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МЕТОДИЧНІ РЕКОМЕНДАЦІЇ ТА НАВЧАЛЬНІ ЗАВДАННЯ

для практичних занять і самостійної роботи з дисципліни «Іноземна мова професійного спілкування» для здобувачів другого рівня вищої освіти спеціальності 274 «Автомобільний транспорт» денної і заочної форм навчання

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Методичні рекомендації та навчальні завдання для практичних занять і самостійної роботи з дисципліни «Іноземна мова професійного спілкування» для здобувачів другого рівня вищої освіти спеціальності 274 «Автомобільний транспорт» денної і заочної форм навчання [Електронне видання] / Осецька Н. Ф., Тарасюк Н. М. – Рівне : НУВГП, 2022. – 42 с.

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ПЕРЕДМОВА

Методичні вказівки та навчальні завдання призначені для розвитку англомовної професійної лексичної компетентності та комунікативних навичок здобувачів освітнього рівня «Магістр», необхідних для здійснення ефективної професійної комунікації в галузі автомобілебудування.

Дана методична розробка розроблена із використанням автентичного матеріалу, який містить огляд деяких типів сучасних транспортних засобів, їх конструкцій, компонентів та функціональних особливостей. Методичні вказівки та навчальні задання мають на меті допомогти оволодіти базовою професійною лексикою, дати можливість використовувати різні мовленнєві зразки, які можуть зустрічатися в цій галузі.

Методичні вказівки та навчальні завдання призначені для студентів, які обізнані зі структурними закономірностями англійської мови і продовжуватимуть опановувати основи професійного дискурсу. Текстовий матеріал може бути використаний для вирішення декількох завдань у процесі навчання: для ознайомлювального та пошукового видів читання, розвитку навичок перекладу, реферування і анотування, роботи зі словником, а також комунікативних навичок у сфері професійної діяльності.

Кожен урок починається з глосарію спеціальних термінів. Тексти для читання дають можливість практичного застосування даних термінів. Післятекстові запитання дозволяють активізувати використання в комунікативній ситуації ці словникові одиниці, а також мовленнєві зразки, які студенти розглядали під час читання. Кожен урок закінчується вправами для повторення, які перевіряють рівень засвоєння словникового запасу, що дає можливість обговорювати інформацію, пов’язану з галуззю автомобілебудування.

Пропонуючи цю розробку, ми сподіваємося, що інтерес студентів до представленої інформації про галузь автомобілебудування підвищить їх здатність спілкуватися англійською мовою.

UNIT ONE. AUTOMOTIVE INDUSTRY

Special Terms

Automotive Industry: Branch of trade or manufacture of any wheeled conveyance.

Vehicle: Any conveyance usually wheeled e.g. car, lorry, motor-care for transportation of goods or passengers on land.

Engine: Machine that generates mechanical power.

Body: Main part of the vehicle where the seats are.

Mass Production: Manufacture of large numbers of identical articles by standardized process.

Producer: Person who produces goods.

Exporter: Trader who exports goods.

Steam-Powered Vehicle: Automobile moved by engine worked or driven by pressure of steam.

Gasoline Engine: Type of engine worked or driven by burning of gasoline.

Technological Advance: Technological progress.

Precision: Accuracy: Freedom from error.

Standardization: Making of one shape, size, and quality according to fixed standard.

Synchronization: Co-ordination in time, speed etc.

Continuity: Going on without a break; the state of being continuous.

Interchangeability: Ability of things, parts to be changeable.

Vocabulary Practice

1. Define *automotive industry*?
2. What is a *vehicle*?
3. Explain the phrase *full-scale mass production*.
4. What is *steam-power vehicle* driven by?
5. What is an *engine*?
6. Explain the *gasoline engine*.
7. What is *precision*?
8. What does *standardization* mean?
9. Define *synchronization*.
10. What is *interchangeability*?
11. What is the function of the vehicle *body*?
12. What is *continuity*?

AUTOMOTIVE INDUSTRY

The automotive industry includes all those companies and activities involved in the manufacture of motor vehicles, including most components, such as engines and bodies, but excluding tires, batteries, and fuel. The industry's principal product is passenger automobiles; commercial vehicles though important to the industry, are secondary.

The history of the automobile industry, while brief compared with that of many other industries, has exceptional interest because of its effects on 20th century history. Although the automobile originated in Europe, the United States completely dominated the world industry for the first half of the 20th century through the invention of mass production techniques. In the second half of the century the situation altered sharply as western European countries and Japan became major producers and exporters.

Although steam-powered road vehicles were produced earlier, the origins of the automotive industry are rooted in the development of the gasoline engine in the 1860s and 1870s, principally in France and Germany. By the beginning of the 20th century, Germany, and France manufacturers had been joined by British, Italian, and U.S. makers.

The outstanding contribution of the automotive industry to technological advance was the introduction of full-scale mass production, a process combining precision, standardization, interchangeability, synchronization, and continuity. Mass production was a U.S. innovation.

Mass production implies mass consumption, which in turn requires an elaborate distributive organization to sell the cars and to develop confidence among customers that adequate service will be available. In the early days of the industry, cars were sold directly from the factory or through independent dealers, who might handle several different makes. When sales in large quantities became the objective, however, more elaborate and better organized techniques of distribution became essential.

The automotive industry has become a vital element in the economy of the industrialized countries: motor vehicle production and sales are one of the major indexes of the state of the economy of those countries.

Discussion

1. The automotive industry is one of the main branches of national economy, isn't it? What does it include?

2. Why is the history of the automotive industry known to have exceptional interest?

3. The first road vehicles were steam-powered. Is the automotive industry rooted in the steam-powered engine?

4. What was the outstanding contribution to technological advance in the automotive industry?

Review

A. Are the following statements true or false? Explain your answers.

1. The industry's principal products are commercial vehicles.

2. The automobile originated in Europe and it completely dominated the world industry for the first half of the 20th century.

3. By the beginning of the 20th century western European countries and Japan became major producers and exporters of automobiles.

4. The main contribution of the automotive industry to technological progress was the introduction of full-scale mass production.

B. Match the words or phrases on the left with the statements on the right.

1. Steam-powered automobile	Branch of trade or manufacture.
2. Innovation	Part
3. Dominate	Something new that is introduced.
4. Industry	Forward movement; progress.
5. Component	Person or firm etc. that produces things.
6. Fuel	Vehicle moved by engine worked or driven by pressure of steam.
7. Manufacturer	To have control, authority or influence.
8. Advance	Material for producing heat or other forms of energy.

C. Fill in the blanks below with the correct word or phrase.

1. The ____ product of automotive industry is ____ automobile.

2. The introduction of ____ mass production was the ____ of the automotive industry.

3. All companies ____ in the manufacture of motor vehicles ____ to the automotive industry.

4. Mass production is known to be ____ innovation.

5. Motor vehicle ____ is one of the ____ indexes of ____ of the economy of industrial developed countries.

UNIT TWO. THE MODERN AUTOMOBILE

Special Terms

System: Group of parts working together in a regular relation.
Subsystem: Separate, independent parts of any system.
Alloy: Mixture of metals.
Means: Method, process, ways of transportation.
Market: Place or building where people meet to bay and sell goods.
Research and Development Engineer: Skilled and trained person who investigates and designs engines, machines etc.
Breakthrough: Major achievements, e.g. in technology.
Model: Design or structure of which copies are to be made.

Vocabulary Practice

1. What is an *automobile*?
2. Explain *system*.
3. What is a *subsystem*?
4. Define *means*.
5. What is a *model*?
6. Who investigates and designs engines, machines, equipment etc.?
7. Define *market*.

THE MODERN AUTOMOBILE

The modern automobile is a complex technical system employing subsystems with specific design functions. Some of those consist of thousands of component parts that have evolved from breakthroughs in existing technology or from new discoveries such as electronic computers, high strength plastics, and new alloys of steel and

nonferrous metals, as well as from factors such as pollution, safety legislation, and foreign competition.

Passenger cars have emerged as the primary means of family transportation, with the total number in use worldwide expected to reach half a billion in the 2000. One-third of these are in the United States, where more than 1,5 trillion miles are travelled each year. Approximately 500 different models have offered to U.S. car buyers, about half domestic and half foreign in origin. New designs have brought into the market more quickly in recent years than in the past to permit manufacturer to capitalize on their proprietary technological advances. With more than 30 mill mew units built each year worldwide, manufacturers have been able to split up the total into many very small segments that nonetheless remained economical to market.

New technical developments are recognized to be the key to successful competition. Research and development engineers and scientists have been employed by all automobile manufacturers and suppliers to improve the car body, engine, drivetrain, vehicle control systems, occupant safety, and environmental emissions, and further work by the industry is necessary to meet the needs of the 21st century.

Discussion

1. Modern automobile is defined as a complex technical system. What does it employ?

2. Passenger car have emerged as the primary means of transportation. How are they distributed through the world?

3. What models have been offered to the U.S. car buyers?

4. What is recognized to be the key to successful competition?

5. Who has been employed by all automobile manufacturers to improve all systems of automobile?

Review

A. Are the following statements true or false? Explain your answers.

1. The modern automobile is a single technical system with definite functions.

2. Some of those subsystems consist of many parts evolved from break throughs in existing technology or from new discoveries.

3. The total number of passenger cars in use worldwide was expected to reach half a billion in the 2000.

4. Research and development engineers and scientists have been employed to create new models of passenger cars.

B. Match the word or phrase on the left with the statement on the right.

1. Design	Systematic application of knowledge to practical tasks in industry.
2. Function	Technological progress.
3. Origin	Drawing or outline from which sth. may be made.
4. Technology	Vehicle used for transportation of passengers on land.
5. Technological advance	Starting point.

C. Complete the following statements with the appropriate word or phrase.

1. The up-to-date automobile is ____ .

2. The complex technical system ____ subsystems.

3. The most component parts ____ evolved from breakthrough in existing technology or from ____ .

4. One-third of passenger cars are in the U.S., where more than 1,5 trillion miles ____ each year.

5. Almost all automobile manufacturers ____ research and development engineers and scientists ____ the existing models of automobiles.

UNIT THREE. VEHICLE DESIGN

Special Terms

Design: Drawing or outline from which vehicle may be made.
Off-road Use: Use in broken ground, rugged country.
Customer: Person who buys things.
Engine Performance: Engine's notable action.
Propulsion: Propelling force, driving a vehicle forward.

Layout: Components arrangement of a vehicle.
Comfort: Contentment; physical well-being.
Option: Right or power of choosing.
Consumer: Person who uses goods.
Suspension: Means by which a motor-vehicle is supported on its axles.

Vocabulary Practice

1. Define *design*. What does vehicle design depend on?
2. What automobiles are suitable for *off-road use*?
3. What is *engine performance*?
4. What is *suspension*?
5. What does *weight distribution* depend on?
6. Explain *comfort options*.
7. What is *propulsion*?
8. What is the common practice of engine *layout*?
9. Is *lay-out* the same as *weight distribution*?

VEHICLE DESIGN

Vehicle design depends to a large extend on its intended use. Automobile for off-road use in countries that lack service facilities must be durable, simple systems with high resistance to severe overloads and extremes in operating conditions. Conversely, the customers for products that intended for the high-speed, limited-access road systems in Europe and North America expect more passenger comfort options, increased engine performance, and optimized high-speed handling and vehicle stability. Stability depends principally on the distribution of weight between front and rear wheels, the height of the centre of gravity and its position relative to the aerodynamic centre of the vehicle, suspension characteristics, and whether front or rear wheels are used for propulsion. Weight distribution depends principally on the location and size of the engine. The common practice of front mounted engines exploits the stability that is more readily achieved with this layout. The development of aluminium engines and new manufacturing processes, have however, made it possible to locate the engine at the rear without necessarily compromising stability.

Discussion

1. Vehicle design depends on its intended use. What automobiles are commonly used in countries that lack service facilities?

2. What comfort do the most customers expect by new vehicle designs?

3. What factors provide necessarily vehicle stability?

Review

Fill in the blanks in the sentences below with the correct word or phrase.

1. Vehicle design depends first of all ____ .

2. Vehicle stability depends principally on such factors as ____ .

3. ____ depends principally on the ____ of the engine.

4. The stability is more readily achieved with ____ .

UNIT FOUR. BUSES

Special Terms

Bus: Public conveyance that travels along a fixed route and takes up and sets dawn passengers at fixed points.

Flexibility: Adaptability to new conditions.

Self-propelled vehicle: Automobile that moves without using external power.

Coach: Wheeled carriage pulled by horses.

Wheelchair: Passenger chair with large wheels for the use of persons unable to walk.

Luggage compartment: Place or room for luggage.

Entrance: Door by which passengers get in.

Capacity: Actual horse-power of an engine.

Rack: Shelf over the seats of a bus for light luggage.

Air Brake: Device for reducing speed or stopping motion worked by compressed air.

Wheelbase: Distance between axles of motor-vehicle.

Safety Provision: Means of providing passengers freedom from danger.

Articulated bus: Bus having parts joined in a flexible manner.

Vocabulary Practice

1. What is a *bus*?
2. What does *flexibility* mean?
3. What type of vehicle operates within the city limits?
4. Define *self-propelled vehicle*.
5. What is *wheelbase*?
6. Define *air brake*.
7. Explain the phrase *safety provision*.

BUSES

The bus is the self-propelled road vehicle, designed to carry more passengers than any automobile, generally on a fixed route. It was developed at the beginning of the 20th century to compete with streetcars by providing greater route flexibility. The bus was a natural outgrowth of the horse-driven coach. Today buses are defined as vehicles that accommodate more than 10 passengers.

There are four main types of buses: city or transit, suburban, intercity or tour, and school. The city bus operates within the city limits and is characterized by low maximum speed, low-ride platform, provision for standing and wheelchair passenger, two entrances on the curb side, low-back seats, and no luggage space.

The suburban bus is designed for short intercity runs and has high-back seats, luggage compartments and racks, and a single front entrance. The intercity type has a high-ride platform to provide maximum luggage space under the passengers, high-back seats, overhead luggage racks, individual reading lights, and a washroom. A typical intercity coach weighs about 26,000 pounds (12,000 kilograms), has a capacity of up to 47 passengers, a two-stroke-cycle diesel engine with up to 450 horsepower, an electronically controlled automatic transmission, and air brakes. School buses generally consist of a 50-passenger bus body, with special signal lamp and safety provisions, mounted on a long-wheelbase truck chassis.

Articulated buses were first used in Europe in the 1950s. In this arrangement a trailer body is connected to the rear of conventional front-engine bus by means of a hitch, a flexible diaphragm, and a continuous floor panel with accurate mating surface during turn

manoeuvres. This arrangement permits up to a 75 percent increase in seating capacity and 20 percent improvement in fuel efficiency per seat-mile. The turning radius is the same as that of conventional bus. Manufacture of this design was begun in the United States in the 1980s by several European firms. Double decking, increased seating comfort, and larger glass areas have been trends in tour buses, principally in Europe and Asia.

Discussion

1. What vehicles are designed as buses? When was the first bus developed?

2. Name and describe the principal types of buses.

3. When and where were the first articulated buses developed and used?

Review

A. Match the word of phrase on the left with the statement on the right.

1. Capacity	Baggage
2. Limit	Unit for measuring the power of an engine
3. Bus	Ability to hold, contain
4. Coach	Put and fix in position.
5. Luggage	Movement, light message, device used to give a warning, an order or information.
6. Mount	Take part in contest, examination etc.
7. Horsepower	Carriage pulled by horses.
8. Signal	Boundary
9. Engine	Vehicle for transportation of people.
10. Compete	Machine that converts energy into power or motion.
11. Articulated bus	Bus having parts joined in a flexible manner.

B. Fill in the following blanks with the appropriate word or phrase.

1. Self-propelled vehicle designed to carry ____ than an automobile ____ .

2. The bus was developed ____ to compete with streetcars.

3. Vehicle that can carry more than 10 passengers is defined ___ .
4. The principal types of buses are ____ .
5. The capacity of ____ makes up to 70 passengers.
6. The bus operating within the city limits ____ .

C. Are the following statement true or false? Explain your answers.

1. The bus is self-propelled vehicle developed to compete with the horse-driven coach.

2. Modern buses are defined as vehicles that provide seating capacity for more than 10 passengers.

3. The suburban bus is designed for long intercity runs.

4. The typical tour bus has a capacity of up to 47 passengers.

5. Both the conventional and the articulated buses have the same turning radius.

UNIT FIVE. LORRIES

Special Terms

Lorry: Long, low, open motor-vehicle for carrying goods by road.
Coupling: Link that joins two parts.
Freight: Load
Monopoly: Complete control of manufacture, trade etc.
Wagon: Wheeled vehicle for carrying goods.
Speed: Swiftness; rapidity of movement.
Articulated vehicle: Vehicle having parts joined in a flexible manner.
Wheelbase: Distance between the axles of a motor-vehicle.

Vocabulary Practice

1. Define *lorry*.
2. Is *truck* the same as *lorry*?
3. What is *freight*?
4. What is the difference between *single lorry* and *articulated* one?
5. What is *speed*?
6. Define *frame*?
7. What is the term *horsepower* used for?

LORRIES

A lorry, or truck, is a motor vehicle designed to carry freight or goods or to perform special services. The lorry was derived from horse-driven wagon technology and some of the pioneer manufacturers came from the wagon business. Because of their speed and flexibility, lorry carries a quater of the intercity freight. Lorries enjoy an almost total monopoly in freight delivery.

In 1896 Gottlieb Daimler of Germany built the first motor lorry. It was equipped with a four-horsepower engine and a belt drive with two speeds forward and one in reverse. In 1896 the Winton Company of the United States produced a gasoline-powered wagon with a single-cylinder six-horse-power engine.

In World War I motor lorries were widely used, and in World War II they largely replaced horse-drawn equipment. A notable vehicle was the four wheel-drive, short-wheelbase jeep, capable of performing a variety of military tasks.

Lorries can be classified as either as straight or articulated. A straight lorry is one in which all axles are attached to a single frame. An articulated vehicle is one that consists of two or more separate frames connected by suitable couplings.

Axle assemblies of heavy lorries may be made up of two or more axles, any of which may be powered. Normally, they are so spaced that the distance between axle centers is not more than one-half times the overall diameter of the wheel and tyre. If the axles are separated by a large distance, the assembly is called a spread tandem.

The ratio of lorries to the passenger cars in the world is increasing annually.

Discussion

1. What type of vehicle is defined as lorry? What is it designed for?

2. Describe the first motor lorry/

3. What is usually classification of lorries?

Review

A. Fill in the blanks with the appropriate word or phrase.

1. Lorries are vehicles ____ .

2. ____ are usually classified ____ .

3. The first motor lorry was ____ .

4. ____ enjoy ____ in intercity freight delivery.

5. ____ were widely used in, and in ____ they ____ horse-drawn equipment.

B. Match the word of phrase on the left with the statement on the right.

1. Service	Having the power.
2. Derive	Arrange in groups.
3. Freight Road	Rod upon or with which a wheel turns.
4. Equipment	Without a bend or curve; extending in one direction only.
5. Classify	Have as a starting point, source of origin.
6. Axle	Load
7. Capable	System or arrangement that supplies public needs.
8. Straight	Thing needed for a purpose.
9. Task	Having parts joined in a flexible manner.
10. Articulated vehicle	Peace of work to be done.

C. Are the following statements true or false? Explain your answers.

1. A motor-car designed to carry passengers is lorry.

2. Lorries were widely used in World Wars.

3. Lorries are classified according to the number of axles.

4. The manufacture of lorries is increasing every year.

5. The axles of heavy lorries are so spaced that the distances between axles centers is not more than one-half times the overall diameter of wheel and tyre.

UNIT SIX. FUTURE SYSTEMS

Special Terms

Automotive Market: Public place where people meet to buy or sell automotive vehicles.

Rectifier: Device, which converts alternating current to direct current.

Battery: Portable cell for supplying electricity.
Torque: Twisting force causing rotation.
Accelerator: Device for reducing the noise made by the exhaust of a petrol engine.
Blend: Mixture made of various sorts.
Cell: Unit of an apparatus for producing electric current by chemical action.
Environment: Surrounding, circumstances.

Vocabulary Practice

1. What is *environment*?
2. Define *automotive market*.
3. Explain the term *electric motocar*.
4. What is *rectifier* used for?
5. What is *blend*?
6. What is *accelerator* used for?
7. Give a definition of *torque*.
8. What is the function of *fuel cell?*

FUTURE SYSTEMS

Expansion of the total potential automotive market in the future and concern for the environment may be expected to change cars of the future. Special-purpose vehicles designed for specific urban or rural functions, with appropriate power system for each type of use, may be needed. Possibilities include electric, solar, steam, gasturbine, hybrid combinations, and other power sources.

Modern electric cars and trucks were manufactured in small numbers in Europe, Japan, and United States beginning in the 1980s.

However, electric propulsion is only possible for relatively short-range vehicles, using power from batteries of fuel cells. In a typical system, a group of lead-acid batteries, connected in a series, power electric AC induction motors to propel the vehicle. A solid-state rectifier, or power inventor, changes the direct current supplied by the battery pack to an alternating current output that is controlled by the driver using an accelerator pedal to vary the output voltage. Because of the torque characteristics of the electric motors, conventional gear-type transmissions are not needed in most designs.

Compressed gas and blends derived from methanol and ethanol are being studied as fuels for the future because they may be produced from readily available biomass sources and have potential for high efficiency and lower emissions.

Gas turbines have been tested extensively and have good torque characteristics, operate on a wide variety of fuels, have high power-to-weight ratios, meet emission standards, and offer quiet operation. Some studies have shown that the advantages of the system are best realized in heavy-duty vehicles.

Nuclear energy offers the advantage of extremely low fuel weight. The obstacle for automotive use, however, is the great weight and volume of shielding required to protect the occupants from excessive nuclear radiating.

The advent during the 1990s of regulating requiring "zero emissions" from some vehicles in certain areas rekindled world interest in new battery technology. Battery system that offer higher energy density became the subject of joint research by auto industry scientists. Noncommercial solar powered electric demonstration vehicles were built by universities and manufactures.

Discussion

1. Name the factors on which the future development of automotive vehicles depends.

2. What alternative power sources are expected to be used to propel the vehicle?

3. What advantages does the nuclear power source offer?

4. What battery system became the subject of joint research by auto industry scientists?

5. What rekindled world interest in new battery technology?

Review

A. Match the word of phrase on the left with the statement on the right.

1. Accelerator	Benefit, profit
2. Future	Coming or arrival of smth.
3. Direct current	Twisting force causing rotation.
4. Turbine	Electric current flowing in one direction.

5. Advent	Time coming after the present.
6. Technology	Device for controlling speed.
7. Advantage	Current that reverses the direction at regular intervals.
8. Obstacle	Engine or motor which driven-wheel is turned by a current of water, steam or air.
9. Alternating current	Systematic application of knowledge to practical tasks in industry.
10. Torque	Something in the way that stops progress or makes it difficult.

B. Discuss the alternative power sources which you think will determine the development of future automotive vehicles.

C. Discuss the possibilities of using the power sources in the automotive industry.

UNIT SEVEN. COMPONENTS OF THE AUTOMOBILE

Special Terms

Passenger car: Automobile for transportation of people.

Bus: Public conveyance that travels along a fixed route and takes up and sets down passengers at fixed points.

Lorry: Long, low, open motor-vehicle, for carrying goods by a road.

Body: Main outside structure of a motor vehicle.

Ignition: Electrical mechanism for igniting the mixture of explosive gases; being igniting

Cylinder: Shaped chamber in an engine in which gas works a piston.

Intake: Drawing a mixture of air and fuel into the cylinder.

Compression: Stroke during which a fuel mixture is compressed.

Power: Energy of force that can be used to do work.

Exhaust: Outlet in engine for gas that has done its work.

Valve: Mechanical device for controlling the flow of air, liquid, gas in one direction only.

Vocabulary Practice

1. What is the *passenger car* propelled by?

2. What are the four stroke of an engine?

3. What is *top dead centre*?
4. What is *bottom dead centre*?
5. What are the passenger cars distinguished by?

COMPONENTS OF THE AUTOMOBILE

Automobiles are lorries, self-propelled vehicles for land transportation of people or goods, or for moving materials. There are three types of automobiles. These are passenger cars, buses and lorries. The automobile consists of the following components: a) the engine; b) the frame work; c) the mechanism that transmits the power from engine to the wheels; d) the body.

Passenger cars are, as a rule, propelled by an internal-combustion engine. They are distinguished by the horsepower of the engine, the number of cylinders in the engine and the type of the body, the type of transmission, wheelbase, weight and overall length.

There are engines of various designs. They differ in the number of cylinders, their position, they operating cycle, valve mechanism, and cooling system.

Most automobile engines have six or eight cylinders, although some four-, twelve-, and sixteen-cylinder engines are used. The activities that take place in the engine cylinder can be divided into four stages which are called strokes. The four strokes are: intake, compression, power and exhaust. The upper limit of piston movement is called top dead centre, TDC. The lower limit of piston movement is called bottom dead centre, BDC. A stroke constitutes piston movement from TDC to BDC, or from BDC to TDC. In other words, the piston completes a stroke each time it changes the direction of motion.

Discussion

1. What are the functions of the automobile?
2. List the main components of an automobile?
3. There are engines of different design. What do they differ in?
4. Describe the passenger car.
5. What activities take place in the engine cylinder?

Review

A. Fill in the following space with the appropriate word or phrase.

1. There are ____ main types of automobiles.
2. Passenger cars are distinguished by ____ .
3. Top dead centre is ____ .
4. The low limit ____ is called ____ .
5. Each time the piston changes direction of motion ____ .

B. Match the word of phrase on the left with the statement on the right.

1. Component	General arrangement or planning of a vehicle.
2. Internal combustion	Things carried by means of transportation.
3. Cylinder	Part helping to form a complete thing.
4. Goods	One of a series of regularly repeated movements.
5. Design	Clutch, gears and drive which transmit power from the engine to the rear axle of a vehicle.
6. Valve	The process by which power is produced by the explosion of gas inside a cylinder of the engine.
7. Stroke	Forcing out the gases produced by the burning of fuel mixture.
8. Motion	Shaped chamber in an engine in which gas works a piston.
9. Transmission	Mechanical device for controlling the flow of air, liquid gas in one direction only.
10. Exhaust	Manner of moving; movement.

UNIT EIGHT. BODY

Special Terms

Body: Main part of the structure.
Roof: Top covering of a car, bus.
Pillar: Strong and important supporter.

Arrangement: Putting in order.
Windshield: Screen of glass in front of a motor-vehicle.
Visibility: Field of view.
Refinement: Perfection; Improvement; Elegance.
Retractable fabric top: Top of flexible material that can be moved back or in.
Sheet: Broad, flat piece of thin material.
Wrinkling: Small fold or line on the surface of body.
Property: Special quality that belongs to sth.
Technique: Method of doing smth expertly.
Alloy: Mixture of metals especially a metal of a low value with a metal of a higher value.
Convertible Model: Model with a folding or detachable root.
Model: Design or structure of which copies can be made.

Vocabulary Practice

1. What is a *body*?
2. What is the function of *pillar*?
3. Give a definition of *property*.
4. Explain the *retractable fabric top*.
5. What is the *windshield* produced of?
6. What is *alloy*?
7. Is *design* the same as *model*?
8. What does *refinement* mean?
9. What is *technique*?
10. What is *visibility*?

BODY

Automotive body designs are frequently categorized according to the number of doors, the arrangement of seats, and the roof structure. Automobile roofs are conventionally supported by pillars on each side of the body. Convertible models with retractable fabric tops rely on the pillar at the side of the windshield for upper body strength as convertible mechanisms and glass areas are essentially non-structural. Glass areas have been increased for improved visibility and for aesthetic reasons.

The high cost of new factory tools makes it impractical for manufacturers to produce totally new designs every year. New designs usually have been programmed on three– to six-year cycles with generally minor refinements appearing during the cycle. In the past, as much as four years of planning and new tool purchasing was needed for a completely new design. Computer-aided design and computer aided manufacturing techniques may now be used to reduce this time requirement by 50 percent or more.

Automotive bodies are generally formed out of sheet steel. Elements are added to the alloy to improve its ability to be formed deeper depressions without wrinkling or tearing in manufacturing presses. Steel is used because of its availability, low cost, and good workability. For certain applications, however, other materials, such as aluminium, fiberglass, and carbon-fiber reinforced plastic, are used because of their special properties. Polyamide, polyester, polystyrene, polypropylene and ethylene plastics have been formulated for greater toughness and resistance to brittle deformation. This material has been designed successfully for some body panels. Tooling for plastic component generally costs less and requires less time to develop than that for steel components and therefore may be changed by designers at lower costs.

To protect body from corrosive elements and to maintain their strength and appearance, special priming and painting processes are used.

Discussion

1. What does the category of an automotive body design depend on? Describe some of the main structural elements of body.

2. What prevents manufacturers from producing totally new designs every year? What is needed for a completely new design?

3. What materials were usually automotive body formed out of in recent time?

4. What reasons make the manufacturers of automobile search after and use new materials in motor-car industry?

Review

A. Match the word of phrase on the left with the statement on the right.

1. Categorize	Strength; hold up or keep up in place.
2. Seat	Strength; durability; firmness.
3. Body	Capacity or power to do smth.
4. Design	Perfection, improvement, elegance.
5. Roof	Special quality.
6. Retractable fabric top	Price to be paid for a thing.
7. Property	Top covering of a bus, car etc.
8. Reason	Main part of a vehicle.
9. Windshield	Field of view.
10. Ability	Pattern; model.
11. Visibility	Screen of glass in a front of a motor-vehicle.
12. Cost	Place in passenger vehicle in which one has a right to sit.
13. Toughness	Fact serving as cause of or justification for smth.
14. Refinement	Top made of textile material that can be moved back or in.
15. Support	Place in a category; classify.

B. Fill in the blanks with the appropriate word or phrase.

1. Pillars on each side of the automobile body ____ .

2. ____ are generally formed out of ____ .

3. It is unpractical for manufacturers to produce totally new designs every year because ____ .

4. New manufacturing techniques are now widely used ____ .

C. Describe the general structure of the automobile bodies. Describe their properties.

UNIT NINE. CHASSIS

Special Terms

Chassis: Base framework of a motor-vehicle on which the body and working parts are mounted.

Frame: Skeleton or main structure of an automobile.

Transmission: Clutch, gears and drive, which transmit power from the engine to the rear axle of a motor-vehicle.

Axle: Bar or rod that passes through the centres of pair of wheels.

Steering Mechanism: Device for directing the course of a car.

Brake: Device for reducing speed or stopping motion.

Suspension Members: Parts by which a motor-vehicle is supported on its axles.

Acceleration: Making or being made quicker; rate of increase; rate of speed per unit of time.

Shell: Outer structure of a vehicle.

Vocabulary Practice

1. Give the definition of *chassis*.

2. What does the *frame* form?

3. What are the *suspension members* mounted on?

4. What is the *body shell* reinforced with?

5. What is an *axle*?

6. What does the term *acceleration* mean?

CHASSIS

The chassis of the modern automobile is the main structure of the vehicle. In most designs a pressed steel frame forms a skeleton on which the engine, wheels, axle assemblies, transmission, steering mechanism, brakes, and suspension members are mounted. The body is flexible bolted to the chassis during the manufacturing process. The combination of body and frame absorbs the reactions from the movement of the engine and axle, receives the reaction forces of the wheels in acceleration and braking, absorbing aerodynamic wind forces and road shocks through the suspension, and absorbs the major energy of impact in the event of an accident.

In modern small car designs there has been a trend toward combining the chassis frame and the body into a single structural element. In this arrangement the steel body shell is reinforced with braces that makes it rigid enough to resist the forces that are applied to it. Separate frames are used for other cars to achieve better noise-isolation characteristics. The presence of heavier-gauge steel components in modern separate frame designs also tends to limit intrusion in accidents.

Discussion

1. The chassis is the main part of the automobile. What is its arrangement?

2. What tendency has been observed in modern small car designs?

Review

A. Are the following statements true or false? Explain your answers.

1. The chassis of the main modern automobile is the accessory structure of the vehicle.

2. The body is rigid bolted to the chassis.

3. All working parts of the vehicle are mounted on the chassis.

4. To achieve a better noise-isolation characteristics separate frames are used.

UNIT TEN. ENGINE

Special Terms

Energy-Conversion System: Device or system for conversion energy from forms provided by nature into those most useful to society.

Piston: Round plate or short cylinder fitting closely inside in cylinder in which it moves up and down or backwards and forwards.

Internal-Combustion Engine: Type of engine in which power is produced by the explosion of gases inside the cylinder.

Reciprocating-Piston: Piston moving backwards and forwards in a straight line.

Stroke Cycle: Series of regularly repeated movements of piston.

Speed: Swiftness; rapidity of movement.

Mass Production: Manufacture of large numbers of identical articles by standardized processes.

Make: Model, kind.

Range: Row, line or series of things, e.g. of energy-conversion systems.

Vocabulary Practice

1. Explain the *energy-conversion system*.
2. What engine is operating on four-stroke cycle?
3. What engine proved to be the most successful for automobiles?
4. What is a *piston*?
5. Explain the *mass production*.
6. What is a *stroke cycle*?
7. What is a *make*?
8. What measure unit is used for measuring engine capacity?

ENGINE

A wide range of energy-conversion systems has been used experimentally and in automotive production. These include electric, steam, solar, turbine, rotary, and a variety of piston-type internal combustion engines. The most successful for automobiles has been the reciprocating piston internal-combustion engine, operating on four-stroke cycle, while diesel engines are widely used for lorries and buses. The gasoline engine was originally selected for automobiles because it could operate more flexible over a wide range of speeds, and power developed for a given weight engine was reasonable; it could be available, moderately priced fuel-gasoline. Reliability, compact size, and range of operations later became important factors.

There has been an ongoing reassessment of these priorities with new emphasis on the pollution-producing characteristics of automotive power systems. This has created new interest in alternate power sources and internal-combustion engine refinements that were not economically feasible in prior years. Although a few limited-production battery-powered electric vehicles have appeared from time to time, they have not proved to be competitive owing costs and operating characteristics. The gasoline engine, with new emission-control devices to improve emission performance, has not yet been challenged significantly.

In the late 1940s a trend began to increase engine horsepower, particularly in American models. Design changes incorporated all known methods of raising engine capacity, including increasing the pressure in the cylinders to improve efficiency, increasing the size of

the engine and increasing the speed at which power is generated. The advent of smaller cars brought a return to smaller engines, four– and six-cylinder designs rated as low as 80 horsepower.

European automobile engines were of a much wider variety, ranging from 1 to 12 cylinders, with corresponding differences in overall size, weight, piston displacement, and horsepower ratings from CAPut!' to 120.

Discussion

1. List the energy conversion systems used in automotive production.

2. What engines proved to be the most successful for automobiles? Why?

3. What factors have created new interest in alternate power sources and internal-combustion engine refinements?

Review

A. Fill in spaces with the appropriate word or phrase.

1. Wide range of energy-conversion systems used in automotive production ____ variety of piston-type internal-combustion engines.

2. The reciprocating-piston internal-combustion engine proved to be ____ .

3. Such factors as ____ reliability, compact size and range of operations ____ .

4. As far as ____ a trend began to increase engine horsepower.

B. Are the following statements true or false?

1. European engines were of usual variety.

2. As s gasoline engine could operate more flexible over a wide range of speeds, it was selected for automobiles.

3. The return to smaller engines brought the advent of smaller cars.

4. All known methods of raising engine capacity were incorporated in these design changes.

UNIT ELEVEN. HEAT ENGINES

Special Terms

Spark Ignition: Electrical mechanism for igniting the air-fuel mixture.

Power Plant: Apparatus, machinery for producing electricity.

Crankshaft: Shaft that turns or is turned by a crank (L-shaped arm or handle for transmitting rotary motion).

Velocity: Speed; rate of motion produced.

To-and-Fro Motion: Movement backwards and forwards.

Flywheel: Heavy wheel revolving on a shaft to maintain a constant velocity.

Heat Engine: Machine that converts heat energy into mechanical one.

Diesel Engine: Oil-burning engine in which ignition is produced by the heat of suddenly compressed gas.

Vocabulary Practice

1. Explain the *heat engine*.
2. What is a *diesel engine*?
3. What differs a diesel engine from an *internal-combustion engine*?
4. What engine is called *steam engine*?
5. What changes *to-and-fro motion* into rotary motion?
6. Define *velocity*.
7. What maintains constant *output velocity*?
8. What is the function of *flywheel*?

HEAT ENGINES

The heat engine is a machine that converts heat energy to mechanical energy. The engines of motor-cars, motor-cycles, farm tractors, motor-boats etc., are heat engines, which belong to the type of internal combustion engines. Combustion engines may be divided into several types according to the number of piston strokes. Most of modern automotive engines operate on four-stroke cycle. . There are also engines which operate on two-stroke and six-stroke cycles.

A diesel engine is a machine which produces power by burning oil in a body of air which has been squeezed to a high pressure by a moving piston. Because of this pressure the diesel engines have

heavier parts then the gasoline engines. Diesel engines are especially suitable where an independent source of power is required, as in ships, locomotives, mobile equipment of all sorts and isolated power plants.

Steam, gas and oil engines were known and used prior to the invention of the diesel engine .The steam engine converts the heat energy of steam to mechanical energy. A typical steam reciprocation engine consists of a cylinder fitted with a piston. A connecting rod and crankshaft change the piston to-and-fro motion into rotary motion. The steam pressure on the piston varies during the stroke, and it is a flywheel which maintains a constant output velocity.

Discussion

1. Describe structure, function and operation of the heat engine.
2. What differs gasoline engine from diesel engine?
3. What types of combustion engines are there?
4. What does the typical steam engine consists of?

Review

A. Are the following statements true or false? Explain your answers.

1. Steam, gas and oil engines are known to have been used prior to the invention of the diesel engine.

2. Diesel engine is a machine which produces power by burning petrol.

3. The flywheel maintains the constant output velocity.

B. Match the word and phrase on the left with the statement on the right.

1. Steam	Make or become heat.
2. Body	Sea-going vessel of considerable size.
3. Heat	Creating thing not existing before.
4. Operate	Manufacture; make; create.
5. Crankshaft	Self-propelled engine for use on railway.
6. Ship	Mass, Quantity.
7. Locomotive	Shaped chamber in an engine in which gas or steam work a piston.
8. Produce	Cause to work, be in action.

9. Invention	Gas or vapour into which boiling water changes.
10. Cylinder	Shaft that turns and is turned by a crank.

UNIT TWELVE. FUEL AND LUBRICATION

Special Terms

Fuel: Material for producing heat or other forms of energy

Lubrication: Putting oil or grease into machine parts to make them work easily

Operation: Working; way in which automobile works.

Volatility: Ability for easy change into gas or vapour.

Antiknock compound: Substance added to the fuel in a motor-car engine to reduce noise

Combustion: Process of fuel burning.

Performance: Efficiency.

Friction: The rubbing of one part against another.

Coolant: Kind of fluid used for cooling

Bearing: Device that supports moving parts and reduces friction.

Grease: Animal fat melted soft, used to lubricate axles.

By-Product: Substance obtained by the burning of fuel mixture in engine.

Transmission: Arrangement, which transmit power from the engine to the axle of a motor-vehicle.

Vocabulary Practice

1. Give the definition of *fuel*.

2. What do all moving parts of a vehicle require for their reliable operation?

3. Is the *friction* a positive effect?

4. What is *combustion*?

5. What is a *pump*?

6. What are *bearings* used for?

7. Explain the *antiknock compound.*

8. What serves as a *coolant*?

9. What is a *grease*?

10. What is a *power*?

FUEL AND LUBRICATION

Specially formulated gasoline is essentially the only fuel used for automobile operation, although diesel fuels are used for many trucks and buses and a few automobiles. The most important requirements of a fuel for automobile are proper volatility, sufficient antiknock quality, and freedom from polluting by-products of combustion. The volatility is reformulated seasonally by refiners so that sufficient gasoline vaporizes, even in extreme cold weather, to permit easy engine starting. Antiknock compounds, principally tetraethyl lead, were added to most gasolines to prevent knocking, a rapid, uncontrolled burning in the final stages of combustion that result in a characteristic "knock" and may damage an engine or reduce its performance.

All moving parts of an automobile require lubrication. Without it, friction would increase power consumption and damage the parts. The lubricant also serves as a coolant, a noise-reducing cushion, and a sealant between engine piston rings and cylinder walls. The engine lubrication system incorporates a gear-type pump that delivers filtered oil under pressure to a system of drilled passages leading to various bearings. Oil spray also lubricates the cams and valve lifters.

Wheel bearings and universal joints require stiff grease; other chassis joints require a soft grease that can be injected by pressure guns. Hydraulic transmissions require a special oil similar to that for rear axles to resist heavy loads on the grade of light hydraulic fluid, and manually shifted transmissions use heavier gear teeth. Gears and bearings in lightly loaded components, such as generators, and window regulators, are fabricated from selflubricating plastic materials.

Discussion

1. Describe the most important requirements of a fuel for automobile operation.

2. Why do all moving parts of an automobile require lubrication? What does the lubrication system incorporate?

3. Do all parts and joints require the same lubrication?

Review

A. Fill in the blanks below with the correct word or phrase.

1. The only fuel used for automobile operation is ____ .

2. ____ are the most important requirements of a fuel ____ .

3. Without lubrication ____ and damage the automobile parts.

4. Universal joints and ____ require ____ .

5. The cams and valve lifters ____ by oil spray.

B. Are the following statements true or false? Explain your answers.

1. The only fuel for automobile operation of all makes is specially formulated gasoline.

2. Without proper lubrication of moving parts of automobile friction would damage these parts.

3. Different devices and joints require the same gears, don't they?

4. Furthermore any lubrication serves as a noise reducing cushion.

5. Hydraulic transmission requires a special grade of light hydraulic fluid.

C. Match the word or phrase on the left with the statement on the right.

1. Combustion	Bar or rod that passes through the centers of a pair of wheels.
2. Lubricant	Fluid used for cooling engine parts.
3. Transmission	Substance that is put into machine parts to make them work easily.
4. Gear	Device that supports moving parts and reduces friction between them.
5. Bearing	Process of burning of fuel.
6. Friction	Substance obtained during burning of fuel mixture.
7. Coolant	Arrangement which transmit power from the engine to the axle of motor-vehicle.
8. By-products of combustion	Device that controls mechanical movement.
9. Volatility	The rubbing of one part against another.

10. Axle	Set of toothed wheels to connect the engine of a motor-vehicle with the road wheels.
11. Regulator	Ability for easy change into gas or vapour.

ADDITIONAL TEXTS

ENGINE OPERATION

An automobile, powered by a petrol engine, begins to operate when the driver turns a flywheel connected to the engine crankshaft. As the crankshaft revolves, a mixture of fuel and air is drawn from a carburettor into the engine cylinders. The ignition system provides the electric sparks that ignite this mixture. The resultant explosions of the mixture turn the crankshaft, and the engine starts moving. By regulating the flow of the fuel and air with a throttle, the driver controls the rotational speed of the crankshaft.

Cooling, electrical ignition and lubrication systems are of great importance for the good performance of a car. The lights, radio and heater add to the flexibility, comfort, and convenience of the car. The indicating devices keep the driver informed as to engine temperature, oil pressure, amount of fuel, and battery charging rate.

Brakes are of drum and disk types. The steering system consists of a manually operated steering wheel, which is connected by a steering column to the steering gear from which linkages run to the front wheels. It is difficult to turn the steering wheel, and special hydraulic power mechanisms are used to lessen this effort. Suitable springs are used against shocks. There are leaf springs, coil springs, torsion bars and air suspensions.

AIR-COOLED ENGINES

All vehicle engines are air-cooled to some degree. Even in water-cooled engines heat is transmitted first from cylinder to water and afterwards, in the radiator, from water to air. This method of cooling is not difficult to accomplish, because the heat taken off the hot cylinder walls by water can be distributed without difficulty upon the large cooling surface of the radiator and so easy transmission of heat to air is made possible.

Reciprocating engines used in aircraft are almost entirely air-cooled. Aircraft engines cooled by air are manufactured today in sizes ranging from 50 to 3500 hp and they have superseded water-cooled engines. The principal advantages of air-cooled aircraft engines are low weight, and greater reliability in operation. Modern

motor-cycles are also designed almost exclusively with air-cooled engines.

New designs of air-cooled vehicle engines are notable for their easy maintenance, reliability and economical operation.

COOLING SYSTEM

Almost all automobiles employ liquid systems for their engines. All typical automotive cooling system comprises (1) a series of channels cast into engine block and cylinder head, surrounding the combustion with circulating water or other coolant to carry away excessive heat, (2) a radiator consisting of many small tubes equipped with a honeycomb of fins to radiate heat rapidly, that receives and cools hot liquid from the engine, (3) a centrifugal-type water pump with which to circulate coolant, (4) a thermostat, which maintains constant temperature by automatically varying the amount of coolant passing into the radiator, and (5) a fan, which draws fresh air through the radiator.

For operation at temperature below 32 F (0 C), it is necessary to prevent the coolant from freezing. This is usually done by adding some compound to depress the freezing point of the coolant. Alcohol formerly was commonly used, but it has a relatively low boiling point and evaporates quite easily, making it less desirable than organic compounds with a high boiling point.

Air-cooled cylinders operate at higher, more efficient temperatures, and air-cooling offers the important advantage of eliminating not only freezing and boiling of the coolant at temperature extremes but also corrosion damage to the cooling system. Control of engine temperature is more difficult, however, and high-temperature-resistant ceramic parts are required when design operating temperatures are significantly increased.

ELECTRICAL SYSTEM

Originally, the electrical system of the automobile was limited to the ignition equipment. With the advent of the electric starter on 1912 model, electric lights and horns began to replace the kerosene and acetylene lights and bulb horns. Electrification was rapid and complete, and by 1930, six-volt systems were standard everywhere.

The electrical system comprises a storage battery, generator, starting motor, lighting system, ignition system, and various accessories and controls.

The ignition system provides the spark to ignite the air-fuel mixture in the cylinders of the engine. The system consists of the spark plugs, coil, distributor, and battery. In order to jump the gap between the electrodes of the spark plugs, the 12-volt potential of the electrical system must be stepped up to about 20,000 volts. This is done by a circuit that starts with the battery, one side of which is grounded on the chassis and leads through the ignition switch to the primary winding of the ignition coil and back to the ground through an interrupter switch. Interrupting the primary circuit induces a high voltage across the secondary of the coil. The high-voltage secondary terminal of the coil leads to a distributor that acts as a rotary switch, alternately connecting the coil to each of the wires leading to the spark plugs.

The source of energy for the various electrical devices of the automobile is a generator, or alternator, that is belt-driven from the engine crankshaft.

A lead-acid battery serves as a reservoir to store excess output of the generator. Energy for the starting motor is thus made available along with power for operating other electric devices when the engine is not running or when the generator speed is not sufficiently high to carry the load.

STEERING

Automobiles are steered by a system of gears and linkages that transmit the motion of the steering wheel to the pivoted front wheel hubs. The gear mechanism, located at the lower end of the shaft carrying the steering wheel, is usually a worm-and-nut or cam-and-lever combination that rotates a shaft with an attached crank arm through a small angle as a steering wheel is turned. Tie rods attached to the arm convey its motion to the wheels. In concerning, the inner wheel must turn through a slightly greater angle than the outer wheel, because the inner wheel negotiates a sharper turn. The geometry of the linkage is designed to provide for this.

When the front wheels are independently suspended, the steering

must be designed so that the wheels are not turned as tie-roads lengthen and shorten as a result of spring action. The point of linkage attachment to the steering gear must be placed so that it can move vertically with respect to the wheel mountings without turning the wheels.

The distribution of weight between the front and rear wheels of automobiles shifted toward the front as the engine and passenger compartment were moved forward to improve riding comfort and road-handling characteristics. As the weight carried on the front wheels increased to more than the half of the total vehicle weight, the effort necessary to turn the wheels in steering increased. Larger, heavier cars with wider tires and lower tire pressure also contribute to drag between tire and road that must overcome in steering, particularly in parking. It was originally considered satisfactory to limit the pull on the rim of the steering wheel to 30 pounds (14 kilograms), but this limit proved to be too high. Considerable reduction in the work of steering resulted from increased efficiency of the steering gears and better bearings in the front wheel linkage. Additional case of turning the steering wheel was accomplished by increasing the overall steering gear ratio. Large steering gear ratios make high-speed maneuverability more difficult, however, because the steering wheel must be turned through greater angles. On the other hand, steering mechanisms of higher efficiency are also more reversible; that is, road shocks are transmitted more completely from the wheels and must be overcome to a greater extend by the driver. This causes a dangerous situation on rough roads or when a front tire blows out, because the wheel may be jerked from the driver's hands.

WHEELED VEHICLES

After the early efforts to domesticate animals for their burden-carrying abilities, the next significant addition to human locomotion was the wheeled vehicle. It was one of the great inventions of all time because of the contribution that the wheel, and its utilization in a vehicle, makes to applying supplemental sources of power to an individual's mobility. Horses and camels can travel faster than the humans riding on their backs, but to transport more than one person with a single animal – something most horses had the strength to do

– a vehicle was needed. Probably the first conveyance of this sort was a plank or log dragged along the ground; the Plains Indians of North America used such a travois of two poles in their transhumant wanderings until the 19th century. Its mechanical inefficiency must have prompted the search for improvements. The invention of the wheel made the contribution of a horse more productive. The power provided by any one horse has varied little over time, but the effective product of that horsepower has grown with changes in vehicles, in harnessing and in the surface on which it operates.

Much of human history saw no technology superior to the sling or travois but when the wheel was devised changes was both substantial and probably fairly rapid. It seems that there were versions of the travois shaped like a platform, with a great reduction in the extent of actual contact with the ground; only the ends of the poles supporting the platform dragged along the surface, where friction would be great. Improvement came with placing a revolving wheel at the end of each of the dragpoles. From this advance it was but a minor step to arrive at a two-wheel cart.

ANTITHEFT DEVICES

Motor-vehicle theft is an increasing problem for owners, insurers, and manufacturers. The annual number of thefts increases almost every year, and the rate of thefts mat by expected to exceed 1 out of every 100 registered vehicles per year in the United States by the end of the 20th century. The problem is, however, not new. The 1900 Leach automobile featured a removable steering wheel that the driver could carry away to prevent unauthorized vehicle use. More recently, sophisticated electronic alarms, some of which incorporate radio beacons, and more tamper-resistant wiring electronic locks have been produced.

SAFETY SYSTEMS

From its beginnings, the automobile posed serious hazards to public safety. Vehicle speed and weight provided an impact capacity for occupants and pedestrians that produced great numbers of fatalities (13,000 in 1920) and serious injuries. During the 20th century, the rates of death and injury declined significantly in terms

of vehicle miles. Because of the increased number of vehicles on the road, however, total fatalities have declined only slightly. Most fatal accidents occur on either city streets or secondary roads. Federal expressway systems are relatively safer. Driver training, vehicle maintenance, highway improvement, and law enforcement were identified as key areas with potential for improving safety, but the basic design of the vehicle itself and the addition of special safety features received increased attention. Safety features of automobiles come under two distinct headings: accident avoidance and occupant protection.

ROAD TRANSPORT

Road transport is perhaps the most visible and common means of conveyance because of the presence on our roads of a great number of lorries whose variety stems from the necessity for carriers to meet the wide range of needs from shippers.

A road haulier (GB) or trucker (US) may own a fleet of vehicles, but part of their equipment can be rented from specialized firms for special shipments. They usually set up their business by determining a specific route and serving a few well-defined area. Lorry drivers then commonly ply between the same cities and the experience they gain by so doing reinforces the efficiency of the service.

A semi-trailer – or articulated lorry – with an important payload, is mostly resorted to for a long haul in order to reduce transport costs. When an open-top trailer is used, a tarpaulin – or tilt – will protect the goods from the rain. A removal van carries all the furniture and belongings of a family moving house. A tanker lorry is especially designed for the transport of liquid cargoes, whether foodstuff, oil products or chemicals. Retailers and shopkeepers often have their orders brought to them by means of a delivery van.

More and more goods are transported in containers by both road and rail. This bimodal transport makes it necessary to tranship the goods from train onto lorries in a piggy-back terminal.

Road transport depends on the road network. Not all roads can be used by any sort of lorry and if motorways and main roads – or trunk roads – are generally available, as well as dual carriageways in great Britain, there may be a few limitations on secondary roads in order to

prevent lorries from causing obstructions – or "hold-ups", "traffic-jams", "congestions". This may indeed be the case at certain junctions – or "crossroads" – which is one of the reasons why these are gradually being replaced by roundabouts. In the same way, level crossings which halt the traffic at regular intervals tend to disappear in modern road networks. Road works are another cause of delays and a diversion may have to be set up to avoid inconvenience.

Finally, when planning a route, hauliers must remember that not all the roads and bridges are free, and they may have to pay a toll for part of the route.

Література:

1. Осецька Н. Ф. Англійська мова. Навчальний посібник для студентів напрямів підготовки 6.070106 «Автомобільний транспорт», 6.050503 «Машинобудування». Рівне : НУВГП, 2013. 258 с.

2. Навчальні завдання та методичні рекомендації для розвитку мовленнєвих компетентностей та навичок самостійної роботи студентів другого магістерського рівня вищої освіти усіх спеціальностей НУВГП з дисципліни «Іноземна мова за професійним спрямуванням» (частина І) / Тадеєва М. І. та ін. Рівне: НУВГП, 2018. (06-09-21) http://ep3.nuwm.edu.ua/id/eprint/13222

3. Навчальні завдання та методичні рекомендації для розвитку мовленнєвих компетентностей та навичок самостійної роботи студентів другого магістерського рівня вищої освіти усіх спеціальностей НУВГП з дисципліни «Іноземна мова за професійним спрямуванням» (частина ІІ) / Тадеєва М. І. та ін. Рівне: НУВГП, 2018. (06-09-21) http://ep3.nuwm.edu.ua/id/eprint/13224