

МИНИСТЕРСТВО ПРОСВЕЩЕНИЯ ПМР  
ГОУ СПО «Рыбницкий политехнический техникум»

**УЧЕБНОЕ ПОСОБИЕ  
ПО АНГЛИЙСКОМУ ЯЗЫКУ  
«MOTOR CAR ANATOMY»**

**для студентов **3**-го курса**

**специальности «Техническое обслуживание  
и ремонт автомобильного транспорта»**

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Данное пособие составлено в соответствии с Рабочей программой по дисциплине «Английский язык» (профессиональный курс) для специальности СПО «Техническое обслуживание и ремонт автомобильного транспорта» и календарно-тематическим планом дисциплины. Пособие предназначено для изучения английского языка обучающимися специальности СПО «Техническое обслуживание и ремонт автомобильного транспорта» и является дополнительным источником обучения к разделу «История автомобилестроения» Рабочей программы по английскому языку.

Пособие имеет чёткую организационную структуру, состоит из 34-х тем, каждая из которых содержит как теоретический материал, так и практический (грамматику, активную лексику, оригинальные тематические тексты (с сокращениями), упражнения и задания).

В конце пособия приведена рекомендуемая литература по курсу.

## ВВЕДЕНИЕ

Учебное пособие «Motor Car Anatomy» предназначено для изучения курса английского языка в группах среднего профессионального образования специальности «Техническое обслуживание и ремонт автомобильного транспорта», реализующих образовательную программу при подготовке специалистов среднего звена.

Учебное пособие ориентировано на достижение следующих целей:

- дальнейшее развитие иноязычной коммуникативной компетенции (речевой, языковой, социокультурной, компенсаторной, учебно-познавательной):

- **речевая компетенция** – совершенствование коммуникативных умений в четырех основных видах речевой деятельности (говорении, аудировании, чтении и письме); умений планировать своё речевое и неречевое поведение;

- **языковая компетенция** – овладение новыми языковыми средствами в соответствии с получаемой специальностью: увеличение объёма используемых технических лексических единиц; развитие навыков оперирования языковыми единицами в коммуникативных целях;

- **социокультурная компетенция** – увеличение объёма знаний о социокультурной специфике страны/стран изучаемого языка, совершенствование умений строить своё речевое и неречевое поведение адекватно этой специфике, формирование умений выделять общее и специфическое в культуре родной страны и страны изучаемого языка;

- **компенсаторная компетенция** – дальнейшее развитие умений объясняться в условиях дефицита языковых средств при получении и передаче иноязычной информации;

- **учебно-познавательная компетенция** – развитие общих и специальных учебных умений, позволяющих совершенствовать учебную деятельность по овладению техническим иностранным языком согласно получаемой специальности, удовлетворять с его помощью познавательных интересов в других областях знаний;

Основу учебного пособия составляет содержание, согласованное с Рабочей программой по специальности «Техническое обслуживание и ремонт автомобильного транспорта».

Изучение иностранного языка по данной программе направлено на достижение *профессиональных* и *практических задач*, на дальнейшее развитие иноязычной коммуникативной компетенции.

*Профессиональные задачи* обучения направлены на расширение знаний обучающихся об устройстве автомобиля; формирование у обучающихся навыков и умений самостоятельной работы, совместной работы в группах, умений общаться друг с другом и в коллективе.

*Практические задачи* обучения направлены на развитие всех составляющих коммуникативной компетенции согласно выбранной специальности (речевой, языковой, социокультурной, компенсаторной и учебно-познавательной).

Основными компонентами содержания обучения иностранному языку в учреждениях СПО являются: языковой (фонетический, лексический и грамматический) материал; речевой материал, тексты; знания, навыки и умения, входящие в состав коммуникативной компетенции обучающихся и определяющие уровень её сформированности.

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## COMPONENTS OF THE AUTOMOBILE

**Упражнение 1. Прочтите и переведите на русский язык интернациональные слова.**

Automobile, chassis, electric, system, control, differential, ventilator, cylinder.

**Упражнение 2. Прочтите и переведите текст, а затем выполните следующие за ним упражнения.**

### COMPONENTS OF THE AUTOMOBILE

The automobile is made up of three basic parts: the power plant, or the engine, the chassis and the body.

The engine is the source of power that makes the wheels rotate and the car move. It includes fuel, cooling, lubricating and electric systems. Most automobile engines have six or eight cylinders.

The chassis includes a power train (power transmission), a running gear, steering and braking systems as well.

The power train carries the power from the engine to the car wheels.

The power transmission, in turn, contains the clutch, gearbox, propeller or cardan shaft, final drive, differential, rear axle and axle shafts. The running gear consists of a frame with axles, wheels and springs.

The body has a hood, fenders and accessories: the heater, stereo tape recorder, windshield wipers, conditioner, speedometer and so on.

### The exercises to be done after reading the text

**Упражнение 3. Выберите и запишите термины, данные ниже, которые относятся к: *the engine* (двигателю); *the chassis* (шасси); *the body* (кузову).**

Fuel system, axle shaft, accessories, cooling system, frame with axles, running gear, lubricating system, steering system, heater, propeller shaft, power transmission, final drive, windshield wiper, clutch, wheels and axle shafts, gearbox, electric system, differential.

**Дайте русские эквиваленты приведённых выше терминов.**

**Упражнение 4. Найдите в тексте ответы на вопросы:**

1. What main parts is the automobile made up of?
2. What is the function of the engine?
3. What systems does the engine include?
4. What does the chassis consist of?
5. What units does the power transmission comprise?
6. What assemblies does the running gear consist of?
7. What has the body?

### VOCABULARY

**engine** – двигатель  
**chassis** – шасси  
**body** – кузов  
**power train** – силовая передача  
**running gear** – ходовая часть  
**steering system** – рулевое управление  
**brakes** – тормоза  
**clutch** – сцепление  
**gearbox** – коробка передач  
**propeller shaft** – карданный вал  
**final drive** – главная передача  
**differential** – дифференциал  
**rear axle** – задний мост  
**axle shafts** – полуоси  
**springs** – рессоры  
**hood** – капот  
**fenders** – крылья  
**heater** – отопитель  
**windshield wiper** – стеклоочиститель  
**in turn** – в свою очередь  
**source of power** – источник энергии  
**fuel** – топливо  
**cooling** – охлаждение  
**lubricating** – смазка

**Упражнение 5. Закончите предложения, выбрав соответствующее по смыслу окончание.**

1. The automobile is made up of ...	1) a power transmission, running gear, steering and braking systems
2. The engine is ...	2) the clutch, gearbox, propeller shaft, final drive, differential and axle shafts
3. The engine includes ...	3) a hood, fenders and accessories
4. The chassis consists of ...	4) the engine, the chassis and the body
5. The power transmission comprises ...	5) a frame with axles, wheels and springs
6. The running gear consists of ...	6) the source of power
7. The body has ...	7) fuel, cooling, electric and lubricating systems

**Упражнение 6. Найдите в тексте английские эквиваленты предложений и запишите их.**

1. Автомобиль состоит из трех основных частей: двигателя, шасси и кузова.
2. Двигатель – это источник энергии.
3. Двигатель включает в себя топливную, охлаждающую, смазывающую и электрическую системы.
4. Шасси включает в себя силовую передачу, ходовую часть, рулевую и тормозную системы.
5. Силовая передача (трансмиссия), в свою очередь, состоит из сцепления, коробки передач, карданного вала, главной передачи, дифференциала, заднего моста и полуосей.
6. Ходовая часть включает в себя раму с осями, колеса и рессоры.
7. Кузов включает в себя капот, крылья и вспомогательные аксессуары: отопитель, стеклоочистители, магнитолу, кондиционер и т.п.

**Упражнение 7. Прочтите диалог несколько раз, а затем выполните следующие за ним упражнения.**

**DIALOGUE**

**A.:** Do you know what parts the automobile is made up of?

**B.:** Certainly. It is made up of the engine, the chassis and the body.

**A.:** What is the source of power?

**B.:** The source of power is the engine. It includes fuel, cooling, lubricating and electric systems.

**A.:** And what does the chassis consist of?

**B.:** It consists of a power transmission, running gear, steering and braking systems. By the way, the power transmission, in turn, comprises the clutch, gearbox, propeller shaft, final drive, differential, rear axle and axle shafts.

**A.:** And what has the body?

**B.:** The body has a hood, fenders and accessories, such as: the heater, stereo tape recorder, windshield wipers, conditioner and so on.

**A.:** Thank you very much for your information.

**B.:** Don't mention it. I am glad to help you.

**Упражнение 8. Найдите в диалоге слова и словосочетания, эквивалентные русским словам и словосочетаниям, приведённым ниже.**

Сделан из; шасси; кузов; включать в себя; топливная, охлаждающая, смазывающая и электрическая системы; трансмиссия; ходовая часть; рулевая и тормозная системы; карданный вал; главная передача; дифференциал; задний мост; полуоси; капот; крылья; вспомогательные устройства; стеклоочистители.

**Упражнение 9. Закончите предложения, используя необходимые слова или словосочетания, данные ниже.**

**A.:** What parts does the automobile ...?

**B.:** It is made up of ...

**A.:** What is ...?

**B.:** The source of power is the ...

**A.:** What systems does the engine ...?

**B.:** It includes ...

**A.:** What does the chassis ...?

**B.:** The chassis ...

**A.:** What does the power train include?

**B.:** The power train includes ...

**A.:** What units does the body comprise?

**B.:** It comprises ... and accessories such as ...

**A.:** Thank you for your ...

*Engine, chassis, body, power train, running gear, steering system, brakes, clutch, gearbox, propeller shaft, final drive, differential, rear axle, axle shafts, hood and fenders, heater, windshield wipers, information, conditioner, consist(s) of, the source of power, include, fuel, cooling, lubricating, electric systems.*



**Упражнение 10. Ответьте на вопросы:**

1. What main parts is the automobile made up of?
2. What is the function of the engine?
3. What systems does the engine include?
4. What does the chassis consist of?
5. What units does the power transmission comprise?
6. What assemblies does the running gear consist of?
7. What has the body?

**Упражнение 11. Выберите и запишите соответствующий описанию механизм.**

1. Mechanism which is used to stop the car.  
a) clutch; b) brakes; c) gearbox; d) steering system.
2. Mechanism which is used to guide the car.  
a) clutch; b) brakes; c) gearbox; d) steering system.

3. Mechanism which engages or disengages the engine and the car wheels.

a) clutch; b) brakes; c) gearbox; d) steering system.

4. Mechanism which is used to change the speed of the car.

a) clutch; b) brakes; c) gearbox; d) accelerator.

5. Mechanism which is used to guide the car in one or the other directions.

a) clutch; b) brakes; c) gearbox; d) steering system.

6. Device which is designed to measure the speed of the car.

a) heater; b) windscreen; c) speedometer; d) tachometer.

## PRINCIPLE OF OPERATION OF THE FOUR-STROKE PETROL ENGINE

**Упражнение 1. Переведите слова на русский язык, обращая внимание на суффиксы.**

to combust – combustion; to operate – operation; to ignite – ignition; to reciprocate – reciprocation; to connect – connection; to compress – compression; to describe – description.

**Упражнение 2. Прочтите и переведите интернациональные слова.**

Principle, cycle, piston, center, cylinder, atmosphere.

**Упражнение 3. Переведите предложения на русский язык.**

1. During the inlet (intake) stroke the inlet valve opens and a charge of fuel (mixture) flows into the cylinder.

2. During the compression stroke the inlet valve is closed and the fuel is compressed by the rising piston.

3. During the power stroke both valves are closed, pressure rises in the combustion chamber, and the spark ignites the mixture.

4. During the exhaust stroke the exhaust valve is opened, pressure is released and the residual gases flow into the atmosphere through the exhaust valve.

**Упражнение 4. Прочтите и переведите текст, а затем выполните следующие за ним упражнения.**

### PRINCIPLE OF OPERATION OF THE FOUR-STROKE PETROL ENGINE

The internal combustion engine is called so because fuel is burned directly inside the engine itself. Most automobile engines work on a 4-stroke cycle. A cycle is one complete sequence of 4 strokes of the

### VOCABULARY

**bottom dead center** – нижняя мёртвая точка

**combustion** – сгорание

**combustion chamber** – камера сгорания

**compression stroke** – такт сжатия

**crankshaft** – коленчатый вал

**cylinder** – цилиндр

**diesel engine** – дизельный двигатель

**engine** – двигатель

**exhaust stroke** – такт выпуска

**four-stroke cycle** –

четырёхтактный цикл

**fuel injection** – впрыск топлива

**to ignite** – воспламенять

**ignition** – зажигание

**intake (inlet) stroke** – такт впуска

**internal combustion engine** – двигатель внутреннего сгорания

**mixture** – смесь

**operating cycle** – рабочий цикл

### VOCABULARY

**petrol engine** – бензиновый двигатель

**piston** – поршень

**power stroke** – рабочий ход

**pressure** – давление

**reciprocating movement** – возвратно-поступательное движение

**residual gas** – остаточный газ

**rotary movement** – вращательное движение

**spark plug** – свеча зажигания

**stroke** – ход (поршня)

**top dead center** – верхняя мёртвая точка

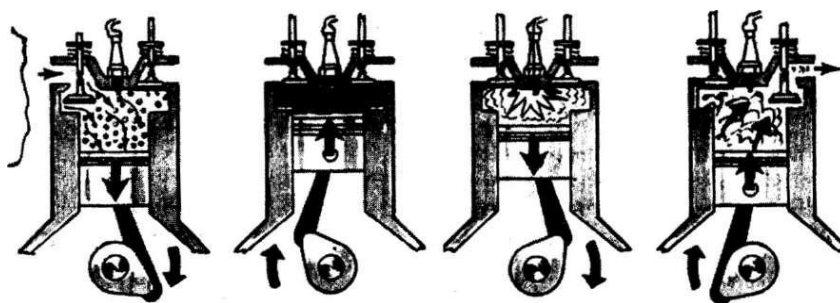
**valve** – клапан



piston in the cylinder. The operating cycle of the four-stroke petrol engine includes: inlet stroke (intake valve opens), compression stroke (both valves closed), power stroke (both valves closed), exhaust stroke (exhaust valve is opened).

To describe the complete cycle, let's assume that the piston is at the top of the stroke (top dead center) and the inlet and the exhaust valves are closed. When the piston moves down the inlet valve opens to intake a charge of fuel into the cylinder. This is called the inlet (intake) stroke. On reaching the lowest position (bottom dead center) the piston begins to move upward into the closed upper part on the cylinder, (the inlet valve is closed and the mixture is compressed by the rising piston. This is called the compression stroke. As the piston again reaches the top dead center the spark plugs ignite the mixture, both valves being closed during its combustion. As a result of burning mixtures the gases expand and great pressure makes the piston move back down the cylinder. This stroke is called the power stroke. When the piston reaches the bottom of its stroke, the exhaust valve is opened, pressure is released, and the piston again rises. It lets the burnt gas flow through the exhaust valve into the atmosphere. This is called the exhaust stroke which completes the cycle. So the piston moves in the cylinder down (intake stroke), up (compression stroke), down (power stroke), up (exhaust stroke).

The heat released by the fuel is transformed into work so that the reciprocating movement of the pistons is converted into rotary movement of a crankshaft by means of connecting rods.



*1 – intake 2 – compression 3 – power 4 – exhaust  
Principle of Operation of the Four-Stroke Petrol Engine*

**The exercises to be done after reading the text**  
**Послетекстовые упражнения**

**Упражнение 5. Найдите в тексте абзацы, где идёт речь о такте впуска, такте сжатия, рабочем ходе, такте выпуска и переведите их на русский язык.**

**Упражнение 6. Выберите правильные по смыслу ответы на вопросы:**

1. Why is the engine called the internal combustion engine?
2. What stroke is called the inlet one?
3. What is a compression stroke?
4. What takes place in the cylinder on power stroke?
5. What takes place on the exhaust stroke?
6. By means of what is the reciprocating movement of the pistons converted into rotary movement of a crankshaft?

1. It is called so because the fuel (the mixture) is burned.....
  - a) directly inside the engine;
  - b) outside the engine.
2. The inlet stroke is called so because during moving down the piston .....
  - a) the inlet valve opens to intake a charge of fuel into the cylinder;
  - b) the inlet valve is closed and the mixture is compressed.
3. The compression stroke is a stroke.....
  - a) when the inlet valve opens to intake a charge of fuel into the cylinder;
  - b) when the inlet valve is closed and the mixture is compressed.
4. On power stroke.....
  - a) the spark plugs ignite the mixture, both valves are closed during its combustion;
  - b) the exhaust valve is opened and the residual gas flows through the exhaust valve into the atmosphere.
5. On the exhaust stroke .....
  - a) the spark plugs ignite the mixture, both valves are closed during its combustion;
  - b) the exhaust valve is opened and the residual gas flows through the exhaust valve into the atmosphere.
6. It is done.....
  - a) by means of pistons;
  - b) by means of the connecting rods.

**Упражнение 7. Закончите предложения, выбрав правильный по смыслу вариант окончания.**

1. The internal combustion engine is called so because fuel is burned.....
  - a) outside the engine;
  - b) inside the engine.
2. On the inlet stroke .....
  - a) the intake valve opens;
  - b) the intake valve is closed;
  - c) the intake and the exhaust valves are closed.
3. On the compression stroke .....
  - a) the intake valve opens;
  - b) the intake valve is closed;
  - c) the intake and the exhaust valves are closed.
4. On the power stroke.....
  - a) the intake valve opens;
  - b) the intake valve is closed;
  - c) the intake and the exhaust valves are closed.
5. On the exhaust stroke.....
  - a) the exhaust valve opens;
  - b) the intake valve is closed;
  - c) the intake and the exhaust valves are closed.

**Упражнение 8. Прочтите диалог несколько раз, а затем разыграйте его в парах.**

### DIALOGUE A Tracing a Fault

**Nick:** Peter, I know you are a good driver. I would like you to have a look at my car.

**Peter:** What's wrong with your car?

**N.:** I don't know.

**P.:** Let me have a look. When did you have your plugs checked?

**N.:** Three days ago. I thought I had run out of fuel but the tank is half full.

**P.:** The carburettor is in order but the engine is misfiring. I guess the battery has run down. It needs recharging.

**N.:** Too bad.

**P.:** Don't get upset about it. It won't take you long to have your battery recharged.

**N.:** Do you really think so?

**P.:** I am sure of it. I advise you to have the engine greased.

**N.:** I'll follow your advice. Thank you, Peter.

**P.:** Don't mention it, Nick. I'm very sorry I couldn't help you.

**N.:** Well, you helped me to find the fault. Thanks a lot. Good-bye.

**P.:** See you later.



**Упражнение 9. Переведите русские предложения на английский язык, а затем разыграйте диалоги в парах.**

1. – Не знаю, что случилось с моей машиной.

– Let me trace the fault.

– Пожалуйста. Ты опытный водитель?

– Yes, I am. I have been driving a car for fifteen years now. May be you have run out of fuel?

– Бак почти полный.

– When did you have your plugs checked?

– Вчера. Карбюратор тоже в порядке.

– В таком случае давай поедem до ближайшей ремонтной станции.

– Good idea. They will have the car fixed.

2. – Когда тебе починили машину?

– Last month. The engine is in good condition now. It was well greased.

– Хорошо. Мне тоже надо чинить машину. Ослабли тормоза (The brakes are slack.)

Аккумулятор разрядился (The battery has run down.)

– It can be easily done.

– Я рад это слышать.

3. – Какую машину ты хочешь купить?

– I want a second-hand car. Could you help me?

– С большим удовольствием.

– I hear there are good cars on sale 42nd Street.

– Я знаю этот магазин. Давай поедem туда.

– Good idea. If I choose a car there, I won't have to bother any more.

– Совершенно верно.

**Упражнение 10. Прочтите диалог и расскажите, о чём в нём идёт речь.**

### DIALOGUE B At the Repairing Shop

**Client:** Good afternoon! Can you help me? There is something wrong with the engine.

**Master:** Hi! What is wrong with it?

**C.:** I don't know. It wouldn't start. Maybe the pistons and valves are in disorder.

**M.:** Let's have a look! Well, they are quite right.

**C.:** And what about the crankshaft, or electric spark plugs. I know absolutely nothing about the operating cycle of the engine.

Just a moment. Don't worry! We shall check up all units and how they work together.

**Sometime later**

**M.:** My God! There is no petrol in the tank. How can you move drive?

**C.:** Really? Oh, I have forgotten to fill in the tank! I beg your pardon to trouble you!

**M.:** No trouble, at all. You are welcome!

## CHASSIS

**Упражнение 1. Переведите слова на русский язык, обращая внимание на суффиксы:**

to transmit – **transmission**; to connect – **connection**;  
to found – **foundation**; to move – **movement**.

**Упражнение 2. Переведите на русский язык интернациональные слова.**

Transmission, system, mechanism, radiator, friction, automobile, cardan, portion, final, accelerator, pedal, position.

**Упражнение 3. Переведите предложения на русский язык.**

1. The chassis includes the running gear, the power transmission and the steering mechanism.
2. The power transmission consists of the clutch, gearbox, cardan shaft, rear axle, final drive, differential and axle shafts.
3. The clutch connects the engine with the driving wheels.
4. The gearbox changes the speed of the car movement.
5. The steering mechanism changes the direction of the car.

**Упражнение 4. Прочтите и переведите текст, а затем выполните следующие за ним упражнения.**

### CHASSIS

The main units of the chassis are: the power transmission, the running gear and the steering mechanism. The power transmission includes the whole mechanism between the engine and the rear wheels. This entire mechanism consists of the clutch, gearbox, propeller (cardan) shaft, rear axle, final drive, differential and axle shafts.

### VOCABULARY

**unit** – узел, блок, агрегат  
**power transmission** – силовая трансмиссия  
**tractive effort** – тяговое усилие  
**running gear** – ходовая часть  
**driving wheels** – ведущие колёса  
**steering system** – система рулевого управления  
**brakes** – тормоза  
**flywheel** – маховик  
**rear axle** – задний мост  
**clutch** – сцепление  
**friction device** – фрикционное устройство  
**axle shafts** – полуось

At the front end of the car is the engine. On the back of it is the flywheel. Behind the flywheel is the clutch. The clutch is a friction device connecting the engine with the gears of the gearbox. The main function of the gearbox is to change the speed of the car.

The power is always transmitted by the cardan shaft to the live back axle. The final drive reduces the high speed of the engine to the low speed of the driving wheels. The differential enables the driving wheels to turn at different speeds which is necessary when turning the car. The foundation of the automobile is the frame to which different chassis units are attached.

The rear axle is capable of moving up and down about the frame. The rear axle is an important part of the transmission. It carries the greater portion of the weight of the car.

The steering mechanism is designed for changing the direction of the car.

The brakes are used for stopping the car, for decreasing its speed and for holding the car position.

**Упражнение 5. Найдите в тексте ответы на следующие вопросы:**

1. What main units does the chassis consist of?
2. Where is the engine located?
3. Where is the flywheel fixed?
4. Where is the clutch placed?
5. What is the gearbox designed for?
6. By what shaft is the power transmitted to the back axle?
7. What does the rear axle do?
8. What is the function of the differential?
9. What purpose is the steering system designed for?
10. What is the function of the brakes?

**Упражнение 6. Переведите предложения на русский язык, обращая внимание на Complex Subject.**

1. Transmission, running gear and steering mechanism **are known** to be the main units of the chassis.
2. The clutch **is known** to connect the engine with the driving wheels of the car.
3. The gearbox is **known** to change the speed of the car.
4. The steering mechanism is **known** to change the direction of the car.
5. Brakes **are considered** to be one of the most important mechanisms of the car.

**Упражнение 7. Переведите на английский язык следующие предложения (при выполнении задания вы можете обращаться к тексту).**

1. Основными узлами шасси являются: трансмиссия, ходовая часть и рулевой механизм.
2. Радиатор расположен в передней части автомобиля.
3. Маховик крепится на задней части двигателя.
4. Сцепление соединяет двигатель с коробкой передач.
5. Коробка передач предназначена для изменения скорости движения автомобиля.
6. Усилие передается карданным валом.
7. Главная передача снижает высокие обороты двигателя до невысоких оборотов ведущих колёс.
8. Дифференциал позволяет ведущим колесам вращаться с разной скоростью при повороте автомобиля.
9. Рулевой механизм предназначен для изменения направления движения автомобиля.
10. Тормоза используются для остановки или снижения скорости автомобиля.

## Упражнение 8. Прочтите диалог и разыграйте его в парах.

### DIALOGUE Transmission Mechanism

**Teacher:** Let's speak about the transmission mechanism. What main units does the transmission include?

**Student:** The transmission is the entire mechanism between the engine and the rear wheels. It includes the clutch, gearbox, cardan shaft, rear axle, final drive and differential.

**T.:** What does the clutch connect?

**S.:** The clutch connects the engine with the gearbox.

**T.:** And what does the gearbox do?

**S.:** The gearbox changes the speed of the car.

**T.:** What does the differential enable?

**S.:** The differential enables the driving wheels to move at different speeds when turning the car.

**T.:** For what purpose is the steering system used?

**S.:** The steering system is used for changing the direction of the car movement.

**T.:** And what is the function of the brakes?

**S.:** Brakes are used to slow or stop the car.

**T.:** That's right. You know the subject very well.



## Упражнение 9. Переведите текст на русский язык, пользуясь словарём.

### BASIC TROUBLES OF TRANSMISSION MECHANISM

The transmission of the engine torque to the driving wheels of the automobile must be smooth. There should be no vibration in the operation of transmission mechanism within the range of travelling speeds.

The indications of malfunctions in the transmission mechanism components are as follows:

1. incomplete disengagement of the clutch;
2. difficult engagement or self-demeshing of gears;
3. run out and vibration of the cardan-drive shaft.

What to do in these cases:

1. Check the free travel of the clutch pedal and adjust it.
2. Check the oil level in the gearbox housing and wash breather channel.
3. Check to see that all the fastening belts are securely tightened.

### FRAME

## Упражнение 1. Переведите на русский язык интернациональные слова.

Chassis, structure, system, integral, construction, steel, vibration, passenger, metal, contact.

### VOCABULARY

- frame** – рама
- twist** – кручение
- support** – опора
- suspension** – подвеска
- body** – кузов
- channel section** – полая секция
- longitudinal members** – лонжероны
- to weld** – сваривать
- cross members** – поперечины
- to rivet** – заклепывать
- to reinforce** – усиливать
- to insulate** – изолировать
- rigid** – жёсткий
- rubber pad** – резиновая прокладка
- mining** – прочный
- unibody construction** – конструкция
- withstand strains** – выдерживать несущим кузовом нагрузки
- strengthen** – укреплять

**Упражнение 2. Переведите слова, обращая внимание на суффиксы.**

To found – foundation; frame – frameless; to construct – construction; structure – structural – structurally; to attach – attachment; to vibrate – vibration; to insulate – insulation; usual – usually.

**Упражнение 3. Прочтите и переведите текст, а затем выполните следующие за ним упражнения.**

**FRAME**

The foundation of the automobile chassis is the frame which provides support for the engine, body and power-train members. Crossmembers reinforce the frame. The frame is rigid and strong so that it can withstand the shocks, vibrations, twists and other strains to which it is put on the road.

The frame provides a firm structure for the body, as well as a good point for the suspension system. There are two types of frames, namely: conventional frames and integral (unibody) frames (frameless constructions).

Conventional frames are usually made of heavy steel channel sections welded or riveted together. All other parts of the car are attached to the frame.

In order to prevent noise and vibrations from passing to the frame and from there to the passengers of the car, the frame is insulated from these parts by rubber pads.

It is also important to insulate the frame in order to prevent metal-to-metal contacts.

Frameless (unibody) constructions are called so because they are made integral with the body. The body parts are used to structurally strengthen the entire car. Some unibody frames have partial front and rear frames for attaching the engine and suspension members.

**Послетекстовые упражнения**

**The exercises to be done after reading the text**

**Упражнение 4. Найдите в тексте и выпишите английские эквиваленты русским терминам.**

Лонжероны, поперечины, жёсткий, прочный, выдерживать нагрузки, подвеска, обычная (общепринятая) рама, безрамная конструкция, полые секции, сваренные или заклепанные, прикреплять к раме, резиновые прокладки, укреплять.

**Упражнение 5. Найдите в тексте ответы на вопросы:**

1. What does the frame provide?
2. Why is the frame rigid and strong?
3. What types of frames are there?
4. What is the conventional frame made of?
5. By what is the frame insulated from the other car parts? For what purpose?
6. What do you know about unibody frames?

**Упражнение 6. Подберите из правой колонки соответствующие окончания для предложений из левой колонки.**

1) The frame provides support for ...	a) channel sections welded together
2) Conventional frames are made of ...	b) prevent noise and vibrations from passing to the passengers
3) Tameless constructions are made ...	c) cross members
4) The frame is insulated from other parts in order to ...	d) the engine, body and power train members
5) The frame is reinforced by ...	e) integral with the body

**Упражнение 7. Переведите предложения на русский язык. Обратите внимание на Complex Object.**

1. We know the frame to be the structural centre of any car.
2. Car specialists consider the conventional frame to be extremely rigid and strong.
3. We know the frame to be insulated from the other parts by rubber pads to prevent metal-to-metal contacts.
4. Many specialists consider the body parts to be used to structurally strengthen the entire car.
5. The manufacturers believe the unibody constructions to be called so because they are made integral with the body.

**Упражнение 8. Переведите текст, не пользуясь словарём.**

The frame is a structural centre of any car as it provides support for the engine, body, wheels and power-train members.

Cross members reinforce the frame and provide support for the engine and wheels. The frame is extremely rigid and strong. The engine is attached to the frame in three or four points and insulated in these points by some rubber pads to prevent vibration and noise from passing to the frame and thus to the passengers. There are two types of frames: conventional construction and unibody one.



**Упражнение 9. Переведите предложения на английский язык.**

1. Рама обеспечивает опору для кузова, двигателя и узлов силовой передачи.
2. Она состоит из лонжеронов и поперечин, которые усиливают раму.
3. Рама должна выдерживать вибрацию, кручения и другие нагрузки (напряжения).
4. Рамы бывают двух типов: обычные (стандартные) и выполненные воедино с кузовом.
5. Стандартные рамы изготовлены из стальных полых секций, сваренных или заклепанных вместе.
6. Безрамные конструкции выполнены воедино с кузовом.
7. Рама изолируется от кузова резиновыми прокладками, чтобы шумы и вибрации не проходили к пассажирам автомобиля.



**Упражнение 10. Прочтите диалог, а затем разыграйте его в парах.**

### DIALOGUE

**Stas:** Hi! Seen you for ages! How are you?

**Vlad:** Hi! I'm perfectly well! I am working at a repairing shop. Very interesting I can tell you.

**S.:** What are you doing there?

**V.:** Now, we are testing the frame. You see, the driver has got into trouble. Something is wrong with his car. He thinks it is the frame.

**S.:** Has the car a conventional frame or a unibody frame?

**V.:** Unibody frame.

**S.:** I think you have to do a lot of work as body parts strengthen the entire car.

**V.:** Sure. We are testing all parts in order to find out the damage.

**S.:** I think you will cope with the problem.

**Notes:**

**seen you for ages** – не видел тебя сто лет;

**perfectly well** – прекрасно;

**get into trouble** – попасть в беду;

**be wrong with** – что-то не так;

**sure** – конечно (без сомнения);

**find out the damage** – отыскать повреждение;

**cope with** – справиться (с проблемой).

## CLUTCH

**Упражнение 1. Переведите слова, обращая внимание на суффиксы и префиксы.**

Connect – **disconnect** – connection – **disconnection**;  
operate – **operation**; friction – **frictional**; engage – **engagement** – **disengagement**.

**Упражнение 2. Прочтите и переведите интернациональные слова.**

Start, disc, friction, frictional, material, base, principal, control, pedal.

**Упражнение 3. Прочтите и переведите текст, а затем выполните следующие за ним упражнения.**

### CLUTCH

The clutch is a friction device. It connects the engine to the gears in the gearbox. It is used for disconnecting the engine from the gearbox, for starting the car and for releasing the engine from the car wheels.

The clutch is fixed between the flywheel of the engine and the gearbox and consists of two plates (discs): the friction disc and the pressure disc. The friction disc is situated between the flywheel and the pressure plate and has a hard-wearing material on each side.

The basic principal operation of the clutch is a frictional force acting between two discs. The clutch is controlled by the clutch pedal. When the pedal is at rest the clutch is engaged and the running engine is connected to the gearbox. When the pedal is pressed down the clutch is disengaged and the engine runs idly.

### VOCABULARY

**friction device** – фрикционное устройство

**pressure disc** – нажимной диск

**hard-wearing material** – износостойкий материал

**frictional force** – сила трения

**to start the car** – завести автомобиль

**clutch pedal** – педаль сцепления

**to release the engine** – отсоединить

**at rest** – находится в покое

**is engaged** – включено

**to fix** – крепить

**flywheel** – маховик

**is disengaged** – отключенный

**friction disc (plate)** –

фрикционный диск

**to run idly** – находится в покое

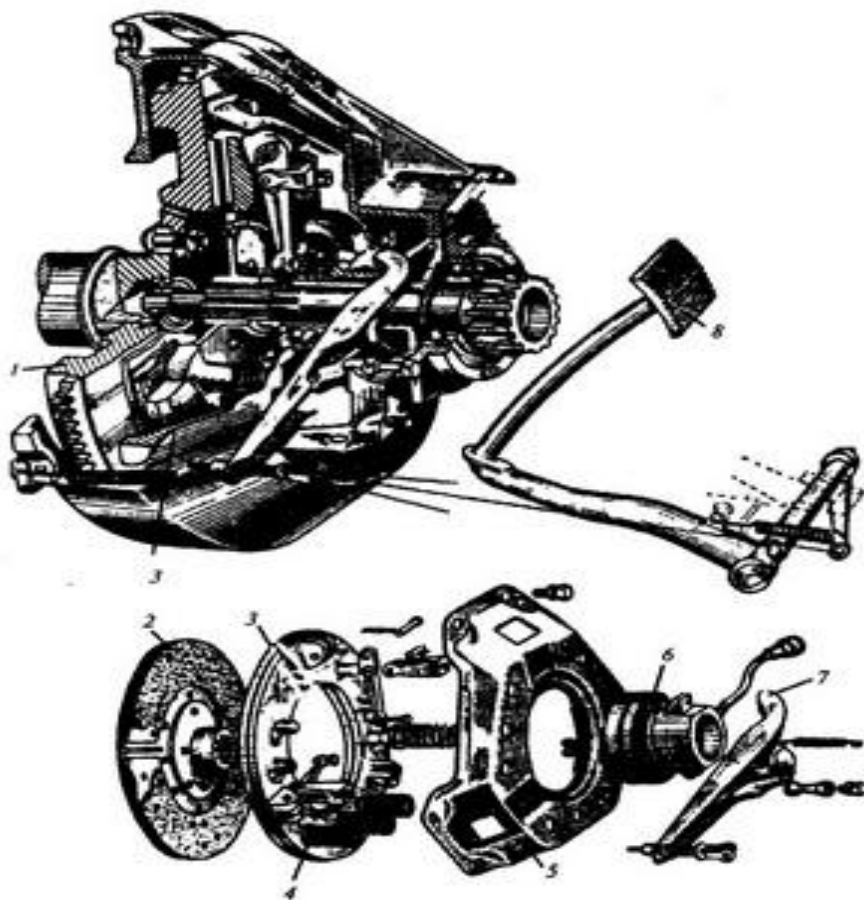


Рис. 2. Clutch

- |                                     |                                       |
|-------------------------------------|---------------------------------------|
| 1. flywheel – маховик               | 5. cover – крышка                     |
| 2. friction disc – фрикционный диск | 6. thrust bearing – упорный подшипник |
| 3. pressure disc – нажимной диск    | 7. lever – рычаг                      |
| 4. spring – пружина                 | 8. pedal – педаль.                    |

#### Послетекстовые упражнения

#### The exercises to be done after reading the text

**Упражнение 4. Найдите в тексте данные ниже слова и напишите их русские эквиваленты.**

Friction device, clutch, gearbox, to free, to start, to release, flywheel, pressure plate, basic principle of operation, to fix, hard-wearing material, to consist of, to be controlled by, running engine, to run idly, to engage, to disengage, to press down, to be at rest.

**Упражнение 5. Найдите в тексте ответы на следующие вопросы:**

1. What device is the clutch?
2. What units does it connect?
3. What is the clutch used for?
4. Where is the clutch placed?
5. What plates does the clutch consist of?
6. What is the basic principal operation of the clutch?
7. What is the clutch controlled by?
8. What takes place when the clutch pedal is at rest?
9. When does the engine run idly?

**Упражнение 6. Закончите предложения, выбрав соответствующее логике окончание.**

1. The clutch is a device connecting ...
  - a) the rear axle and axle shafts;
  - b) the gearbox and differential;
  - c) the engine and the gearbox.
2. The clutch is situated between ...
  - a) the gearbox and cardan shaft;
  - b) the flywheel and the gearbox;
  - c) the gearbox and rear axle.
3. The clutch is controlled by ...
  - a) the brake pedal;
  - b) the clutch pedal;
  - c) the gearbox and rear axle.
4. The clutch is engaged ...
  - a) when the clutch pedal is pressed down;
  - b) when the clutch pedal is at rest.
5. The clutch is disengaged ...
  - a) when the clutch pedal is at rest;
  - b) when the clutch pedal is pressed down.

**Упражнение 7. Прочтите диалог и выполните следующие за ним упражнения.**

**DIALOGUE**

**A.:** What is the function of the clutch?

**B.:** You see, it serves three functions. It is used for freeing the engine from the gearbox, for starting the car and for freeing the engine from car wheels.

**A.:** Is it a friction device?

**B.:** Yes, of course. It is fixed between the flywheel of the engine and the gearbox and usually consists of two discs.

**A.:** What discs?

**B.:** The friction disc (driven disc) and the pressure disc.

**A.:** I suppose the principle of operation of clutches is a frictional force between discs. Am I right?

**B.:** Yes, you are. When the clutch is fully engaged the frictional force makes discs rotate at the same speed.

**A.:** And by what is the clutch controlled?

**B.:** By the clutch pedal. When it is at rest the clutch is engaged and when it is pressed down the clutch is disengaged and the engine is disconnected from the car wheels.

**A.:** Thank you. And what types of clutches do you know?

**B.:** Positive clutches and gradual engagement clutches.

**A.:** Thank you very much for your information.

**B.:** Not at all. Glad to help you.

**Упражнение 8. Найдите в диалоге английские эквиваленты следующим русским терминам и выпишите их.**

Функция сцепления, для отключения двигателя от коробки передач, крепится между маховиком и коробкой передач, фрикционный (ведомый) диск, нажимной диск, фрикционная сила, сцепление включено, педаль в исходном положении, педаль сцепления нажата.

**Упражнение 9. Разыграйте диалог в паре.**

**Упражнение 10. Подберите из правой колонки русские эквиваленты английским словам из левой колонки и проверьте себя по ключу.**

a friction device	a.	завести автомобиль
gearbox	b.	фрикционный диск
to start the car	c.	маховик
to release the engine	d.	износостойкий материал
is fixed	e.	работать вхолостую
flywheel	f.	соединяться
the friction disc	g.	сила трения
the pressure disc	h.	разъединяться
hard-wearing material	i.	фрикционное устройство
frictional force	j.	находиться в покое
the clutch pedal	k.	закреплен
to be engaged	l.	педаль сцепления
to be at rest	m.	нажать на педаль
to be disengaged	n.	отсоединить двигатель
to press down on the pedal	o.	нажимной диск
to run idly	p.	коробка передач

**Упражнение 11. Закончите предложения, используя необходимые слова или словосочетания, данные ниже.**

**A.:** What three functions does the clutch ... ?

**B.:** It is used for ...

**A.:** Where is it ... ?

**B.:** It is ... between the flywheel of the engine and the ...

**A.:** By what is the clutch ... ?

**B.:** It is ... by the ...

**A.:** What takes place when the pedal is ... ?

**B.:** The clutch is ...

**A.:** And when the driver pushes down on the pedal?

**B.:** The clutch is ...

*freeing the engine from the gearbox, serve, fixed, gearbox, controlled, starting the car, freeing the engine from the car wheels, pedal, at rest, engaged, disengaged, do, located.*

**Упражнение 12. Переведите на английский язык следующие предложения.**

1. Сцепление – это фрикционное устройство.

2. Сцепление соединяет двигатель и коробку передач.

3. Сцепление расположено между маховиком двигателя и коробкой передач.

4. Как правило, сцепление состоит из двух дисков: ведомого и нажимного.

5. Сцепление управляется педалью сцепления.

6. Когда педаль сцепления находится в покое, диски сцепления соединены и работающий двигатель соединён с коробкой передач и колёсами.

7. Когда водитель нажимает на педаль сцепления, диски отходят, сцепление отсоединяется и двигатель работает вхолостую.

## GEARBOX

**Упражнение 1. Прочтите и переведите на русский язык интернациональные слова.**

Principal, function, construction, constructional, class, classify, type, planet, planetary, history, historical.

**Упражнение 2. Переведите слова, обращая внимание на суффиксы.**

Move – **movement**, construct – **construction** – **constructional**, arrange – **arrangement**, history – **historical** – **historically**, wide – **widely**, vary – **various**, simple – **simply**, body – **bodily**.

**Упражнение 3. Прочтите текст, а затем выполните следующие за ним упражнения.**

### GEARBOX

The gearbox is placed between the clutch and the propeller shaft. The principal function of the gearbox is to vary the speed of the car movement to meet the road conditions. The gearbox provides four forward speeds and one reverse, as follows:

1. First or low gear;
2. Second gear;
3. Third gear;
4. Fourth or top gear;
5. Reverse gear.

There are many constructional arrangements of gearboxes, which can be classified as follows:

1. Sliding-mesh type;
2. Constant-mesh type;
3. Epicyclic (planetary) type.

The sliding-mesh type is the simplest one and is the oldest historically. The constant-mesh type is the most widely used type. They are termed «ordinary» gearing, the characteristic feature of which is that the axes of the various gears are fixed axes. The gears simply rotate about their own axes.

The characteristic feature of epicyclic (planetary) gearing is that one gear rotates about its own axis and also rotates bodily about some other axis.

To secure the several speeds of the car the clutch shaft is mounted in direct line with the gearbox shaft. The gearbox shaft carries on it the sliding gears which are used for shifting to secure the forward speeds and the reverse drive.

### VOCABULARY

**gear** – шестерня  
**gearbox** – коробка передач  
**gearing** – зубчатое соединение  
**road conditions** – дорожные условия  
**forward speed** – передняя скорость  
**reverse drive** – обратный (задний) ход  
**low gear** – первая передача  
**top gear** – четвёртая передача  
**sliding-mesh gearbox** – коробка передач со скользящими шестернями  
**constant-mesh gearbox** – коробка передач с постоянным зацеплением шестерён  
**epicyclic (planetary) gearbox** – эпициклическая коробка передач  
**ordinary gearing** – стандартное зубчатое соединение

### VOCABULARY

**characteristic feature** – характерная особенность  
**fixed axes** – зафиксированные оси  
**rotate bodily** – вращаться корпусом  
**axis** – ось  
**axle** – вал  
**secure** – обеспечить  
**shifting** – переключение  
**in direct line** – на одном уровне

**Послетекстовые упражнения**  
**The exercises to be done after reading the text**

**Упражнение 4. Найдите в тексте ответы на вопросы.**

1. Where is the gearbox situated?
2. What is the function of the gearbox?
3. What speeds does the gearbox provide?
4. What types of gearboxes do you know?
5. Why is the clutch shaft mounted in direct line with the gearbox shaft?

**Упражнение 5. Подберите из правой колонки соответствующие окончания предложений из левой колонки.**

- |   |   |
|---|---|
| 1. The principal function of the gearbox is ... | a) sliding-mesh type, constant mesh type and planetary type |
| 2. The gearbox provides ...                     | b) the simplest one and historically oldest                 |
| 3. Gearbox can be ...                           | c) to vary the speed of the car                             |
| 4. The sliding-mesh gearbox is ...              | d) four forward speeds and one reverse                      |
| 5. The constant-mesh gearbox is ...             | e) the most widely used                                     |

**Упражнение 6. Переведите предложения на английский язык.**

1. Коробка передач предназначена для изменения скорости движения автомобиля.
2. Коробка передач обеспечивает четыре передние скорости и задний ход.
3. Коробки передач могут быть: со скользящими шестернями, с постоянным зацеплением шестерен и планетарного типа.
4. Самыми простыми являются коробки передач со скользящими шестернями.
5. Коробки передач с постоянным зацеплением шестерен используются наиболее часто.
6. Скользящие шестерни на валу коробки передач используются для обеспечения передних скоростей и обратного хода.

**Упражнение 7. Переведите текст, пользуясь словарём.**

Gearboxes are assembled and disassembled on special stands using special mechanisms. In case of trouble in change-speed gearbox it can be repaired only in the workshop. But in order not to get into trouble you should do the followings steps:

- a) check the oil level in the gearbox casing;
- b) wash the breather channel;
- c) change the oil in accordance with the lubrication schedule;
- d) wash the gearbox with a thin mineral oil;
- e) drain the used oil through the drain hole.



**Упражнение 8. Прочтите диалог и разыграйте его в парах.**

**DIALOGUE**

**Mike:** Peter, do you remember what our teacher told us last time? What do you know about gearboxes?

**Peter:** I know that the gearbox is used to change the speed of the car.

**M.:** And how many speeds does the gearbox provide?

**P.:** It can provide four forward speeds and one reverse.

**M.:** Into what types are the gearboxes divided according to their arrangements?

**P.:** They are divided into sliding-mesh type, constant-mesh type and epicyclic type.

**M.:** What type is the simplest?

**P.:** The sliding-mesh one.

**M.:** Thank you very much for you help.

**P.:** You are welcome. Glad to help you.

## BRAKES

**Упражнение 1. Прочтите и переведите интернациональные слова.**

Mechanism, passenger, type, hydraulic, cylinder, vacuum, function, classify, classification, mechanical, electric, electromagnet.

**Упражнение 2. Переведите слова, обращая внимание на суффиксы.**

Safe – safety; to improve – improvement; to move – movement; to drive – driver; to apply – application; to attach – attachment; to arrange – arrangement; to perform – performance; name – namely; to operate – operation; to equip – equipment.

**Упражнение 3. Прочтите текст, а затем выполните следующие за ним упражнения.**

### BRAKES

Brakes are used to slow or stop the car where it is necessary. It is one of the most important mechanisms of the car as upon its proper performance the safety of passengers depends. Car brakes can be divided into two types, namely: drum brakes and disc brakes. The drum type may be either a band brake or a shoe brake. Depending on their functions, the automobile has foot brakes and hand brakes (parking brakes). According to their mode of operation, the brakes are classified as: mechanical brakes, hydraulic brakes, airbrakes, electric brakes. Brakes are controlled by the brake pedal. Most braking systems in use today are hydraulic. This system consists of a master cylinder mounted on the car frame and wheel cylinders. When the driver pushes down on the brake pedal, it forces the piston to move in the master cylinder and brake fluid is delivered from it to the wheel cylinders. The piston movement causes brake shoes to move and the brakes are applied (the brake shoes are pressed against the brake drums).

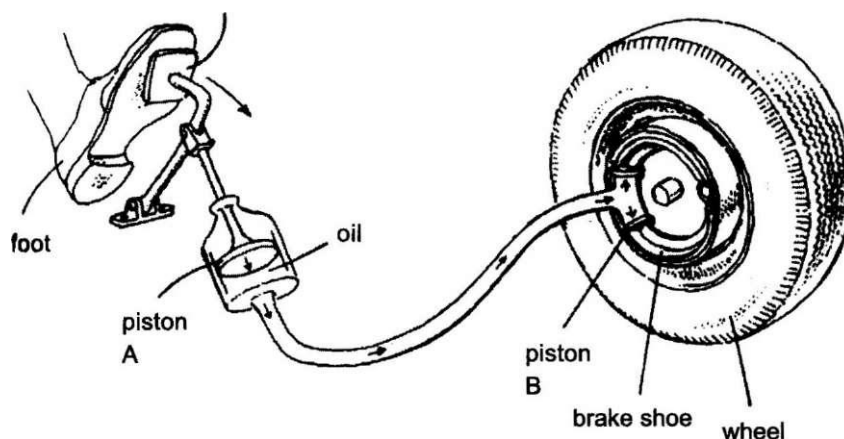
The air brake uses compressed air to apply the braking force to the brake shoes.

Electric brakes use electromagnets to provide the braking effort against the brake shoes.

Formerly brakes were applied only to the two rear wheels, but now all cars are equipped with all-wheels brakes. Today many improvements are being made in brakes.

### VOCABULARY

**brakes** – тормоза  
**force the fluid** – подавать жидкость  
**performance** – работа  
**under pressure** – под давлением  
**safety** – безопасность  
**to apply** – срабатывать  
**to depend** – зависеть  
**to slow** – замедлять  
**braking effort** – тормозное усилие  
**to divide** – разделять  
**push down on the brake pedal** – нажать на тормозную педаль  
**drum brakes** – барабанные тормоза  
**band brake** – ленточный тормоз  
**disk brakes** – дисковые тормоза  
**shoe brake** – колодочный тормоз  
**hydraulic assisted brakes** – тормоза с гидравлическим приводом  
**brake shoes** – тормозные колодки  
**brake fluid** – тормозная жидкость  
**brake pedal** – педаль тормоза  
**master cylinder** – главный цилиндр



**Break system**

**Послетекстовые упражнения**  
**The exercises to be done after reading the text**

**Упражнение 4. Найдите в тексте английские эквиваленты следующих русских терминов и выпишите их.**

Тормоза, безопасность пассажиров зависит от правильной работы тормозов, барабанные тормоза, дисковые тормоза, тормоза с усилителем, гидравлический привод тормозов, жидкость под давлением, тормоза срабатывают, тормозное усилие, нажать на тормозную педаль.

**Упражнение 5. Найдите в тексте ответы на следующие вопросы:**

1. What is the function of the brakes?
2. What types are brakes divided into?
3. What brakes do you know according to their mode of operation?
4. What braking systems are used today?
5. By what are brakes controlled?
6. When are brakes applied?

**Упражнение 6. Выпишите из правой колонки русские слова и словосочетания, соответствующие английским из левой колонки.**

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| 1) performance                       | a) зависеть от                       |
| 2) the safety of passengers          | b) барабанные тормоза                |
| 3) to depend upon                    | c) тормоза срабатывают               |
| 4) namely                            | d) тормоза с гидравлическим приводом |
| 5) drum brakes                       | e) работа (действие)                 |
| 6) disc brakes                       | f) именно                            |
| 7) brakes are applied                | g) тормоза с усилителем              |
| 8) hydraulic assisted brakes         | h) под давлением                     |
| 9) power assisted brakes             | i) нажать на тормозную педаль        |
| 10) to press down on the brake pedal | j) дисковые тормоза                  |
| 11) under pressure                   | k) безопасность пассажиров           |



### **Упражнение 7. Переведите следующие предложения на английский язык.**

1. Тормоза являются наиболее важным механизмом автомобиля.
2. Они используются для замедления движения или остановки автомобиля.
3. Тормоза можно разделить на два типа, а именно: барабанные тормоза и дисковые тормоза.
4. На большинстве автомобилей используется гидравлический привод или пневматический привод.
5. Тормоза срабатывают, когда водитель нажимает на тормозную педаль.

### **Упражнение 8. Прочтите диалог, а затем выполните следующие за ним упражнения.**

#### **DIALOGUE**

**Alex:** Why are brakes used?

**Boris:** They are used to stop or to slow the car.

**A.:** Well, it is one of the most important mechanisms of the car, isn't it?

**B.:** Of course, the safety of the passengers depends upon their proper performance.

**A.:** What types of brakes are used today?

**B.:** Drum brakes, disk brakes and others.

**A.:** And in what way are they applied?

**B.:** They are applied by the brake pedal. When the driver pushes down on the pedal they are applied.

**A.:** Thank you. It was very nice of you to tell me this information.

**B.:** Don't mention it. I was glad to serve you.

### **Упражнение 9. Запишите на аудиокассету реплики Алекса и повторяйте в паузах реплики Бориса.**

### **Упражнение 10. Запишите на аудиокассету реплики Бориса и повторяйте в паузах реплики Алекса.**

### **Упражнение 11. Расскажите на английском языке, о чём идёт речь в диалоге.**

### **Упражнение 12. Найдите абзацы, в которых идёт речь о сцеплении и о тормозах и запишите их в две колонки.**

#### **TWO STORIES – IN ONE**

1. Brakes are the most important mechanism of the car. They are used to slow or stop the car where it is necessary.
2. The clutch is a friction device. It connects the engine to the wheels in the gearbox. It is used for freeing the engine from the gearbox, for starting the car and for releasing the engine from the car wheels.
3. It is fixed between the flywheel of the engine and the gearbox.
4. They are divided into 2 types, namely: drum brakes and disc brakes.
5. Most cars of today use hydraulic or power assisted brakes.
6. They may be of 2 plates: friction disc and pressure disc. The friction disc is situated between the flywheel and the pressure disc.

### TROUBLES IN BRAKING SYSTEM

The basic troubles of the braking system are as follows:

- 1) poor braking action;
- 2) sticking brake shoes which would not return to the initial position after a brake pedal is released;
- 3) non-uniform braking of the left and the right wheels on a common axle;
- 4) leakage of brake fluid and air leakage in the hydraulic brake;
- 5) poor air tightness of the pneumatic brake control.

#### What to do:

1. Check the action of the foot and hand brakes and leak proofness of the brake hoses connections, components of the hydraulic and pneumatic controls of the brakes, as well as of the vacuum-power system.
2. Inspect the friction linings, wheel-brake springs, master and wheel cylinders of the hydraulic brake and the air compressor of the pneumatic brake using a test manometer to check it.

#### Упражнение 14. Переведите предложения на английский язык.

1. Тормоза используются для замедления движения или остановки автомобиля.
2. В зависимости от привода тормоза классифицируют на механические, гидравлические, пневматические и электрические.
3. Тормоза управляются тормозной педалью.
4. Тормоза срабатывают, когда водитель нажимает на тормозную педаль (тормозные колодки прижимаются к тормозным барабанам).
5. В пневматических тормозах для создания тормозного усилия используется сжатый воздух.
6. В электрических тормозах для создания тормозного усилия используется электромагнит.
7. В современных автомобилях используются тормоза с приводом на все колеса

## STEERING SYSTEM

#### Упражнение 1. Прочтите слова и сопоставьте их с русскими значениями.

column, spindle, system, hydraulic, pump, reservoir, popular, type, effective, effectiveness, effectively, energy, function, to deform, deformation.

#### Упражнение 2. Переведите слова, обращая внимание на суффиксы и префиксы.

Rotate – rotation, apply – application, move – movement, develop – development, drive – driver, form – reform – deform – deformation, guide – guidance.

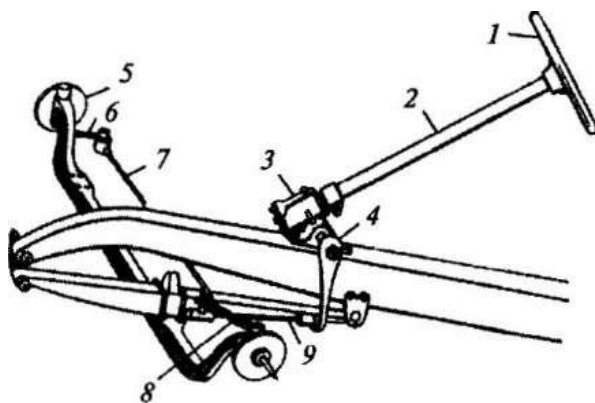
**steering knuckle arm** – рычаг поворотного кулака  
**tie-rod** – поперечная тяга  
**pitman arm** – рулевая сошка  
**rack and pinion assembly** – рулевой механизм с рейкой и шестерней  
**ball joint** – шаровой шарнир  
**leverage** – рычажный механизм  
**Hose** – шланг  
**steering gear assembly** – рулевой механизм  
**rack and pinion type** – реечно-шестеренчатый тип  
**recirculating ball steering** – рулевой механизм с шариковой гайкой  
**worm and sector** – червяк и сектор  
**injury** – повреждение  
**steering box** – картер рулевого механизма

**Упражнение 3. Прочтите текст, а затем выполните следующие за ним упражнения.**

### STEERING SYSTEM

To guide the car, it is necessary to have some means of turning the front wheels so that the car can be pointed in the direction the driver wants to go. The steering wheel in front of the driver is linked by gears and levers to the front wheels for this purpose. The front wheels are on pivots so they can be swung to the left or right. They are attached by steering knuckle arms to the rods. The tie-rods are, in turn, attached to the pitman arm.

When the steering wheel is turned, gearing in the steering gear assembly causes the pitman arm to turn to the left or right. This movement is carried by the tie-rods to the steering knuckle arms, and wheels, causing them to turn to the left or right.



#### Steering System

- 1) steering wheel – рулевое колесо
- 2) steering column, steering mast – рулевая колонка
- 3) steering gear – рулевой механизм
- 4) steering arm, steering lever, (steering) pitman arm – рулевая сошка
- 5) steering knuckle – поворотная цапфа, поворотный кулак
- 6) steering knuckle lever, steering knuckle arm – рычаг поворотного кулака
- 7) single tie-rod – неразрезная поперечная рулевая тяга
- 8) steering knuckle lever, steering knuckle arm – рычаг поворотного кулака
- 9) drag link, steering gear connecting rod, steering drag rod – продольная рулевая тяга

The steering system incorporates: the steering wheel and column, steering gear, pitman arm, steering knuckle arm, front axle, steering knuckle pivot, tie-rods.

There are several different manual steering gears in current use, such as the rack and pinion type and the recirculating ball type. The rack and pinion steering gear is widely used. Another manual steering gear which is popular in imported cars is the worm and sector type.

The steering wheel and column are the source of injury to the driver, air bags and other devices being developed now to save the life of a driver.

Energy-absorbing columns must stop the steering wheel and column from being pushed to the rear as the front of the car is crushed in an impact.

Energy-absorbing columns must also provide the driver with a tolerable impact as he moves forward and strikes the wheel with his chest.

#### VOCABULARY

**guide the car** – управлять автомобилем  
**means of turning** – средство поворота  
**front wheels** – передние колёса  
**steering wheel** – рулевое колесо  
**steering column** – рулевая колонка  
**pivot** – шарнир  
**to swing (swang, swung)** – поворачиваться

**Послетекстовые упражнения**  
**The exercises to be done after reading the text**

**Упражнение 4. Найдите в тексте ответы на вопросы:**

1. What mechanism is necessary to guide the car?
2. How is the steering wheel connected to the front wheels?
3. Why can the front wheels be swung to the left or to the right?
4. What does the manual steering system incorporate?
5. What types of manual steering gears in use do you know?

**Упражнение 5. Переведите на русский язык, обращая особое внимание на герундий.**

1. To guide the car it is necessary to have some means of turning the front wheels.
2. The steering wheel in front of the driver is linked by gears and levers to the front wheels for turning the car in the direction the driver wants to go.
3. Without using the steering system the car moves only in the direct position.
4. Manufacturers can use rack and pinion type steering gear without choosing another type because «rack and pinion» type steering is very dependable.
5. Energy-absorbing columns must stop the steering wheel from being pushed to the rear when the front of the car is damaged in an impact.

**Упражнение 6. Переведите текст, не пользуясь словарём.**

To turn the car you must have some means of turning the front wheels. For this purpose the steering wheel and steering column are linked to the front wheels. The front wheels are on pivots and can be swung to the left or to the right. When the driver turns the steering wheel and column the front wheels (being on pivots) attached by the steering knuckle arms to the tie rods are also turned.

**What to do**

1. Check the steering-wheel free play and steering gear performance while the car is running.
2. Check the steering-gear case for oil leakage by visual inspection.
3. Adjust the steering gear. Steering gear of the worm and roller type is adjusted by end playing in the steering worm shaft bearings.

**Упражнение 8. Переведите предложения на английский язык.**

1. Для управления автомобилем необходима система рулевого управления.
2. Рулевое управление включает в себя: рулевое колесо и рулевую колонку, зубчатое соединение, рулевую сошку, рычаги поворотного кулака и шарнирные соединения, рычаги и поперечные тяги.
3. Существуют различные типы рулевых механизмов, а именно: реечно-шестеренчатый тип, механизм с шаровой гайкой, механизм с червяком и сектором.
4. Когда водитель поворачивает руль влево или вправо, то рулевой механизм заставляет рулевую сошку поворачиваться влево или вправо. Это движение передаётся поперечными тягами к рычагам поворотных кулаков и к колёсам, заставляя их поворачиваться влево или вправо.

## Homework

**Упражнение 9. Прочтите диалог, а затем выполните следующие за ним упражнения.**

### DIALOGUE

**Stas:** Look here. I have some troubles with the steering system.

**Vlad:** What troubles?

**S.:** The first is excessive free play of the steering wheel.

**V.:** You should check free play of the steering wheel and steering gear performance.

**S.:** The second problem is oil leakage from the steering gear case.

**V.:** Check the steering gear case for oil leakage visually. Anything else?

**S.:** Sure. It is disadjustment of the steering gear. And I don't know what to do.

**V.:** You see, in this case it is better for you to go to a repairing shop. Good specialists should do this job.

**S.:** Thank you very much.

**V.:** Not at all.

### Notes:

**look here** – послушай

**troubles** – неисправности, неполадки

**excessive free play** – чрезмерный свободный ход

**check** – проверять

**performance** – работа, характеристики

**steering gear case** – картер коробки передач

**anything else** – что ещё

**in this case** – в этом случае

## USING COMPUTER

**Упражнение 1. Прочтите слова и сопоставьте их с русскими значениями.**

transform, battery, voltage, regulation, system, computer, microprocessor, transistor, diode, chip, material, electricity, magnetic, program, defective, limit, compensate, variation, code.

**Упражнение 2. Переведите слова, обращая внимание на суффиксы и префиксы.**

ignite – ignition, transform – transformation, regulate – regulation, break – breaker, conduct – conductor, process – processor, specify – specific, adapt – adapter – adaptive, expense – expensive, adjust – adjustment, connect – disconnect, learn – relearn.

### VOCABULARY

**to provide** – обеспечивать

**onboard computer system** – бортовой компьютер

**hardware** – аппаратная часть компьютера

**software** – программное обеспечение

**CPU – Central Processing Unit** – центральный процессор

**integrated circuit** – интегральная схема

**semiconductor** – полупроводник

**silicon** – кремний

**specific sequence** – специальная последовательность

**permanent memory** – постоянная память

**ROM – Read only memory** – постоянная память

**RAM – random access memory** – оперативная память

**PROM – programmable read only memory** – программируемая постоянная память

**trouble code** – неисправный код

**expensive** – дорогостоящий

**adaptive memory** – адаптивная память

**Упражнение 3. Прочтите и переведите текст, а затем выполните следующие за ним упражнения.**

### USING COMPUTER

Ever since the car was first invented, a breaker point ignition has been used to transform battery voltage into 20 000 volts to fire the spark plugs. With government intervention and regulation, more advanced **system** was needed. This system had to meet emission control levels, **gas** mileage, and provide a smooth and continuous operation. The answer was found in an on-board computer system. The computer mounted on modern cars has two components. One is the hardware and the other is the software.

The computer hardware on an automobile uses a Central Processing Unit (CPU), which, when made in an integrated circuit, is referred to as a microprocessor. The integrated circuit (IC) combines transistors, diodes, and capacitors, which are placed on a tiny chip of semiconductor material that is smaller and thinner than an eraser on a pencil. The material used most of the time is silicon. Silicon, like any **semiconductor**, does not conduct electricity until either voltage, a magnetic field, heat, or light is directed to the semiconductor. A program instructs the microprocessor what to do.

The computer software on a car carries a program. The program (tells the computer what to do, and when to do it in a specific sequence. The program is stored in a permanent memory, which is referred to as Read Only Memory (ROM). The computer knows only what is placed in its memory.

There is another variation, which is called the Programmable Read Only Memory (PROM), which can be readily removed and replaced, while the ROM cannot. This makes it less expensive if the memory becomes defective. Only the PROM has to be replaced, not the entire microprocessor. The microprocessor contains a ROM (or PROM) and a RAM. RAM stands for Random Access Memory, which can be accessed without going through a specific sequence. The technician interfaces with the RAM whenever trouble codes are accessed. Not all computerized ignition systems have trouble codes, however. Some computers have the ability to learn. This is referred to as an adaptive memory. When a value falls outside of a specified limit, due to engine wear, the adaptive memory makes a slight adjustment in the program to compensate. The car must be driven from 20 to 30 miles, as it takes the computer this long to learn. Any time that power is disconnected from the computer, it will have to relearn everything.

### Послетекстовые упражнения

#### The exercises to be done after reading the text

**Упражнение 4. Найдите в тексте ответы на вопросы:**

1. How many components has the computer on modern cars? What are they?
2. How do we call the computer hardware on the automobile?
3. What does an integrated circuit combine?
4. What material is used in the integrated circuit? Why?
5. What does the computer software do?
6. Why is the computer used on board the car?
7. What does the program tell to the computer?
8. Where is the program stored?
9. What is ROM?
10. What is PROM?
11. What is RAM?



## Homework

### **Упражнение 5. Переведите на английский язык.**

1. Многие современные автомобили оборудованы бортовыми компьютерными системами для лучшей работы автомобиля.
2. Программа такого компьютера имеет только два запоминающих устройства: постоянную память (ПЗУ) и оперативную память (ОЗУ).
3. Компьютерная программа сообщает компьютеру, что надо делать и когда необходимо выполнить данное действие в соответствующей последовательности.
4. Программа хранится в постоянной памяти компьютера.
5. Микропроцессор содержит в себе постоянную и оперативную память.
6. Некоторые компьютеры обладают способностью запоминать (заучивать). Это относится к адаптивной памяти.

### **Упражнение 6. Прочтите диалог, а затем выполните следующие за ним упражнения.**

#### **DIALOGUE**

**Anton:** What is the purpose of using computers on board the car?

**Vlad:** You see. As I know computer is used to advance the engine operation as well as the performance of other units.

**A.:** What components does the on-board computer consist of?

**V.:** It consists of two components. One is the hardware and the other is the software.

**A.:** What is hardware?

**V.:** The computer hardware uses a Central Processing Unit (CPU) which is referred to as a microprocessor.

**A.:** What is software?

**V.:** The computer software on a car carries a program. The program tells the computer what to do and when to do it.

**A.:** And where is the program stored?

**V.:** It is stored in a permanent memory which is called Read Only Memory (ROM).

**A.:** And what is Programmable Read Only Memory (PROM)? What is the difference between ROM and PROM?

**V.:** In case the memory becomes defective PROM can be readily removed and replaced, while ROM cannot.

**A.:** And what is RAM?

**V.:** RAM is Random Access Memory (main memory), which can be accessed without going through a specific sequence. The technician interfaces with RAM whenever trouble codes are accessed.

**A.:** Thanks a lot for your explanation.

**V.:** You are welcome. See you later.

**A.:** Goodbye.

### **Упражнение 7. Разыграйте диалог в паре.**

## FINDING A FAULT IN A CAR

**Упражнение 1. Прочтите текст с целью общего понимания содержания.**

**Упражнение 2. Ответьте на вопросы, помещённые после текста.**

### FINDING A FAULT IN THE CAR

Let's look closer at the engine components that operate together to generate power. The basic unit of the engine is the piston which moves up and down inside a cylinder. As air is compressed in the cylinder, fuel is injected on top of the piston. Under high pressure the fuel mixes with the hot air and self-ignites causing combustion. The force of the combustion pushes the piston and connecting rod down turning the crankshaft and flywheel which drive other components.

During engine operation the piston goes through four strokes: intake, compression, power and exhaust. During the four strokes, the piston moves down and up to complete cycles.

**Intake:** During the intake stroke the piston moves down in the cylinder pulling air past an open intake valve into the combustion chamber.

**Compression:** During the compression stroke all valves are closed, and piston moves up in the cylinder compressing the air. As the air molecules are compressed the air temperature increases dramatically to about 1000°F (537°C). As the piston nears the top of its stroke, fuel is injected into the combustion chamber on top of the piston. The fuel mixes with the hot compressed air and causes combustion.

**Power:** During the power stroke the valves are closed as the forces from combustion push the piston and connecting rod down, thereby turning the crankshaft. The heat energy has now been converted into mechanical power.

**Exhaust:** During the exhaust stroke the inertial force of the turning flywheel helps continue the rotation of the crankshaft to push the piston up again in the cylinder forcing the burned gases out the open exhaust valve. This completes the four strokes of the piston. These four strokes are repeated over and over as the engine operates.

Diesel engine offers the following advantages over automotive-type gasoline engines:

Fuel economy

Diesel engines have higher compression ratios and therefore burn fuel more completely and efficiently.

Reliability

Diesel engines have no electrical ignition system to fail or be maintained. They are built with heavy-duty parts to withstand the higher compression ratios and to operate for long periods with minimum breakdown. In on-highway trucks for instance, diesel engines have a projected service life of many hundreds of thousands of miles.

Power

It depends on engine size, but diesel engines generally produce more torque and power output than gasoline engines.

### **Homework** Questions:

1. What takes place in the combustion chamber during the intake stroke?
2. What takes place in the cylinder during the compression stroke?
3. What takes place in the combustion chamber during the power stroke?
4. What takes place in the combustion chamber during the exhaust stroke?
5. What advantages do diesel engines offer?



## GAS ECOLOGY

**Упражнение 1. Прочтите текст с целью общего понимания содержания.**

**Упражнение 2. Найдите в тексте предложения, в которых говорится о том, чего не следует делать.**

### GAS ECOLOGY

There are many ways that we can reduce pollution by observing good gas ecology – that is using our cars in fuel efficient ways.

Don't move the car unless you are going somewhere. Plan ahead. Starting the car up just to move it a short distance produces more pollutants than hours of driving on the freeway.

Don't use your heater until the car is warmed up. The engine will start more quickly, because it won't be losing heat to warm you.

Try to drive within 35–45 miles per hour when possible. Driving at slower speeds reduces engine efficiency and causes more pollutants.

Don't make fast starts or stops. Fast starts can burn more than 50% gas than regular acceleration (as well as cause 50% more emissions). When a big burst of gas enters the engine, much of catalytic converter's job is bypassed and the unburned gas comes out the tailpipe or is sent into the converter. Rapid acceleration is only called for in emergency or passing situations. Stopping rapidly also leaves the engine with a lot of unburned gas to deal with. This results in damage to the converter and pollution.

Try not to idle. At bank lines and fast food places with over thirty second waits, turn the engine off, and restart it. It is more fuel efficient, and causes less pollution. The only time that idling is a good thing is after a long, fast run. Idling the engine for a minute or so after one of these helps get rid of any hot spots and fuel vapors.

Keep to steady speeds on the highway. Changing speeds produces more pollution and uses more gas. Don't use the air conditioner unless you have to. It makes your engine work harder, uses more gas, and causes more pollution. Most evaporative emissions get into the atmosphere when we put gas in our cars. Make sure your gas cap is the right one, and in good working order. Gas caps don't cost that much, but are very important in anti-pollution.

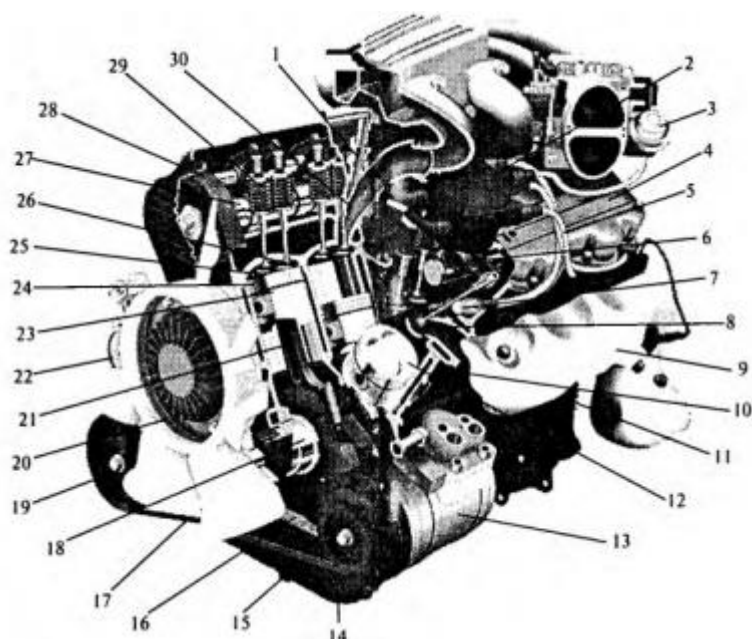
Since gasoline expands, never overfill your tank. It will wind up leaking out.

Use known brands of gas. Poor quality gas will not save you money. Instead, it will foul your engine and cause it to function badly. Try several different brands and octane ratings to find out which makes you car the happiest, and stay with it.



**Упражнение 3. Кратко перечислите, что необходимо предпринять для улучшения экологических условий.**

## GASOLINE ENGINE



*Gasoline engine*

### VOCABULARY

- injector** – инжектор
- crankshaft** – коленчатый вал
- inlet valve** – впускной клапан
- cooling fan** – охлаждающий вентилятор
- exhaust valve** – выпускной клапан
- camshaft** – распределительный вал
- engine block** – блок цилиндров
- spark plug** – свеча зажигания

### **Упражнение 1. Проверьте правильность перевода.**

1. Injector – маховик
2. Intake manifold – поршень
3. Valve spring – компрессор воздушного кондиционера
4. Timing belt – поддон картера
5. Camshaft – крышка головки блока цилиндров
6. Inlet valve – генератор переменного тока
7. Combustion chamber – шатун
8. Ring – уплотнительная прокладка поддона картера
9. Piston skirt – выпускной коллектор
10. Alternator – выпускной клапан
11. Connecting rod – кольцо (поршневое)
12. Cooling fan – юбка поршня
13. Pulley – крышка распределителя зажигания
14. Crankshaft – маслосливная пробка
15. Fan belt – ремень (привода) вентилятора
16. Oil pan gasket – блок цилиндров
17. Oil drain plug – камера сгорания
18. Oil pan – вакуумный корректор (диафрагма)
19. Air conditioner compressor – клапанная пружина
20. Piston – ремень синхронизации фаз распределения зажигания
21. Flywheel – охлаждающий вентилятор
22. Engine block – распредвал
23. Exhaust manifold – впускной клапан
24. Exhaust valve – коленчатый вал
25. Spark plug – свеча зажигания
26. Rocker arm – коромысло

27. Spark plug cable – свечной провод
28. Cylinder head cover – шкив
29. Vacuum diaphragm – инжектор
30. Distributor cap – впускной коллектор



**Упражнение 2. Составьте 10 предложений со словами из упражнения 1.**

## **DIESEL ENGINE**

**Упражнение 1. Прочтите и переведите текст, а затем выполните следующие за ним упражнения.**

### **DIESEL ENGINE**

In 1890s Rudolf Diesel, a German, invented the engine that bears his name. As distinguished from gasoline engines diesels have no ignition system fed with electricity. The fuel is ignited simply by contact with very hot air in the cylinder.

The operation performed is like this: when taken in the cylinder the air is highly compressed, the temperature rises so the heated fuel-air mixture burns. The higher the pressure, the higher the temperature. Besides the compressed mixture produced more power than that uncompressed.

Diesel engines power many of the used vehicles and other equipment. They are usually used in cases where engine weight is not a prime factor. Their advantage is that they are simple in design and use much heavier liquid fuels than gasoline engines. The cost of a heavier fuel is much less than that of a light one. Besides the fuel consumption of a diesel is much less than that of gasoline engines.

Although applied for many purposes diesel engines have certain disadvantages. Their weight is more than that of a gasoline engine of the same power and it occupies much space. The disadvantages of diesels as passenger-car engines are slow performance, noise and smoke.

All the companies investigating diesels are trying to reduce noise and smoke, but the problems are not yet entirely solved. Diesel engines clatter when started on a cold morning. And the warm-up period for all diesels seems too long to drivers accustomed to gasoline models.

### **VOCABULARY**

**ingenious device** – хитроумное устройство

**ability** – способность

**power plant** – силовой агрегат

**thrust** – сила тяги, тяга

**ratio** – соотношение

**power output** – выходная мощность

**specific fuel consumption** – удельное потребление топлива

**flexibility** – гибкость

**to run smoothly** – работать устойчиво, ровно

**to work at** – работать над

**overhaul** – переборка двигателя

**full load** – полная нагрузка

**advantage** – преимущество

**disadvantage** – недостаток

**Упражнение 2. Прочитайте и переведите предложения.**

1. The higher the pressure, the higher the temperature.
2. Their weight is more than that of a gasoline engine.
3. The cost of a heavier fuel is less than that of a light one.
4. The fuel consumption of a diesel is much less than that of gasoline engines.

**Упражнение 3. Составьте из приведённых ниже слов возможные словосочетания.**

Electricity, the, that, his, ignition, to, be, warm, system, performed, up, bears, period, with, fed, engine.

**Упражнение 4. Дополните и переведите словосочетания.**

To be \_\_\_\_\_ with electricity, the operation \_\_\_\_\_, warm-up \_\_\_\_\_, the engine that \_\_\_\_\_ his name, \_\_\_\_\_ system.



**Упражнение 5. Переведите со словарём на русский язык предложения, выделенные в тексте «Diesel engine» жирным шрифтом.**

## COOLING SYSTEM

**Упражнение 1. Прочтите и переведите текст.**

### COOLING SYSTEM

The manufacturer of **cooling system components** should be involved with vehicle design at the **concept stage**. This can result in **optimum radiator location** and frontal area as well as necessary mounting provisions. The **present state of the art** provides the vehicle designer with the basic details of radiators, oil coolers, and the **problems they face**. Among the most important engineering aspects are the design and **installation** of radiators and oil coolers for optimum cooling and air flow.

#### Frontal area

Selection of cooling system **frontal area**, fan diameter, and relative fan location are critical to efficient operation and economy. Systems with large frontal areas and fans reduce fan horsepower, noise, and vehicle system resistance because the air is better distributed and moves less rapidly. Every effort should be made by the vehicle designer to maximize the **frontal area available** for the cooling system. A good rule is that 20 percent more frontal area **provides** 10 percent more cooling with the same fan and fan speed.

#### Fan location

The fan should be spaced 2–3 times its projected width from the radiator core **to improve** efficiency and air **distribution**, while reducing noise. Help also comes from mounting the fan on **spacers** and keeping it as far as possible from the engine. Air flow testing is desirable **prior** to **decision-making**.

#### Air distribution

The **discharge pattern** of a fan is **doughnut shaped**; moving the fan away from the **radiator core** and engine and using a well-designed **shroud** to even out the velocity distribution: a 30 percent velocity increase raising cooling about 20 percent.

### VOCABULARY

**cooling system** – система охлаждения

**installation** – установка

**frontal area** – фронтальная часть

**horsepower** – лошадиная сила

**to improve** – улучшать

**distribution** – распределение

**discharge pattern** – тип раструба (для прохождения воздушного потока)

**doughnut** – овальный

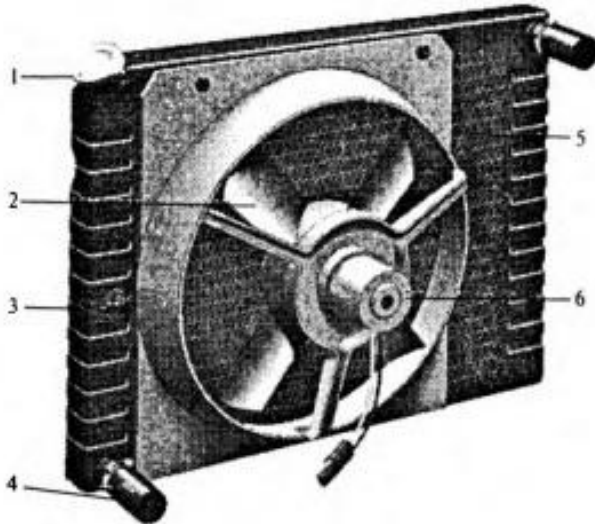
**shroud** – кожух

**clearance** – зазор

**rubber sheet** – резиновая полоска

## Fan considerations

**Fan tip clearance** should be the minimum that can be **tolerated** without having the fan hit the **shroud** in any operational **mode**. To maximize fan efficiency, some vehicle manufacturers use close fitting **rubber sheet** on the fan shroud and let the fan cut its own clearance.



**Radiator**

- 1 – filler cap – крышка наливного отверстия
- 2 – cooling fan – охлаждающий вентилятор
- 3 – fan thermostat – термостат вентилятора
- 4 – radiator hose – патрубок радиатора
- 5 – grille – решётка радиатора
- 6 – electric motor – электромотор

## **Homework**

### **Упражнение 2. Дополните диалог.**

- Good morning!
- Good afternoon!
- Let me introduce myself. My name is \_\_\_\_\_. I am a student \_\_\_\_\_. I am interested in \_\_\_\_\_.
- How can I help you? Do you know that \_\_\_\_\_. Let me tell you about \_\_\_\_\_.
- Can you describe me \_\_\_\_\_? What are the main characteristics of \_\_\_\_\_.
- Thank you for help! It was nice to meet you.
- See you.
- Good bye.

## **VOCABULARY**

- drive wheels** – ведущие колёса
- transmission** – трансмиссия
- motive power** – движущая сила
- drive shaft** – ведущий мост
- rear-axle** – задняя ось
- to revolve** – вращаться
- suspension** – подвеска
- jerk jar** – резкое движение, вибрация
- stiff** – жёсткий
- bend down** – наклоняться
- spindle** – ось, вал
- to be fit with** – быть снабжённым
- knuckle** – шарнир

## TRANSMISSION OF POWER IN AUTOMOBILE

### **Упражнение 1. Прочтите и переведите текст.**

The power from the engine to the drive wheels is transmitted through the transmission which is composed of the following mechanisms: clutch is a device which permits the engine to be connected with, or disconnected from, the transmission mechanisms, so that the car may, or may not, move while the engine is running.

**Gearbox** is a mechanism regulating the **motive power** of the engine, which is transmitted to the drive wheels of the automobile.

Through **drive shaft** power is transmitted from the engine to the rear-axle. It is located between the gearbox and the rear-axle.

**Differential** is the device that permits the rear wheels to revolve at different speeds **independently one of the other**.

Front-axle and rear-axle suspensions **serve to support the automobile**.

**The front suspension** of a car carries about 80% of the weight of the engine, and must at the same time withstand the **shocks and jerk, jars** that it receives through the **steering wheels**; it must, therefore, **be strong and stiff**. It also carries about 20 to 40 percent of the weight of the entire car.

The center of the axle is **bent down**, so that it is the lowest point of the car **except** the wheels. This is done **in order to** protect the mechanism from being struck by high spots in the road. A rock or a stump, standing up high enough **to hit** the **flywheel**, will first strike the axle which is strong enough **to withstand a blow** that could easily **damage** the engine.

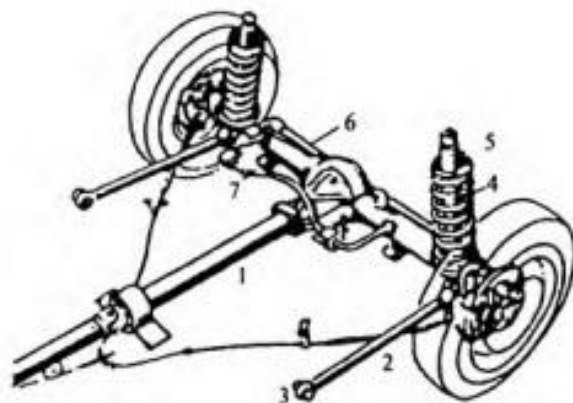
The steering **spindles** are that part of the front axle on which the front wheels revolve. They are made of **nickel steel, heat-treated**. The steering spindles are **fitted with** either roller or **ball bearings**. The **steering knuckle** is that part which fits into the **joke** of the axle.

### **The rear axle suspension**

There are two types of rear axles: «**dead axle**» and «**live axle**». The rear axle carries from 60 to 80% of the car weight. Dead axles are **stationary**, with the wheels running **free** on the ends of the axle. Live rear axles is the name given to axles that revolve with the wheels, and are known as «plain» live axle, «semi-floating» axle, «three-quarter floating» axle, «full-floating» axle. The axle shafts on a «live» axle are in two sections. The inner end is connected with the **differential gear**; the outer ends are connected to the **drive wheels**. It is necessary to support the axle parts in a strong housing. Nowadays multilink **rear suspension** is standard.

### **Live axle (ведущий мост с вращающейся осью)**

1. Propeller shaft – карданный вал
2. Trailing arm – продольный рычаг подвески
3. Rubber bush – резиновая втулка
4. Coil spring – пружинная рессора
5. Damper – амортизатор
6. Panhard rod – тяга Панара
7. Stabilizer bar – стержень стабилизатора



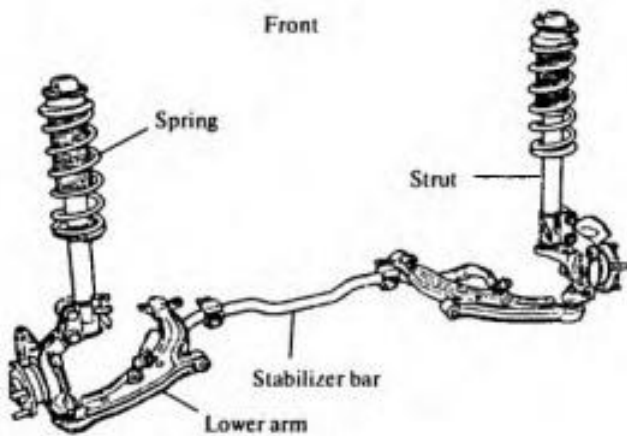
### **Упражнение 2. Переведите слова и словосочетания в тексте, выделенные жирным шрифтом.**

## Homework

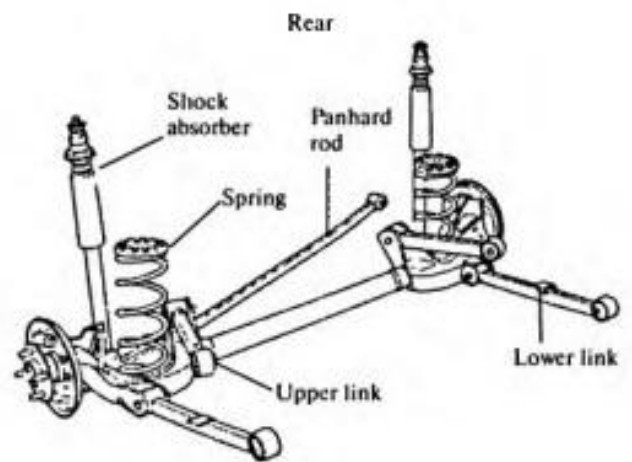
Упражнение 3. Просмотрите текст и кратко перескажите текст на русском языке.

## SUSPENSIONS

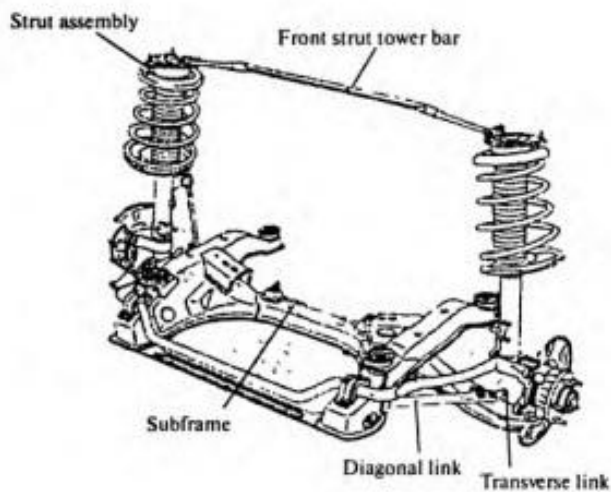
Упражнение 1. На основе пройденного материала и визуальной информации, попытайтесь перевести без словаря обозначения элементов и узлов подвески, изображённых на рисунках. Проверьте правильность перевода.



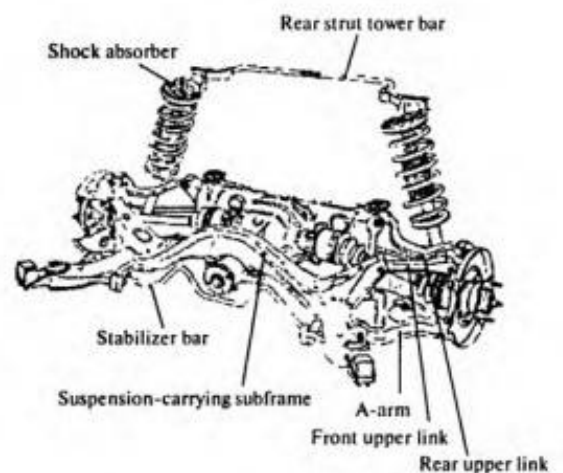
Передняя подвеска  
мини-автомобиля «Майкра»



Задняя подвеска  
мини-автомобиля «Майкра»



Передние стойки Макферсона



Стандартная многорычажная задняя подвеска

## UNIVERSAL JOINTS

### Упражнение 1. Прочитайте и переведите текст.

A **universal joint** is a **flexible connection** between two shafts, which permits one to drive another, although they may not be in line.

Universal joints are usually placed at the ends of the **propeller shaft**. They are also termed cardan joints.

Universal joints are necessary on automobiles with **shaft drive**, for while one end of the **driving shaft** is attached to the transmission shaft which is on the frame, the other end is connected to the axle, and is **constantly moving up and down** as the wheels follow the **roughness of the road**.

If no universal joints were used, **the shaft would jam** in its bearings from the **up and down movement** of one end of it. The propeller or driving shaft has two universal joints. The **driving and driven gears** are contained within a **case** that supports the bearings for the parts of the axle and also the end of the driving shaft. All of the moving parts are **enclosed and protected from dust**, and run in **grease or oil**, which means **perfect lubrication**.

### VOCABULARY

**universal joint** – карданный шарнир

**move up** – двигаться вверх

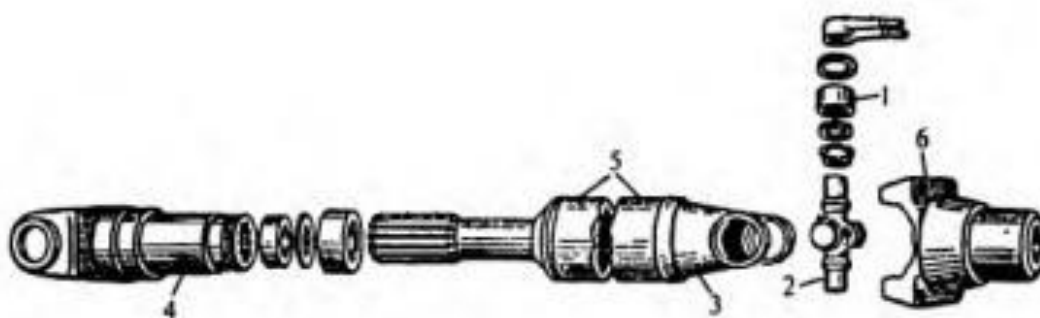
**move down** – двигаться вниз

**roughness** – жёсткость

**to jam** – останавливаться, сжиматься

**lubrication** – смазка

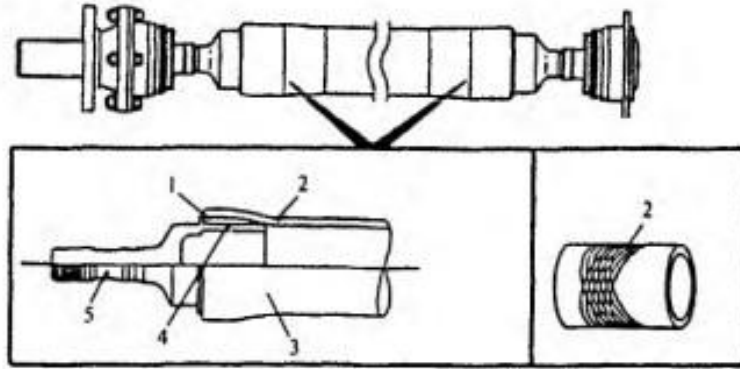
Упражнение 2. Подберите из правого столбика перевод обозначений на рисунках, используя следующие слова и словосочетания. Правильность перевода проверьте в ключах.



### Карданная передача, карданный привод

1. Universal-joint flange – игольчатый роликовый подшипник с закрытым торцом
2. Universal-joint center cross, trunnion cross – фланец крепления кардана
3. Universal-joint fork – скользящая вилка кардана
4. Universal-joint slip yoke – труба карданного вала
5. Universal-joint shaft tube, propeller shaft tube – вилка кардана
6. Needle bearing with closed end – крестовина кардана





*Карданный вал «Паджеро» 2000 года,  
сделан из усиленного углеродными нитями пластика*

1. Hoop layer – шлицованное, зубчатое уплотнение
2. Helically wound layer – труба из пластика, усиленного углеродным волокном
3. Carbon-fiber-reinforced plastic tube – вал
4. Separated fitting – стягивающий слой
5. Shaft – геликоидальный витой слой

## HEAVY VEHICLE SUSPENSION CONTROL

**Упражнение 1. Определите с помощью словаря возможные варианты перевода слов *cargo, suspension, upper, damping*. Составьте предложения с этими словами.**

**Упражнение 2. Дополните и переведите словосочетания.**

Shock \_\_\_\_\_, air \_\_\_\_\_, manually \_\_\_\_\_ system, long \_\_\_\_\_ transportation, cargo \_\_\_\_\_.

**Упражнение 3. Прочтите и переведите текст.**

### HEAVY VEHICLE SUSPENSION CONTROL

Heavy vehicles used for **long-distance transportation** experience widely varying road conditions and **traffic** situations. Optimum riding comfort and **cargo protection** **must be maintained** with full-, partial-, and no-loads **without sacrificing** driving safety and good **handling characteristics**.

With a soft **suspension**, ride comfort is achieved and **impacts on the payload** and cabin are reduced. However, optimized handling of a fully loaded vehicle requires increased **damping** that can result in **drastically** reduced comfort when the truck is **empty** or **partially** loaded. Therefore, a damping control system that can **adapt** to varying driving and load conditions is the ideal **solution**.

### VOCABULARY

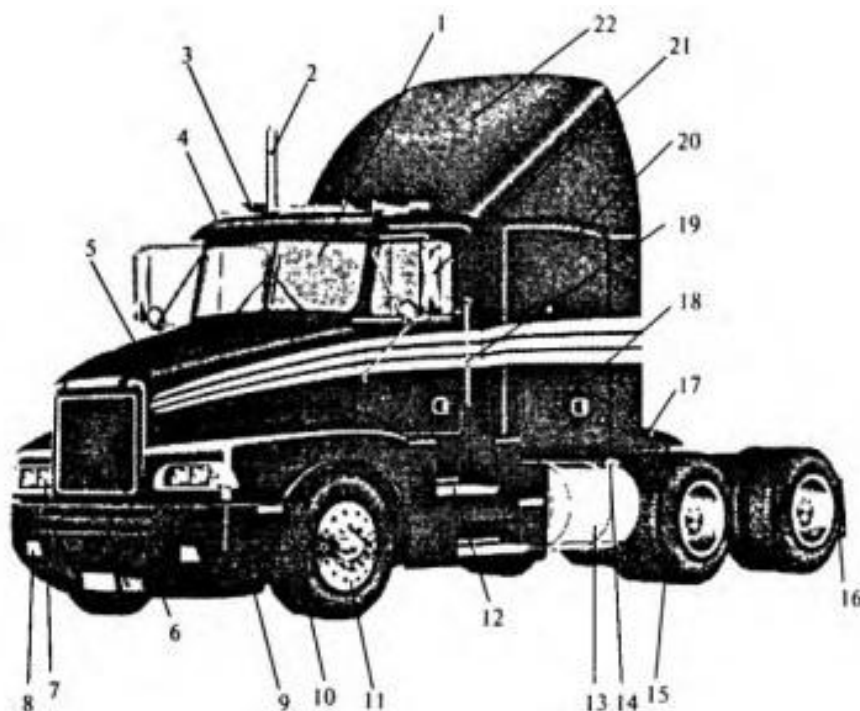
**to maintain** – обслуживать  
**to sacrifice** – пожертвовать  
**solution** – решение  
**adjustable** – регулируемый  
**coach** – автобус  
**velocity** – скорость  
**damping force curve** – кривая силы демпфирования  
**steep** – большой, крутой  
**bracketry** – крепёжные элементы, кронштейны

Manually adjustable and **electronically controlled shock absorbers** have been **available** in the upper class passenger car market for some years. The heavy **truck** market in Europe has offered such systems combined with controlled **air suspensions** for about two years. In Japan, **coaches** are equipped with a **manually adjustable system**.

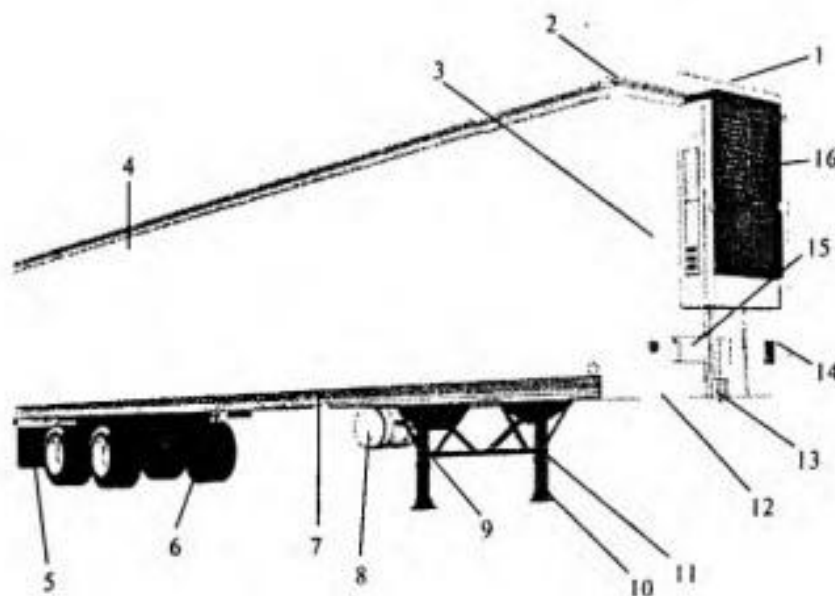
For comfort, the **optimum damping** should be as low as possible, and for safety the damping should be higher at high damper **velocity**. The required **damping force curve** increases with a **steep gradient** at low damping speeds to reduce **roll movement** at higher damping speeds, the forces should «blow off» to reduce impacts on the **bracketry**.

### *Грузовой тягач*

1. Windshield – ветровое стекло
2. Exhaust stack – выхлопная труба
3. Air horn – пневматический звуковой сигнал
4. Marker light – габаритный фонарь
5. Hood – капот
6. Radiator grill – решетка радиатора
7. Headlight – передняя фара
8. Fog light – противотуманная фара
9. Bumper – бампер
10. Fender – крыло
11. Wheel – колесо
12. Step – ступенька
13. Fuel tank – топливный бак
14. Filler cap – крышка горловины топливного бака
15. Tyre – шина
16. Mud flap – грязевой щиток, брызговик
17. Fifth wheel – прицепное устройство сидельного тягача, «пятое колесо»
18. Storage compartment – отделение для запасных частей и автопринадлежностей
19. Grab handle – поручень
20. Sleeper cab – спальная кабина
21. West Coast mirror – наружное зеркало
22. Wind deflector – дефлектор, отражатель потока воздуха



## Полуприцеп



1. Refrigeration unit – холодильная установка
2. Market light – габаритный фонарь
3. Frontwall – передняя стенка
4. Sidewall – боковая стенка
5. Mud flap – брызговик, грязевой считок
6. Reflector – отражатель
7. Side rail – лонжерон, продольная балка
8. Auxiliary tank – запасной топливный бак
9. Support leg crank – угловой рычаг опорной стойки
10. Sand shoe – «песчаный башмак», платформа против погружения в грунт под нагрузкой
11. Support leg – опорная стойка
12. Ring pin – поворотный шкворень
13. Electrical connection – электрический разъем
14. Partlow chart – схема контроля работы агрегатов автомобиля фирмы «Партлоу»
15. Battery box – отсек под аккумуляторную батарею
16. Vent door – вход воздуховода

**Упражнение 4. Найдите в тексте синонимы слов *protection, controlled*.**

**Упражнение 5. Заполните пропуски в предложениях в соответствии с содержанием текста и переведите предложения.**

Heavy vehicles used for long-\_\_\_\_\_ experience widely varying road conditions and traffic situations. Optimum riding comfort and cargo protection must be \_\_\_\_\_ with full-,partial-, and no-loads without sacrificing driving safety and good \_\_\_\_\_ characteristics. A damping control system that can \_\_\_\_\_ to varying driving and load conditions is the ideal \_\_\_\_\_.

Manually adjustable and electronically \_\_\_\_\_ shock absorbers have been available in the upper class passenger car market for some years. The heavy truck market in Europe has offered systems combined with controlled \_\_\_\_\_ for about two years.

### VOCABULARY

- component** – составная часть
- hazard** – риск
- in a well coordinated manner** – должным образом скоординировано
- accident** – происшествие
- unsafe** – небезопасный
- danger** – опасность
- to ensure** – обеспечивать
- traffic** – дорожное движение
- slight** – лёгкий, тонкий
- to harden** – уплотняться, затвердевать
- flyover** – эстакада
- underpass** – туннель



**Упражнение 6. Переведите вопросы на русский язык. На основе ответа на вопросы кратко перескажите основное содержание текста.**

1. What do heavy vehicles experience on the road?
2. May we sacrifice driving safety and good handling characteristics?
3. What is the ideal solution for a damping control system?
4. Are electronically controlled shock absorbers available in the car market?
5. Are there systems combined with controlled air suspension in the heavy truck market?

## **DRIVER, VEHICLE AND ROAD**

**Упражнение 1. Определите с помощью словаря возможные варианты перевода слов fail, accident, highways, sound, curve, avoid, boredom.**

**Упражнение 2. Переведите однокорневые и производные слова и объясните причины изменения их значения.**

Essence, essential, essentially, essentiality

Create, creator, creature, creation, created, creates, creating

Determine, determined, determines, determining, determination

**Упражнение 3. Прочитайте и переведите текст на русский язык.**

### **DRIVER, VEHICLE AND ROAD**

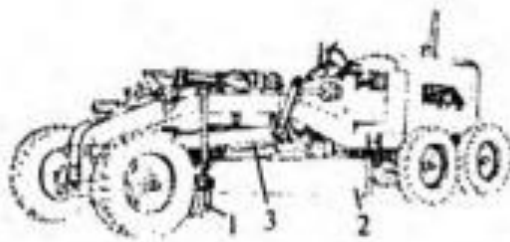
Transportation is a system consisting **essentially** of three components: driver, vehicle, and road. If any one of these components fails, the whole system would fail, and conditions of **hazards** would be **created** on the road.

To provide a safe and evident transportation system, it is necessary that all of these three components should function in **a well coordinated manner**.

Driver. Studies have shown that 86% of the serious **accidents** are **caused by drivers**.

Vehicle. This component also plays a vital part in determining safety on roads. An **unsafe** vehicle is a source of constant **danger** in a road transportation system.

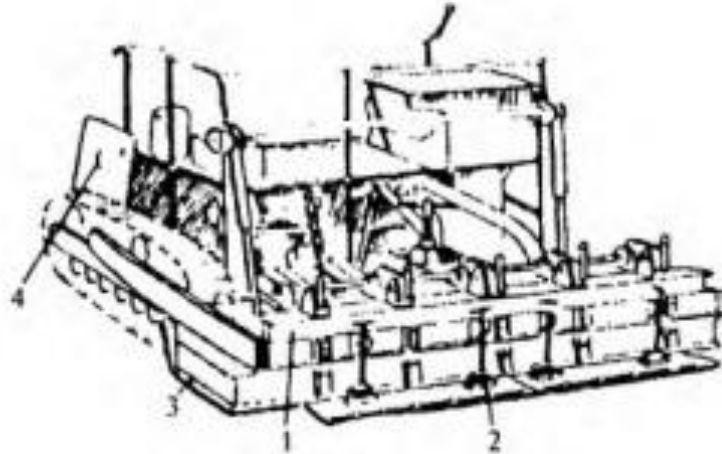
Road. **To ensure maximum** safety for the transportation system, it is necessary to plan and design highways on **sound engineering techniques**.



**Grader**

1. Scarifier – рыхлитель
2. Grader leveling – выравнивающий нож грейдера
3. Blade-slewing gear – поворотный механизм ножа

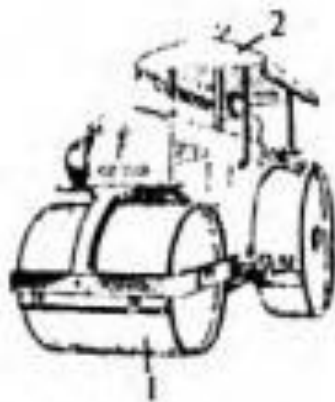
Modern roads. Modern roads should possess the following principal features. They should be designed according to the **anticipated volume and speed of the traffic**. Bends and gradients should always be **slight**. Visibility should not **be hindered**. They should be well lit. Hedge and tree planting on the road sides should provide a pleasant and interesting outlook **to avoid monotony and boredom**.



***Road metal spreading machine***

1. Tamping beam – трамбующая балка
2. Sole-plate – опора
3. Side stop – боковой ограничитель
4. Side of storage bin – борт бункера расходного запаса материала

Stabilization can be carried out by adding substances that **harden** the soil, and greatly increase its **compressive strength**. The **constantly increasing volume** of modern traffic involves the construction of numerous **auxiliary** structures, such as bridges, **flyovers**, tunnels, and **underpasses**. It is mainly these structures that will **present** problems for the engineers.



***Three-wheeled roller, a road roller***



**Упражнение 4. Заполните пропуски в предложениях, в соответствии с содержанием текста.**

Transportation is a system \_\_\_\_\_ essentially of three components: driver, \_\_\_\_\_, and road. If any one of these \_\_\_\_\_ fails, the whole system would be in conditions of \_\_\_\_\_ would be created on the road. To \_\_\_\_\_ a safe and efficient transportation system, it is necessary that \_\_\_\_\_ all of these three components \_\_\_\_\_ function in a well \_\_\_\_\_ manner. Of all the above \_\_\_\_\_ components driver is the most \_\_\_\_\_ component influencing safety on a road. It is possible to obtain maximum \_\_\_\_\_ on highways by controlling their geometry \_\_\_\_\_ of vertical and horizontal \_\_\_\_\_ and providing adequate \_\_\_\_\_ distances. Hedge and tree planting on the \_\_\_\_\_ sides should provide a pleasant and interesting outlook to \_\_\_\_\_ monotony and boredom. In modern road construction, there is much greater \_\_\_\_\_ of the importance of the subsoil \_\_\_\_\_ a road. It is \_\_\_\_\_ as an integral part of the road. In case of mechanical stabilization \_\_\_\_\_ or \_\_\_\_\_ materials are added to the subsoil. In dry climates it is necessary to add \_\_\_\_\_ helping to \_\_\_\_\_ sufficient. Stabilization can be carried out by adding substances that \_\_\_\_\_ the soil, and greatly increase its \_\_\_\_\_ strength.

**VOCABULARY**

**differential** – дифференциал  
**corner** – угол  
**mechanism** – механизм  
**engine** – двигатель  
**resistance** – сопротивление  
**distance** – расстояние  
**inside** – внутренний  
**outside** – внешний  
**difference** – разница

**THE DIFFERENTIAL**

**Упражнение 1. Переведите слова и словосочетания, выделенные в тексте жирным шрифтом.**

**THE DIFFERENTIAL**

It is necessary **to provide** an automobile with a differential, in order that the rear wheels may **revolve** at different speeds when the car **turns a corner**, while at the same time both are **being driven by the engine**.

The differential is an automatic mechanism which operates according to the **resistance of the road against the revolving wheels**. When a car turns a corner, it is necessary for the **outside wheel** to revolve faster, because it has a longer distance **to travel** than the **inside wheel**. The outside wheel revolves faster than the inside wheel if the car turns to the right.

The **axle shaft** of the outside wheel being attached to the wheel, must revolve faster than the axle shaft of the inside wheel when turning to the right, and slower if turning to the left. Therefore, to compensate for this difference in speed of the two wheels, the **bevel gears** on the ends of the axle shafts **mesh with** the small bevel gears, called **compensating or differential gears**.

**VOCABULARY**

**end-of-life disposal** – использование после завершения жизненного цикла  
**customer** – потребитель  
**air-conditioning** – кондиционирование воздуха  
**refrigerant** – хладагент  
**modification** – видоизменение  
**coolant** – охладитель  
**fuel-saving technology** – топливно-сберегающая технология  
**to recycle** – перерабатывать  
**atmosphere** – атмосфера  
**to implement** – применять

**Упражнение 2. Просмотрите текст и кратко перескажите основное содержание текста на русском языке.**

## VEHICLES AIR CONDITIONING AND ENVIRONMENT

**Упражнение 1. Определите с помощью словаря возможные варианты перевода слов *billion, emission, warming, compartment, design*.**

**Упражнение 2. Переведите цепочки слов.**

Environmental concern, end-of-life disposal, global warming gas, engine compartment, passenger compartment, cost-benefit analysis, fuel-saving technology, far-reaching, technician service procedures, refrigerant recycling standard, to prevent unnecessary release of refrigerant, need to be changed, total vehicle emissions.

**Упражнение 3. Прочитайте и переведите текст на русский язык.**

### VEHICLES AIR CONDITIONING AND ENVIRONMENT

In the near future, there will be 1 billion vehicles on the world's roads. As this number grows, so does environmental concern over fuel usage, emissions, and end-of-life disposal.

Today's vehicles are composed of many systems, each affecting customer satisfaction and environmental impact. One of many such systems is air-conditioning (A/C). Customers have come to expect the high level of comfort and safety current systems offer. As a result, A/C is now standard on most new vehicles in the U.S. while demand for it in Europe and Asia is rising.

The refrigerant used in current systems is HFC-134a, which is classified as a global warming gas and is under scrutiny for possible phase-out in Europe. Emissions of HFC-134a from vehicle A/C systems account for about 0,1% of total world emissions. While the automotive industry is improving HFC-134a systems, it is evaluating two replacement refrigerants: carbon dioxide (CO<sub>2</sub>) and propane. The CO system has higher operating pressures; if used, CO<sub>2</sub> would require all new A/C system components.

The use of propane requires only a modification of the existing HFC-134a system. In the secondary-loop propane system, a device in the engine compartment chills a coolant (water-glycol). This coolant, not propane, circulates through the passenger compartment.

Although these technical options are promising, cost-benefit analysis is needed to understand the environmental and consumer benefits they offer compared to other potential vehicle fuel-saving technologies.

The international impact of SAE (Society of Automotive Engineers) documents on mobile A/C systems is far-reaching. SAE standards for system design, service equipment, and technician service procedures and training have been used throughout the world. Equipment based on SAE's refrigerant recycling standards is being used in both developed and developing countries to prevent unnecessary release of refrigerant to the atmosphere during service.

Vehicle makers will have to determine which systems need to be changed to best manage total vehicle emissions and then implement those changes.

**Упражнение 4. Дополните и переведите словосочетания.**

Fuel-\_\_\_\_\_ technology, far-\_\_\_\_\_, technician \_\_\_\_\_ procedures \_\_\_\_\_ compartment, passenger \_\_\_\_\_, cost-benefit \_\_\_\_\_, environmental \_\_\_\_\_, end-of-life \_\_\_\_\_, global \_\_\_\_\_ gas refrigerant \_\_\_\_\_ standard, to prevent \_\_\_\_\_ release of refrigerant, need to be \_\_\_\_\_, total \_\_\_\_\_ emissions.

## Homework

**Упражнение 5. Заполните пропуски в предложениях в соответствии с содержанием текста и переведите предложения.**

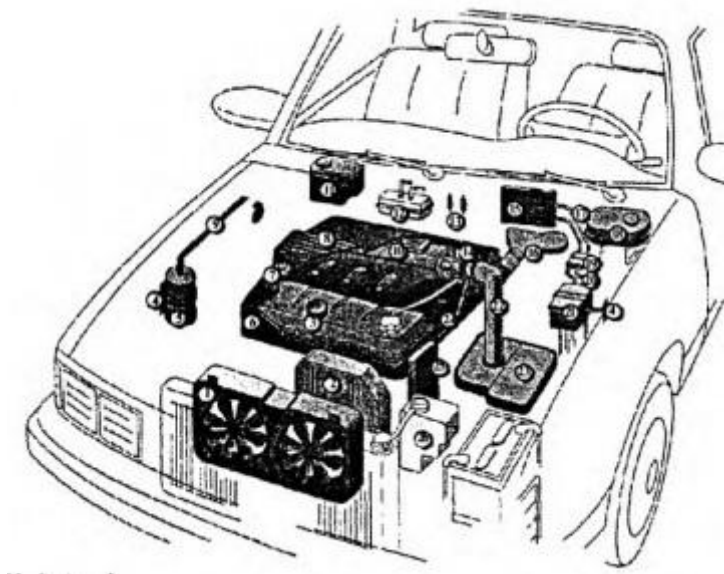
In the near future, there will be 1 \_\_\_\_\_ vehicles on the world's roads. As this number grows, so does \_\_\_\_\_ concern over fuel usage, \_\_\_\_\_, and end-of-life \_\_\_\_\_.

Today's vehicles are \_\_\_\_\_ of many systems, each \_\_\_\_\_ customer satisfaction and environmental \_\_\_\_\_. One of many such systems is air-conditioning (A/C). Customers have come to expect the high level of comfort and \_\_\_\_\_ current systems offer. As a result, A/C is now standard on most new \_\_\_\_\_ in the U.S. while \_\_\_\_\_ for it in Europe and Asia is rising. Although the technical options are promising, \_\_\_\_\_ analysis is needed to understand the \_\_\_\_\_ and consumer benefits they offer compared to other potential vehicle \_\_\_\_\_-saving technologies. Vehicle makers will have to \_\_\_\_\_ which systems need to be changed to best manage total \_\_\_\_\_ emissions and then \_\_\_\_\_ those changes.

## UNDERHOOD

**Упражнение 1. Основываясь на пройденном материале, попытайтесь перевести названия узлов и агрегатов.**

1. Fan and shroud –
2. Transmission cover –
3. Oil cap –
4. Brackets –
5. Vapor canister –
6. Cam/rocker cover –
7. Electronic coil cover –
8. Engine cover –
9. Tubing –
10. Air intake manifold –
11. Power steering reservoir –
12. Cruise control vacuum canister –
13. Clips –
14. Throttle –
15. Power distribution center –
16. Air resonator –
17. Convoluted tubing –
18. Power brake reservoir –
19. Connectors –
20. Wire jacketing –
21. Electronic control module –
22. Air duct –
23. Air cleaner –
24. Oil dip stick –
25. Timing belt cover –
26. Overflow bottle –



**Underhood**



## IRIZAR (SCANIA)

**Упражнение 1. Отработайте произношение и переведите цепочки слов на русский язык.**

Firm commitment to innovation, longstanding industrial tradition, overturning resistance of the superstructure, strength of the seat anchoring, close vehicle air conditioning and heating, elimination of external moldings, strictest policy in safety standards.

**Упражнение 2. Дополните и переведите на русский язык словосочетания.**

Annual \_\_\_\_\_, \_\_\_\_\_ components, a matter \_\_\_\_\_, \_\_\_\_\_ plant, \_\_\_\_\_ service, overturning \_\_\_\_\_, \_\_\_\_\_ account, safety \_\_\_\_\_, ample \_\_\_\_\_, strictest \_\_\_\_\_, seat \_\_\_\_\_, current \_\_\_\_\_.

**Упражнение 3. Прочитайте и переведите текст на русский язык.**

Come into the world of IRIZAR's technology and design, IRIZAR is the Spain's leading coach builder, and has achieved its privileged position **amongst** European coach builders due to its firm **commitment** to innovation, safety, economy, quality and service.

IRIZAR's plant in the Basque country is located in an area with a **longstanding** industrial tradition and which is also one of the main communication links between Spain and France.

IRIZAR is a part of MONDRAGON COOPERATIVE CORPORATION – an industrial and services group, comprising some one hundred companies. The group employs over 26 thousand workers and has an **annual turnover** in excess of 4 billion dollars.

The MONDRAGON COOPERATIVE CORPORATION groups together various sectors as diverse as capital goods, **automotive components**, **domestic appliances** and electronic components, industrial services, construction, household goods and distribution with leading companies like FAGOR, DANOBAT and EROSKI.

The Corporation also has its own financial institution – CAIILABORAL. MCC is an efficient, well-established group which is striding confidently into the future – and this is reflected in IRIZAR, one of its leading companies. Having firmly decided to develop its own **R&D**, the company has produced some highly successful products over the years.

Its most recent success, the Century Coach, has been awarded the 1994 Coach of the Year Prize in the United Kingdom. In addition to this important Prize, IRIZAR has also obtained the **ISO 9001** Certification which says everything about the high level of quality at which the company works. But the quality and technological innovation of today are not **a matter of chance** but rather the result of serious, constant work for over more than one hundred years.

The company was founded in 1889 and since then it has been engaged in the construction of coach work for passenger transport. The **enormous experience**, it has accumulated over the years, has made IRIZAR the market leader in Spain.

### VOCABULARY

**commitment** – обязательство

**longstanding** – давний

**annual turnover** – годовой оборот

**appliance** – прибор

**innovation** – нововведение

**a matter of chance** – дело случая, случайность

**experience** – опыт

**requirement** – требование

**stringent** – строгий, жёсткий

**aftersale service** – послепродажное обслуживание

**superstructure** – каркас

**anchoring** – анкерное крепление

**panel sealing** – герметизация панелей

**elimination** – отсутствие

The company is also a leading exporter with 70 percent of its turnover coming from export business.

IRIZAR has a Technology Transfer Department which has carried out development projects for **turn-key** production plants in America, Africa and Asia. It is no coincidence that our products are valued most in precisely those markets in which the **quality requirements** are most **stringent**. Germany, France, Great Britain, Italy, Austria, Greece, and the Middle East are some of the countries we regularly export to, and in which we provide our own **after sale service**.

It is no coincidence either that the Century Coach has been certified to the most demanding European Union regulations, regarding the **overturning resistance** of the **superstructure**, the **strength of the scat anchoring** and the standards, covering weight and noise. Nor is it a coincidence that IRIZAR has been awarded the prestigious Coach of the Year Prize for 1994 in the United Kingdom because the production systems that we have implemented have been subsequently adopted by other companies in the sector. Such is the case with the semi-integral structure, the **closed vehicle air conditioning and heating**, the **panel sealing** and the **elimination of external moldings**.

If we link this to the fact that the company is capable of building a coach starting from the chassis in just 22 days, it is understandable why IRIZAR is at the **forefront** of coach building in Europe. This must be underlined, that the time the coach chassis arrives at our Production Centre until dispatched to the customer, takes only 22 working days. This record is all the more remarkable if we **take into account** the fact that the construction process is subject to the **strictest policy in safety standards**.

IRIZAR has managed to ensure that the six stars, displayed by its latest product, The Century Coach, form the basis of the company's **current drive**: Safety, Ergonomics and Comfort, Design, Economy, Quality and Service, and Guarantee.

#### **Перевод сокращений:**

**CFC** (chlorofluorocarbon) – хлорфторуглероды; при попадании в атмосферу разрушают озоновый слой

**ECS** – European Community Standards

**ISA** – International Standard Association

**ISO** – International Organization for Standardization

**R&D** (Research and Development) – исследование и разработка

**SAE** – Society of Automotive Engineers

**Упражнение 4. Проанализируйте предложения, в которых отсутствуют пробелы между словами. Правильно поставьте пробелы и знаки препинания и напишите предложения.**

Theamplespacetheexcellntinsulationandsoundproofingtheairconditioningsystemwithitscyclicalairchangeoverallhelptoprovidcanunprecedentedlevclofcomfort.

Anexcllntpcnetrationcoefficienthasbccnachicvcdwhichconsidcrablyrduccsfuclconsumptionandcasycaccsstothcmmechanicalsystemsmaintenanceworkissimplified.

## Homework

Упражнение 5. Заполните пропуски и переведите предложения.

\_\_\_\_\_ into the world of IRIZAR's technology and design, IRIZAR has achieved its privileged position amongst European coach builders. The enormous experience it has \_\_\_\_\_ over the years has made IRIZAR the market leader in Spain. \_\_\_\_\_ developed for the aeronautical industry has been used here, giving an aerodynamic design full of elegance and clarity of line.

The Century Coach has been certified to the most demanding regulations regarding the overturning resistance of the superstructure, the \_\_\_\_\_ of the seat anchoring and the standards, covering weight and noise. A great many of the materials we use in building our coaches can be \_\_\_\_\_. The group \_\_\_\_\_ over 26 thousand workers and has an annual turnover in excess of 4 billion dollars.

## VOCABULARY

**pressure** – давление

**cab** – такси

**benefit** – выгода, польза

**radial** – радиальный

**ability** – способность

**to hold the road** – держать дорогу

**challenge** – проблема

**reduction** – снижение

**internal ribs** – внутреннее ребро

## ZERO-PRESSURE TYRES

Упражнение 1. Определите с помощью словаря возможные варианты перевода словосочетаний и слов **zero, pressure, blowout, impossible**.

Упражнение 2. Переведите и упростите предложения, исключив слова, не влияющие на основную мысль предложения.

Responding to the global environmental challenge, Michelin introduced the world's first 80,000-mile tire in 1992.

An integrated system offering improved performance, mobility, safety, and major options in vehicle design, Pax System encompasses the tire and wheel into one unit.

The tire is mechanically locked against the wheel to make losing the tire during a blowout impossible.

At zero pressure, the tire rests against a support ring to allow the tire to turn freely and the vehicle to travel at speeds of 55 mph for 125 miles.

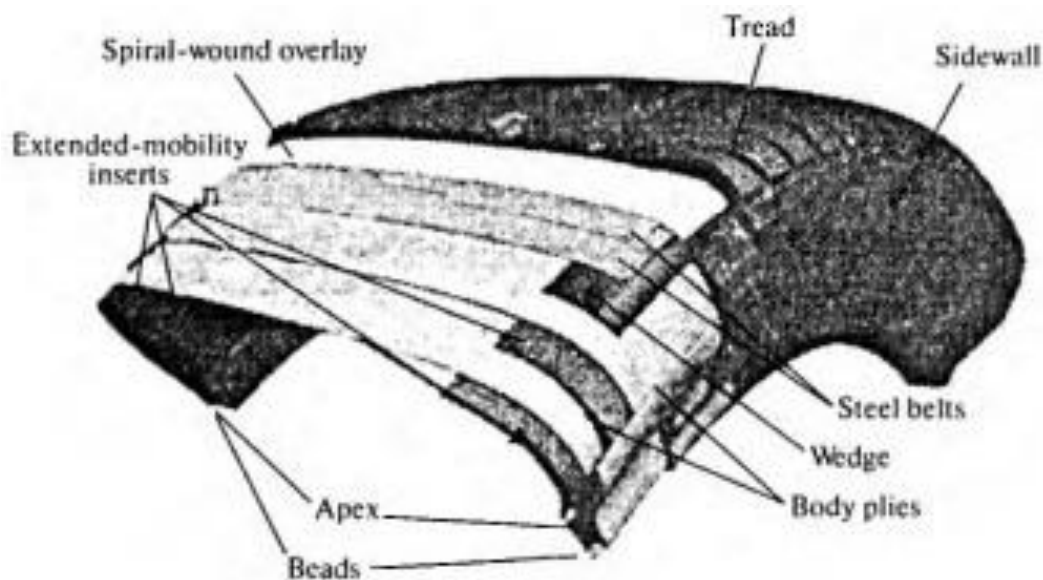
Упражнение 3. Прочитайте и переведите текст на русский язык.

### ZERO-PRESSURE TIRES OR RUN-FLAT TIRES

The symbolic **relationship** between the auto and tire industries was born when French brothers Edouard and Andre Michelin began producing **pneumatic tires** for Parisian cabs in the early 1890s. Over the following 100 years, three Michelin **innovations** stand out as examples of the company's **dedication** to the technological advances to **benefit consumers** and the auto industry.

In 1946. Michelin engineers **developed** the first radial tire for a car: the Michelin X – an innovation that would change forever the automotive industry. The radial tire's ability **to hold the road**, increased **tread life, wet road performance**, and ride quality are legendary. Today, radials **remain** the industry standard.

Responding to the global **environmental challenge**. Michelin introduced the world's first 80,000-mile tire in 1992. Two years later, the company introduced the Michelin Energy line of tires. These «green» tires offer a **significant reduction** in **rolling resistance**, thus providing improvements in **fuel consumption**. In 1997, Michelin again made automotive history as the first tire company to offer **zero-pressure or run-flat tires** to the replacement market for **popular family vehicles**.



### *Inside the run-flat tire*

In the new millennium, Michelin believes its latest technology **breakthrough** – the innovative Pax System – could set a new standard. An integrated system offering improved performance, mobility, safety, and major options in vehicle design. Pax System **encompasses** the tire and wheel into one unit. The tire is mechanically locked against the wheel to make **losing** the tire during a **blowout** impossible. At zero pressure, the tire rests against a **support** ring to allow the tire to turn freely and the vehicle to travel at speeds of 55 mph for 125 miles.

The Michelin Pax wheel has **internal ribs** to locate the support ring that lets the tire run without air pressure. An external attachment system ensures that the tire stays on the **bead**, even **when deflated**.

The Continental Safety Ring is a steel and rubber support that mounts inside a conventional wheel and tire to provide run-flat capability.

The device adds weight and cost, but provides the piece of mind of a run-flat tire without requiring any changes to infrastructure or special wheels.

**Упражнение 4. Найдите в тексте синонимы слова *breakthrough*.**



**Упражнение 5. На основе пройденного материала подготовьте диалог.**

**а) для студента (student)**

Good morning!

Good afternoon!

Hello!

Let me introduce myself.

My name is \_\_\_\_\_

I am \_\_\_\_\_

I study at \_\_\_\_\_

I am interested in \_\_\_\_\_

I would like to ask you about \_\_\_\_\_

And what about \_\_\_\_\_

Can you describe me \_\_\_\_\_

Can you tell me about \_\_\_\_\_

What are the main characteristics of \_\_\_\_\_

Thank you for your help.

It was nice to meet you.

See you.

Good-bye.

**б) для инженера-автомобилиста (automotive engineer)**

Good morning!

Good afternoon!

Hello!

How can I help you?

What can I do for you?

Do you know that \_\_\_\_\_?

Let me tell you about \_\_\_\_\_

I would like to mention that \_\_\_\_\_

The point is that \_\_\_\_\_

## **THE CHANGING EXPECTATIONS OF THE AUTOMOTIVE ENGINEERS**

**Упражнение 1. Определите с помощью словаря возможные варианты перевода словосочетаний и слов *in the past, deal with, in nature, project, mechanical, focus, intelligent, simulation, engineering.***

**Упражнение 2. Переведите цепочки слов.**

Closely associated, mechanical engineering, door handle, continuously variable transmission, automotive engineer, automotive engineer is expected to know, knowledge is beyond mechanical engineering, intelligent vehicle technology, manufacturing capability, competitive quality, empty promises, software development, achieve optimum operation, performance evaluation, computer simulation, not-too-distant future.

**Упражнение 3. Прочитайте и переведите текст.**

### **THE CHANGING EXPECTATIONS OF AUTOMOTIVE ENGINEERS**

In the past, automotive engineers were **closely associated** with the field of **mechanical engineering**. After all, most automotive engineers dealt with topics such as gasoline and diesel engines, transmissions, **suspension** systems, chassis, **door handles**, seats, etc. **A** few ventured off into new developments such as turbine gas engines, continuously **variable** transmissions, or even Sterling engines. Some dealt with plastics and painting systems. The vast **majority** of knowledge needed by the automotive engineer of the past was mechanical in nature.

The reality of today is that **the automotive engineer is expected to know** about far more than just mechanical engineering. To attract the best and brightest, the industry needs to project an image of the automotive engineer as someone with skills and **knowledge beyond mechanical engineering**.

The modern automobile has often been described as a computer on wheels. It is that and more – much more. Electronics control component systems such as the engine, transmission, and brakes. Those controls have become not just **add-ons** but integral parts of the operation of each system and

the whole vehicle. A focus is on **intelligent vehicle technology**, which **highlighted** the integration of more electronics into the vehicle.


No longer can design engineers «throw their designs over the wall» to the manufacturing engineer. The design engineer must know enough about the **manufacturing capability** of his/her organization or supplier, and the manufacturing engineer must be an early participant in the design team. **Competitive quality** and **cost** require that the design specifications match the manufacturing capability. **Empty promises** by manufacturing («give us a design and we will build it») are no longer accepted.

**Software development** is not only necessary to **achieve optimum operation** of each vehicle computer, but vehicle **performance evaluation** prior to design is becoming standard practice. **Computer simulation** for demonstrating **compliance** with regulations will probably be widely accepted in the **not-too-distant future**.

**Упражнение 4. Найдите в тексте синонимы слова *performance*.**

**Упражнение 5. Заполните пропуски в предложениях в соответствии с содержанием текста.**

The vast majority of knowledge needed by the \_\_\_\_\_ engineer of the was mechanical in nature. The reality of today is that the automotive engineer is \_\_\_\_\_ to \_\_\_\_\_ about far more than just mechanical engineering. The industry needs to project an image of the automotive engineer as someone with skills and \_\_\_\_\_ mechanical engineering. The modern automobile has often been described as a \_\_\_\_\_ on wheels. A focus is on \_\_\_\_\_ vehicle \_\_\_\_\_, which highlighted the integration of more electronics into the vehicle. The design engineer must know enough about the \_\_\_\_\_ \_\_\_\_\_ of his/her organization or supplier, and the manufacturing engineer must be an early participant in the \_\_\_\_\_ team. Competitive quality and cost require that the design specifications \_\_\_\_\_ the manufacturing capability. Software development is not only necessary to achieve \_\_\_\_\_ operation of each vehicle computer, but vehicle performance \_\_\_\_\_ prior to design is becoming standard practice.

 **Упражнение 6. Переведите вопросы на русский язык. На основе ответов на вопросы кратко перескажите основное содержание текста.**

1. What knowledge was needed by the automotive engineer of the past?
2. What is the reality of today for the automotive engineer?
3. What skills and knowledge does the automotive engineer need today?
4. How can we describe the modern automobile?
5. What aspect is the modern automotive technology focused on?
6. What is necessary to achieve optimum operation of a vehicle computer?
7. What is becoming standard practice in vehicle design?

## ***SENSORS AND THE AUTOMOBILE***

**Упражнение 1. Определите с помощью словаря возможные варианты перевода слов *gauges, ignition, fuel, emission, digital*.**

**Упражнение 2. Проанализируйте слова *break* и *brake*. Сделайте выводы.**

**Упражнение 3. Переведите однокорневые и производные слова и объясните причины изменения их значения.**

Cool, cooled, cooler, coolant

Convert, converter, conversion, convertible, convertibility

Emit, emitted, emission, emissive

Determine, determination, determined

**Упражнение 4. Составьте из приведенных ниже слов, предлогов, артиклей возможные словосочетания из двух или более слов.**

fuel, brakes, area, ignition, level, injection, converter, deployment, emission, electronic, anti-, lock, determine, powertrain, seat, impact, side, airbag, misfire, and, fuel, exhaust, position, catalytic, frontal, engine, sensors, airbags, occupant, vehicles, control, head, collision, electronic, acceleration, torque, stability, avoidance, other, the, proximity, protection, of, position, lateral, sensors, engine

**Упражнение 5. Прочитайте и переведите текст на русский язык.**

### SENSORS AND THE AUTUMOBILE

In the 1960s, vehicles were equipped with oil pressure, **fuel level**, and temperature **coolant** sensors. Their **outputs** were connected to analogue **gauges** or «idiot» lights. As we entered the 1970s and emissions became a driving factor, more sensors were added to help control the **powertrain**. With the addition of the **catalytic converter**, **electronic ignition**, and **fuel injection** came a number of sensors required to help maintain tight air/fuel control and **exhaust emissions**. In 1980s, safety became a factor with **antilock brakes** and **airbags**.

Today sensors are everywhere. In the **powertrain area**, sensors are used to measure the temperature and pressure of most of the **fluids** (air temperature, **manifold** absolute pressure, coolant temperature, and fuel injection pressure). Speed and position sensors are connected to most moving parts (**vehicle speed**, **throttle position**, **camshaft**, crankshaft, transmission shift position, **EGR valve position**, and transmission speed sensors). Others measure knock, engine load, **engine misfire**, and oxygen level in the exhaust. Climate control requires the use of various sensors in the air conditioning system to determine refrigerant pressure and temperature and interior air temperature.

Sensors have been added to the interior **to determine seat position**. With the addition of antilock braking and suspension control a number of sensors have been added to determine wheel speed, ride height, and tyre pressure. As airbags were added for **frontal and side impact**, more crash sensors and accelerometers were added to control **airbag deployment**. As the concern for front seat passengers has grown so has the need for sensors to determine if the passenger airbag needs to deploy. **Occupant position**

### VOCABULARY

**fuel level** – уровень топлива

**output** – выход

**catalytic converter** –

каталитический

преобразователь

**fuel injection** – впрыск топлива

**antilock brakes** – тормоза с АБС

**throttle** – дроссель

**engine misfire** – неправильное

зажигание в двигателе

**airbag** – подушка безопасности

**to sophisticate** – усложнять

**protection** – защита

**yaw rate** – рыскание (*поворот*

*автомобиля вокруг*

*вертикальной оси*)

**collision avoidance sensors** –

сенсоры предупреждения

столкновения

**proximity** – приближение

**lateral acceleration** – боковое

ускорение

**engine torque** – крутящий

момент двигателя

**sensors, passenger weight sensors**, and others have been developed to ensure the correct deployment of the front passenger airbag. Other sensors are being added as car manufacturers add side impact bags, roof airbags, and **sophisticated** side impact **head protection airbags**.

As engineers have moved beyond antilock braking and traction control into **electronic stability control**, more sensors are required. **Yaw rate**, steering wheel angle, and **collision avoidance sensors**, such as radar sensors or sensors to determine **the proximity of other vehicles**, will be added. Additional sensors to help control or determine **lateral acceleration**, speed of each wheel, and **engine torque** will be needed.

Control of the vehicle's braking system is tied into the stability control system. The first oil pressure and coolant temperature sensors were set up to work independently of each other. In fact some of them were nothing more than switches that were activated at certain maximum or minimum levels. As more sensors become electronic or **digital**, they are interconnected and their output is used for more than one vehicle system. Thus sensor manufacturers are searching for better ways to design and manufacture sensors.

**Упражнение 6. Заполните пропуски в предложениях в соответствии текста и переведите их.**

As we entered the 1970s and emissions became a \_\_\_\_\_ factor, more \_\_\_\_\_ were added to help control the powertrain. With the addition of the catalytic converter, electronic \_\_\_\_\_, and fuel \_\_\_\_\_ came a number of sensors required to help maintain tight air/fuel control and \_\_\_\_\_ emissions. In 1980s, \_\_\_\_\_ became a factor with antilock brakes and airbags. Other sensors are being added as car manufacturers add side \_\_\_\_\_ bags. roof airbags, \_\_\_\_\_ and side impact head \_\_\_\_\_ airbags.

 **Упражнение 7. В ходе диалога используйте следующие слова и разговорные фразы.**

**а) для студента (student)**

Good morning!

Good afternoon!

Hello!

Let me introduce myself.

My name is \_\_\_\_\_

I am \_\_\_\_\_

I study at \_\_\_\_\_

I am interested in \_\_\_\_\_

I would like to ask you about \_\_\_\_\_

And what about \_\_\_\_\_

Can you describe me \_\_\_\_\_

Can you tell me about \_\_\_\_\_

What are the main characteristics of Thank you for your help.

It was nice to meet you.

See you.

Good-bye.

**б) для инженера-автомобилиста (automotive engineer)**

Good morning!

Good afternoon!

Hello!

How can I help you?



What can I do for you?

Do you know that \_\_\_\_\_?

Let me tell you about \_\_\_\_\_

I would like to mention that \_\_\_\_\_

The point is that \_\_\_\_\_

Thank you for your coming.

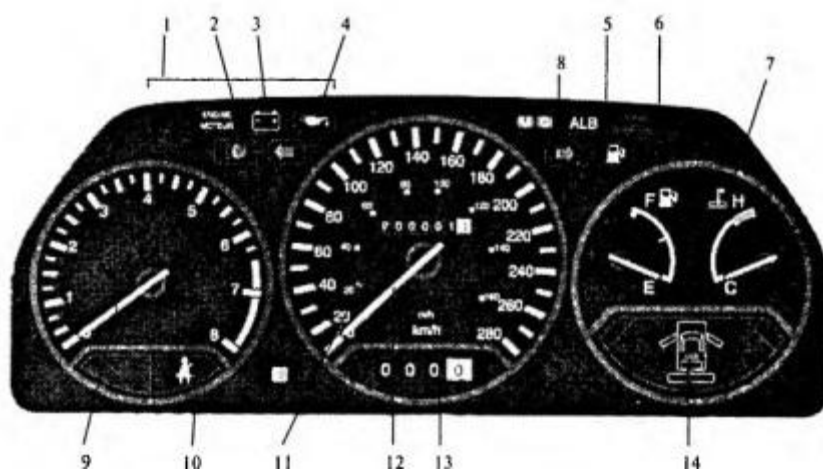
It was nice to meet you.

Hope to see you soon.

Good-bye.

See you.

## INSTRUMENTAL PANEL



*Instrumental panel*

1. – warning lights	тахометр
2. – high beam indicator light	контрольный индикатор наличия топлива
3. – alternator warning light	индикатор работы указателей поворота
4. – oil warning light	контрольная лампа дальнего света
5. – low fuel warning light	спидометр
6. – fuel indicator	контрольная лампа открытой двери
7. – temperature indicator	одометр (счётчик пробега)
8. – turn signal indicator	счётчик суточного пробега
9. – tachometer	контрольная лампа аварийного состояния работы генератора
10. – seat-belt warning light	контрольная лампа температуры масла
11. – odometer	контрольная лампа ремней безопасности
12. – speedometer	контрольные лампы аварийного состояния
13. – trip odometer	контрольная лампа малого запаса топлива
14. – door open warning light	контрольный индикатор температуры охлаждающей жидкости

**Упражнение 1.** На основе визуальной информации и пройденного материала подберите из правого столбика соответствующий перевод обозначений на рисунке *Instrumental panel*.

## HIGH STRENGTH STEEL

**Упражнение 1. Определите с помощью словаря возможные варианты перевода слов и словосочетаний *sheet, part, reduction, hot-rolled, sulphur, content, silicon, reduce.***

**Упражнение 2. Переведите цепочки слов.**

high strength steel, chassis parts, improved stretch ability, to undergo stretch flanging, stretch flange formability, retained austenite sheet steel, tensile strength, to attain automobile mass reduction, cracking and splitting during pressing, fatigue of welded joints, hot-rolled steel sheet.

**Упражнение 3. Составьте из приведённых ниже слов (предлогов, артиклей) возможные словосочетания.**

hot-, stretchability, austenite, strength, strength, formability, retained, to, stretch, stretch, flange, improved, undergo, flanging, cracking, sheet, steel, parts, tensile, chassis, steel, splitting, sheet, fatigue, reduction, joints, pressing, automobile and, steel, during, rolled, high, mass, to, attain, welded, of.

**Упражнение 4. Прочитайте и переведите текст на русский язык.**

### **HSS SHEET FOR CHASSIS PARTS**

Mitsubishi Motors Corp. developed a new 590-Mpa (86-ksi) ultra **HSS sheet** containing retained austenite for 80 **chassis parts** on the third-generation Pajero released last fall (2000). The **sulphur and retained austenite content** is controlled in the new HSS sheet to realize **improved stretchability**, and to enable it **to undergo stretch flanging**, in which high degrees of localized flexing and stretching are generated. This has resulted in an increase in the **hole expansion ratio** to more than 80% – an indicator of **stretch flange formability** – and enabled for the first time the use of **retained austenite sheet steel** in chassis parts, many of which are difficult to form.

Generally the greater is the **tensile strength** of the steel, the more possible it is to use the thinner **gauges**, necessary **to attain automobile mass reductions**. However, steel sheet formability **deteriorates** with increasing **tensile strength**, as evidenced by **cracking and splitting during pressing**, and also softens by the heat effect during **welding**, which results in the **fatigue of welded joints**. This puts a limit on the strength of the steel that can be used in forming parts; to date most chassis sheet metal parts have been made using **hot-rolled steel sheet** between 370 to 400 Mpa (54 to 58 ksi).

In the new 590-Mpa (86-ksi) **ultra HSS sheet**, the **sulphur content** has been lowered from 0,006 to 0,002%, while the retained austenite content has been reduced from between 8–12% to 4–8%. This has made it possible to provide the **stretchability needed** for the manufacture of chassis parts requiring stretch flanging. In addition, the steel's high **silicon** and **manganese** content **prevents** softening during welding and **enables** increased welded-joint fatigue strength.

The use of the new steel in the Pajero series reduced the mass of the parts by 13% for a total mass reduction of 14 kg (31 lb).

### **VOCABULARY**

**high strength steel** – высокопрочная сталь  
**retained austenite content** – выдержанный аустенитный состав  
**stretchability** – пластичность  
**undergo stretch flanging** – претерпевать загибание кромки  
**hole expansion ratio** – коэффициент расширения отверстий  
**tensile strength** – прочность на разрыв  
**to attain** – достигать  
**to deteriorate** – ухудшать  
**to crack** – трескаться  
**to split** – раскалываться  
**welding** – сварка  
**fatigue** – усталость  
**manganese** – марганец  
**enable** – давать возможность

**Упражнение 5. Переведите со словарём сокращения.**

*Lb, Mpa, ksi*

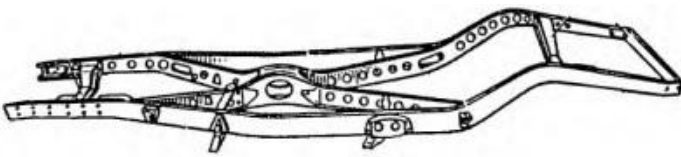
**Упражнение 6. Проанализируйте предложения, в которых отсутствуют пробелы между словами. Правильно проставьте пробелы и знаки препинания.**

The greater the tensile strength of the steel the more possible it is to use the thinner gauges necessary to attain a  
automobile mass reduction.

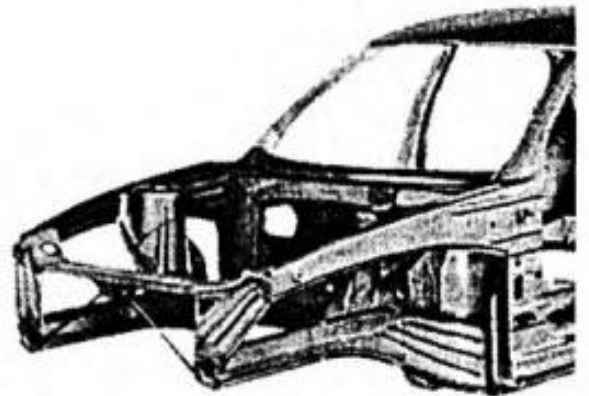
Steel sheet formability deteriorates with increasing tensile strength as evidenced by cracking and splitting during  
pressing and also softens by the heat treatment during welding which results in the fatigue of welded joints.

**Homework** Упражнение 7. Переведите вопросы. На основе ответов на вопросы кратко перескажите основное содержание текста на английском языке.

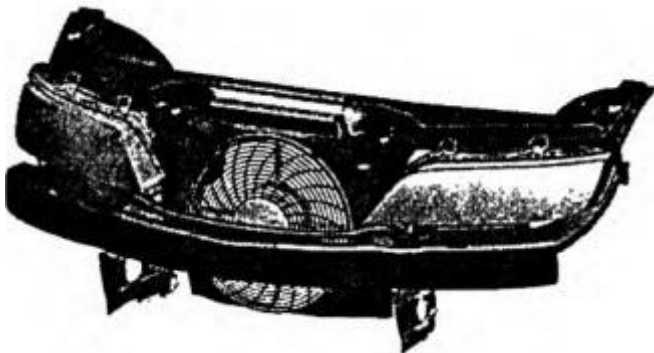
1. What steel did the company develop for automobile parts?
2. What helps to realize improved stretchability?
3. What are the contents of sulphur and the retained austenite in the new ultra HSS sheet?
4. Does the steel's high silicon and manganese content prevent softening during welding and enable increased welded-joint fatigue strength?
5. Did the use of the new steel series reduce the mass of the parts?
6. What total mass reduction was achieved?



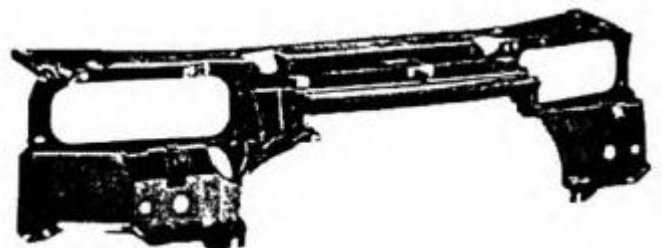
*Opened front-end structure*



*Closed front-end structure*



*Front-end module (FEM) delivered without fascia*



*FEM headlamp carrier*

## BODY PANEL DESIGN CAN PREVENT CORROSION

**Упражнение 1. Прочтите и переведите текст на русский язык.**

### BODY PANEL DESIGN CAN PREVENT CORROSION

Careful design of body panels and joints is the best starting point for **corrosion prevention**. Prevention of oxidation or corrosion of steel auto body panels requires prevention of contact between the **oxygen-rich environment** (air) and metal.

Road salt usage, use of hygroscopic calcium chloride and general environment sources, **coupled with** often **marginal** vehicle cleaning and maintenance, cause corrosion cells to accumulate and **thrive**.

Building lighter, smaller, more fuel-efficient cars has resulted in **reduced steel gauge** and reduced percentage of **corrosion tolerance**. Dips, sprays, and different coatings are among the methods for preventing contact between hostile environmental elements and metal.

#### Hood

For corrosion resistance, the following items **should be considered** by the designer: all essentially horizontal **inner panel surfaces** should be **sloped toward a drain hole**, **drain holes** should be located at low points of all areas which **trap fluid**. In the **hood latch** region a flat area is generally needed for the **latch mechanism** and should be checked for **proper drainage**.

#### Fender

Fender assemblies generally have three major components: **fender outer panel**, **fender rear reinforcement** or **fender inner panel**. **Splash shields and aprons** often serve to protect fender, **dash panel**, **lamp housings** and wiring from **stone abrasion** and **wheel splash** as well as being structural panels.

To improve corrosion resistance reinforcement and fender are preferably separated to a maximum allowable distance. Attachment of rear reinforcement to fender at their lower contact should be a minimum 15 degrees angle to provide proper drainage. Large **openings** around **headlamps** are preferably **avoided** or **shielded** to prevent **erosion corrosion** (this is accelerated corrosion of a metal surface- due to movement of a corrosive **fluid** over its **surface**; in this case the fluid is **hot humid salty air**).

#### Doors

Sheet metal panels of a door assembly consist basically of a door **outer panel**, **door inner panel**, **hinge reinforcement**, and a **side impact** or **intrusion bar**. A completed door assembly with glass, **weatherstrips**, **water shields**, and **trim panels** installed presents a most **unfavorable problem** for a corrosion protection engineer. Water, road salt, and dirt will enter the door, but its basically **sealed-of condition** and **lack of air circulation** creates an undesirable **humidity chamber**.

This effect can be minimized by the following: all horizontal areas **should be sloped** a minimum of 10 degrees **toward drain holes**, drain holes at the door bottom should be at its **lowest point**.

### VOCABULARY

**corrosion prevention** –

предотвращение коррозии

**marginal** – предельный

**thrive** – процветать

**tolerance** – выдержка

**drain hole** – дренажное отверстие

**trap** – поглощать

**latch mechanism** – затворный механизм

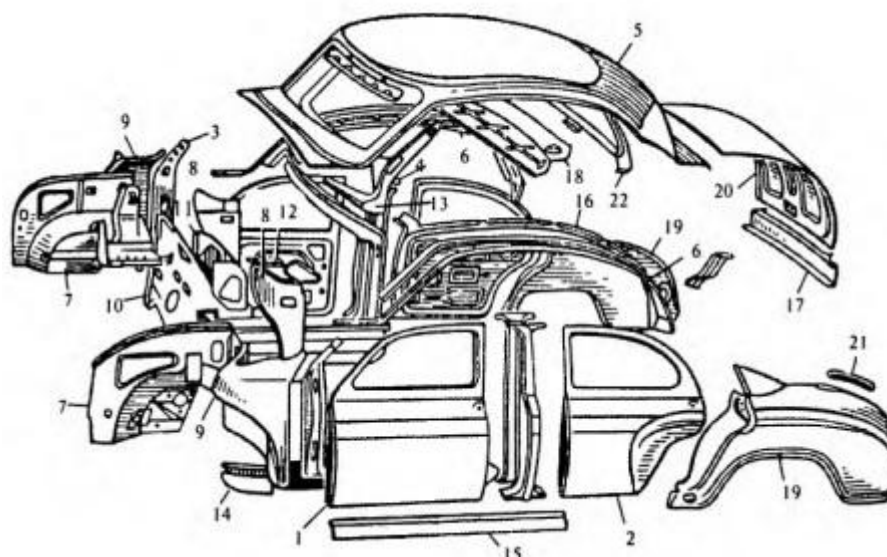
**drainage** – дренаж

**splash shield** – брызговик

**apron** – фартук

**intrusion bar** – интрузия

**trim** – балансировать



**Parts of car body**

1 – body door (front)	– продольный брус
2 – body door (rear)	– верхний брус
3 – door pillar, door post, door pier (front)	– приборный щиток
4 – door pillar, door post, door pier (centre)	– дверь кузова (передняя)
5 – roof panel	– боковина передка кузова
6 – cant rail	– рама заднего окна
7 – valance	– панель приборного щитка
8 – dash side panel (inner)	– боковая панель приборного щитка (внутренняя)
9 – dash side panel (outer)	– крышка багажника
10 – dash panel	– панель крыши
11 – panel tray	– дверная стойка (передняя)
12 – panel tray rail	– корыто переднего щитка
13 – fascia panel	– брус корыта переднего щитка
14 – sill	– панель полки заднего сиденья
15 – sill facing panel	– дверь кузова (задняя)
16 – header bar	– облицовочная панель нижнего обвязочного бруса
17 – body rear lower panel	– нижний обвязочный брус
18 – rear-seat shelf panel	– задняя нижняя панель кузова
19 – quarter panel	– заднее крыло
20 – deck lid (trunk lid)	– боковая панель приборного щитка (наружная)
21 – trunk stay bracket	– опорный кронштейн багажника
22 – backlight frame	– дверная стойка (средняя)

## AUTOMOTIVE MATERIALS

**Упражнение 1. Определите с помощью словаря возможные варианты перевода слов *vehicle, display, automotive, double, commercially, isolate, doubled, head*.**

**Упражнение 2. Переведите цепочки слов.**

concept vehicle, fast-changing, non-conventional materials, latest production process, recently discovered, aluminum-bearing clays, separately but simultaneously invented, smelting of iron, drivetrain components, engine block, cylinder head, according to.

**Упражнение 3. Переведите варианты предложения. Объясните причины изменения перевода предложения.**

The automotive engineer **must know** the capability of materials.

The automotive engineer **has to know** the capability of materials.

The automotive engineer **is to know** the capability of materials.

The automotive engineer **had to know** the capability of materials.

The automotive engineer **was to know** the capability of materials.

The automotive engineers **will have to know** the capability of materials. The automotive engineers were **to know** the capability of materials.

### VOCABULARY

**non-conventional** – необычный

**capability** – способность

**angle** – угол

**silicate** – силикат

**clay** – глина

**smelting of iron** – плавление железа

**to grab** – схватывать

**spotlight** – высветить

**casting** – литьё

**drivetrain** – система передач

**Упражнение 4. Прочитайте и переведите текст на русский язык.**

### AUTOMOTIVE MATERIALS

Materials are a fast-changing aspect for automotive engineers. **Concept vehicles** displayed demonstrate that new uses of plastics, composites, aluminum, and other **non-conventional materials** are to be a part of future automobiles and light trucks.

The automotive engineer for the next-generation vehicle must know the **capability** of a wide range of materials and the capability of the **latest production processes** for these materials.

#### The aluminum angle

By most accounts, aluminum is the most **recently discovered** commonly used metal, and exists only in combination with other materials such as **silicates and** oxides. Although early civilizations used **aluminum-bearing clays** to make pottery and aluminum salts to make **dyes and medicine**, it was not until 1808 that Sir Humphrey Davy established the existence of aluminum and named it.

It took another 17 years for Hans Christian Oersted **to isolate** it, and it has been produced commercially only since 1854. It was not until 1886 that two scientists, Paul Louis Toussaint Heroult in France and Charles Martin Hall **separately but simultaneously invented** the electrolytic process that is the basis of all aluminum production today, the Hall-Heroult process.

By contrast, the Iron Age, characterized by mankind's **smelting of iron** and its use in industry, began before 1000 B.C. Considering its relatively recent **entrance** into not only the automotive industry but the metal industry as well, aluminum has made great strides in **grabbing** a respectable

amount of the **automotive spotlight** from steel. **According to** the Aluminum Association, between 1991 and 1999 the use of automotive aluminum doubled, and is expected **to double** again by 2005.

A report released by the Ducker Research Co. in 1999 stated that 61,9% of passenger car and light truck aluminum content is **castings** for **drivetrain components** such as **engine blocks**, cylinder heads, and manifolds.

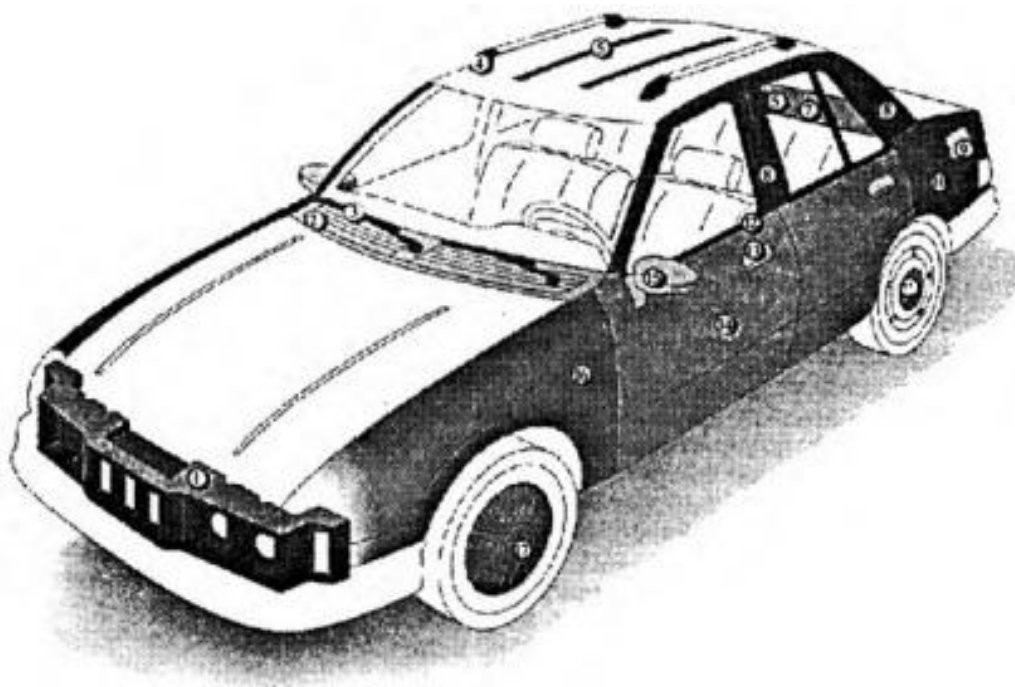
**Упражнение 4. Проанализируйте предложения, в которых отсутствуют пробелы между словами. Правильно проставьте пробелы.**

Concept vehicles displayed demonstrate that new uses of plastics, composites, aluminum and other nonconventional materials are to be a part of future automobiles and light trucks.

The automotive engineer for the next generation vehicle must know the capability of a wider range of materials and the capability of the latest production processes for these materials.



**Упражнение 5. Проверьте правильность перевода.**



### **Exterior**

- |                                   |                                |
|-----------------------------------|--------------------------------|
| 1. Grill opening reinforcements   | 13. Door handles & escutcheons |
| 2. Cowl vent grill                | 14. Door panels                |
| 3. Wiper systems                  | 15. Mirror snails & brackets   |
| 4. Roof rack stanchions           | 16. Front fenders              |
| 5. Roof rack rails                | 17. Wheel covers               |
| 6. Center high-mounted stop light |                                |
| 7. Rear package shelf X           |                                |
| 8. Appliques                      |                                |
| 9. Gas tank filler door           |                                |
| 10. Rear fenders                  |                                |
| 11. Hub covers                    |                                |
| 12. Window surrounds              |                                |

## HYDROFORMED AUTO PARTS

**Упражнение 1. Определите с помощью словаря возможные варианты перевода слов *cheaper, advantages, complex, inches, choice*.**

**Упражнение 2. Дополните и переведите цепочки слов.**

Precoated \_\_\_\_\_, stamped \_\_\_\_\_, sequential \_\_\_\_\_, intricate \_\_\_\_\_, hole \_\_\_\_\_, automotive \_\_\_\_\_, to \_\_\_\_\_ notice, pressurized \_\_\_\_\_ forming process, hydroformed \_\_\_\_\_, advantages over \_\_\_\_\_, frame \_\_\_\_\_, engine \_\_\_\_\_, instrument panel \_\_\_\_\_, roof \_\_\_\_\_ seat, low carbon \_\_\_\_\_ steel, high \_\_\_\_\_.

**Упражнение 3. Прочитайте и переведите текст на русский язык.**

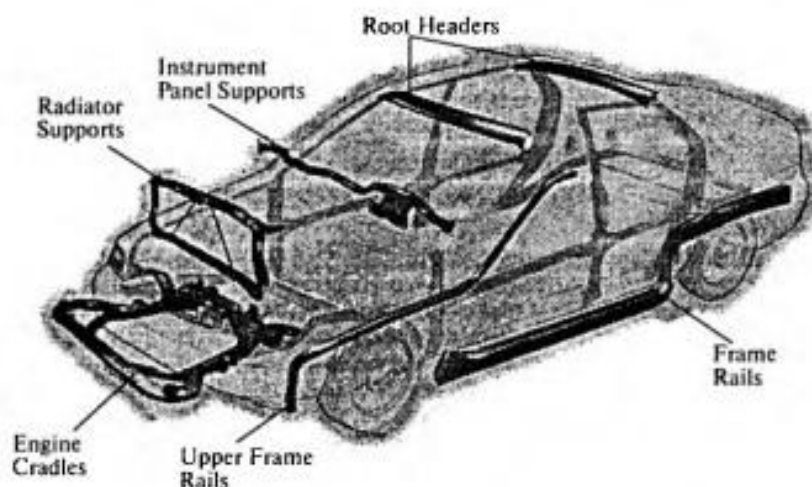
### HYDRO FORMED AUTO PARTS

Find a better, cheaper way to produce parts, and the auto industry takes notice. **Hydroformed parts**, after all, offer weight, design, and cost **advantages over stampings**.

Tube hydroforming is a **pressurized hydraulic forming process** that produces complex shapes, typically from three to 10 feet long, and one to six inches in diameter.

Prime candidates include **frame rails, engine cradles**, radiator and instrument panel supports, roof headers, and scat frames. Hydroformed blanks can be manufactured from a variety of **less-expensive** materials, including low carbon hot rolled steel, cold rolled steel, high strength low alloy steels, precoated steels such as **galvanneal**, and even aluminum. And changing the **material gauge** does not require revised tooling, as it does in **stamped assemblies**.

**Упражнение 4. На основе пройденного материала и визуальной информации переведите без словаря название и обозначения к рисунку.**



**VARI-FORM tubular hydroformed parts now account for some 3 million parts per year sold to auto makers**



### Упражнение 5. Заполните пропуски в предложениях в соответствии с содержанием текста.

Hydroformed parts, after all, \_\_\_\_\_ weight, design, and cost over stampings.

Tube hydroforming is a pressurized \_\_\_\_\_ forming process that produces \_\_\_\_\_ shapes, typically from three to 10 feet long, and one to six inches in diameter.

Prime candidates include \_\_\_\_\_, \_\_\_\_\_, radiator and instrument panel supports, \_\_\_\_\_, and \_\_\_\_\_.

Tube hydroforming is \_\_\_\_\_ that produces complex shapes.

Hydroformed parts and assemblies are quickly becoming the \_\_\_\_\_ for automotive manufacturers.



### Упражнение 5. Переведите вопросы. На основе ответов на вопросы кратко перескажите на английском языке основное содержание текста.

1. What is tube hydroforming?
2. What do hydroformed parts offer?
3. What steels can hydroformed blanks be manufactured from?
4. What automotive parts can be produced by hydroforming?
5. What are the advantages of hydroformed parts?

## TITANIUM ALLOYS FOR AUTOMOTIVE APPLICATIONS

### Упражнение 1. Прочитайте и переведите текст на русский язык.

#### TITANIUM ALLOYS FOR AUTOMOTIVE APPLICATIONS

Among engineering alloys, titanium possesses the **strength**, **density**, and **modulus** to use it in automotive applications. Various titanium alloys are suitable for making springs and exhaust **system components**. The first production cars to ride on titanium springs are now on the road with the rear suspension of the 2001 Volkswagen Lupo fitted with these **springs**.

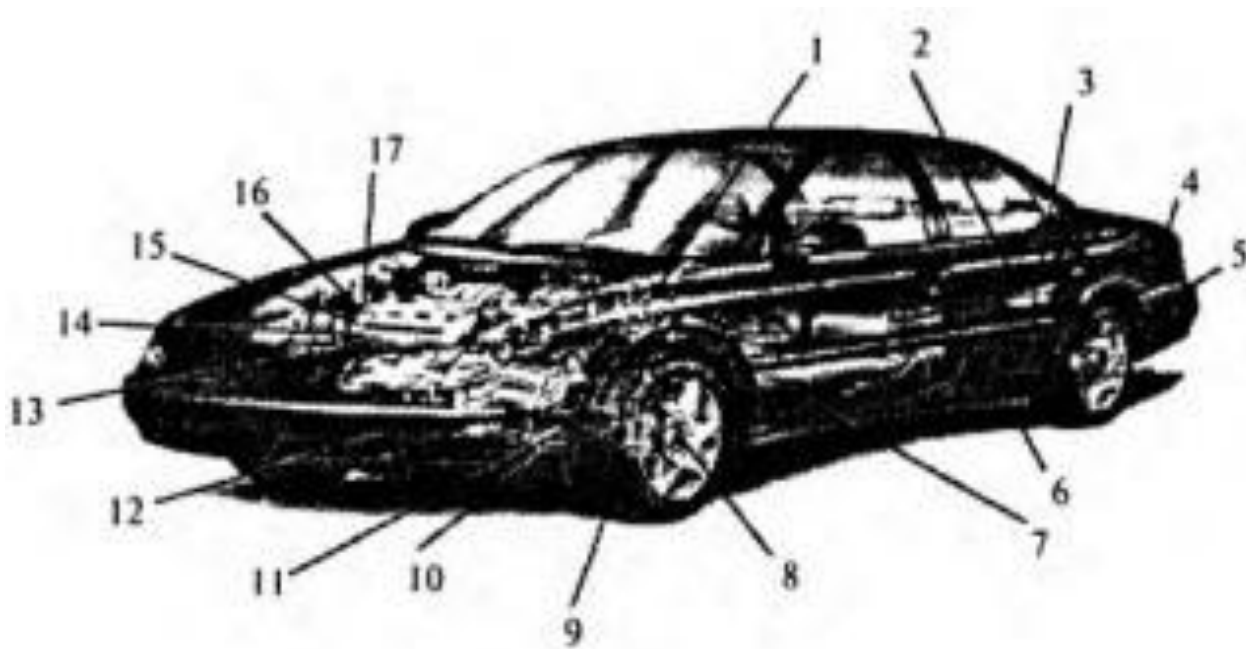
The **cold spring winding**, **cold setting (blocking)**, and **shot peening** process steps are basically the same for titanium springs as for steel. The learned process differences included minor adjustments – such as determining the optimum **heat treatment** approach and the optimum **aging time**.

Because of titanium's **low shear modulus**, there are not as many turns required for titanium springs as steel springs. Since the density of titanium is about half that of steel, titanium can perform the same task as steel springs on most applications while weighing 60–70% less.

An added advantage of titanium is its **inherent corrosion resistance**. In standard **salt-spray exposure fatigue tests**, the typical fatigue strength of a steel spring, coated or uncoated, is reduced by up to 50% over that of the same spring tested in air. In the same tests, the life of the titanium springs in salt spray was reduced by less than 4% over the tests done in air.

Unlike steel springs, titanium springs do not require **protective coatings**. A primary mechanical engineering property considered in the design of **steel suspension springs** is **corrosion fatigue strength**.

**Упражнение 2. На основе визуальной информации и пройденного материала, подберите из правого столбика соответствующий перевод обозначений деталей кузова автомобиля.**



### ***Automotive titanium alloys application***

- |                            |   |
|----------------------------|---|
| 1. Coil suspension springs | – крепления заднего бампера                   |
| 2. Shock center rods       | – клапаны                                     |
| 3. Rear bumpers supports   | – рессорные пружины подвески                  |
| 4. Sway bar fittings       | – глушитель                                   |
| 5. Muffler                 | – центральные стержни амортизатора            |
| 6. Door intrusion beams    | – шатуны                                      |
| 7. Exhaust pipe            | – колёсные шпильки                            |
| 8. Lug nuts/studs          | – поршни тормозных цилиндров суппорта         |
| 9. Brake caliper pistons   | – выхлопная труба                             |
| 10. Sway bar fittings      | – приводные валы                              |
| 11. Drive shafts           | – уплотнители стержня стабилизатора колебаний |
| 12. Front bumper supports  | – крепления переднего бампера                 |
| 13. Connecting rods        | – внутренние дверные перегородки              |
| 14. Wrist pins             | – клапанная пружина                           |
| 15. Retainers              | – тарелки клапанной пружины                   |
| 16. Valves                 | – уплотнители стержня стабилизатора колебаний |
| 17. Valve spring           | – поршневые пальцы                            |

## WHAT ABOUT SAFETY?

**Упражнение 1. Определите с помощью словаря возможные варианты перевода слов и словосочетаний *safety, safe, crash, distraction, accident, voice recognition.***

**Упражнение 2. Не прибегая к словарю, попытайтесь перевести применительно к контексту слова и словосочетания, вспоминая терминологию из пройденного материала.**

safety, driver, error, 6 million crashes, U.S. highways, each year, public and government organizations, driver distraction, technologies, navigation system, e-mail, Internet, 44%, drivers, have phones, 7%, e-mail, 3%, facsimile, 25% crashes, cellphone, 1,5% of accidents, 1995, 1999, 32 000 vehicles, 8,5% of drivers distracted, audio-system (11,4%), speaking (10,9%), making climate control (2,8%), eating and drinking (1,7%), communication and information system, design, human/machine interface, company, control systems, to control audio, climate-control, and telephone functions, innovation, safe driving, voice-recognition technologies, automotive industry.

**Упражнение 3. Переведите цепочки слов.**

driver error, leading cause, emerging technologies, entertainment system, intelligent vehicle, safety issues, intelligent vehicle safety issues, while driving, safety implications, far longer, primary emphasis, voice-recognition technology, infotainment feature, voice command.

**Упражнение 4. Прочитайте и переведите текст на русский язык.**

**Driver error** is the **leading cause** of the 6 million plus **crashes** that **occur** on U.S. highways each year. Public and government organizations are concerned with possible driver **distraction** involving **emerging technologies** such as navigation and **entertainment** systems and e-mail and Internet **access**.

It is found that in the U.S. 44% of drivers have phones in their vehicles or carry phones when they drive, 7% have e-mail access, and 3% have facsimile capabilities. An estimated 25% of crashes each year **involve** some form of disattraction or **inattention**. Driver distraction, along with other **intelligent vehicle safety issues**, is discussed by researchers, manufacturers, and customers.

Use of a cell phone **while driving** accounts for about 1,5% of accidents caused by driver disattraction. In reviewing crashes from 1995 through 1999 involving 32 000 vehicles, researchers found that 8,3% of drivers were distracted when the accident occurred. Of those, 29,4% were distracted by «something outside» the vehicle. Other distractions, in order, were making audio-system adjustments (11,4%), speaking with vehicle **occupants** (10,9%), making climate control

### VOCABULARY

**drive error** – ошибка водителя  
**leading cause** – основная причина  
**emerge** – появляться  
**distraction** – потеря внимания  
**access** – доступ  
**to involve** – вовлекать  
**inattention** – невнимательность  
**intelligent vehicle safety issues** – аспекты безопасности умного автомобиля  
**occupants** – пассажир  
**adjustment** – регулировка  
**implication** – подтекст  
**primary emphasis** – основной акцент

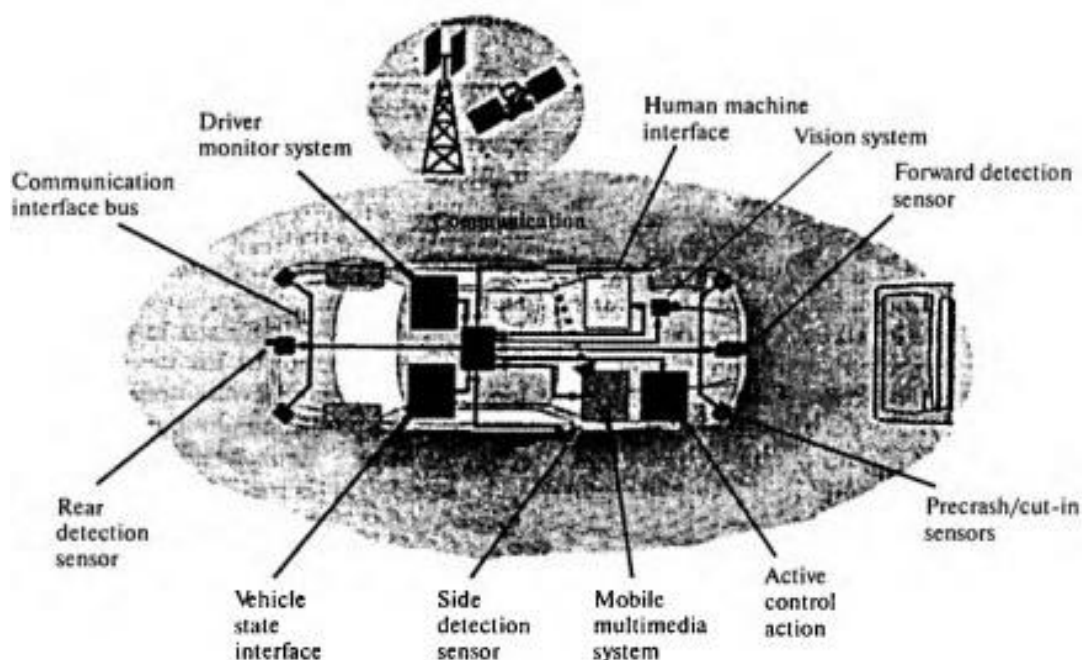
**adjustments** (2,8%), and eating and drinking (1,7%). 29% of drivers indicated that they had used a cell phone **behind the wheel**. Of those, 13% said dealing with the phone caused or almost caused an accident.

Though specialists in many countries have been researching the safety **implications** of «new» in-vehicle systems on driver disattention for a number of years, the industry has been doing it for **far longer**. Similar concerns surfaced when radios were first fitted to vehicles. A **primary emphasis** of the industry's approach to vehicle communication and information system development is driver safety, with systems designed to ensure that drivers keep their hands on the steering wheel and eyes on the road. Research is being conducted to develop well-designed in-vehicle human/machine interfaces for safe driving.

**Упражнение 5. Основываясь на визуальной информации и пройденном материале, попытайтесь перевести без словаря названия узлов и систем, обеспечивающих безопасность водителя и автомобиля.**

Подсказка: LED – light emitting diode

Проверьте правильность перевода в ключах.



**The ISS (integrated safety system) vehicle employs microwave and millimeter-wave radars, cameras, ultrasonic transducers, and laser- or LED-based sensor devices**

**Упражнение 6. Проанализируйте предложения, в которых слова написаны слитно и неправильно расставлены пробелы.**

Dri verer rorist he lead ing causeoft he sixmil lion pluscr ashes thatoc euro name rican highway sea chy car. Thesein novati on swill hel pre duced riverdi sat irac tionand makethcr oadss afer.



**Упражнение 6. Переведите вопросы. На основе ответов на вопросы кратко перескажите на английском языке основное содержание текста.**

What is the leading cause of crashes that occur on U.S. highways?

What causes the driver distraction?

What automotive issues are discussed by researchers, manufacturers, and customers?

How many accidents are caused by the use of a cell phone?

What is a primary emphasis for automotive researchers, manufacturers, and customers?

What do you know about human/machine interfaces and voice-recognition technologies?

What will help reduce driver disattraction and make the roads safer?

## **BOSCH OPTIMIZES AIRBAG ECU**

**Упражнение 1. Определите с помощью словаря возможные варианты перевода слов *range, collision, protection, occupant, sensing, absorption*.**

**Упражнение 2. Переведите цепочки слов.**

Airbag control unit, extended functional range, belt tensioner, frontal collision, upfront sensors, central crash sensor's information, occupant restraint system, slow frontal impact, severe frontal impact, acceleration sensors, energy absorption, minor crash, passive safety system, lateral collision.

**Упражнение 3. Переведите варианты предложения. Объясните причины изменения перевода предложения.**

The system detects the impact speed of a frontal collision.

The system detected the impact speed of a frontal collision.

The system will detect the impact speed of a frontal collision.

The system has detected the impact speed of a frontal collision.

The impact speed of a frontal collision was detected by the system.

**Упражнение 4. Дополните и переведите словосочетания и цепочки слов.**

Severe frontal \_\_\_\_\_, acceleration \_\_\_\_\_, \_\_\_\_\_ absorption, air \_\_\_\_\_ control unit, extended functional \_\_\_\_\_, belt \_\_\_\_\_, frontal \_\_\_\_\_, upfront \_\_\_\_\_, central \_\_\_\_\_ sensor's information, \_\_\_\_\_ restraint system, slow frontal \_\_\_\_\_, minor \_\_\_\_\_, passive \_\_\_\_\_ system, \_\_\_\_\_ collision.

**Упражнение 5. Прочитайте и переведите текст на русский язык. Основываясь на содержании текста, расшифруйте аббревиатуру ECU.**

### **BOSCH OPTIMIZES AIRBAG ECU**


Bosch has developed an **airbag control unit** with **extended functional range** for highly precise **triggering** of airbags and **belt tensioners**. According to the company, the system detects the **impact** speed of a **frontal collision** at a very early stage with the help of two «**upfront**» **sensors**.

The **central crash sensor's information** ensures good decision precision. Depending on the type of accident, the **occupant restraint systems** can be triggered either in one or two phases.

With today's centralized sensing, reliable accident information on the impact speed is available about 50 ms after a **crash**. Before that, the signal «course» of a **slow frontal impact** against a solid **obstacle** differs only slightly from that of a **severe frontal impact** with an approaching vehicle.

The new system has two **acceleration sensors** integrated into a vehicle's **deformation zone**. These upfront sensors transmit signals, from which the **electronic control unit** calculates early and precisely the **energy absorption** as well as the **velocity** of vehicle deformation. After only about 15 ms, it is clearly recognizable whether it will be a **minor crash** without the **actuation** of the airbag or a **critical crash** with triggering of the necessary **passive safety systems**.

A side impact is detected by means of four **side-impact sensors**, the signals of which are checked for **plausibility** against those of the central sensor in the airbag **ECU**. This concept guarantees early triggering of the side airbag for optimum **protection** of head and chest in a **lateral collision**.

 **Homework** Упражнение 6. Составьте диалог. В ходе диалога используйте следующие вводные слова и разговорные фразы.

а) для студента (student)

Good morning!

Good afternoon!

Hello!

Let me introduce myself.

My name is \_\_\_\_\_

I am \_\_\_\_\_

I study at \_\_\_\_\_

I am interested in \_\_\_\_\_

I would like to ask you about \_\_\_\_\_

And what about \_\_\_\_\_

Can you describe me \_\_\_\_\_

Can you tell me about \_\_\_\_\_

What are the main characteristics of \_\_\_\_\_

Thank you for your help.

## VOCABULARY

**airbag control unit** – блок управления подушкой безопасности

**trigger** – спусковой механизм

**tension** – напряжение

**extended functional range** – расширенный функциональный диапазон

**frontal collision** – фронтальное столкновение

**«upfront» sensors** – передние сенсоры

**crash sensor** – сенсор столкновения

**to restrain** – сдерживать

**crash** – столкновение

**impact** – удар

**obstacle** – препятствие

**acceleration sensors** – ускорение

**absorption** – поглощение

**velocity** – скорость

**Minor crash** –

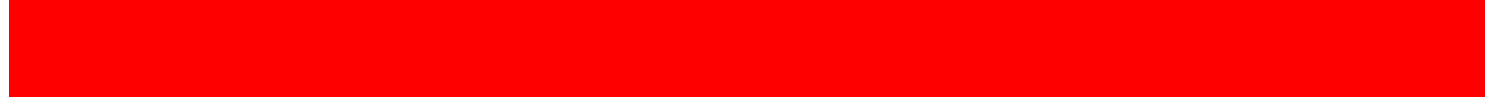
**Actuation** –

**Critical crash** –

**Side-impact sensor** –

**plausibility** –

**Lateral collision** –



It was nice to meet you.

See you.

Good-bye.

**б) для инженера-автомобилиста (automotive engineer)**

Good morning!

Good afternoon!

Hello!

How can I help you?

What can I do for you?

Do you know that \_\_\_\_\_?

Let me tell you about \_\_\_\_\_

I would like to mention that \_\_\_\_\_

The point is that \_\_\_\_\_

Thank you for your coming.

It was nice to meet you.

Hope to see you soon.

Good-bye.

See you.

## **ЗАКЛЮЧЕНИЕ**

Обязательным условием реализации основной образовательной программы подготовки специалиста является учебно-методическое обеспечение учебного процесса. Главной задачей при разработке данного учебного пособия стояла синхронизация и адаптация учебного материала для студентов средних специальных учебных заведений специальности «Техническое обслуживание и ремонт автомобильного транспорта».

Материал чётко структурирован. В качестве структурной единицы выступают содержательно-методические блоки.

Учебное пособие, несомненно, поможет обучающимся расширить профессиональный лингвистический кругозор, овладеть навыками устной речи, повысить уровень знания технического языка в целом.



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