

**Министерство науки и высшего образования Российской Федерации
Федеральное государственное бюджетное образовательное
учреждение высшего образования
Санкт-Петербургский горный университет**

Кафедра иностранных языков

ИНОСТРАННЫЙ ЯЗЫК

**ЭКСПЛУАТАЦИЯ ТРАНСПОРТНО-
ТЕХНОЛОГИЧЕСКИХ
МАШИН И КОМПЛЕКСОВ
(Автомобили и автомобильное хозяйство)**

FOREIGN LANGUAGE

**TRANSPORT AND TECHNOLOGICAL
MACHINES AND COMPLEXES OPERATION
(AUTOMOBILES AND AUTOMOTIVE
INDUSTRY)**

*Методические указания к практическим занятиям
для студентов бакалавриата направления 23.03.03*

**САНКТ-ПЕТЕРБУРГ
2023**

УДК 811.111:551.1 (073)

ИНОСТРАННЫЙ ЯЗЫК. Эксплуатация транспортно-технологических машин и комплексов (автомобили и автомобильное хозяйство): Методические указания к практическим занятиям / Санкт-Петербургский горный университет. Сост.: *Н.Э. Горохова, Е.В. Виноградова*. СПб, 2023. 32 с.

Методические указания предназначены для студентов направления подготовки 23.03.03 «Эксплуатация транспортно-технологических машин и комплексов (Автомобили и автомобильное хозяйство)». Предлагаемый материал направлен на совершенствование навыков профессионально-ориентированного чтения студентов на английском языке. Методические указания к практическим занятиям включают тексты на языке оригинала, специально разработанные упражнения и задания, способствующие развитию речевой, языковой, социокультурной и информационной компетенций студентов, необходимых для общения в сфере профессиональных интересов.

Научный редактор доц. *Ю.М. Сицук*

Рецензент к.фил.н., доцент *В.А. Маевская* (Санкт-Петербургский государственный экономический университет)

UNIT 1.
AUTOMOTIVE ENGINEERING INDUSTRY



Reading & Speaking

1. In pairs, answer the following questions.

1. Have you or your parents got an automobile?
2. Would you say that a modern vehicle has undergone several changes?
3. Who plays an essential role in the design and construction of any car?
4. Can you name key components that make up a vehicle?
5. In your view, what is the job of a systems engineer like?



2. Look at the title of the article below. Try to predict what the text is going to be about.

3. Now read the article. In which paragraph does the author talk about...?

- ___ the body of the vehicle and its aerodynamic features
- ___ the responsibilities of automobile engineering industry
- ___ great changes in the automotive engineering
- ___ the structural integrity of the vehicle

BEHIND EVERY VEHICLE ...

- 1** The automobile has **undergone**¹ significant changes largely due to **advancements**² in the automotive engineering industry. Behind every car, truck, bus or bike on the roads and in the store there is an automobile engineer who played a key role in their design and construction.
- 2** Because of the massive amount of vehicles on the roads today, the automobile engineering industry has a lot of responsibility both to ensure the safety of those vehicles and to make them more efficient.
- 3** Automobile engineering employs different engineering disciplines to

assist in the design and manufacture of any kind of vehicles such as cars and buses, bikes and trucks. So, for example, one automobile engineer is in charge of working on the body of the vehicle to make sure that it is as aerodynamic as possible. It leads to performance maximization and makes sure that a vehicle uses as little fuel as possible.

- 4 While another is working on the structural **integrity**³ of the vehicle to make sure that in case of any sort of crash, the people inside the vehicle are as protected as possible, and so on. If you imagine all the components that make up a vehicle, then it is clear that there is someone who is responsible for making sure that a vehicle functions properly. Some of these jobs and tasks **overlap**⁴. To make sure that all these subsystems of the car work together there is generally a systems engineer or a development engineer who has an **overseer**⁵ role.

(From 'Учебник для технических вузов' by Т. Карпова, Т. Асламова)

NOTES

- ¹ **to undergo** ['ʌndə'gəʊ] – претерпевать; подвергаться
² **advancement(s)** [əd'vɑ:nsmənt] – продвижение; прогресс
³ **integrity** [in'tegriti] – целостность
⁴ **to overlap** ['əʊvə'læp] – частично совпадать
⁵ **overseer** ['əʊvəsiə] – контролер

4. Read the text again and answer the questions.

1. What is the reason of all changes in the automobile?
2. Who is behind every vehicle on the road?
3. What engineer is in charge of working on the body of the vehicle?
4. Why is the structural integrity of the vehicle essential?

Vocabulary

5. Read the text again and match the words with their definitions.

- | | |
|-----------------|---|
| 1 an automobile | A material such as coal, gas, or oil that is burned to produce heat or power |
| 2 a vehicle | B the condition of being protected from or unlikely to cause danger, risk, or injury |

- 3 fuel **C** someone who ensures that all aspects of a system are considered and integrated into a whole
- 4 automotive engineering industry **D** a thing used for transporting people or goods, especially on land, such as a car, lorry, or cart.
- 5 safety **E** a usually four-wheeled automotive vehicle designed for passenger transportation
- 6 a systems engineer **F** a field concerned with vehicle design, development, production, and safety testing

6. Find the English equivalents for the following word combinations.

Автомобильная промышленность несет большую ответственность; любые виды транспортных средств; инженер-разработчик; во многом благодаря развитию автомобильной промышленности; кузовом автомобиля; повышение эффективности; инженерные дисциплины; гарантировать; структурная целостность транспортного средства; подсистемы автомобиля; отвечать за правильную работу.

Pronunciation

1. Put the words according to the pronunciation of *-ure*.

feature, measure, secure, future, manufacture, sure, venture, fracture, azure, disclosure, structure, allure, failure, signature, assure, insurance

[ə]	[uə]

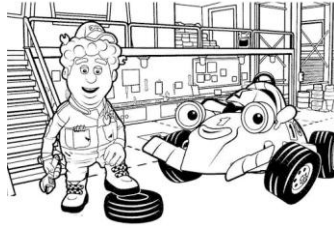
2. In pairs, practice saying the sentences below.

1. The museum of art **features** two Mercedes-Benz in the **allure** of the automobile special exhibit.
2. To **assure** safety and quality of the vehicles produced by countries, automobile **manufactures** will have to follow the new regulations.
3. Automobiles of the **future** will most likely be **manufactured** largely with carbon fibers made from recycled plastics.
4. Poor quality, **impure** fuels can cause damage to engines.
5. I wonder how much car **insurance** is going to cost.

Listening

Listen to the dialogue between Mrs. Farrell who is going on holiday by car and the mechanic engineer, then answer the questions.

1. What does Mrs. Farrell want?
2. Why does she need a complete tune-up?
3. What is written in the service book?
4. What does the car need to be done?
5. When will Mrs. Farrell's car be ready?
6. What did John replace in the car?



Grammar Review

Put the verbs in brackets into the correct tense.

1. The invention of automobiles (*to be*) the most important advance.
2. Over the last century, there (*to be*) great progress in many different areas of automotive industry.
3. It is not possible (*to chronicle*) all of the developments.
4. By that time a car (*to fit*) with a rear view mirror.
5. The suspension system (*to involve*) shock absorbers, and linkages.
6. Automobiles (*to build*) with integral chassis frame and body.
7. There (*to be*) many different types of businesses that produce or make use of automated equipment.
8. This region (*to have*) lots of car producers.
9. The scientific data (*to use*) by the exploration sector while the scientists were carrying out the research.
10. The automation process (*to begin*) a long time ago.

Writing

Read and translate the text into English.

Масштабы производства (*production scale*) российских предприятий, выпускающих автокомпоненты (*auto components*), не соответствуют растущим потребностям российских и совместных автозаводов (*joint car factories*), а ограниченные финансовые возможности не позволяют провести необходимую модернизацию. Назовем

две стратегии развития российских компаний по производству автомобильных компонентов, которые могут быть успешными. Одна состоит в формировании партнерства с международными компаниями, заинтересованными в совместной работе на рынке на основе реконструкции существующих мощностей (*existing facilities*). Этот вариант подходит достаточно эффективным российским предприятиям (*enterprises*), нуждающимся в технологическом обновлении.

Вторая стратегия заключается в акценте на самостоятельном развитии с использованием опыта и поддержки родственных компаний (*related companies*). Помощь производителей базовых материалов, инжиниринговых компаний (*engineering companies*) или проектировщиков оборудования даст возможность выпускать эффективные и качественные компоненты для автомобильных компаний.

(From: www.perspektivy.info/rus/ekob/rossijskaja_avtomobilnaja_promyshlennost.htm)



Speaking

1. In groups, study the information below and write at least five questions about it. Here are some examples to get you started.

1. Who puts together various components of a machine?
2. _____

When building machinery, assemblers put together components of a machine according to a set of prints. Aluminum extrusion is used for guarding and knowledge of different types of connections, such as brackets, end fasteners, and anchor fasteners, is important. A variety of fastening techniques, such as using bolts, screws, dowel pins, or welding, is employed to mount parts to the frame of the machine. Mechanical actuators and linear or rotary motion components also have their own associated assembly techniques. Assemblers are skilled in machine wiring. When machinery has been built, millwrights or maintenance personnel generally perform other tasks associated with working on automation equipment.

(From 'Industrial automation hands-on' by Frank Lamb, p. 258)

2. Get ready to speak about building machinery.

UNIT 2. VEHICLE TYPES



Reading & Speaking

1. With a partner, explain the difference between each pair.

1. Coach – lorry; aircraft – ambulance; motor car – van
2. Barrow – bulldozer; dray – estate car; fire engine – minibus

2. Read and choose the correct headings for the text from the list of headings A-E. There is one extra title that you will not need to use.

CATEGORIES AND CLASSIFICATIONS

In 2011 ‘Consolidated Resolution on the Construction of Vehicles’¹ was adopted. One of the units of the resolution is devoted² to the classification of *power-driven* vehicles and *trailers*. Vehicle categories are defined³ according to the following classification: motor vehicles with at least four wheels designed and constructed for the *carriage* of passengers (category ‘M’); motor vehicles with at least four wheels designed and constructed for the carriage of goods (category ‘N’); trailers (category ‘O’); special purpose vehicles; agricultural and forestry *tractors* (category ‘T’); non-road mobile machinery; *off-road vehicles* (category ‘G’).

A	
B	
C	
D	
BE	
CE	
DE	

There are numerous types of passenger vehicles: light passenger vehicles (motor cars or cars), people *carriers* or minibuses, buses (omnibuses), *coaches*, etc. They are classified according to the types of chassis frame, engine, fuel, as well as the purpose for which they are used.

(From ‘Учебник для технических вузов’ by Т. Карпова, Т. Асламова, p. 181)

NOTES

¹ Consolidated Resolution on the Construction of Vehicles – сводная резолюция о конструкции транспортных средств

- ² **to devote** [di'vəʊt] – уделять (внимание); посвятить
³ **to define** [di'fain] – определять

List of headings

- | | |
|-----------------------------|------------------------------------|
| A Vehicle categories | B Consolidated Resolution |
| C Passenger vehicles | D Vehicles basic components |

Vocabulary

3. Look at the words in italics. Try to work out their meaning from the context. Then match them with the definitions 1-6.

1. _____ an unpowered vehicle towed by another
2. _____ a vehicle for use over rough terrain
3. _____ conveying of goods or passengers
4. _____ propelled by means of power
5. _____ a thing that carries, holds or conveys something
6. _____ a powerful motor vehicle with large rear wheels

Pronunciation

1. Make sure you know how to pronounce the words and understand them. Match the words to the Russian equivalents.

- | | |
|-----------------------------|------------------------------|
| collision [kə'liʒ(ə)n] | levitation ['levi'teɪʃ(ə)n] |
| crash ['kræʃ] | elevation ['eli'veɪʃ(ə)n] |
| disturbance [dɪs'tɜ:b(ə)ns] | disruption [dɪs'rʌpʃ(ə)n] |
| suspension [sə'spenʃ(ə)n] | interruption [ɪntə'rʌpʃ(ə)n] |

Столкновение (авария, ДТП), неисправность (беспокойство), временная остановка, подъём, высота (поднятие), разлад (крушение), приостановка, аварийная ситуация (катастрофа).

2. Match each explanation 1-3 with all the words above.

- 1) an accident involving vehicles _____
- 2) the state of floating in the air _____

3) the act of preventing something from happening _____

Listening

1. Listen to three students giving a presentation on monorails, and complete the sentences (write no more than two words or a number).

What is monorail?

Tracks are usually **1** _____.

Most monorails are used for transporting **2** _____.

The oldest monorail still in use opened in the year **3** _____.

Shanghai monorail trains normally reach a speed of **4** _____ kilometers an hour.

2. Then answer the following questions as you listen.

Safety:

- very rarely derailed
- no risk of **5** _____



Environment:

- produce relatively little **6** _____
- stations can be in **7** _____ and other busy places

Economics:

- only installations take place on site
- low operating costs
- very **8** _____ compared with other forms of transport

Disadvantage:

- they use a **9** _____ .

3. Listen again to what Hannah says about monorails. Read trying to imitate the speaker. Pay attention to the words in bold.

Well, **monorails** are a bit like railways, but there's just one rail, which is wider than each of the rails of a railway. Actually, 'mono' means 'one', which is how it got the name. Some monorails are at ground level or in

subway tunnels, though in most cases the track is **elevated**. The **vehicles** are always wider than the track. In some types of monorail, the vehicles run on the track, like a normal train, and in other types they're **suspended** from it. Some monorails are **used to transport freight**, but the **majority** carries **passengers**. A lot of them take visitors around **amusement parks** – there are plenty of these all round the world – and some form part of an **urban transport system**.

Grammar Review

Put the verbs in brackets into the correct tense.

A modern motor car ... (to have) a considerable number of electrical and electronic systems. It ... (to fit) with certain lights, sidelights and headlights to be used in darkness and in poor visibility. Indicators, or flashers, ... (to use) to inform others of the direction in which a motor car is turning. Brake lights ... (to require) during the application of the brakes. There ... (to be) a lot of other items that ... (to operate) electrically, such as windscreen wipers and washers, horns, heaters, audio systems, conditioning systems, central locking, etc.

Writing

Choose one of the topics and write a passage.

Vehicles for the future. In your view, what are they going to be?

Road freight vehicles for carrying goods.

Caravan transport: what is it for?



Speaking

1. In small groups, answer these questions.

1. What vehicle categories can you name?
2. How are passenger vehicles classified?
3. Where may off-road vehicles be usually used?
4. What do the abbreviations LGV and HGV mean?
5. What category do special purpose vehicles belong to?
6. Which vehicles would you prefer to drive?

UNIT 3. BASIC COMPONENTS OF AUTOMOBILE



Reading & Speaking

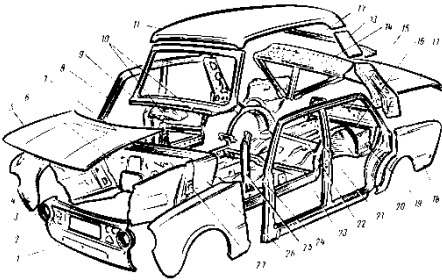
1. In groups, discuss the following question.

1. What requirements does the structure of a vehicle have to fulfill? Can you think of the key purpose of the vehicle structure?
2. What are the main structural components of an automobile?

2. Work in pairs. A read 1, B read 2. Then, tell your partner about 1 and 2 below. What does the aim of the vehicle dictate?

1

A structure of a vehicle has to fulfill a number of requirements. The prime purpose of the vehicle structure is to provide a location for all the necessary vehicle systems and components. The purpose of the vehicle will also dictate the size and weight of the vehicle systems and components and therefore the structure will be designed accordingly.



2

The main structural components of a motor car are engine, chassis and body. Chassis embraces transmission (clutch, gearbox, propeller shaft, main shaft, differentials, final drive shafts or half-shafts), drive lines (frame, front and rear axles, suspension and wheels) and steering systems (wheel steering and brake steering).

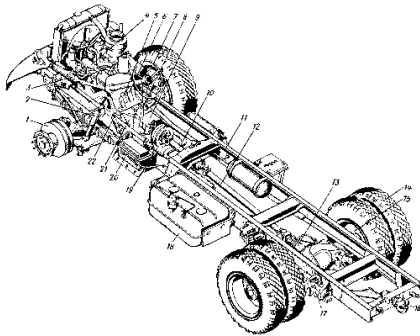
3. Read and translate the text. Get ready to speak about the usual source of power for a motor car.

AUTOMOBILE STRUCTURE

The usual source of power for a motor car is an internal combustion engine. A petrol (gasoline) engine has traditionally been the most

popular for light passenger vehicles. The engine in heavy vehicles is usually a large capacity diesel, the main requirements for which are an ability to produce high levels of pulling power, reliability, and low fuel consumption.

The power of the engine is transmitted through the transmission and drive lines to the drive wheels. For the **rear-wheel drive (RWD)** ¹ layout, the rear wheels act as the driving wheels. Spacing out the main components in this layout makes each unit accessible but a **drawback** ² is



the intrusion of the transmission components into the passenger compartment. The compactness of the front-wheel drive (FWD) layout has made it very popular on modern cars, especially on small cars. The arrangement of four-wheel drive (4WD) is safer because it distributes the drive to all four wheels and during **acceleration** ³ it reduces the risks of wheel spin. The suspension system involving springs, shock absorbers and linkages serves a dual purpose: contributing to the vehicle's handling for good active safety and driving pleasure, and keeping vehicles **occupants** ⁴ comfortable and reasonably well isolated from road bumps, vibrations.

(From 'Учебник для технических вузов' by Т. Карпова, Т. Асламова, p.200)

NOTES

- ¹ **rear-wheel drive** ['riə'wi:l] – заднеприводный
- ² **drawback** ['dro:bæk] – недостаток; изъян
- ³ **acceleration** [ək'selə'reiʃ(ə)n] – разгон; ускорение
- ⁴ **occupant(s)** ['okjupənt] – водитель и пассажиры

Vocabulary

4. Find the English equivalents for the following word combinations.

Бензиновый двигатель; низкий расход топлива; дизельный двигатель большой мощности; при ускорении; ведущие колеса; для заднепри-

водной компоновки; салон автомобиля; система полного привода; система подвески; дорожные неровности; снижать риск пробуксовки колес; недостатком является.

5. Put the words in the correct order to make complete sentences.

1. basically / consists / automobile / of three parts _____
2. the wheels / the engine / rotate / makes _____
3. brakes / includes / a mineral / the chassis / and steering system ____
4. is / by / what / the clutch pedal / controlled _____
5. to slow / the car / brakes / are used / or stop _____

6. Read the text to check your answers of the exercise above.

Basically, the automobile consists of three parts: the power plant, or the engine, the chassis and the body. To these may be added the accessories: the heater, lights, radio, speedometer and other devices. The power plant or engine is the source of power that makes the wheels rotate and the car move. It includes electric, fuel, cooling and lubricating systems. Most automobile engines have six or eight cylinders. The chassis consists of a power train, frame with axles, wheels and springs. The chassis includes brakes and steering system. The power train carries the power from the engine to the car wheels and contains the clutch, gearbox, propeller or cardan shaft, differential and the final drive.

The clutch is a friction device connecting (or disconnecting) the engine crankshaft to the gears in the gearbox. It is used for freeing the gearbox from the engine and is controlled by the clutch pedal.

Brakes are important mechanisms of the car. They are used to slow or stop the car. Most braking systems in use today are hydraulic. They are operated by the brake pedal. When the driver pushes down on the brake pedal, they are applied and the car stops.

(From: Антонова Ю.В. «Иностранный язык», p. 18)

Pronunciation

1. Look at the words with letter ‘a’ used in the text above. With a partner, read them correctly and say what their meanings are.

unitary, location, convertible, saloon, storage, space,
luggage, passenger, rear, compartment

2. Which words do you know contain the same letters and sounds?

☞ Listening

1. Listen to the talk about the attitudes of a particular car driver, and answer the questions.

1. Does Mr. Smith have plenty of money?
2. What does he think about traffic problem? Is it being solved?
3. Does Mr. Smith think that trains are too crowded?
4. Does he need to earn a living?

2. Listen to the talk again and fill in the gaps.

1. If Mr. Smith _____ plenty of money, he'd buy the car of his dream.
2. It's (high/about) time the problem _____ solved.
3. Mr. Smith would rather the money _____ out of general taxation.
4. He sometimes travels by train, but he wishes they _____ so crowded and _____ at some stations.
5. He often says, "If only I _____ to earn a living."

Grammar

1. Look at the verbs you've put in exercise 2, and complete the rule.

In statements about an unreal situation, the verb after them should be in a _____ tense.

I wish _____
It's (about/high) time _____
I'd / I would rather _____
If (only) _____



2. Make up sentences with the structures above. Can you think of situations where you may say something beginning with 'I wish ...'?

Writing

Study the common car maintenance tasks and create your ‘Driver’s Manual’ to give some information on testing the condition of car.

Auto maintenance describes the act of inspecting or testing the condition of car subsystems (e.g.: engine, brakes, radiator, etc.) and replacing parts and fluids. Thanks to regular maintenance it is possible to ensure the safety, reliability and comfort of a car, while during preventive maintenance, a number of parts are replaced to avoid major damage or for safety reasons.

Common car maintenance tasks include:

- car wash
- check or replace the engine oil and oil filters
- inspect or replace windshield wipers
- inspect tyre pressure and wear
- check wheel alignment
- check, clean or replace battery terminals
- inspect or replace brake pads and fluids
- inspect or replace air filter
- lubricate locks and hinges
- check all lights
- inspect or replace spark plugs
- tighten chassis bolts



Speaking

1. In small groups, complete the following sentences and get ready to speak about some vehicle components.

The mechanism used for stopping the car is...

The mechanism used for changing the speed is...

The mechanism used for connecting (or disconnecting) the engine from the gearbox is...

The unit carrying the power from the engine to the car wheels is...

The instrument measuring the speed of the car is...

UNIT 4. ENGINE ANATOMY



Reading & Speaking

1. In your view, what does a car engine include?

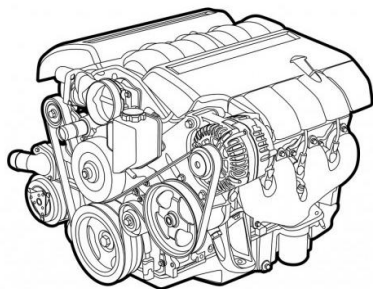
2. Look up the words or phrases in a Russian-English dictionary. Beside the word, write the English equivalent.

Двигатель внутреннего сгорания; поршень; коленчатый вал; клапан; рабочий цикл; горение; двухтактный двигатель; горючее; такт впрыска (топлива); четырехтактный двигатель.

3. Read the text, find the English equivalents for the words in exercise 2 to check yourself. Then, translate the text into Russian.

THE ENGINE

The engine is the source of power that makes the car move. It is usually called an **internal combustion engine** because **gasoline** is burned within its **cylinders** or **combustion chambers**. Most automobile engines have six or eight cylinders. The **operating cycle** of the **four-stroke engine** that takes place in the engine **cylinder** can be divided into four **strokes**. The upper limit of the **piston** movement is called the **top dead centre**. The lower limit of piston movement is called the **bottom dead centre**. A stroke is the piston movement from the top dead centre to the bottom dead centre or from bottom



dead centre to the top dead centre. In other words, the piston completes a stroke each time it changes the direction of its motion.

Where the **entire cycle** of events in the cylinder requires four strokes (two **crankshaft revolutions**), the engine is called a **four-stroke cycle engine**. The four strokes are: **intake**, **compression**, power and **ex-**

haust. Two-cycle engines have also been made, and in such engines the entire cycle of events is completed in two strokes or one revolution of the crankshaft. On the **intake stroke** the intake valve is opened. The mixture of air and **vaporized** gasoline is delivered into the cylinder through the **inlet valve**. On the compression stroke the inlet valve is closed so that the mixture can be **compressed**. On the power stroke both valves (inlet and exhaust) are closed in order to raise pressure during the mixture combustion. On the exhaust stroke the exhaust valve is opened to exhaust the **residual** gas.

📄 Vocabulary

4. Match the words/phrases in the first column to their Russian equivalents.

- | | |
|----------------------------------|------------------------------------|
| 1) internal combustion engine | a) поршень |
| 2) combustion chamber ['tʃeɪmbə] | b) верхняя мертвая точка |
| 3) stroke | c) четырехтактный двигатель |
| 4) piston ['pɪstn] | d) коленчатый вал |
| 5) top dead centre | e) отверстие клапана |
| 6) bottom dead centre | f) двигатель внутр. сгорания |
| 7) four-stroke cycle engine | g) нижняя мертвая точка |
| 8) two-cycle engine | h) топливная система |
| 9) crankshaft ['kræŋkʃɑ:ft] | i) такт впрыска (<i>топлива</i>) |
| 10) intake stroke | j) двухтактный двигатель |
| 11) valve opening | k) камера сгорания |
| 12) fuel system | l) ход, такт (<i>поршня</i>) |
| 13) power stroke | m) выхлоп |
| 14) exhaust | n) рабочий ход поршня |

5. Underline all international words used in the text. What do they mean?

6. Find the answers, and put them in the right order (1-5).

<i>Questions</i>	<i>Responses</i>
1. What is the top dead centre?	A When the entire cycle of events

	is completed in two strokes.
2. What is the bottom dead centre?	B When the entire cycle of events is completed in two strokes.
3. When the engine is called a four-stroke cycle engine?	C The upper limit of the piston movement.
4. When the engine is called a two-cycle engine?	D Intake, compression, power and exhaust strokes.
5. What kind of strokes can the events in the engine cylinder be divided into?	E When the entire cycle of events in the cylinder is completed in four strokes.

7. Complete the sentences.

- An internal combustion engine is called so because gasoline is burned....
a) inside the combustion chamber b) outside the combustion chamber
- The upper limit of the piston movement is called...
- The lower limit of the piston movement is called....
a) the bottom dead centre b) the top dead centre
- The four-cycle engine requires....
a) two strokes of piston movement b) four strokes of piston movement
- The mixture of air and gasoline is delivered into the cylinder....
a) on the power stroke b) on the exhaust stroke
c) on the intake stroke d) on the compression stroke

Pronunciation

1. Underline the words that have the following letters 'ough'. Match them to the sounds [u:], [ʌf], [əu], [o:], [ɒf], [ə] and read the phrases.

*through, enough, although, ought, though, tough,
throughout, brought, thorough, cough*

2. Which words do you know contain the same letters and sounds?

Listening

1. Listen and say how CAD helps designers.

2. Listen to the first part of the text again and fill in the gaps.

Drawing (1) _____ and manual drawing are not always precise and rapid: (2) _____ design is usually slow, especially in its revision and (3) _____. For this reason manufacturing firms have replaced manual drawing with computer-aided design (CAD) to carry out functions related to design and production.

This computer technology assists the designer in the (4) _____, modification and analysis of a physical object. Nowadays computer (5) _____ can easily provide a three-dimensional drawing, which allows engineering designers to see how mechanical components may fit together without making models thus saving a lot of time. CAD is much (6) _____ and more accurate than manual drawing; designs can be quickly modified, reproduced and transmitted (7) _____. Computer simulated analysis of the model helps experts find problems and (8) _____ without building prototypes, in this way saving a lot of money and time. When the design is ready, the CAD system can generate the detailed (9) _____ needed to start product manufacturing.

Grammar

1. Put the verbs in brackets into the correct tense.

The piece of metal that ... (to sit) on top of the cylinders ... (to call) the cylinder head. The cylinder head ... (to contain) small indentations cast into the metal ... (to make) room for combustion at the top of each chamber. There ... (to be) a head gasket ... (to seal) the joint between the cylinder head and the engine block. Mounted to the cylinder head are spark plugs, fuel injectors, and intake valves, which we ... (to define) later.

2. Read the passage. What part of speech are the words in bold?

Pistons **look like** soup cans **turned** upside down. They move up and down in the cylinder. When combustion takes place in the **chamber**, the piston moves down, **turning** the crankshaft. The piston **is attached** to the crankshaft with a **connecting** rod or con rod. The piston **attaches** to the con rod with a piston pin and the con rod connects to the crankshaft.

✍ Writing

Scan through the extract below and write a summary of it using the flow chart.

The first internal combustion engines were made using gunpowder as the fuel to move the pistons. The cylinder was stuffed with gunpowder and the gunpowder was ignited underneath the piston. When the gunpowder exploded, it formed a vacuum that would suck the piston down into the cylinder. It was dubbed the atmospheric engine because of its reliance on changes in air pressure. Unfortunately, it wasn't very efficient, and it was abandoned for steam engines in the seventeenth century.

It wasn't until 100 years later in 1860 that an internal combustion engine was invented that both worked and was reliable. The engine was patented by Jean Joseph Etienne Lenoir from Belgium. The engine worked by injecting natural gas into the cylinder. The gas was ignited by a permanent flame close to the cylinder. This process is similar to the atmospheric engine, but the flame is permanent, so it was slightly more efficient.

In 1864, Eugen Langen and Nicolaus August Otto started a company making engines like the one Lenoir invented. Eventually, Otto left the company to work on his own engine design that he had been experimenting with since 1861. This design was the beginning of what is now the four-stroke engine and this basic design is still used in cars today.

(From: <https://axleandchassis.com/auto-engines-and-performance/>)

Start with an opening sentence, giving the key idea of the passage.
List the stages of the first internal combustion engines.
Mention the year of an internal combustion engine invention.
Say who the engine was patented by.
Point out the way the basic design worked.
Make a conclusion of what you have written.

UNIT 5. AUTOMATION AND ROBOTICS



Reading & Speaking

1. Explain the difference between mechanization and automation.
2. Read the text below to check if you were right.

A GREAT IMPACT OF AUTOMATION

Mechanisation refers to the process of providing human beings with machinery capable of assisting them with the muscular *requirements* of work. A further development of mechanisation is represented by automation, which implies the use of control systems and information technologies to reduce the need for both physical and mental work to produce



goods. *Automation* has had a great impact on industries over the last century, changing the world economy from industrial jobs to service jobs. In manufacturing, where the process began, automation has meant that the desired results can be **obtained**¹ through a series of instructions made automatically by the system, which define the actions to be done. Automated manufacturing grants higher **consistency**² and quality,

while reducing lead times and handling. It also improves work flow and increases the *morale* of workers when a good **implementation**³ of the automation is made. However, the purpose of automation cannot be seen only in terms of a *reduction* of cost and time; there are several more aspects to be taken into consideration. For example, while it is true that automation offers a higher **precision**⁴ in the manufacturing process, it is also true that it requires *skilled* workers who can make repairs and manage the machinery.

(From: 'Flash on English' by Sabrina Sopranzi)

NOTES

¹ to obtain [əb'tein] – получать

- ² **consistency** [kən'sɪst(ə)nɪsɪ] – последовательность; постоянство
- ³ **implementation** [ˈɪmplɪmən'teɪʃ(ə)n] – исполнение
- ⁴ **precision** [prɪ'sɪʒ(ə)n] – точность

 **Vocabulary**

3. Look at the words in *italics*. Try to work out their meaning from the context. Then match them with the definitions 1-6.

1. _____ the use or introduction of automatic equipment in a manufacturing or other process or facility.
2. _____ making something smaller or less in amount or degree
3. _____ having the knowledge, ability
4. _____ the amount of confidence that a group of people have
5. _____ a thing that is compulsory; it is needed or wanted

4. In pairs, sum up the key advantages and disadvantages of automation. The ideas have been given.

+	–
1. Speeds up ...	1. Makes disastrous effects on ...
2. Replaces human ...	2. Increases unemployment ...
3. Saves time and ...	3. Security threats ...
4. Offers higher reliability and ...	4. High initial costs as ...
5. High productivity ...	5. Technical limitations ...

Pronunciation

1. Look at the international words. With a partner, read them correctly and say what their meanings are.

assistance automation cooperation association machinery
process function mechanisation automation service

2. Underline the stressed syllable in the words below.

1 a|cco|dance
2 con|si|de|ra|tion

3 com|pul|so|ry
4 con|trol

5 re|pre|sen|ta|tive
6 au|to|ma|ti|ca|lly

3. What is schwa? Do you know how to pronounce [ə]? Which words above contain the same sound?

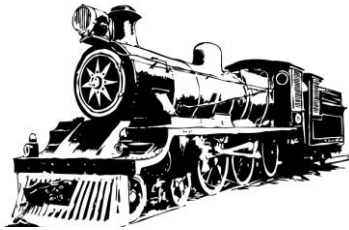
☞ Listening

1. In your view, what do these letters ‘TGV’ stand for? Have you ever travelled by such a high-speed train?

2. Listen to the extract from the lecture and describe the way the train was modified.

3. Listen again and fill in the gaps.

The record speed exceeded the standard operating speed by a huge margin. It was 80% faster at its peak. So you would imagine that the TGV used for the record run was heavily modified. In fact, that wasn't really the case. The train was modified to a certain extent but, with a few (1) _____, it was essentially just an ordinary TGV. As you can see from this slide, one of the biggest differences was that the modified train was significantly shorter, in order to make it lighter. There was a 50% reduction in (2) _____, down to 100 metres, compared with a 200- metre standard length. The coaches being pulled were perfectly standard – the only differences were that some of the seats had been (3) _____ to make way for all of the monitoring (4) _____ that was carried on board. And some changes were made to the bodywork, to make it slightly more aerodynamic, which meant the drag coefficient was reduced by 1 5%. The (5) _____ on the modified train were (6) _____ bigger than the standard size. The (7) _____ was increased by 19%, in order to reduce the speed of revolution, to limit (8) _____ and centrifugal force. And the power of the electric motors was (9) _____ higher than the standard units – boosted by 68%. But none of the changes was fundamental. So my point is, (10)



_____ high-speed trains can be made to go faster by a considerable amount.

Grammar

1. Put the verbs in brackets into the correct tense.

Robotics ... (to be) a special branch of automation in which the automated machines ... (to have) certain human features and ... (to use) to replace human workers in factory operations. Robots are computer-controlled mechanical devices that are programmed ... (to move), manipulate objects and interact with the environment. Nowadays more and more sophisticated robots ... (to build) to serve various practical purposes, for example in houses, businesses, in the army and for medical appliances for disabled people.

2. Look at the sentences, and say what verb forms we use in each clause.

1

I <i>will</i> use robots	if you don't know.
Unless you <i>go</i> with me tomorrow,	I <i>won't</i> go.
<i>Go</i> and <i>see</i> the standard length	if they are necessary.

2

I <i>would</i> use robots	I <i>wouldn't</i> go.
If I <i>were</i> you,	If they <i>were</i> necessary.
We <i>could</i> modify now	if you <i>knew</i> how to do it.



Speaking

1. With a partner, answer the questions in turn. Give information about yourself and express personal opinion.

1. What can robots do nowadays?
2. What would you like to automate in your life? Discuss the impact of automation on your own life and list its main pluses and drawbacks.

AUTOMOBILES IN FICTION

1. In your view, what is a spoiler? Has a friend of yours ever spoiled a book for you by describing the ending of? Does knowing the ending change the experience of your reading?



2. Read some extracts from “The Hitchhiker” (1977), the story with an ironic twist written by Roald Dahl. After each part, answer the questions with a partner.

Roald Dahl (1916-1990) was a British novelist, short story writer, poet, screenwriter, and fighter pilot. His books have sold more than 250 million copies worldwide. Dahl’s works including his famous “Charlie and the Chocolate Factory” are known for their unexpected endings.

I had a new car. It was an exciting toy, a big BMW 3.3 Li, which means 3.3 litre, long **wheelbase**, fuel injection. It had a top speed of 129 mph and terrific acceleration. The body was pale blue. The seats inside were darker blue and they were made of leather, **genuine soft leather** of the finest quality. The windows were electrically operated and so was the sunroof. The **radio aerial** popped up when I **switched on the radio**, and disappeared when I **switched it off**. The powerful engine **growled** (рычать) and **grunted** (ворчать) **impatiently at slow speeds**, but at sixty miles an hour the growling stopped and the motor began **to purr** with pleasure.

I was driving up to London **by myself**. It was a lovely June day. They were **haymaking** in the fields and there were **buttercups** (лютики) along both sides of the road. I was **whispering** along at 70 mph, **leaning back** comfortably **in my seat**, with no more than a couple of fingers resting lightly on the **wheel** to keep her **steady**. Ahead of me I saw a man **thumbing a lift** (останавливать попутные машины, голосовать). I touched the **brake** and ...

1. *Where was the author travelling to? What kind of car did he have?*

2. *Who was standing on the side of the road thumbing a lift?*

What do you think might have happened next?

... and brought the car to a stop beside him. I always stopped for hitchhikers. I knew just how it used to feel to be standing on the side of a country road watching the cars go by. I hated the drivers for pretending they didn't see me, especially the ones in big empty cars with three empty seats. The large expensive cars seldom stopped. It was always the smaller ones that **offered you a lift**, or the **rusty** (ржавые) ones or the ones that **were already crammed full of** children and the driver would say, "I think we can **squeeze in** one more".

The hitchhiker **poked** (пихать) **his head** through the open window and said, "Going to London, guy'nor?"

"Yes," I said. "Jump in".

He got in and I drove on.

1. *Why did the author always stop for hitchhikers?*

2. *What did the hitchhiker do?*

What do you think might have happened next?

... "What can **she** do flat out (на предельной скорости)?" he asked.

"One hundred and twenty-nine miles an hour," I told him.

"I'll bet she won't do it".

"I'll bet she will."

"All car-makers are **liars** (обманщики)," he said. "You can buy any car you like and it'll never do what the makers say it will **in the ads**".

"This one will".

"Open 'er up then and prove it," he said. "Go on guy'nor, open 'er up and let's see what she'll do".

There is a traffic circle at Chalfont St Peter and immediately beyond there's a long straight section of divided highway. We came out of the circle onto the highway and I **pressed my foot** hard down on the accelerator. The big car **leaped forward** (бросок вперед) as though she'd been **stung** (to sting, жалить). In ten seconds or so, we were doing ninety.

“Lovely!” he cried. “Beautiful! Keep goin’!”

I had the accelerator jammed down against the floor and I held it there.

“One hundred!” he shouted. “A hundred and five! A hundred and ten! A hundred and fifteen! Go on! Don’t slack off!”

I was in the outside lane and we flashed past several cars as though they were standing still – a green Mini, a big cream-coloured Citroen, a white Land Rover, a huge truck with a container on the back, an orange-coloured Volkswagen Minibus...

“A hundred and twenty!” my passenger shouted, jumping up and down. “Go on! Go on! Get ’er up to one-two-nine!”

At that moment, I heard the scream of a police siren. It was so loud it seemed to be right inside the car, then a cop on a motorcycle loomed up alongside us in the inside lane and went past us and raised a hand for us to stop.

1. What question did the hitchhiker ask?

2. What kind of cars did they flash past?

What do you think might have happened next?

3. How would you have felt in the author’s position? Do you think you would have made the same decision to highball?

4. R. Dahl’s short stories are all famous for his unexpected endings, and this one is not an exception. Read one of the last the sentences. In your view, why was the author so excited? Can you predict the ending?

... I nearly swerved the car into a milk truck, I was so excited.

“I think you’d better pull off this main road as soon as possible,” he said.

“Then we’d better build a little bonfire and burn these books.”

“You’re a fantastic fellow!” I exclaimed.

TEXTS FOR READING AND TRANSLATION

1

A mechanical engineer is a specialist in all fields related to machines, kinematics, thermodynamics and tools. One of the oldest disciplines of engineering, mechanical engineering is one of the largest producers of engineers around the world today, closely followed by civil and aeronautical engineers. Working as a mechanical engineer is known to be an enriching and rewarding experience and the job involves working to plan, build and examine motor-powered vehicles, manufacturing plants, airplanes, industrial equipment, cybernetics and much more.

2

The large amount of carbon dioxide released in the atmosphere by human activities. We are largely responsible for the increase of dioxide emissions. Carbon dioxide is the result of the combustion of hydrocarbons and coal. At present all vehicles rely on the combustion of hydrocarbons fuels to derive the energy necessary for their propulsion. Actually the combustion is never ideal. Besides carbon dioxide and water, the combustion products contain a certain amount of nitrogen oxides, carbon monoxides and unburned hydrocarbons, all of which are toxic.

3

A grader is a construction machine with a long blade used to create a flat surface, to finish the “rough grading” performed by scrapers and bulldozers. Graders are commonly used in the construction and maintenance of roads or in the preparation of the base for a wide flat surface for the asphalt to be placed on or to finish grade prior to the construction of large buildings. A more recent innovation is the outfitting of graders with GPS technology. Excavators tracked or wheeled are heavy construction machines the parts of which are boom, sticks, bucket and cab on a rotating platform (known as the “house”). Excavators are also called diggers, mechanical shovels, or 360-degree excavators.

4

One of the great advantages in the use of the alternating current is the ease with which the voltage may be changed by means of a relatively

simple device known as a transformer. Although there are many different types of transformers and a great variety of applications, the principles of action are the same in each case. The transformer is a device for changing the electric current from one voltage to another. The key parts are: an iron core, two coils of insulated windings. It is used for increasing or decreasing voltage. So the function of a transformer is to change voltage and current of an alternating system to meet requirements of the equipment used. It is known to be simple in construction that it involves no moving parts. Transformers change voltage through electromagnetic induction.

5

There are different types of transformers. By the purpose they are classified into step-up and step-down transformers. In a step-up transformer the output voltage is larger than the input voltage, because the number of turns on the secondary winding is greater than that of the primary. In a step-down transformer the output voltage is less than input voltage as the number of turns on the secondary is fewer than that on the primary. By the construction transformers are classified into core-type and shelltype. In the core-type transformers the primary and the secondary coils surround the core. Electrically they are equivalent, the difference is in the mechanical construction. By the methods of cooling transformers are classified into air-cooled, oil-cooled and water-cooled.

6

The service life of the automobile greatly depends on the maintenance of the lubrication system. The basic purpose of lubrication is to reduce the friction between moving surfaces. If parts rubbing on each other are not separated by a film or lubricant, the surface will rub and rapidly wear away. The frictional force depends upon the nature of the surface and also on the kind of material. The rougher the surface and the softer the material, the greater the friction. The more friction there is, the greater the loss of power, as it requires power to overcome friction. The principal parts of the engine needing lubrication are the main crankshaft bearings, connecting-rod bearings pins, camshaft bearings, piston and cylinder walls. For engine lubrication, mineral or petroleum oil is used almost exclusively.

БИБЛИОГРАФИЧЕСКИЙ СПИСОК

1. Антонова Ю.В. Иностранный язык: сборник технических текстов с заданиями для специальности «Автомеханик» / Ю.В. Антонова. Новокузнецк: ГОУ СПО Проф. колледж, 2011. 33 с.
2. Карпова Т.А. Английский язык для технических вузов: Учебник / Т.А. Карпова, Т.В. Асламова, Е.С. Закирова, П.А. Красаваин; под общ. ред. А.В. Николаенко. М.: КНОРУС, 2014. 352 с.
3. Лионел К. Англо-русский толковый словарь / Керман Лионел. М.: Теа, 1996. 309 с.
4. Мюллер В.К. Англо-русский и русско-английский словарь: 150000 слов и выражений / В.К. Мюллер. М.: Эксмо, 2009. 1200 с.
5. Black M., Sharp W. Objectives IELTS. Intermediate / Michael Black, Wendy Sharp. Cambridge University Press, 2011. 144 p.
6. Dahl R. The Hitchhiker // The Collected Short Stories of Roald Dahl / Roald Dahl, Penguin Books Limited, 2003. 768 p.
7. Lamb F. Industrial Automation Hands-on / Frank Lamb. McGraw-Hill Education; 2013. 369 p.
8. Sopranzi S. Flash on English for mechanics, electronics, and technical assistance / Sabrina Sopranzi. ESP Series, 2012. 50 с.
9. A comprehension guide to car engine and performance [Электронный ресурс]: <https://axleandchassis.com/auto-engines-and-performance/> (дата обращения 20.01.2021).
10. Automobile written by Ken W. Purdy [Электронный ресурс]: <https://www.britannica.com/technology/automobile> (дата обращения 18.01.2021).

CONTENTS

Unit 1. Automotive engineering industry	3
Unit 2. Vehicle types	8
Unit 3. Basic components of automobile.....	12
Unit 4. Engine anatomy	17
Unit 5. Atomation and robotics	22
Automobiles in fiction.....	26
Texts for reading and translation	29
Библиографический список.....	31

**ИНОСТРАННЫЙ ЯЗЫК
ЭКСПЛУАТАЦИЯ ТРАНСПОРТНО-ТЕХНОЛОГИЧЕСКИХ
МАШИН И КОМПЛЕКСОВ
(Автомобили и автомобильное хозяйство)**

**FOREIGN LANGUAGE
TRANSPORT AND TECHNOLOGICAL MACHINES
AND COMPLEXES OPERATION
(AUTOMOBILES AND AUTOMOTIVE INDUSTRY)**

*Методические указания к практическим занятиям
для студентов бакалавриата направления 23.03.03*

Сост.: *Н.Э. Горохова, Е.В. Виноградова*

Печатается с оригинал-макета, подготовленного кафедрой
иностраннных языков

Ответственный за выпуск *Н.Э. Горохова*

Лицензия ИД № 06517 от 09.01.2002

Подписано к печати 07.02.2023. Формат 60×84/16.
Усл. печ. л. 1,9. Усл.кр.-отт. 1,9. Уч.-изд.л. 1,6. Тираж 50 экз. Заказ 87.

Санкт-Петербургский горный университет
РИЦ Санкт-Петербургского горного университета
Адрес университета и РИЦ: 199106 Санкт-Петербург, 21-я линия, 2