

TYPES OF ENGINES. INTERNAL COMBUSTION ENGINE. CYLINDER BLOCK AND CYLINDER HEAD.

PISTONS. PISTON RINGS AND PISTON PINS, CONNECTING ROD, CRANKSHAFT AND CAMSHAFT. VALVES AND VALVE FILTERS.

Двигуни. Типи двигунів. Двигун внутрішнього згорання. Системи двигуна внутрішнього згорання.

План (Plan):

- 1.Types of engines.
- 2.Internal combustion engine
- 3.Stationary engine parts.
- 4.Rotary engine parts.
- 5.Reciprocating engine parts.
- 6.Systems of engines.

Ключові слова (Key words):

A air- повітря aircraft - авіація to apply – застосовувати application - застосування

B blade- крило, лопать burning- згорання to burn – згоряти bus - автобус

C camshaft - кулачковий вал to cause - спричиняти to change-змінювати chamber- камера close-закривати combustion – згорання connecting rod- шатун completely- повністю compression- стиснення conversion- трансформування cooling – охолодження crankcase- картер crankshaft – колінчатий вал cylinder- циліндр

D developed – розвинений directly – безпосередньо. прямо distance- відстань

E engine- двигун exhaust- вихлоп expansion – викид. поширення

H head- головка heat – тепло

I inside- всередині internal combustion - внутрішнє згорання intake- впуск

F flexibility - гнучкість, пристосування flywheel - маховик force - сила , енергія

fossil- застарілий fuel- паливо

G - gasoline - бензин, паливо **K** keep- утримувати

L link-пов'язувати lubricating oil - мастило lubrication-змащування

M mixture - суміш moderately priced- за помірної ціни to move up - піднімати motion – рух movable- рухомий

O to open- відкривати outside – поза (за межами)

P part- деталь power –потужність, енергія power tools- електроінструменти (деталі) piston- поршень pressure- тиск previously described- попередньо описаний to provide- забезпечувати pump - насос

R. reasonable-доцільний to reduce- знизити to require - вимагати reciprocating -зворотньопоступальний reliability- надійність ring- кільце rotary -обертовий

A. **selected** - відібраний **size**- розмір **solar** – сонячний **spark**- іскра **speed**- швидкість **stationary**- нерухомий **steam**- паровий **storage battery** - акумулятор **stroke** - такт, робочий хід **successful**- успішний **to support**- підтримувати

I to take place - відбуватись **truck**- вантажний автомобіль

U- **useful**- корисний

V valve-клапан **voltage** – напруга

W weakness недолік, слабе місце **wear** – зношуваність **weight** – вага **within**- в середині **wide range** - широкий спектр **widely used**- широко використаний **wood** - деревина

1. **Types of engines.** Automotive production down the ages has required a wide range of energy-conversion systems. These include electric, steam, solar, turbine, rotary, and different types of piston-type internal combustion engines. Heat engines are machines in which the potential energy contained in fuel may be employed to do useful work. We know them to be in two main classes: steam and internal combustion. In steam engines the working substance gets its heat outside the working cylinder. In internal combustion engines (either diesel without electric spark but air compression or fuel ones) the combustion takes place inside the -cylinder. The reciprocating-piston internal -combustion system, operating on a four-stroke cycle, has been the most successful for automobiles, while diesel engines are widely used for trucks and buses.

The gasoline engine was selected for the automobile due to its flexibility over a wide range of speeds. Also, the power developed The gasoline engine was originally selected for a given weight engine was reasonable; it could be produced by economical mass-production methods; and it used a readily available, moderately priced fuel--gasoline. Reliability, compact size, and range of operation later became important factors.

0. **Internal combustion engine** Internal combustion is the process of the burning of fuel within the engine. The fuel burns within the engine and provides forces. These forces provide the engine power. Internal combustion engines have stationary, rotary and reciprocating parts.

The internal combustion engine is an engine in which the combustion of fuel occurs with an oxidiser (usually air) in a combustion chamber. In an internal combustion engine the expansion of the high temperature and pressure gases, that are produced by the combustion, directly apply force to a movable component of the engine, such as the pistons or turbine blades and by moving it over a distance, generate useful mechanical energy.

The term *internal combustion engine* usually refers to an familiar four-stroke and two- stroke piston engines, along with variants, such as the wankel engine A second class of internal combustion engines use continuous combustion: gas turbine, jet engine and most rocket engine each of which are internal combustion engines on the same principle as previously described. The internal combustion engine (or ICE) is quite different from external combustion engine such as steam engine or stirling engine in which the energy is delivered to a working fluid not consisting of mixed with or contaminated by combustion products. Working fluids can be air, hot water, PWR heated in some kind of boiler by fossil fuel, wood-burning, nuclear, solar etc. Now, it has been announced new redesign of the internal-combustion engine, with claims that efficiency gains of between 5% and 20% can be had. What makes us actually sit up and take notice of Ilmor's claims is the company's history, having built Formula 1-winning engines and working with a number of Indy car teams for over a decade to build engines - not exactly amateurs. A large number of different drawing boards for ICEs have been developed and built, with a variety of different strengths and weaknesses. While there have been and still are many stationary applications, the real strength of internal combustion engines is in transport and they completely dominate as a power supply for cars, aircraft, and

boats, from the smallest to the biggest. Only for hand-held power tools do they share part of the market with battery powered devices. Powered by an energy-dense fuel (nearly always liquid, derived from fossil fuel) the ICE delivers an excellent power-to weight ratio with few safety or other disadvantages. The new, more efficient engine is proposing promises to deliver the fuel economy that current engines can achieve, without the associated emissions problems the oil-burners typically offer. Designed for road cars, rather than its usual work with racing applications, the Ilmor-designed 5-stroke gasoline engine is a diminutive 700cc three-cylinder unit that still manages to develop 130 horsepower and 122 pound-feet of torque. According to this engine, the 5-stroke concept engine utilizes two high-pressure fired cylinders operating on a conventional 4-stroke cycle that alternately exhaust into a central low-pressure expansion cylinder, whereupon the burnt gases perform further work. The low-pressure cylinder decouples the expansion and compression processes and enables the optimum expansion ratio to be selected

independently of the compression ratio. The end result is that the engine runs an overall expansion ratio approaching that of a engine – in the region of 14.5:1. The engine is also more compact, and unlike other new technologies does not require any new manufacturing techniques. The engine is just a concept for now, with further development expected to take place. Eventually, the company hopes to achieve a power density figure of 150 horsepower per liter of displacement.

0. **Stationary Engine parts.** Stationary engine parts are the cylinder block, the crankcase and the cylinder head. The cylinder block is one of the basic parts of the engine. The process of combustion takes place within the cylinders. Tractor engines have some cylinders. The crankcase is a part of the cylinder. It supports the crankshaft and the camshaft and keeps the lubricating oil near the engine parts.

The cylinder heads close the cylinders. The cylinders and the cylinder heads form the combustion chambers. The burning of fuel takes place within the combustion chambers.

0. **Rotary Engine parts.** Rotary engine parts are the crankshaft, the flywheel and the camshaft. The crankshaft changes reciprocating motion of pistons to rotary motion. The camshaft opens the valves of the engine.
0. **Reciprocating Engine parts.** Reciprocating engine parts are pistons, rings and connecting rods. These parts cause engine vibration. The piston moves up and down within the cylinder. The rings provide good compression for the piston. The valves open and close the combustion chamber where the burning of fuel takes place. The connecting rod links the pistons and the crankshaft. It changes the reciprocating motion of pistons into the rotary motion of the crankshaft.
0. **Systems of engines.** There are four separate systems of engine: electrical, fuel, lubricating and cooling. The electrical system has a storage battery or a magneto which provides high voltage and transmits it to the spark plugs to

ignite the fuel mixture. The fuel system of diesel engine has a pump to force the fuel through injectors into the combustion chamber. The gasoline engine has no pump but carburetor to transmit mixture of fuel and air to the combustion chamber. Oil pumps of three kinds provide lubrication. The oil filters reduce engine wear. The thermosiphon and pump use water for the engine cooling and are two types of cooling systems. The strokes of engine are intake, compression, power and exhaust.

Запитання для самоперевірки (Questions to self - testing):

1. What are heat engines?
2. Is there the difference between the ways of getting energy to steam engines and diesel engines?

3. What is internal combustion ?
4. What are stationary engine parts?
5. What are rotary engine parts?
6. What are reciprocating engine parts?
7. How many systems are there in engine?
8. What are systems of engine?
9. What do oil filters do ?
10. How many types of cooling system are there?

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5. Match the English and Ukrainian equivalents of word – combinations.

1. Cylinder block – a. колінчастий вал і розподільчий вал
2. Piston rings – b. мастило
3. Combustion chamber – c. обертальний рух
4. Intake valves – d.циліндрична головка
5. Engine parts motion – e. зворотньо – поступальний рух
6. Fuel combustion process – f.енергія двигуна внутрішнього згорання
7. Internal combustion engine power - g. процес згорання пального
8. Reciprocating motion - h. рухомі частини двигуна
9. Cylinder head - i. впускні клапани
10. Rotary motion - j.камера згорання
11. Lubricating oil - k. поршневі кільця
12. The crankshaft and the camshaft - l. циліндричний блок

6. Make up the sentences using the given words.

1. Within, burns, the fuel, the cylinder.

2. Of, changes, reciprocating, the crankshaft, the motion, pistons.

3. The crankcase, is, of, a part, the engine.

4. Study, we, engines.

5. Takes place, the combustion, chamber, in, burning, the process, of.
