fuel injection valve; jacket water temperature control system; valve stem seal with back pressure lip. Contamination resistant applications include a new turbocharger, automatic backwashing lube oil filter and piston razor alloying.

6

The sac at the tip of the fuel injection valve has a 50% lower suction volume than the traditional design. As a result, the injection is sharper and dripping after injection is contained. Yanmar states this helps reduce contamination of the combustion chamber by unburnt fuel. Furthermore, the valves are treated with nitride to enhance heat resistance and durability against corrosion. Besides improving strength at high temperatures and increasing hardness, this technique

means that the strength s maintained under repeated load, while eliminating the oil or water line for nozzle cooling.

7

The 6EY18(A) L has an upgraded jacket water temperature control system. In previous versions, the hot water on the jacket side was kept at 85 C at5 all load conditions. However, the introduction of variable controls allows this to be reduced to 60 C under high loads, hence reducing contamination. On the other hand, at low load conditions, the temperature is maintained at 85 C in order to prevent low temperature corrosion. The temperature adjustment valve switches depending on the load to alter the flow of cooling water in the control unit, thereby increasing/decreasing the temperature.

8

The design of the turbocharger has been revamped to increase time between overhauls. Yanmar carried out field tests lasting over 5000h while operating on heavy fuel oil with a viscosity of 380cSt. The results showed bearing contact and wear resistance were still satisfactory after the trial period with no carbon deposits found. The constant automatic back washing of the filter element ensures there is no lube oil filter clogging during operation.

9

The piston is made of thin ductile cast iron that is highly temperature resistant. The top ring groove is given laser alloying treatment in order to improve wear resistance during the combustion of heavy fuel oil. As the thermal expansion of the piston is small, the piston skirt clearance can be reduced, which helps minimize and ensure stable lube oil consumption.

The cylinder line features an anti-polishing ring, while each cylinder head has four hydraulically tightened bolts, integrated intake pipe and intake swirl. The exhaust valve has a cooled valve seat and is constructed from a nimonic material. The anti-polishing ring is inserted in the upper cylinder liner. This controls the blow-by gas and contamination of the piston crown during extended period of operation. Deposits of hard carbon, in particular, are blocked to prevent polishing wear of the liner.

10

The compact design of the engines leaves space for a simplified engine room layout and the placement of the pipe couplings on the front side contributes to the reduction of pipe connection work. The unification of the intercooler to the

turbocharger and of the lubricating oil cooler to the lubricating oil filter into one unit allows for the reduction of parts used by 30% and further improves the ease of maintenance.

TASK 3. For statements or questions 1 – 10 choose the most appropriate answer from A, B, C or D.

1. Yanmar has expanded its range of:
   A. medium speed marine engines
   B. high speed marine engines
   C. low speed marine engines.

2.Contamination can be caused by:
   A. oil leakage
   B. wear to piston ring
   C. wear to moving parts
   D. all of the above

3. The system seal used for the intake and exhaust valves is made to:
   A. protect against excessive oil pressure drop
   B. maintain a constant flow of fuel
   C. prevent impurities from building up

4. Yanmar developed a new combustion system to:
   A. increase the capacity of the engine
   B. enhance its green credentials
   C. enlarge the nozzles size

5. With the new engine emphasis was placed on:
   A. reliability
   B. compactness
   C.low cost.

6. The injection being sharper and dripping after injection being contained helps to:
   A. burn fuel slower
   B. burn fuel faster
   C. reduce contamination

7. Variable temperature control allows to:
   A. increase water temperature
   B. control water temperature
   C. reduce water temperature

8. Why has the design of the turbocharger been revamped?
   A. to increase time between overhauls
   B. to reduce NOx emission
   C. to suit the new engine

9. What is the piston made of?
   A. Steel
   B. iron
   C. cast iron

10. To leave space for a simplified engine room layout the engine was made:
   A. bigger
   B. of compact design
   C. more powerful

TASK 4. Questions for Group discussion

1. What is Yanmar?
2. What does the new engine boast a raft of?
3.What can contamination be caused by?
4. What is the cooling water thermostat in the jacket side designed for?
5. What is the system seal used for?
6. How does Yanmar enhance its green credentials?
7. What is a staggered layout and what does it provide?
8. How has the shape of the air intake port been optimised?
9. What is meant by the Miller cycle?
10. Why was the emphasis placed on reliability?
11. How can contamination be controlled?
12. What helps reduce contamination of the combustion chamber?
13. How is the jacket water temperature controlled?
14. Why were the field tests carried out and what did their results show?
15. Describe the piston of the new engine.
16. What is the main idea of the article?

TASK 5. Write a summary of the first article in 150-200 words. Use the introductory sentences given in the previous units.

U N I T 9

TASK 1. Match the English terminological word combination in A with its Russian equivalent in B. Learn the words by heart.

A	**B**
1. natural gas consumption	a) сжиженая форма
2. an average annual growth rate	b) масштаб требований
3. liquified form	c) отработаный газ
4.sensitivity	d) отложенный на неопределенный срок
5. coastal nations	e) вдали от берега
6. hedge, n	f) препятствие
7. continuity of supply	g) среднегодовой прирост
8. scale of demand	h) сложная борьба
9. dual fuel propulsion system	i) страны, удаленные от месторождения
10. boil off gas	j) непрерывность поставки
11. off-shore	k) страны, традиционно считающиеся нефтемагнатами
12. ship-to-ship transfer	l) пожинать плоды
13. traditional oil majors	m) установка по сжижению газа
14. to reap the bulk	n) плавучий трубопровод
15. a victim of its own success	o) потребление природного газа
16. indefinite postponement	p) человеческий фактор
17. competent and experienced crew	q) перекачка топлива с судна на судно
18. reliquefaction plant	r) запасы природного газа
19. uphill struggle	s) большой пробел
20. a large gap	t) двухтопливная силовая установк
21. venture	u) организация нового производства
22. cutting edge technology	v) чувствительность
23. safety case	w) условия безопасности
24. stranded gas reserve	x) значительная выгода
25. remote community	y) компетентный и опытный экипаж
26. significant benefit	z) скудные запасы газа
27. floating pipeline	A) новейшие технологии
28. humanitarian impact	B) надежный и простой
29. natural gas storage	C) жертва собственного успеха
30. robust and simple	D) морские державы

TASK 2. You are going to read an article about combating the problems of contamination of marine engines. Choose the most suitable heading from the list F - J for each part 1- 10 of the article.

A. LNG as a part of strategic energy supply B. Newcomers to LNG shipping C. Cutting edge technologies D. Marine CNG E. Worldwide demand for natural gas F. New markets G. Fleet milestones H. Robust and simple technology I. A new commercial trading model J. New challenges

World potential for LNG being fulfilled

1.

Lloyd's Register reports on the worldwide demand for natural gas, which is transforming LNG into one of the hottest sectors in global shipping, and on one technical development that will become increasingly important in the future it believes. Over the past decade natural gas consumption has delivered an average annual growth rate of some 2.4% per year, outpacing annual growth in total energy consumption which has trailed at 2.1% per year. And the preferred way of bringing that gas to market has been in its liquefied form by sea. In the past decade, annual LNG trade growth has averaged 7.7%, clearly ahead of the growth of the international pipeline trade, which has managed just 4.7% per year. Not surprisingly, the world LNG carrier fleet is growing rapidly.

2.

Equally, heightened sensitivity to the future security of their energy supplies has made seaborne delivery attractive to coastal nations. Indeed, several such states include LNG as part of their strategic energy supply

portfolio, having secured long-term supply contracts with LNG ship-owners, as a hedge against continuity of supply.

3.

The scale of demand has been driving innovation within the LNG carrier industry, which has achieved a number of world-firsts over the past two years. In 2006 the first ship fitted with a dual fuel diesel electric (DFDE) propulsion system was delivered. Since then, a number of orders for newbuilds featuring DFDE propulsion, which uses boil off gas to fuel the engine, have been placed.

4.

At the same time, LNG regasification vessels, which can discharge cargoes offshore, are becoming more established members of the world fleet and commercial ship-to-ship LNG transfer is being adopted. The opportunities presented by the rapid growth of the sector have attracted newcomers to LNG shipping, which is no longer the preserve of the traditional oil majors and long standing LNG owners .As part of these developments, the practice of shared ownership has also become more popular - another indication that the industry is opening up to change. South Korea continues to reap the bulk of LNG orders being placed. But this is not limited to experienced yards: STX will be delivering its first LNG ships in the next few years.

5.

However, the LNG carrier industry is also facing the prospect of becoming a victim of its own, and natural gas', success. Currently, a number of potential LNG production projects awaiting final investment decisions are facing indefinite postponement. There are a couple of reasons for this: construction costs are rising, while skilled labour is more expensive and scarce. The resulting delays mean that

many LNG carriers delivered on time have to wait for their first cargoes. **A**lso, sourcing competent and experienced crew to run these newer and bigger LNG carrier ship types, many of which feature novel propulsion systems and reliquefaction plants onboard, is an uphill struggle. Many shipowners have started investing in training programmes, but there remains a large gap to fill.

6.

Consequently, the key decision makers in the LNG transport industry need to be wise. Success does not come without experience, nor is it simple to achieve. Successful LNG ventures must begin with the creation and application of a commercial trading model that manages the development of contract specifications, the securing of gas supplies and the charter rates. When a shipbuilding contract is signed, the specification must be right and there must be confidence that the contracting parties can deliver what is needed, on time and to the necessary standards.

7.

Lloyd’s Register has years of experience helping builders, owners and operator clients with these challenges. It was the first to help develop a practical approach to using safety cases for technology qualification; for cutting edge technologies such as reliquefaction plants, dual-fuel diesel-electric propulsion systems (for the larger Qatar Gas and BP vessels) ; and novel LNG delivery systems, such as Accelerate Energy’s re-gasification technology, which has facilitated the offshore import of LNG into the United States and elsewhere.

8.

A completely new class of ship will be required to access these stranded gas reserves. In recent years a number of technological solutions have been put

forward, including those that build on the concept of compressed natural gas (CNG) , a technology already employed on land as a means of transporting natural gas to remote communities by road and rail. Overseas Shipholding Group (OSG) and TransCanada are taking the lead in the field of marine CNG transport. They have created a new company Trans CNG International (TCI) , dedicated to bringing stranded gas to market.

9.

Whereas LNG shipping performs well in tonne/mile terms, CNG offers significant benefits in terms of flexibility. ‘CNG does not need large investment in infrastructure in terms of production or delivery,’ says Campbell. ‘CNG ships are thus mobile assets and interchangeable between projects.’ Compression of the gas is a relatively straightforward process; the main consideration being that gas must be sufficiently dehydrated. CNG ships will therefore be most useful in serving small markets located near to stranded gas fields. ‘A typical CNG system would need a number of ships to make it work,’ the industry is essentially providing a floating pipeline between the gas field and the consumer.’

10.

‘CNG shipping has the potential to have significant industrial and humanitarian impact,’. ‘Remote communities will have greater access to energy supplies which will provide the means to grow local businesses and industry.’ It is unlikely that such communities will have much in the way of natural gas storage, so each CNG ship will play a crucial part in ensuring markets are supplied with a constant and reliable stream of CNG. ‘The technology that industries has been proven on land and is extremely robust and simple. Furthermore, the quality, integrity and combined experience of TransCanada and OSG as world class organizations and the investment we make in our staff means that TCI is well-placed to provide a gold standard service to customers.

TASK 3. For questions or statements 1-10 choose the correct answer A, B, C or D.

1.What is the preferred way of bringing the gas to market?
A. in its solid form
B. in its liquefied form
C. in its gas form

2. Which countries find LNG attractive?
A. naval
B. cenrtal
C. southern

3. DFDE stands for:
A. diesel fuel propulsion system
B. diesel electric propulsion system
C. dual fuel diesel electric propulsion system

4. Which ship can discharge cargoes off shore?
A. LNG re-gasification vessels
B. natural gas carriers
C. liquefied gas carriers

5. Why are LNG projects facing indefinite postponement?
A. they become a victim of its own
B. construction costs are rising
C. B and D
D. skilled labour is more expensive & scarce

6. When a shipping contract is signed the contracting parties should:
A. deliver what is needed
B. deliver the cargo in time
C. deliver the cargo to the necessary standards
D. all of the above

7. " Cutting edge technologies" in passage 7 means:
A. dual-fuel diesel-electric
B. navel LNG delivery
C. re-gasification technology
D. high tech

8. CNG stands for:
A. compressed neutral gas
B. compressed natural gas
C. composite natural gas

9. Which ships will be most useful in serving small markets near the stranded gas fields?
A. CHG
B. LNG
C. DFDE

10. The word “robust” in passage 10 means:
A. simple
B. solid
C. reliable
D. relevant

11. What is the main idea of the article?
A. The advantages of CNG over LNG
B. LNG is becoming one of the important part in global shipping
C. Switch to a dual fuel diesel electric propulsion system
D. Annual Lloyd’s Register report

TASK 4.

In the following sentences the prepositions are missing. Put in the suitable one from the box below.

of, of, of to, to, to, to, to, to, at, up, on, on, on, for, by, in, in, between

1. Lloyd's Register reports_____the worldwide demand _____natural gas.
2. LNG is becoming one ___the hottest sectors___global shipping.
3. The preferred way _____bringing natural gas_____market has been ___its liquefied form ___sea.
4. Heightened sensitivity____the future security of their energy supplies has made seaborne delivery attractive____coastal nations.
5. DFDE uses boil___gas___fuel the engine.
6. ____the same time LNG re-gasification vessels can discharge cargoes ____shore.
7. The LNG industry is opening ____ _____ charge.

8. There must be confidence that the contracting parties can deliver what is needed, ___time and ___the necessary standards.

9. ___recent years some technological solutions are built____the concept____compressed natural gas.

10. The industry is providing a floating pipeline____gas field and the consumer.

TASK 5. Questions for Group discussion

1. Why is LNG being transported into one of the hottest sectors in global shipping?
2. What is the preferred way of bringing the natural gas to the market?
3. What presents the obstacle to the continuity of supply?
4. What is dual fuel diesel electric propulsion system?
5. What is an LNG re-gasification vessel?
6. Why is LNG carrier industry becoming a victim of its own and natural gas's success?
7. What are the reasons for indefinite postponement of LNG production projects?
8. Why does sourcing competent and experienced crew present an uphill struggle?
9. What must successful LNG ventures begin with?
10. What must be kept in mind when a shipbuilding contract is signed?
11. What cutting edge technologies are mentioned in the article?
12. What is the idea of the CNG concept?
13. What will make a typical CNG system work?
14. What is the main idea of the article?

TASK 6.

In the following summary of the article some terms are missing. Fill in the gaps with a suitable word from the list.

According to the Lloyd's Register 1_____the worldwide demand for 2_____ gas has been increasing. 3_____is transforming into one of the hottest

4_____in global shipping. The 5_____way of bringing natural gas to 6_____has been in its 7_____form by sea.

One of the fleet 8_____ is the introduction of 9_____fuel diesel 10___(DFDE) propulsion system. This system uses 14_____gas to fuel the 15____and commercial LNG transfer.

However, a number of potential LNG production 17_____are facing indefinite 18_____ . There are a couple of reasons for this:19_____are rising, while 20_____labour is more 21_____and scarce.

Successful LNG 22_____must begin with the 23_____and application of a commercial 24_____model that manages the development of contract 25_____, the 26_____ of gas supplies and the charter 27_____. The 28_____technologies such as 29_____plants, 30_____diesel-electric propulsion systems and novel 31_____ systems have been introduced recently.

a. liquefied
b. sectors
c. engine
d. reliquefaction
e. creation
f. projects
g. reports
h. off-shore
i. dual-fuel
j. market
k. ventures
l. electric
m. securing
n. postponement
o. proffered

p. delivery

q. rates

r. natural

s. trading

t. skilled

u. boil off

v. demand

w. cutting edge

x. LNG

y. dual

z. re-gasification

A. construction costs

B. specifications

C. fleet

D. expensive

E. ship-to-ship

U N I T 10

TASK 1. Match the English terminological word combination in A with its Russian equivalent in B. Learn the words by heart.

A	**B**
1. podded propulsion	a. двигатель
2. research programme	b. кабелепрокладчик
3. propulsor	c. опорный подшипник
4. initial manufacture	d. во избежание путаницы
5. assembly	e. лопатка
6. azimuthig thrusters	f. в сборе
7. ro/pax ferry	g. съемные кольца
8. cable layer	h. встроенная конфигурация
9. enhanced propulsive efficiency	i. устройства миневрирования
10. to avoid confusion	j. съемный
11. manoeuvering device	k. забортный электрический винторулевой механизм
12. external to the ship's hull	l. завод-изготовитель
13. propeller powering capability	m. возбудитель
14. spiral bevel gearing	n. косозубая передача
15. thrust bearing	o. Азимутальны подруливающие устройства
16. exciter	p. силовая мощность винта
17. sealing systematic	q. поворотный кольцевой подшипник
18. ship-ring assembly	r. выступающий за копрус судна
19. slewing ring bearing	s. система герметизации
20. axisymmetric	t. исследовательская программа
21. suspended	u. осесимметричный
22. aerofoil shaped fin	v. подвешенный
23. fixed pitch	w. винт фиксированного шага
24. built-up configuration	x. повышенная эффективность силовой установки
25. blade	y. грузо-пассажирский паром
26. detachable	z. с обтекаемой формой подводных крыльев

TASK 2. You are going to read an article about combating the problems of contamination of marine engines. Choose the most suitable heading from the list F - J for each part 1- 10 of the article.

A. Derivative from the cocept of azimuthing thrusters
B. Definition of a podded propulsor
C. Internal machinery of the podded propulsor
D.Lloyd's Register reseach programme
E. Rapid expansion of podded propulsors
F. Electrical part of the podded propulsors.

Podded propulsion

1.

Following the introduction of podded propulsors the marine market demanded a rapid increase in size to in excess of 20MW. This increase led Lloyd's Register (LR) to undertake a major research programme into the loadings experienced by these propulsors and the way in which they are reacted by the individual components. Much emphasis was given to the practical problems of achieving the design intent both at the time of building and subsequently through life. The results of this work were used to update the Rules, originally published in July 2003, and in developing a system of survey procedures which embraced the practical problems of initial manufacture and assembly as well as dry-docking maintenance activities.

2.

Podded propulsors have only recently been introduced into the marine industry and derive from the concept of azimuthing thrusters which have been in common use for many years, the first application being in 1878. Indeed, many of the early design principles for podded propulsors were derived from azimuthing thruster practice. However, the demand for ever bigger pods occurred very rapidly during the latter half of the 1990s with units rising from a few megawatts in size to the largest which are now in excess of 20MW.

3.

Their principal applications in the early years were in ice breakers and then cruise ships, but subsequently they have found application with ro/pax ferries,

tankers, cable layers, naval vessels and research ships. Much of this rapid expansion was fuelled by claims of enhanced propulsive efficiency and ship manoeuvrability, the latter having been clearly demonstrated.

4.

Before considering the experience with podded propulsion systems and to avoid confusion it is important to be clear on the definition of a podded propulsor as distinct from other forms of propulsion. A podded propulsor is defined as a propulsion or manoeuvring device that is external to the ship's hull and houses a propeller powering capability. This, therefore, distinguishes them from azimuthing thrusters which have their propulsor powering machinery located within the hull and commonly drive the propeller through a system of shafting and spiral bevel gearing. Consequently, in outline terms the mechanical system of a podded propulsor has normally comprised a short propulsion shaft on which an electric motor is mounted and supported on a system of rolling element radial and thrust bearings.

5.

The motor is likely to be either be an ac machine or, in some cases, a permanent magnet machine. Also mounted on the shaft line may be an exciter and shaft brake together with an appropriate sealing system. The motor power, some control functions and monitoring equipment are supplied by an arrangement of electrical cables and leads connected to the inboard ship system by a slip-ring assembly located in the vicinity of the slewing ring bearing at the interface between the propulsor and the ship's hull.

6.

The podded propulsor's internal machinery is supported within a structure comprising a nominally axisymmetric body suspended below the hull by an aerofoil shaped fin. The propellers fitted to these units are currently of a fixed pitch design and are frequently of a built-up configuration in that the blades are detachable from the boss.Podded propulsors can be either tractor or Pusher units while some designs have a system of tandem propellers mounted to the shaft: one propeller mounted at each end of the propulsor body. Each manufacturer has variants about these basic forms' but Fig 1 shows a typical schematic layout for a tractor unit, this being the most common form at the present time.

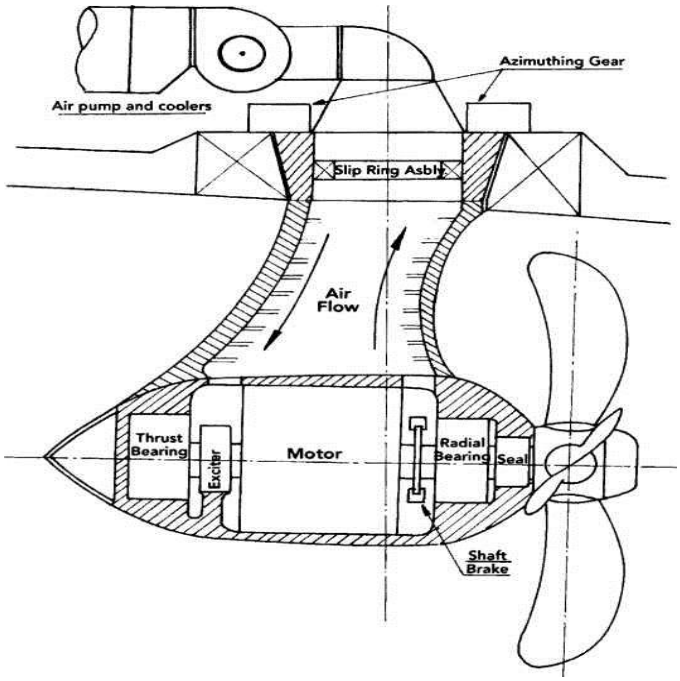


Fig 1

TASK 3. For questions or statements 1-10 choose the correct answer A, B, C or D.

1. Lloyd's Register undertook a research programme into
A. increase in ship's size
B. the loading by propulsors
C. individual components

2. Podded propulsors were derived from
A. bow thrusters
B. stern thrusters
C. azimuthing thruster

3. The principal applications of podded propulsors
A. ice breakers
B. cruise ships
C. ro/pax ferries
D. all ships

4. A podded propulsors is defined as a propulsion or manoeuvering device that is
A. external to the ship's hull
B. within the hull
C. the same as azimuthing thruster

5. The mechanical system of a podded propulsor is
A. a system of rolling element radical and thrust bearings
B. a combination of short propulsion shaft with electric motor
C. a spiral bevel gearing

6. The motor is usually
A. an AC machine
B. a permanent magnet machine
C. both of the above

7. What may be mounted on the shaft?
A. exciter
B. shaft break
C. exciter and shaft break with a sealing system

8. The motor power is connected to the inboard ship system by
A. a ship-ring assembly
B. the slewing ring bearing
C. the propusor

9. The propellers of the units are of
A. a controllable
B. an aerofoil shape
C. a fixed pitch design

10. Podded propulsors can be
A. tractor unit
B. pusher unit
C. both

TASK 4. In the text gaps below write in any suitable verb form.

Podded propulsors_____only recently _____(1. to be) introduced into the marine industry. Many of the early design principles for podded propulsors _____ (2. to derive) from azimuthing thruster practice.

However , the demand for ever bigger pods_____(3. to occur) very rapidly during the latter half of the 1990's with units _____(4. to rise) from a few megawatts in size to the largest which _____(5. to be) now in excess of 20 MW.

LR's Rules relating to podded propulsion units_____(6. to define) in Part 5, Chapter 23i of the Rules and _____(7. to publish) in July 2003. These Rules

with the benefit of research and development activities and the experience_____ (8. to gain) in recent years _____(9. to enhance) subsequently and a revision _____(10. to become) effective in July 2006.

TASK 1 a. Match the English terminological word combination in A with its Russian equivalent in B. Learn the words by heart.

A	**B**
1. mechanical failure	a. уязвимая конструкция корпуса
2. predominant	b. отрицательня сторона
3. distort	c. метод пограничного элемента
4. impact	d. преобладающий
5. subsequent time	e. подвергать
6. to keep in mind	f. принимать во внимание
7. twin screw	g. подъемная поверхность
8. boundary layer	h. винтообразный
9. incident wake field	I. Погнуть, повредить
10. strut	j. иметь в виду
11. poor hull design	k. направление течения
12. citing	l. спутная струя гребного винта
13. penalty	m. эфект взаимодействия
14. incur	n. тяга
15. model scale	o. столкнуться с
16. from streamline	p. механическая поломка
17. lifting line	q. размещение
18. lifting surface	r. количественные допуски
19. boundary element method	s. более позднее время
20. helicoidal propeller	t. двойной винт
21. slip stream	u. случайная кильватерная волна
22. take into account	v. несущая линия
23. tractor unit	w. пограничный участок, пласт воды
24. pusher unit	x. толкач
25. interraction effects	y. опора
26. quantitative approximations	z. модельная шкала

Task 2a

You are going to read an article about combating the problems of contamination of marine engines. Choose the most suitable heading from the list F - J for each part 1- 10 of the article.

A. Steady State Running
B. Consideration of the flow streamlines
C. The interaction between the propeller and pod body
D. Significant blade damage
E. Failure statistics
F. Manoeuvring Loads
G. Comparing podded and conventional propulsion systems.

Steady State Running of Podded propulsion

1.

An analysis of LR's survey data base relating to podded propulsors suggests that over a seven year period beginning in 1998 the incidence of failure per 10 years for electrical and mechanical failures was 1.7 and 4.1 respectively. Within these failure incidence rates little overall difference is seen between the principal manufacturers over the last few years although some differences in the detail of the failures experienced and their timing naturally occur.
The relative incidences of failures within the broad electrical and mechanical classifications are shown in Figs 2 and 3 respectively. In the case of the mechanical failure distribution, Fig 3, although propeller failures appear to be predominant these are mostly blade damages due to contact with underwater objects that have either distorted or broken the blades, normally in their tip or outer regions.

2

Clearly, however, in some cases where a propeller has impacted with some object sufficient to result in significant blade damage, this may have led either then or at some subsequent time to the failure of other podded propulsor components such as the rolling element bearings or shaft line.
To place these statistics in perspective the equivalent failure incidences for conventional diesel-electric propulsion systems were analysed and this showed failure rates of 0.4 and 3.0 per 10 years respectively for the electrical and mechanical categories of failure.

3.

However, when comparing these rates with those for podded propulsors it should be kept in mind that the sample size for the conventional propulsion systems is considerably greater and, therefore, may lead to a statistical distortion of the comparison.

Furthermore, it should also be noted that podded propulsors have been a developing technology throughout this period of review and, as such, experience of other novel developments suggests that the failure incidence can be higher during these early development periods.

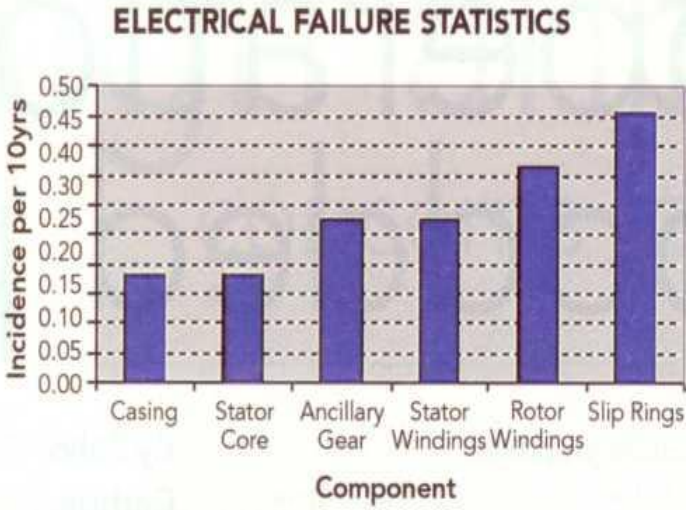


Fig 2.

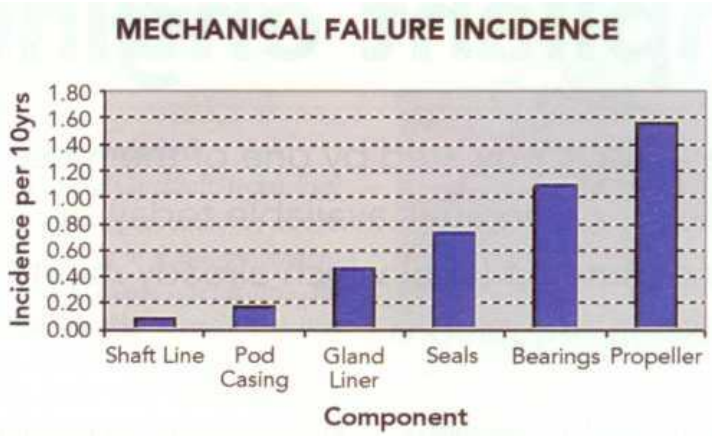


Fig 3.

4.

Assuming that it is of the tractor type, the podded propulsor in its twin screw propulsion configuration will operate in relatively clear water disturbed principally by the boundary layer development over the hull. This is in contrast to a conventional twin screw propulsion arrangement in which the incident wake field is disturbed by the shafting and its supporting brackets or, alternatively, for a pusher pod configuration which has to operate in the boundary layer and velocity field generated by the pod body and strut. Consequently, the wake field presented to the propeller of a tractor podded propulsor, in the absence of any separation induced by the effects of poor hull design, should be rather better for the ahead free running mode of operation than would be the case for a conventional twin screw ship.

5.

Notwithstanding the benefits of an improved wake field, the citing of the propulsors on the hull and their attitude relative to the ship's buttocks and waterlines needs to be undertaken with care. If this is not done then propulsion efficiency penalties may be incurred since propulsion efficiency has been found at model scale to be sensitive to relatively small changes in propulsor location on the hull.

Moreover, the optimum pod azimuth angle for ahead free running has to be derived from a consideration of the flow streamlines over the after body of the ship, particularly if a range of operating conditions is anticipated for the ship. Similarly with the tilt angle, however this may be approximated for initial design purposes as being half the angle of the ship's buttocks relative to the base line at the propulsor station.

The computation of the propeller thrust and torque at or close to the zero azimuthing position can be satisfactorily accomplished using classical hydrodynamic lifting line, lifting surface or boundary element methods. Similarly, estimates can be made of the other forces and moments about the propeller's Cartesian reference frame. However, full scale trial measurements conducted some years ago on cruise ships' propellers with conventional A-bracket shafting arrangements, suggested that a greater error bound should be allowed for when extending the calculation of these loadings in the other Cartesian directions.

6.

When undertaking manoeuvres, including turns and stopping, both at sea and when in harbour, and also when operating in poor weather model tests have indicated that the hydrodynamic loadings can significantly increase. Moreover, the predictions of these loadings do not at present lend themselves to assessment by the normal classical methods of analysis but must be estimated from model or full scale data. Similarly, Reynolds Averaged Navier Stokes (RANS) codes are currently not at the required state of development to confidently make quantitative predictions of the loads, nevertheless they can give useful qualitative insights into the flow behaviour and the various interactions involved.

The loadings developed by the pod are complex since the axisymmetric body and a part of the fin, or strut, need to be analysed within the helicoidal propeller slipstream for a tractor unit. The remainder of the strut lies in a predominantly translational flow field and for analysis purposes has to be treated as such.

7.

Furthermore, the interaction between the propeller and pod body needs also to be taken into account. A different flow regime clearly exists in the analysis of pusher units since the propeller then operates in the wake of the strut and pod body and the propeller-pod body interaction effects are still significant. Notwithstanding these complexities it is possible to make useful quantitative approximations using earlier empirical data, provided a proper distinction is made between those parts of the propulsor which are subjected to translational flow and those which will operate within the propeller slipstream.

TASK 3 a. For questions or statements 1-10 choose the correct answer A, B, C or D.

1.The podded propulsor may be:
A. of tractor type
B. of pusher type
C. of both

2. The podded propulsor of the tractor type in its twin screw propulsion will operate
A. in relatively clear water
B. in the boundary layer
C. in the ahead free running made

4. The impached propeller may lead to the failure of:
A. the rolling element bearing s
B. shaft line
C. both of the above

5. The term “ streamline” in passage 5 mean:
A. of optimum speed
B. of optimum shape
C. of optimum resistance of the hull to the water flow

6. Model tests have indicated that the hydrodynamic loadings can significantly increase
A. when maneuvering
B. both at sea and when in harbor
C. when operating in poor weather

7. The world strut in passage 6 mean:
A. fin
B. helicoidal propeller
C. tractor unit

8. Quantitative approximations between the propeller and pod body is:
A. complex
B. significant
C. practically unuseful

TASK 4.

In the technical text in English passive verb constructions are frequently used . If in the active tenses the subject performs the action by itself , while in the passive constructions the action is performed over the object .

e.g. The analysis of the data suggests the steady inrease. (Active tense) .

The steady increase was suggested in the Lloyd's published data. (Passive tense)

Transform the following sentences from active to passive and vice versa.

1. Fig. 2 and 3 show electrical and mechanical failures respectively.

_____

2. Underwater objects have either distorted or broken the blades.

_____

3. You should keep in mind that the sample size for the conventional propulsion system is considerably greater.

_____

4. The incident make field is distributed by the shafting and its supporting brackets.

_____

5. One needs to undertake with care the citing of the propulsors on the hull.

_____-

6. The manufacturer anticipates a range of operating conditions for the ship.

_____

7. The complex loading were developed by the pod.

_____

8. The axisymmetric body is analysed within the helicoidal propeller slipstream.
_____

9. One needs to take into account the interraction between the propeller and pod body.
_____

10. Systematic model test data have been assessed by the experts.
_____

TASK 5. Questions for Group discussion

1. What does an analysis of LR's survey data base suggest as for podded propulsor?
2. Compare and describe electrical and mechanical failures using Fig.2 and Fig.3.
3. What may lead to the failure of other podded propulsor components?
4. What type of failure incidents were analysed?
5. What is the difference between conventional diesel-electrical propulsion system and podded propulsors?
6. What are the two types of the podded propulsors?
7. What is the difference between tractor type and pusher type of the podded propulsor?
8. What is the incident make field?
9. What may the propulsion efficiency at model scale be sensitive to?
10. What must the optimum pod azimuth angle for ahead free running be derived from?
11. What have model tests indicated?
12. What is helicoidal propeller slipstream ?
13. What can you say about the interaction between the propeller and the pod body?
14. In which case is it possible to make useful quantitative approximations?

TASK 6.

In the following summary of the article some terms are missing. Fill in the gaps with a suitable word from the list.

With podded _____(1) the failures may be of 2 types:_____(2) and _____(3) . In some cases where a _____(4) has impacted with some _____(5) sufficient to result in significant blade _____(6) , this may lead to the failure of other podded propulsor _____(7) such as the rolling element _____(8) or _____(9) line. Assuming that it is of the _____(10) type, the _____(11) propulsor in its twin _____(12) propulsion configuration will operate in relatively clear ____(13) distributed principally by the boundary ____(14) development over the hull. Notwithstanding the ____(15) of an improved wake _____(16) , the citing of the propulsors on the _____(17) and their attitude relative to the ship's buttocks and water -lines to be undertaken with _____(18) .

The optimum pod _____(19) angle for ahead free running has tj be derived from a consideration of the flow _____(20) over the after body of the ship.

When undertaking _____(21) , including turns and shopping, both at sea and when in _____(22) model tests have indicate that the hydrodynamic _____(23) can significantly increase.

The loading developed by the _____(24) are complex since the _____(25) body and a part of the fin or strut, need to be analysed within the _____(26) propeller sliptream for a _____(27) unit.

1) axisymmetric
2) azimuth
3) benefit
4) components
5) damage
6) electrical
7) foeld
8) harbour
9) hull
10) loadings
11) manoeuvres
12) layer
13) mechanical
14) object
15) pod
16) propeller
17) shaft
18) propulsors
19) streamlines
20) screw
21) tractor
22) podded
23) water

Answers

Unit 1

Task 1

1e, 2t, 3z, 4a, 5b, 6m, 7c, 8d, 9b, 10u, 11n, 12e, 13 c, 14o, 15v, 16d, 17y, 18e, 19p, 20j, 21r, 22f, 23w, 24q, 25i, 26x, 27s, 28g, 29h, 30 f

Task 2

1D 2A 3B 4F 5E 6H 7G 8I 9C

Task 3

1C 2B 3C 4D 5C 6B 7C 8B 9B 10B 11C 12A 13C 14B

Task 4

1. (-) , (-) , the, the, (-) , (-) , (-)
2. (-) , the, a, the, (-)
3. the, (-) , (-)
4. the, (-) , the
5. the, the, the
6. the, (-) , (-) , the
7. the, a, the
8. The, a, the
9. (-) , (-) , the
10. a, the, the, the, a, the, the, the

Task 5. Questions for Group discussion

Unit 1

1. What is the main idea of the article?
2. What monitoring methods are mentioned in the article?
3. What is the idea of Temperature Monitoring Method?
4. What is the idea of Lubricant Condition Monitoring (L.C.M.) ?
5. Where has LCM been put to use?
6. What is the idea of Vibration Monitoring?
7. What is the strength of selection sensors?
8. How many sensors are needed to monitor a large number of devices and why?

9. What does the system do?

10. Where has the first selective vibration monitoring module was installed?

11. What does this module analyze?

12. What is the idea of Load Monitoring?

Unit 2

Task 1.

1k, 2p, 3 f, 4r, 5q, 6c, 7n, 8g, 9s, 10m, 11o, 12D, 13G, 14h, 15b, 16t, 17v, 18x, 19E, 20F, 21B, 22i, 23c, 24j 25u, 26 l, 27w, 28d, 29A, 30z, 31a, 32e, 33H, 34y.

Task 2.

2.1 b

2.2 1-f , 2-e, 3-a, 4-q, 5-m, 6-q, 7-b, 8-R, 9-h, 10-p, 11-i, 12-s, 13-c, 14-n, 15-j, 16-v, 17-d, 18-k, 19-o, 20-e, 21-t, 22-u.

2.3. 1-C, 2-H, 3-E, 4-G, 5-A, 6-J, 7-D, 8-B, 9-I, 10-F.

Task 3.

1-C, 2-B, 3-C, 4-C, 5-C, 6-A, 7- A&B, 8-C, 9-B, 10-C;

Task 4.

1-e, 2-m, 3-p, 4-f, 5-s, 6-q, 7-w, 8-g, 9-t, 10-y, 11-a, 12-o, 13-h, 14-r, 15-b, 16-j, 17-n, 18-i, 19-l, 20-c, 21-n, 22-x, 23-k, 24-v, 25-d.

Task 5. Questions for Group discussion

1. What is the main idea of the Article?

2. What did the recent IMO study reveal?

3. Explain the idea of CBM approach.

4. What is not understood about CMB methods.

5. What type of comprehensive tests did the OBO undergo?

6. Describe Table I. What does it show?

7. What was the difference in Vibration levels in the port to starboard direction VS the forward aft direction?

8. What is the reason for such difference?

9. What was the reason for the foundation stool wastage?

10. What important info was found during lub oil analysis?

11. What is the idea of the Thermal imaging?

12. Why a vessel can be a good candidate for detention by Port State Control?

13. What did the engine performance analysi8s indicate?

14. How can modern technique help where human ear cannot?

15. What did the final analysis demonstrate?

Unit 3

Task 1

1g, 2l, 3p, 4a, 5s, 6w, 7h, 8m, 9u, 10b, 11t, 12i, 13r, 14e, 15n, 16v, 17j, 18z, 19o, 20y, 21c, 22x, 23f, 24k, 25q, 26d.

Task 2

1C, 2A, 3F, 4G, 5D, 6B, 7E, 8H.

Task 3.

1C, 2D, 3B, 4B, 5B, 6A, 7A, 8B, 9B, 10D

Task 4.1

fall-grow, decrease-increase, remain stable-differ, drop-go up, higher-lower, much less-much more, is bigger- is lower, is practically the same – is dramatically different.

Task 4.3

1-73, 2- rise, 3 – decreasing, 4 – fall, 5 – remain stable, 6 – substantial growth, 7 – rise, 8-much more, 9 – stable, 10 – increase, 11 – slight drop.

Task 5.1

c, h, a, g, b, j, d, f, e, i, l, k

Task 6. Questions for Group discussion

1. What is meant by in-service performance?

2. Which defects top a list of potential fault categories?

3. What can a new ship division database do?

4. What three groups was the search classified into?

5. Compare figures 1a and 1b.

6. Which turbocharges are more reliable for high speed or medium and stow speed engines.

7. Describe Fig. 2

8. Of actual turbochargers defects which are the most catastrophic?

9. What does the LR proof-test ensure?

10. What is the main idea of the article?

Unit 4

Task 1.

1u, 2g, 3t. 4 h, 5v, 6a, 7w, 8i, 9s, 10b, 11j, 12q, 13r, 14k,15f, 16 o, 17n, 18e, 19c, 20e, 21d, 22m, 23p.

Task 2 .2.

1C, 2A, 3D, 4B

Task 2 .3.

1g, 2p, 3j, 4n, 5a, 6f, 7i, 8e, 9h, 10q, 11b, 12k, 13 r, 14c, 15l, 16s, 17t.

Task 2 .4.

1B, 2A, 3D, 4C, 5F

Task 3.

1B, 2C, 3B, 4A, 5C, 6D, 7A, 8B, 9A, 10A

Task 4.

1- features, 2-type, 3-cylinder, 4- advantageous, 5- mechanical, 6- placed, 7-system, 8-technical, 9-leaving, 10- decided, 11- disable, 12- disable, 13- failure, 14- However, 15-will, 16-insufficient, 17- astern, 18- fails, 19-investigation, 20-experienced, 21-correctly, 22- reasons.

Task 5.

1d, 2s, 3-i , 4-j, 5g, 7p, 8r, 9k, 10e, 11b, 12f, 13m, 14q, 15l, 16h, 17c, 18i, 19n.

Task 6. Questions for Group discussion

1. What is the main idea of the article?
2. Why do fires caused by hot fuel or lube oil spray present a real problem?
3. Why do engine manufacturers introduce double-cased pipes?
4. What is a hot-box?
5. What may a leakage result in?
6. Will the new generation of common rail engines provide a permanent solution?
7. How can pipe joints in areas proximate to hot surfaces be minimised?
8. What happened on board the Queen of Surrey?
9. What did the third engineer observe while carrying out a routine inspection of the ER?
10. Why was the area evacuated and sealed?
11. What was the fire the result of?
12. What was the damage to the Queen of Surrey?

13. Why did the TSB issue two Ship Safety Bulletins?

14. What did the two guidance documents recommended?

15. Have you even encounted with fires on board? What were the reasons for them?

Unit 5

Task 1.

1g, 2f, 3l, 4q, 5u, 6a, 7m, 8i, 9p, 10b, 11v, 12r, 13j, 14w, 15k, 16t, 17s, 18c, 19e, 20o, 21d, 22n.

Task 2.

1E, 2A, 3F, 4D, 5G, 6B, 7C.

Task 3.

1A, 2C, 3B, 4B, 5A, 6B, 7C, 8B, 9A, 10A.

Task 4.

1. don't reduce; will start. 2. had; would be able. 3.does not; will have to. 4. would be. 5. should be. 6. had been; would have seen. 7. had; would 8. could not, would present; 9. had not been; would have been. 10. being; would. 11. had done; wouldn't have experienced.

Task 5.

1. stabilizers tests, 2. was injured, 3. drills, 4. benefits, 5. stabilizers, 6. fatigue, 7. enhancing, 8. roll moment, 9. to anticipate, 10. lifting hydrodynamic surfaces, 11. fins or tabs, 12. expensive, 13. claim. 14. manufacturers, 15. reduce, 16. major qualification, 17. higher Sea States, 18. maximum equivalent wave.

Task 6. Questions for Group discussion

1.What announcement did the captain of QE2 make?

2. Why did the crew make the stabilizers work in reverse?

3. What were the impressions of one of the passengers?

4. What are the benefits of stabilizers?

5. How can stabilizers influence the bottom line?

6. How can the effects of the sea be anticipated on board ship?

7. What is one of the ways to stabilize a vessel?

8. What is the function of fins or tabs?

9. What are the six degrees of freedom?

10. Why is 90% reduce roll is meaningless on its own?

11. What is meant by “ higher Sea States”?

12. What is EWS?

13. What is the ship's heeling moment?

14. Why is the article called “Digital electronics provide a stable platform”?

15. What is the message of the article?

Unit 6

Task 1.

1 y, 2p, 3x, 4o, 5a, 6i, 7b, 8q, 9c, 10j, 11e, 12d, 13m, 14s, 15r, 16k, 17n, 18t, 19w, 20l, 21f, 22g, 23v, 24 u.

Task 2.1

1B, 2F, 3 C, 4G, 5A, 6E, 7D.

Task 3.

1B, 2C, 3A, 4B, 5D, 6A, 7A, 8C, 9B, 10A.

Task 4.3

1n, 2f, 3i, 4k, 5b, 6a, 7q, 8e, 9h, 10g, 11c, 12d, 13j, 14p, 15m, 16e.

Task 6. Questions for Group discussion

1. Why do routine testing of ignition and combustion qualities of bunker fuels still hold a mystery?
2. What is a key indicator of cost effectiveness of the bunker fuel?
3. What is the idea of a new test method?
4. What are medium speed engines more sensitive to?
5. What may cause increased deposits on exhaust valves and piston rings?
6. What may be the reason of excessive wear of cylinder liner?
7. What may cause poor ignition/ combustion qualities?
8. Why blending is a complicated procedure?
9. Describe the necessity of CCA index?
10. What is the idea of IP test method?
11. What does the test method measure?
12. How can you trace the rate of the fuel's release?
13. What happens at the points of the fuel's ignition?
14. What indicates the fuel's combustion properties?
15. What are the burning questions of bunkering?

Unit 7

Task 1.

1c, 2h, 3l , 4o, 5s, 6w, 7p, 8v, 9d, 10m, 11e, 12n, 13i, 14a, 15r, 16t, 17w, 18j, 19q, 20b, 21g, 22k, 23f.

Task 2.

1F, 2C, 3D, 4G, 5H, 6B, 7E, 8A.

Task 3

1B, 2A, 3B, 4C, 5B, 6A, 7B, 8C, 9A, 10B.

Task 4.

1b, 2h, 3d, 4j, 5i, 6a, 7c, 8f, 9e, 10g.

Task 5. Questions for Group discussion

1. Why are the Erika and Prestige incidents still ti the fore in European minds?
2. What is important in tankers design now and why?
3. What is Intertanks?
4. What does the project POP&C aim at?
5. What are the “first principles” approach to all tankers?
6. What are the safety concerns of single-hull tankers versus double-hull tankers?
7. What is the majority that oil traffic consists of single- or double-hull tankers?
8. Why types of oil tankers pose the highest pollution risk?
9.What is one specific objective of the project?
10. What are the other key aims of the project?
11. Why are risk-based methodologies in rational design so important?
12. What is the main idea of the article? Do you think it is possible to enchance taker safety to the level of other ship types safety?

Unit 8

Task 1.

1g, 2p, 3h, 4q, 5a, 6s, 7i, 8r, 9b, 10j, 11t, 12w, 13k, 14c, 15u, 16l, 17v, 18x, 19d, 20m, 21n, 22z, 23e, 24o, 5y, 26f.

Task 2.

1C, 2J, 3D, 4B, 5H, 6F, 7A, 8G, 9E, 10 I.

Task 3.

1B, 2D, 3B, 4A, 5A, 6C, 7B, 8A, 9C, 10B.

Task 4. Questions for Group discussion

1. What is Yanmar?

2. What does the new engine boast a raft of?

3.What can contamination be caused by?

4. What is the cooling water thermostat in the jacket side designed for?

5. What is the system seal used for?

6. How does Yanmar enhance its green credentials?

7. What is a staggered layout and what does it provide?

8. How has the shape of the air intake port been optimised?

9. What is meant by the Miller cycle?

10. Why was the emphasis placed on reliability?

11. How can contamination be controlled?

12. What helps reduce contamination of the combustion chamber?

13. How is the jacket water temperature controlled?

14. Why were the field tests carried out and what did their results show?

15. Describe the piston of the new engine.

16. What is the main idea of the article?

Unit 9

Task 1.

1o, 2g, 3a, 4v, 5D, 6f, 7j, 8b, 9t, 10c, 11e, 12q, 13k, 14l, 15C, 16d, 17y, 18m, 19h, 20s, 21u, 22A, 23w, 24z, 25e, 26x, 27n, 28p, 29r, 30B.

Task 2.

A2, B4, C7, D8, E1, F9, G3, H10, I6, J5.

Task 3.

1B, 2A, 3C, 4A, 5C, 6D, 7D, 7D, 8B, 9A, 10C, 11B.

Task 4.

1 – on, for ; 2- of, in, 3 – of, to, by 4 – to, to; 5 -off, to; 6 – at, off,; 7 -up, to; 8 -on, to; 9 -in, on, of ;10 – between

Task 6.

1g, 2r, 3x, 4b, 5o, 6j, 7a, 8v, 9y, 10 l, 11u, 12c, 13z, 14h, 15C, 16E, 17f, 18n, 19A, 20 t, 21D, 22k, 23e, 24s, 25B, 26m, 27q, 28w, 29d, 30i, 31p.

Unit 10

Task 1.

1k, 2t, 3a, 4l, 5f, 6o, 7y, 8b, 9x, 10d, 11i, 12r, 13p, 14n, 16m, 17s, 18g, 19q, 20w,21v, 22z, 23w, 24h, 25e, 26j.

Task 2.

1D, 2A, 3E, 4B,5F, 6C.

Task 3.

1B, 2C, 3D, 4A, 5B, 6A, 7A, 8A, 9C, 10C.

Task 4.

1.have been, 2. were derived, 3. occurred, 4. rising, 5. are, 6. are defined, 7. were published, 8. gained, 9. were enhanced, 10. became

Text №2

Task 1a.

1p, 2d, 3i, 4o, 5s, 6j, 7t, 8w, 9u, 10y, 11a, 12q, 13b, 14e, 15z, 16k, 17v, 18g, 19c, 20h, 21l, 22f, 23n, 24x, 25m, 26R.

Task2a.

1E, 2D, 3J, 4A, 5B, 6F, 7C.

Task 3a.

1C, 2A, 3C, 4C, 5C, 6B, 7A, 8B.

Task 4.

1. Electrical and mechanical failures are shown in Fig. 2 and 3 respectively.

2. The blades have been either distorted or broken by the underwater object.

3. It should be kept in mind that the sample size for the conventional propulsion system is considerably greater.

4. The shafting and its supporting brackets distribute the incident make field.

5.The citing of the propulsors on the hull should undertaken with care.

6. The manufacturer anticipates a range of operating conditions for the ship.

7. The pod developed the complex loading.

8. The helicoidal propeller slipstream analyses the axisymmetric body.

9. The interraction between the propeller and pod body should be taken into account.

10. The experts have assess the systematic model test data.

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