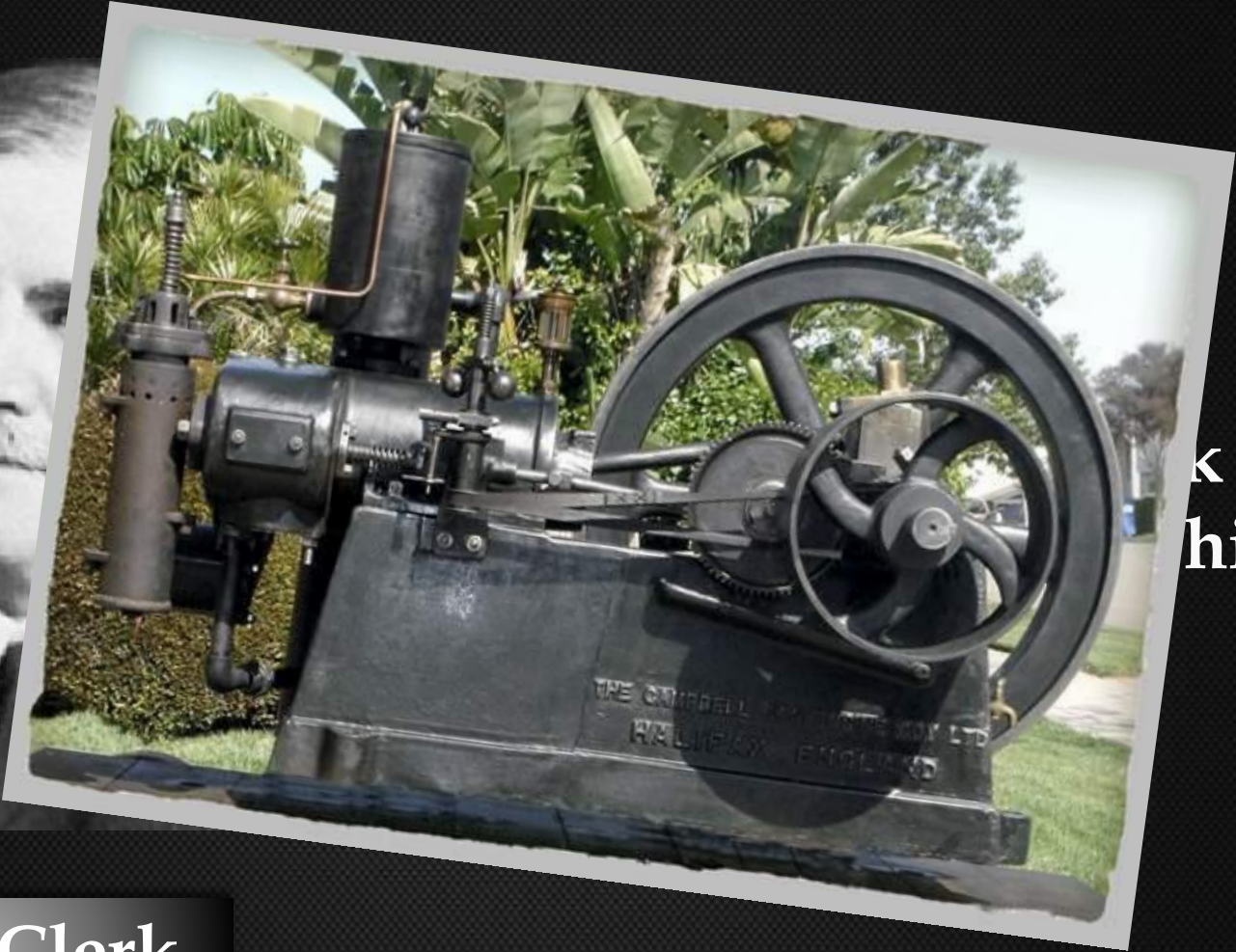
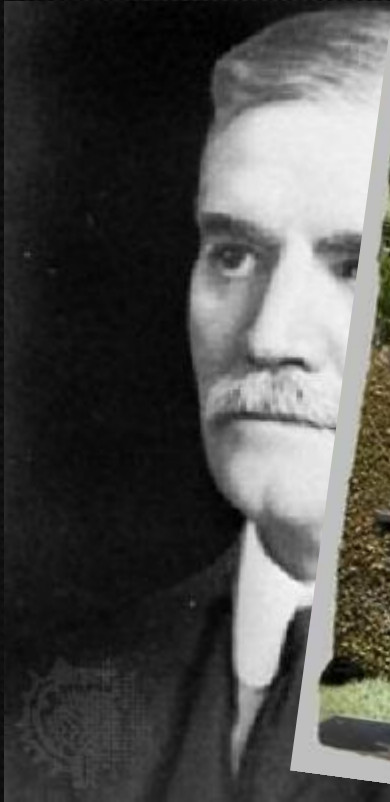


INTERNAL COMBUSTION ENGINE

**BY NIKOLAS NOSENKO
STUDENT OF GROUPE IMMM-11-1
MMF NMU**

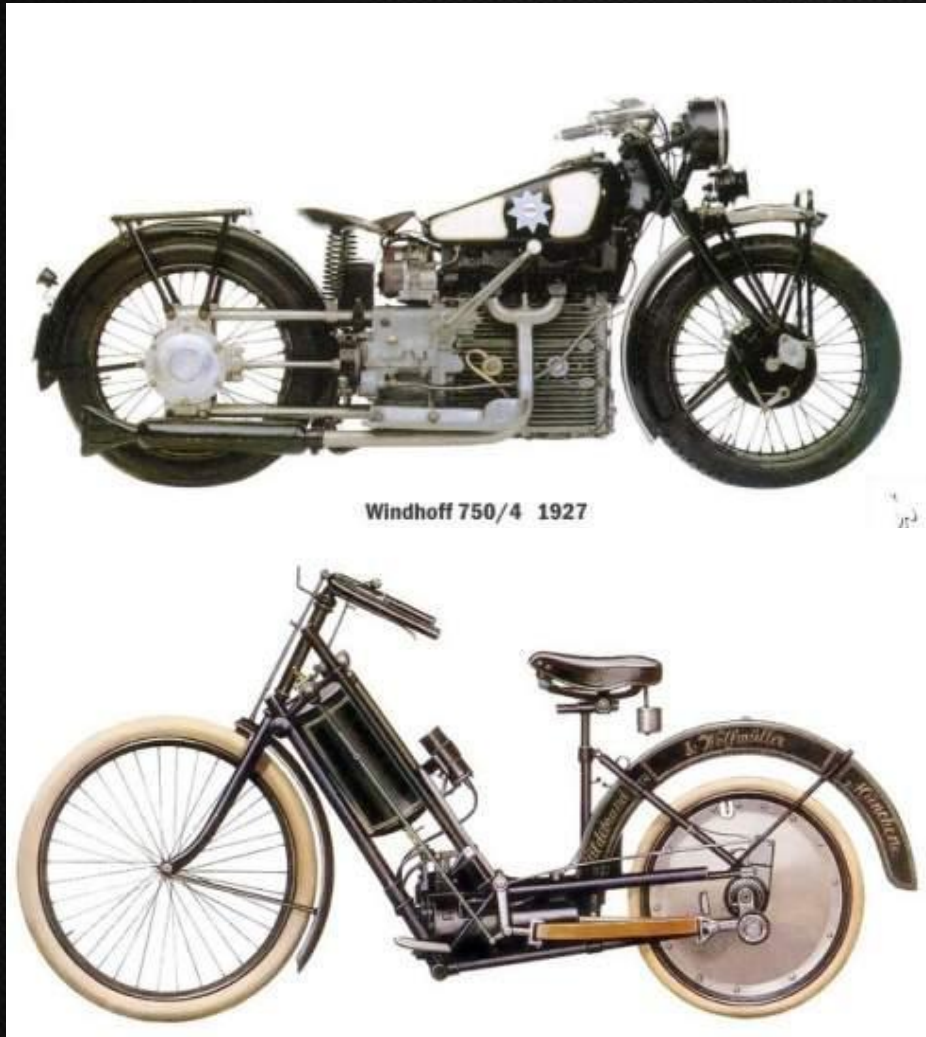
Invention



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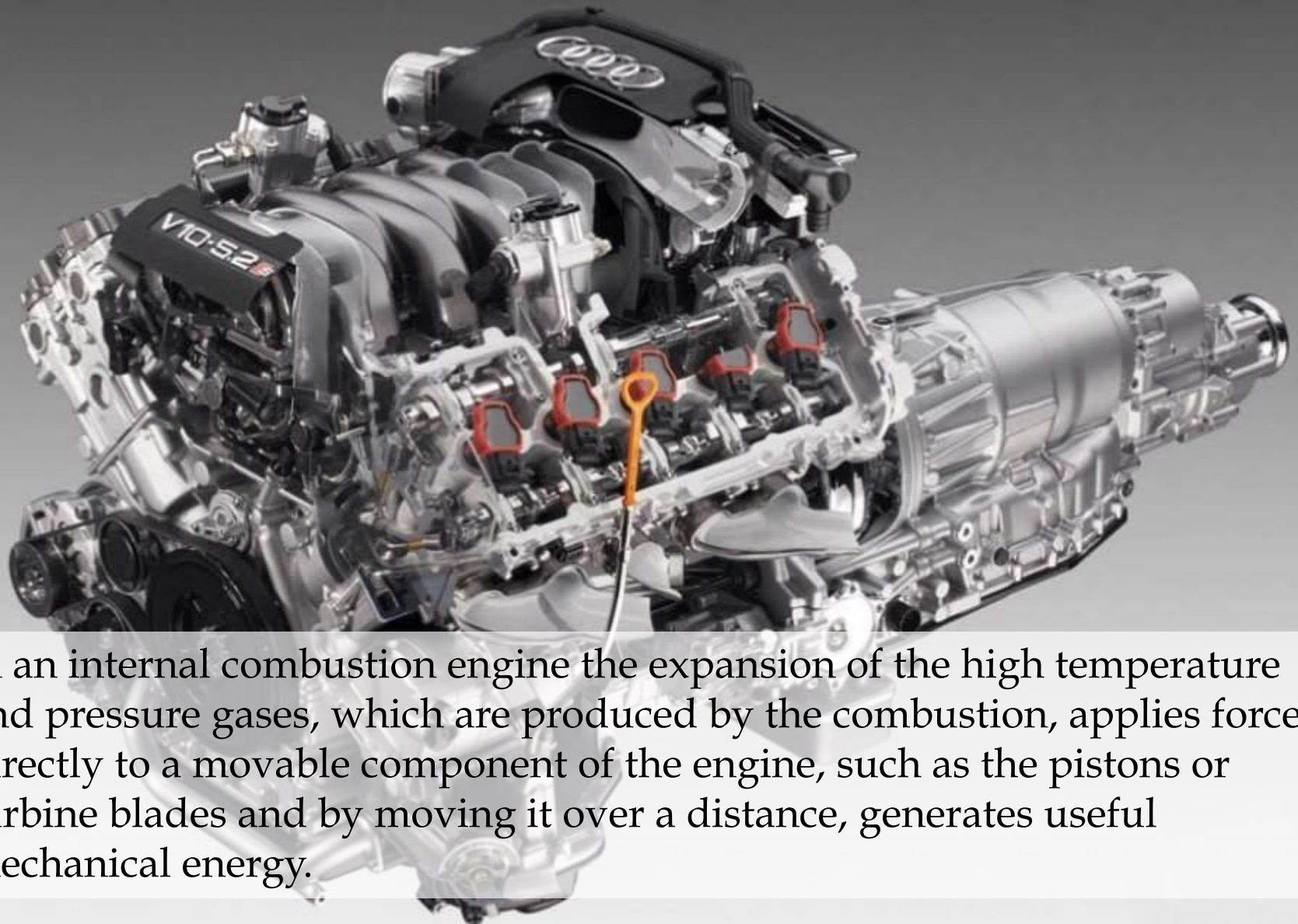
20th century



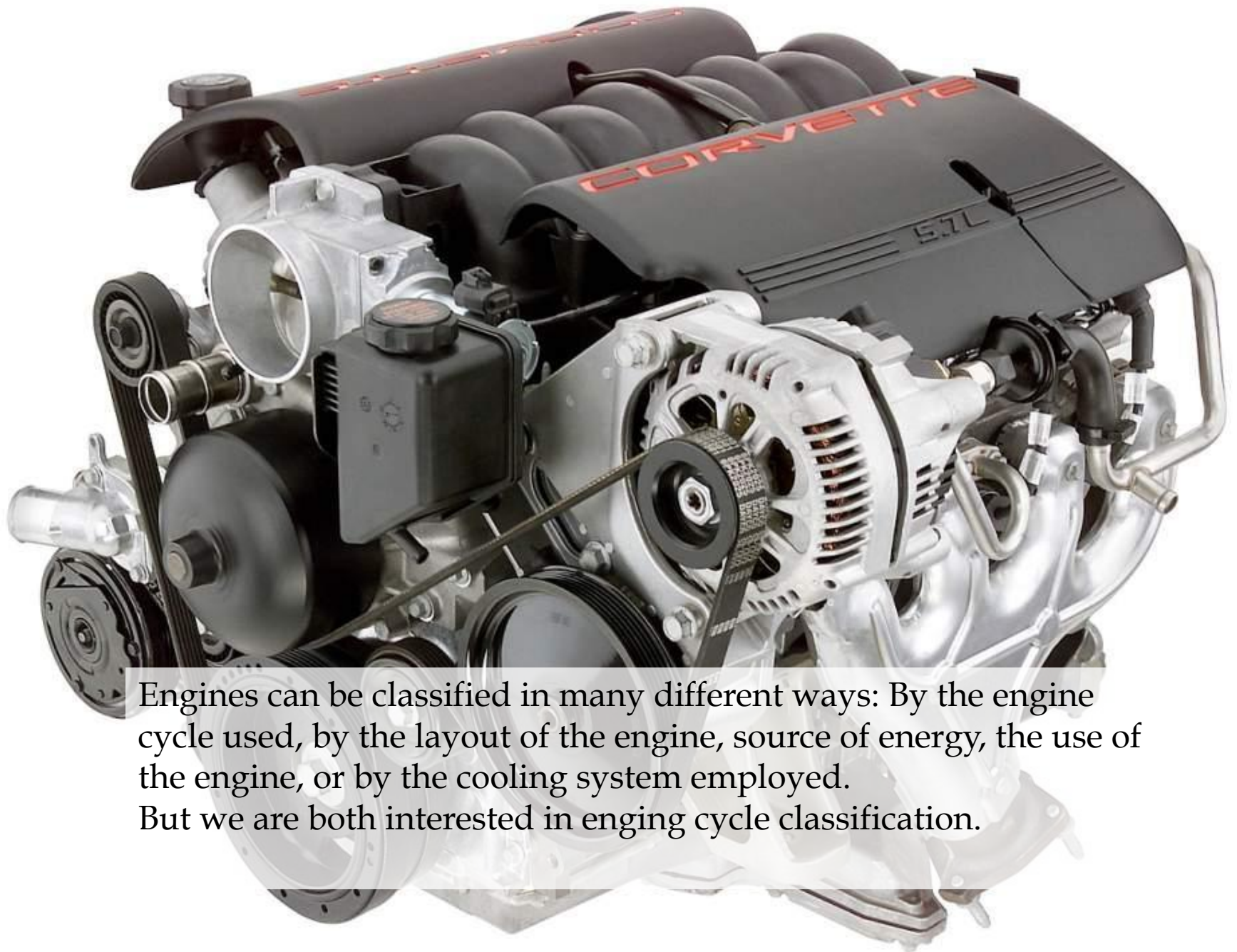
The two-stroke engine was most popular throughout the 20th century in motorcycles, small engined devices such as chainsaws and outboard motors and some cars. Due to their simple design (and resulting low cost) and higher power-to-weight ratios.



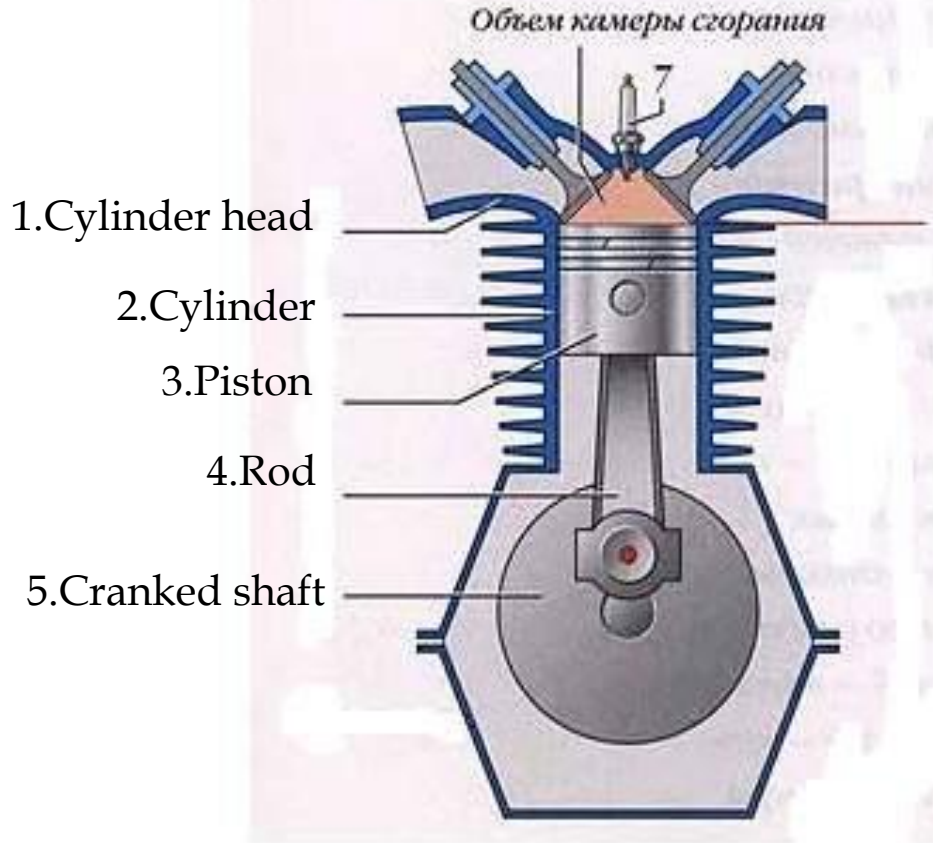
The internal combustion engine is an engine in which the combustion of fuel (generally, fossil fuel) occurs with an oxidizer (usually air) in a combustion chamber.



In an internal combustion engine the expansion of the high temperature and pressure gases, which are produced by the combustion, applies force directly to a movable component of the engine, such as the pistons or turbine blades and by moving it over a distance, generates useful mechanical energy.



Engines can be classified in many different ways: By the engine cycle used, by the layout of the engine, source of energy, the use of the engine, or by the cooling system employed. But we are both interested in engine cycle classification.



1. Cylinder head

2. Cylinder

3. Piston

4. Rod

5. Cranked shaft

Объем камеры сгорания

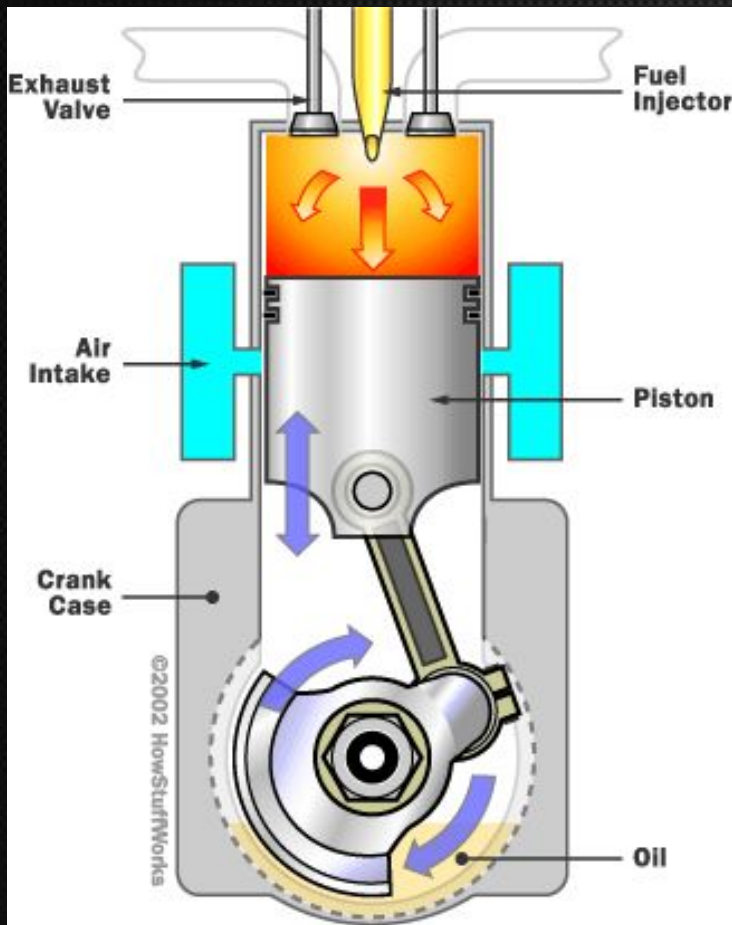
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1 - головка цилиндра; 2 - цилиндр; 3 - поршень; 4 - шатун; 5 - коленчатый

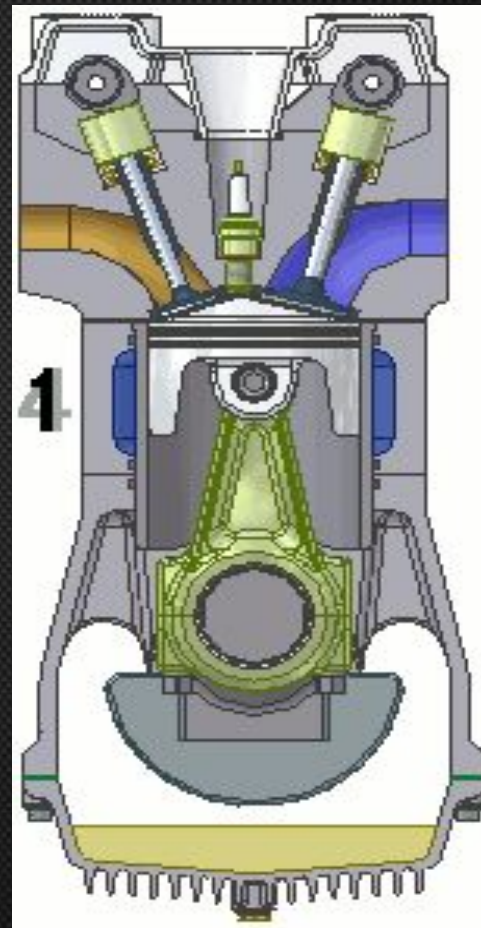
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The two main parts of it are

- Two-stroke cycle

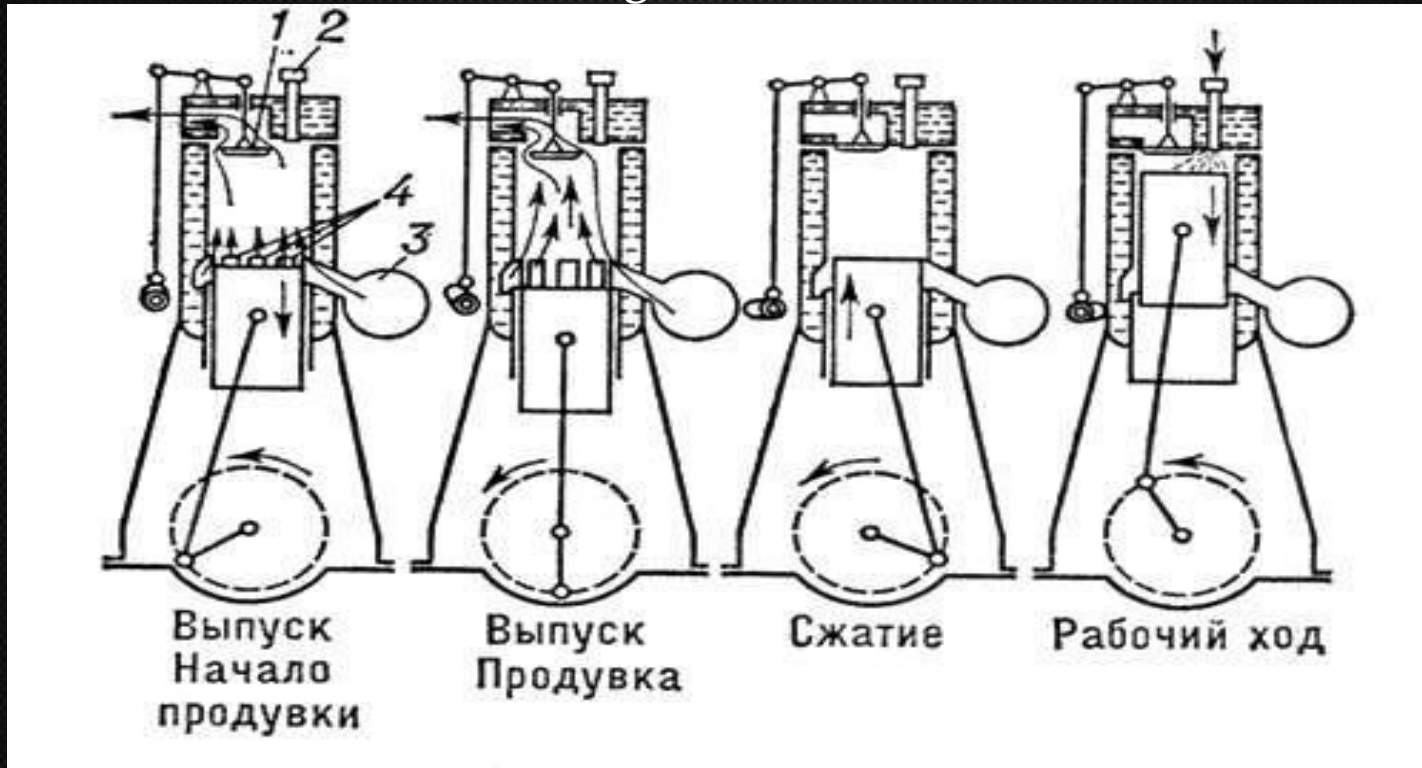


- Four-stroke cycle



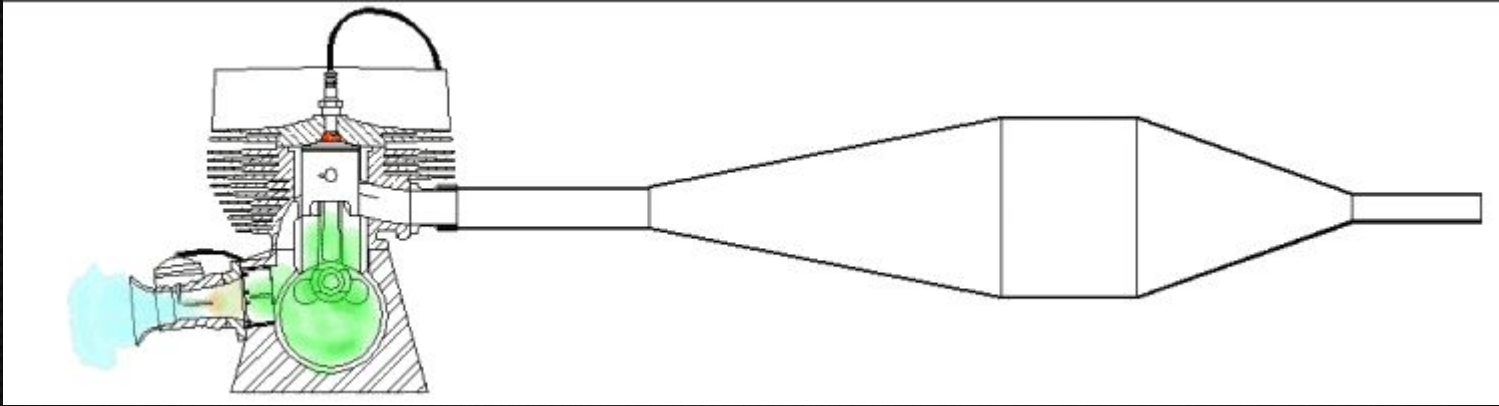
TWO-STROKE CYCLE

Let's start with the Two-stroke engine. Also it's named "the father of engines"



A two-stroke engine is an internal combustion engine that completes the thermodynamic cycle in two movements of the piston compared to twice that number for a four-stroke engine. This increased efficiency is accomplished by using the beginning of the compression stroke and the end of the combustion stroke to perform simultaneously the intake and exhaust (or scavenging) functions. In this way two-stroke engines often provide strikingly high specific power.

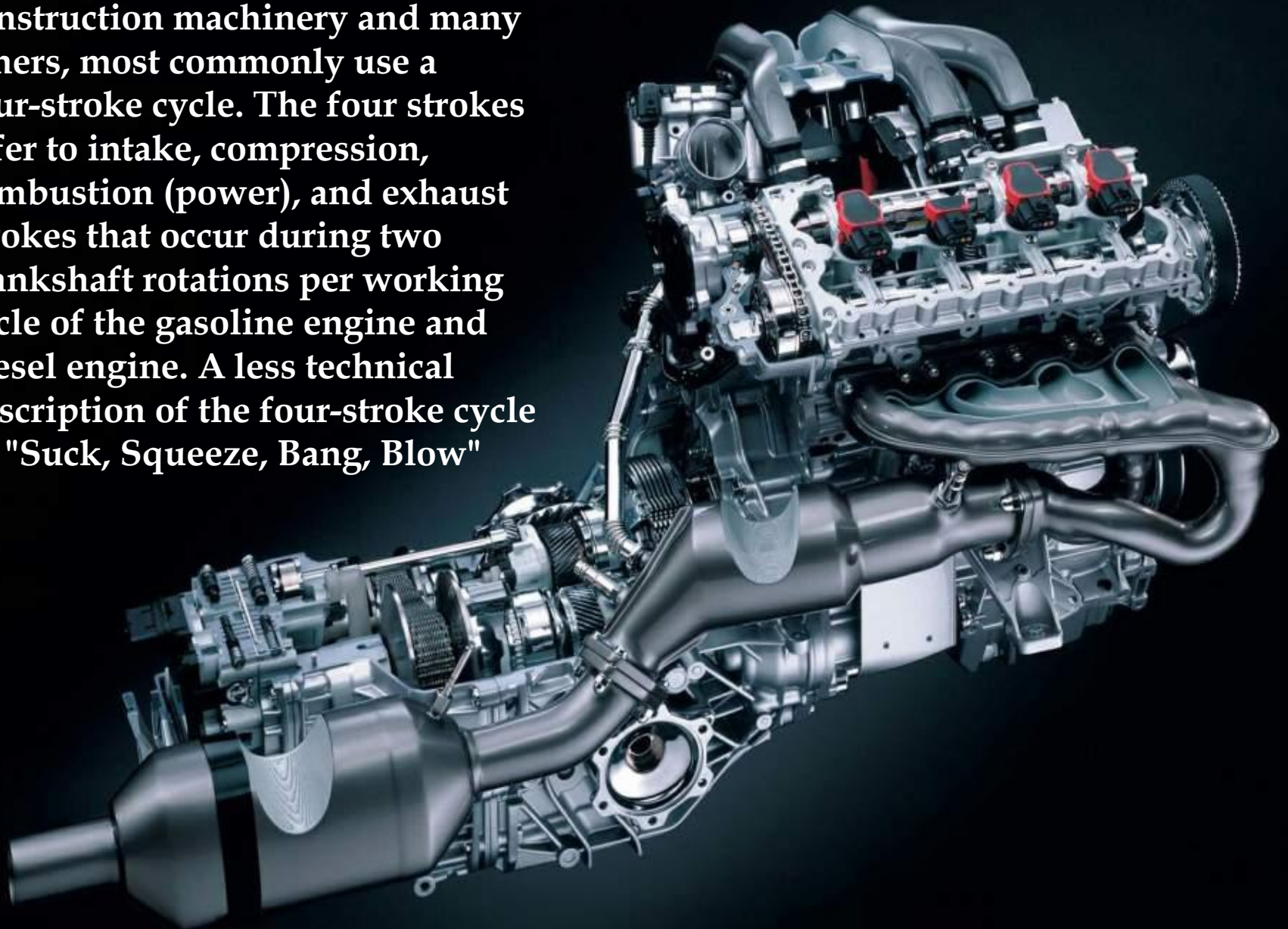
Two-stroke engine



A two-stroke engine, in this case with a tuned expansion pipe illustrate the effect of a reflected pressure wave on the fuel charge. This feature is essential for maximum charge pressure (volumetric efficiency) and fuel efficiency. It is used on most high-performance engine designs.

Today, internal combustion engines in cars, trucks, motorcycles, aircraft, construction machinery and many others, most commonly use a four-stroke cycle. The four strokes refer to intake, compression, combustion (power), and exhaust strokes that occur during two crankshaft rotations per working cycle of the gasoline engine and diesel engine. A less technical description of the four-stroke cycle is, "Suck, Squeeze, Bang, Blow"

FOUR-STROKE ENGINE



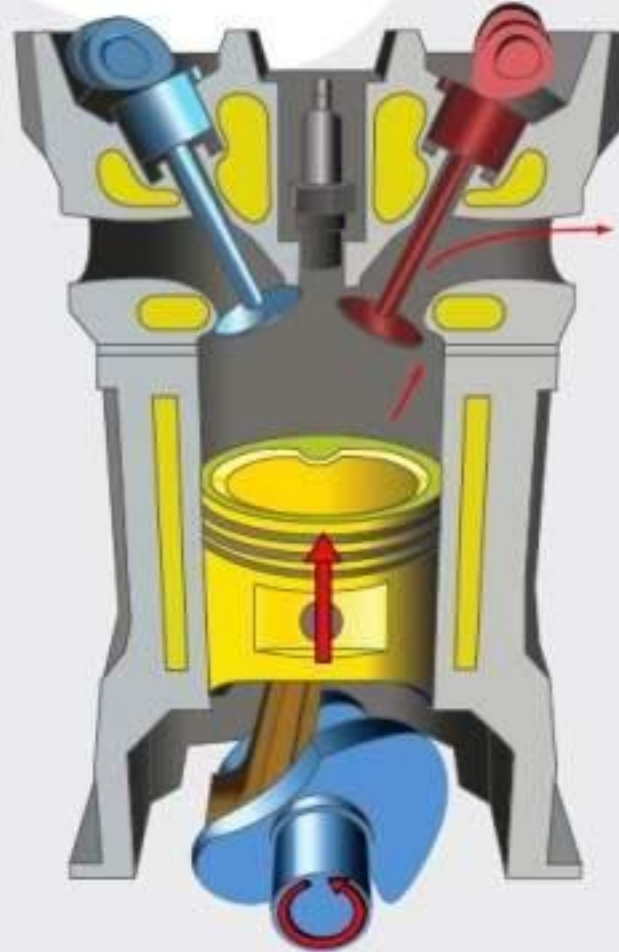
How it works

The compression stroke occurs at top dead center (TDC), when the piston is farthest away from the axis of the crankshaft. A stroke refers to the full travel of the piston from Top Dead

Center (TDC) to Bottom Dead Center (BDC) and vice versa. At the end of the compression stroke, the spark plug ignites the fresh compressed mixture. As the piston rises, the poppet valve is forced shut by the increased cylinder pressure. Flywheel momentum drives the piston upward, compressing the mixture. The intake valve is drawn open by the vacuum produced by the intake stroke. Some engines exhaust fuel out of the cylinder this way; however, most

modern engines include a separate exhaust valve. The exhaust valve is closed during the compression stroke.

As seen on the diagram, the exhaust valve is closed during the compression stroke.



IV ТАКТ - ВЫПУСК



And let see how to increase the efficiency of these engines with the help of special mechanisms .

SUPERCHARGING

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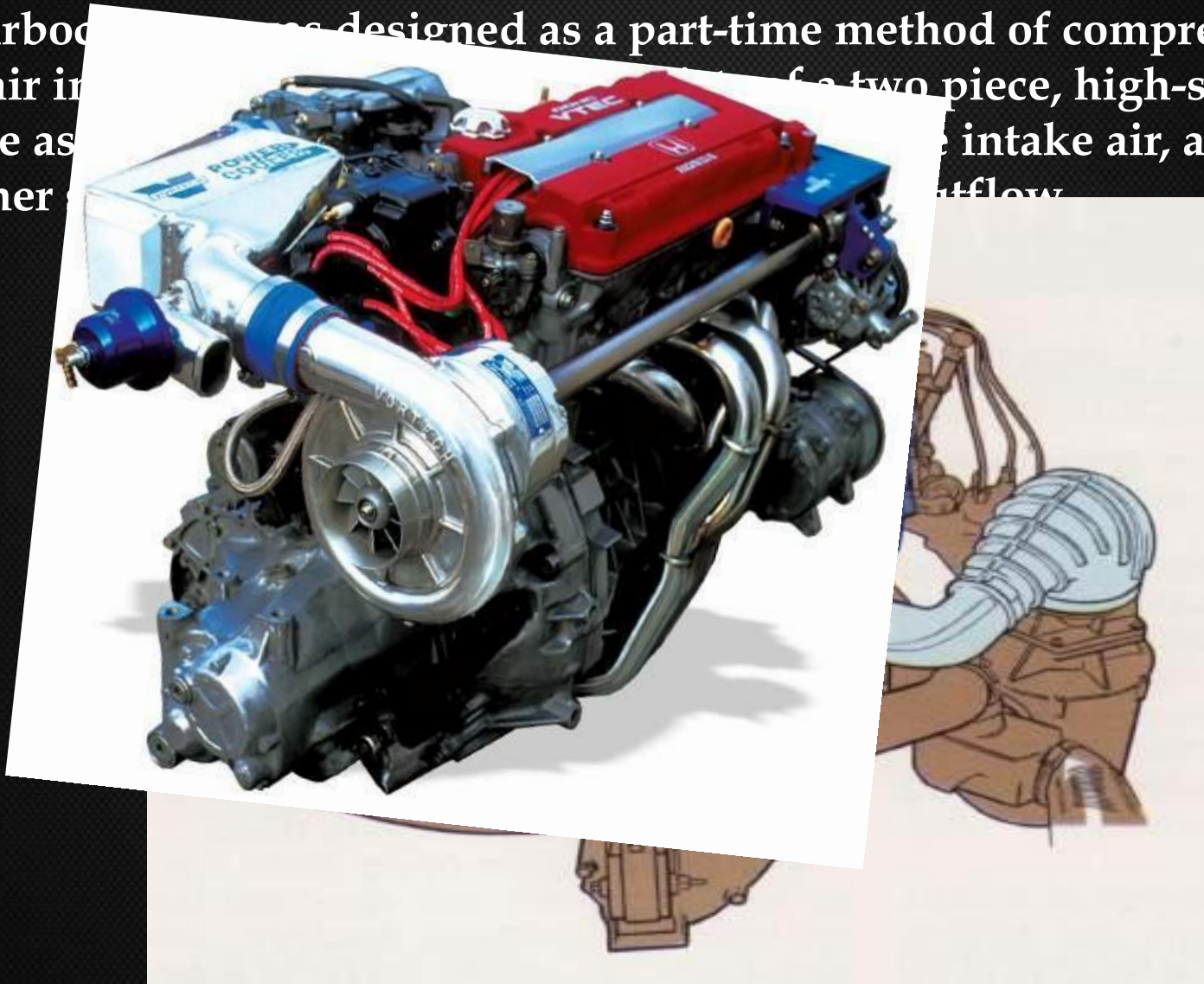
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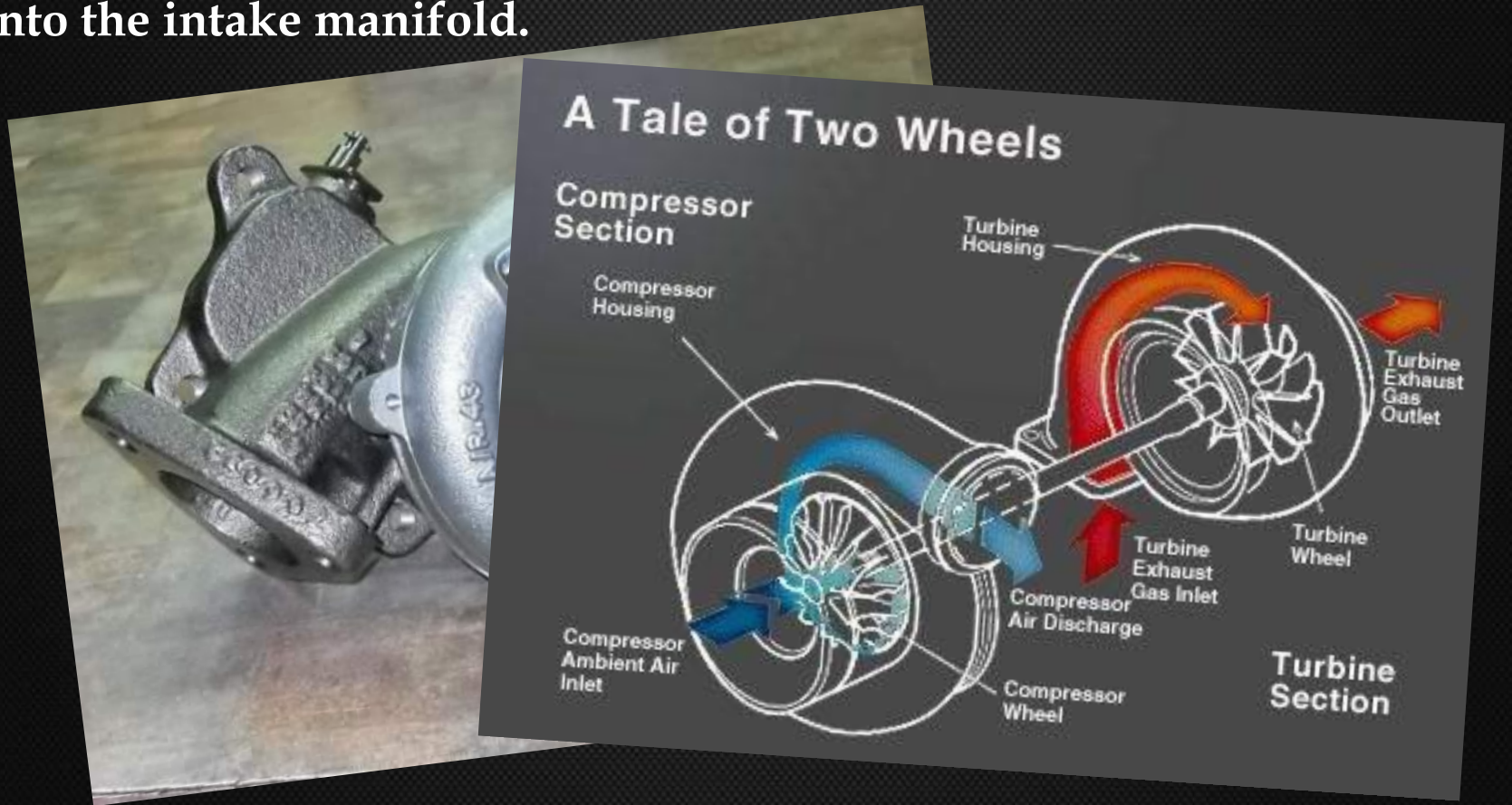
(c)2007 Bill Gercken

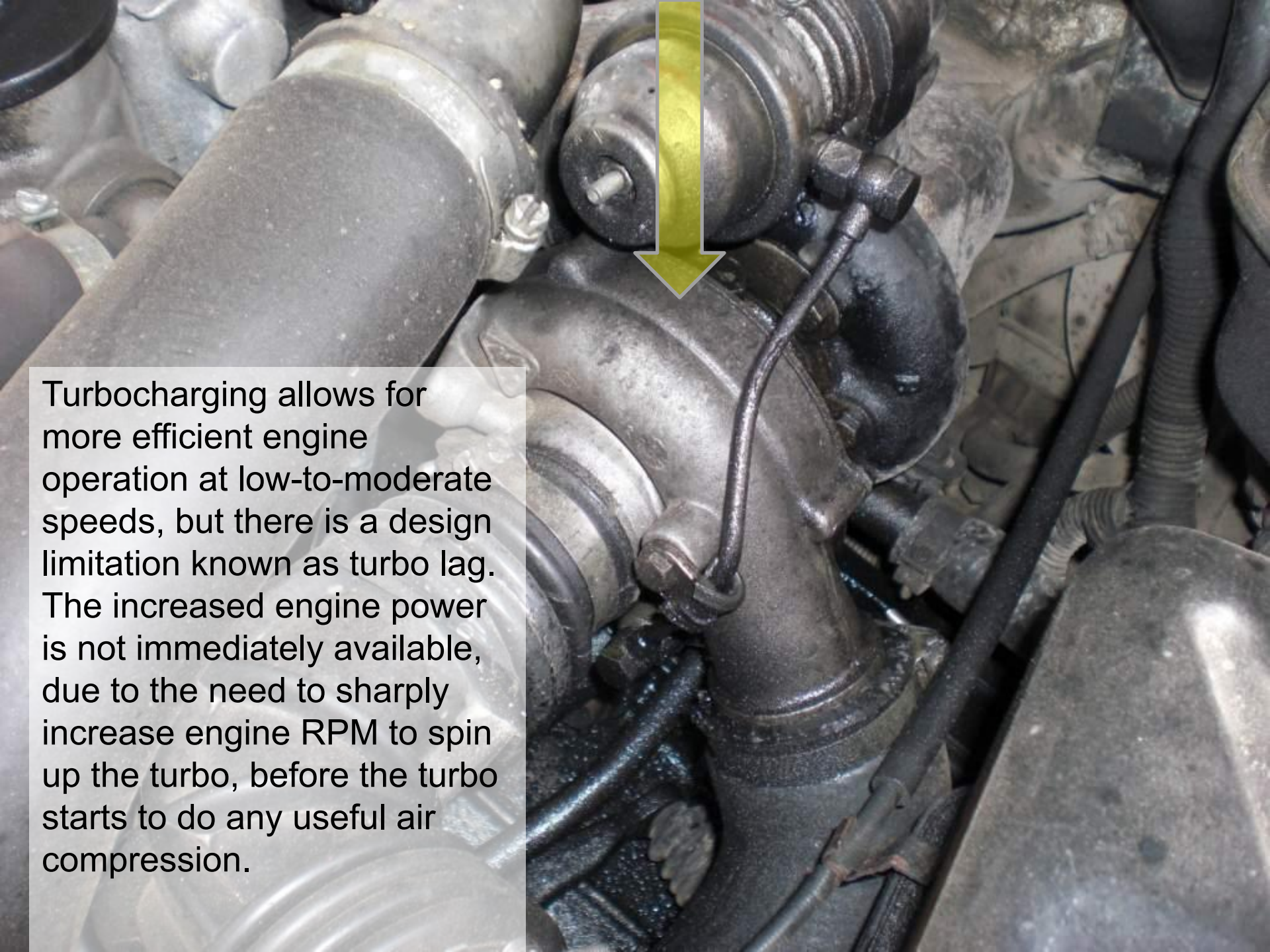
Turbocharging

The turbocharger is designed as a part-time method of compressing more air into the combustion chamber. It consists of a two piece, high-speed turbine as the compressor, which draws in intake air, and a compressor wheel as the turbine, which draws in exhaust flow.



When idling, and at low-to-moderate speeds, the turbocharger is not engaged and the engine operates in a naturally-aspirated manner. When much more power output is required, the engine speed is increased until the exhaust gases are sufficient to 'spin up' the turbocharger's turbine to start compressing much more air than normal into the intake manifold.





Turbocharging allows for more efficient engine operation at low-to-moderate speeds, but there is a design limitation known as turbo lag. The increased engine power is not immediately available, due to the need to sharply increase engine RPM to spin up the turbo, before the turbo starts to do any useful air compression.