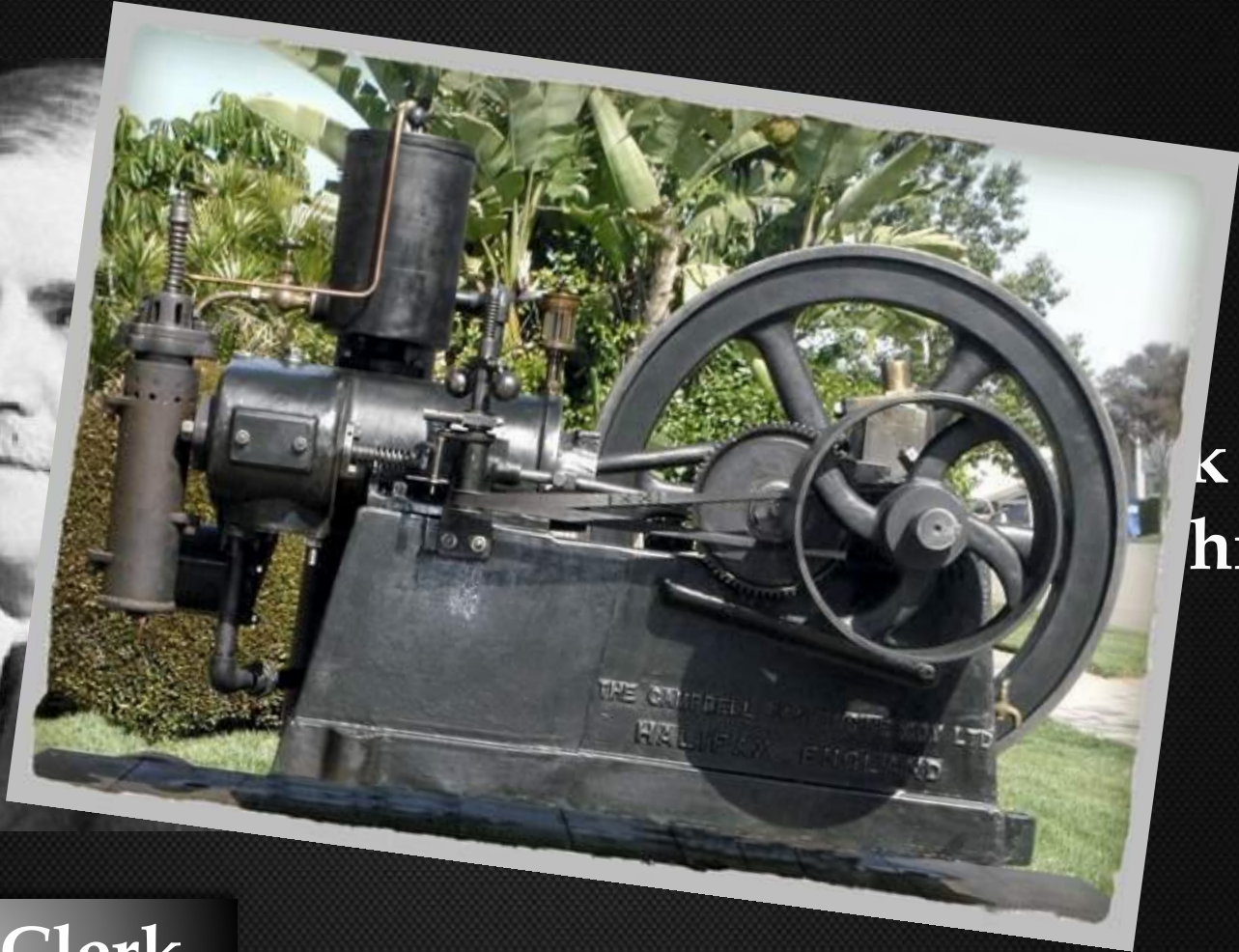
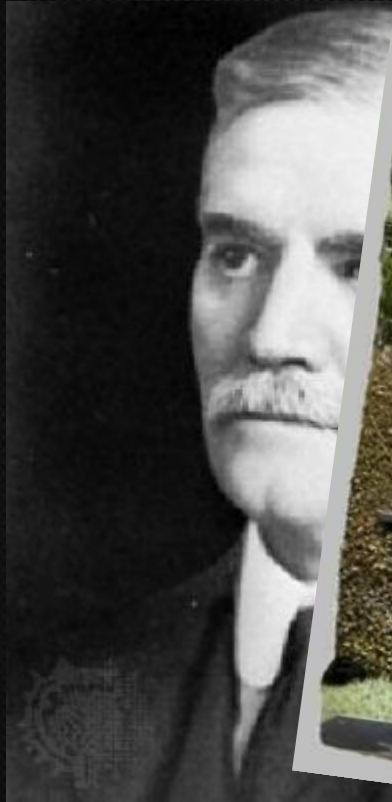


INTERNAL COMBUSTION ENGINE

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

Invention



K
his

Dugald Clerk

20th century



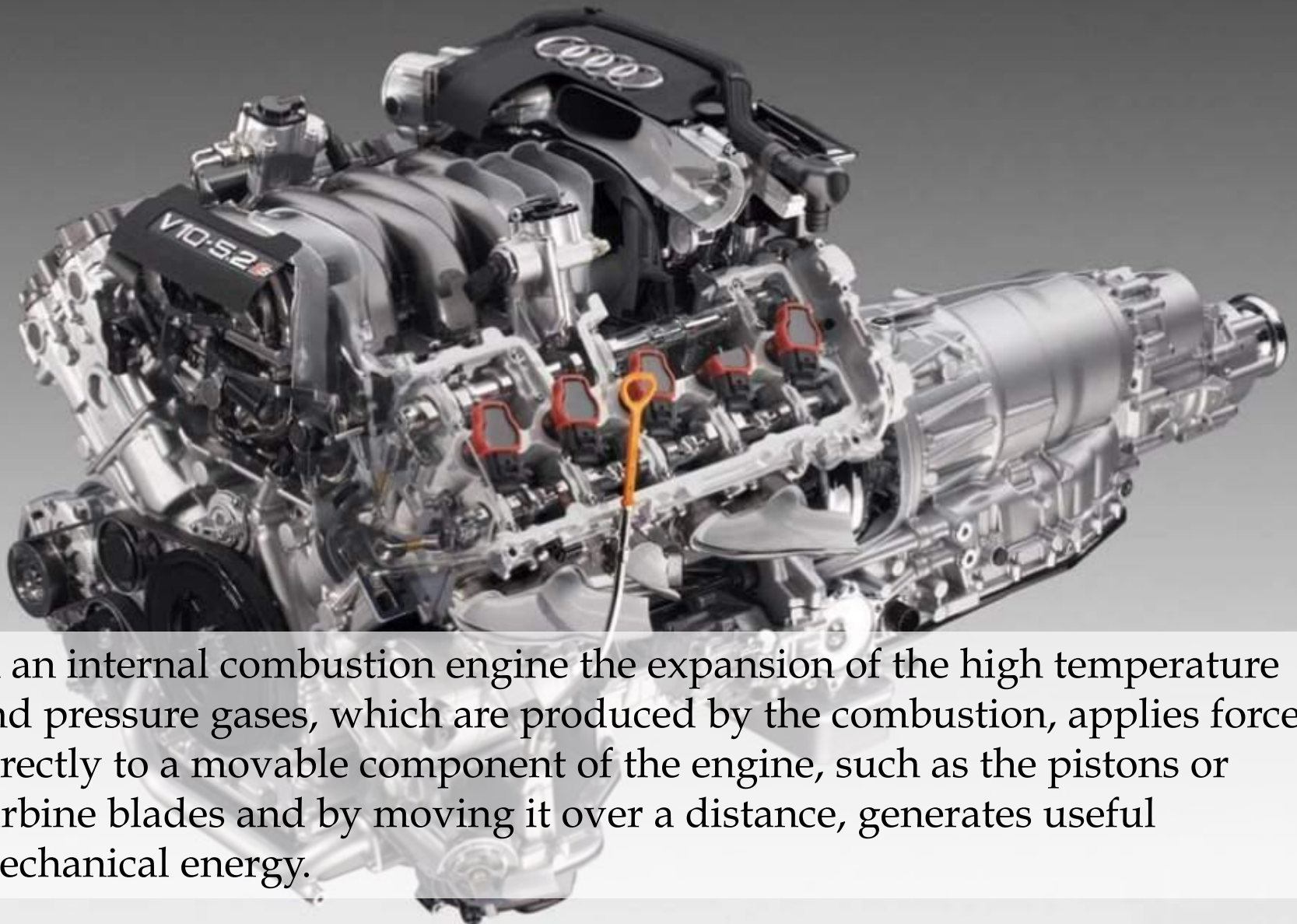
Windhoff 750/4 1927



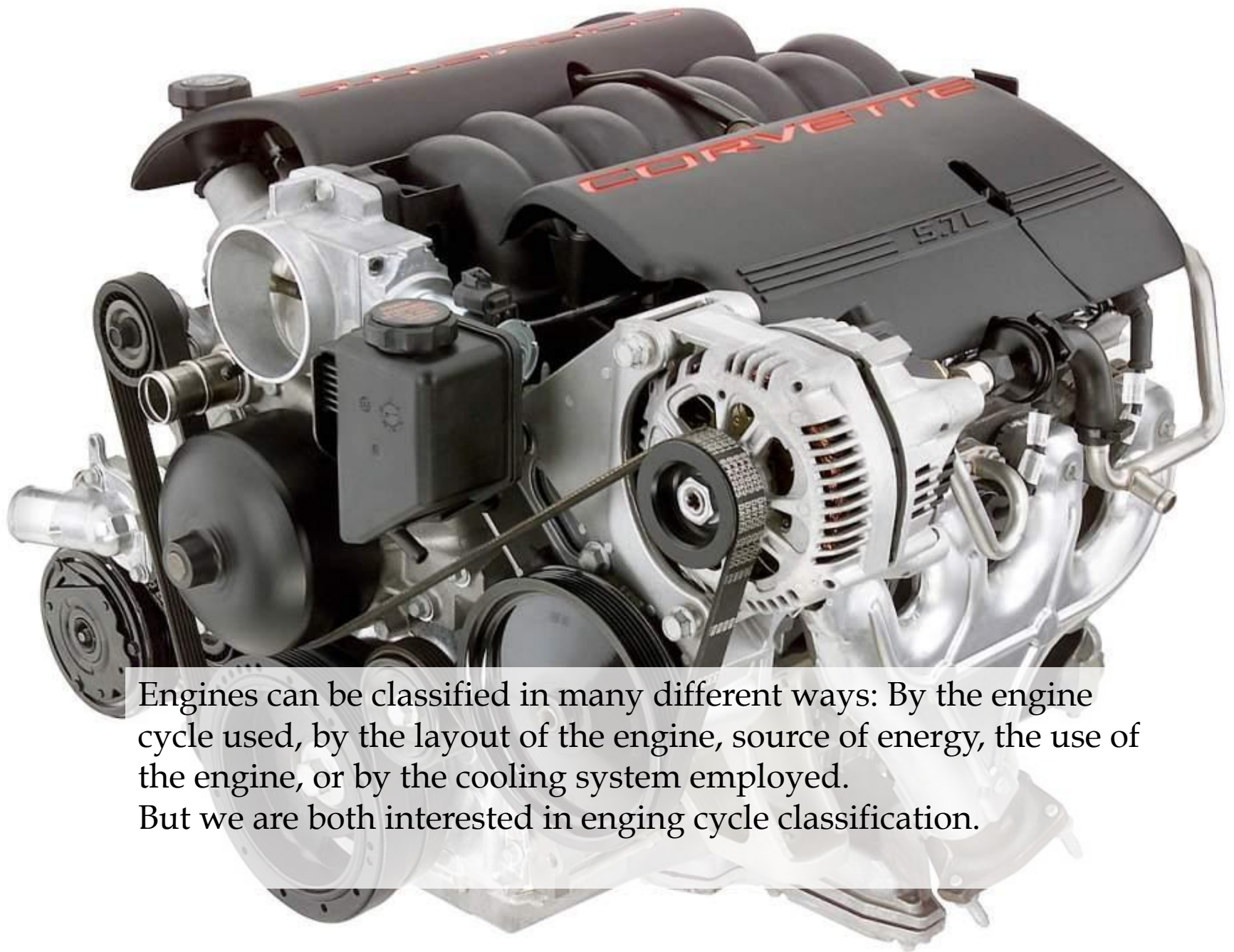
The two-stroke engine was most popular throughout the 20th century in motorcycles, small engined devices such as chainsaws and outboard motors and some cars. Due to their simple design (and resulting low cost) and higher power-to-weight ratios.



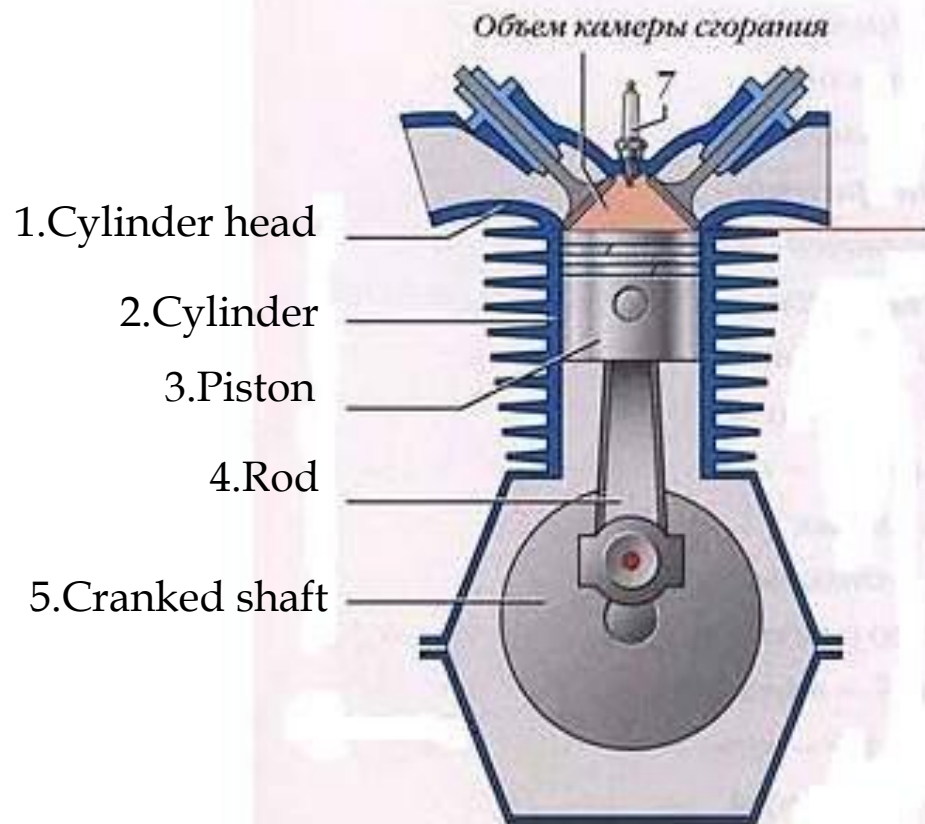
The internal combustion engine is an engine in which the combustion of fuel (generally, fossil fuel) occurs with an oxidizer (usually air) in a combustion chamber.



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.



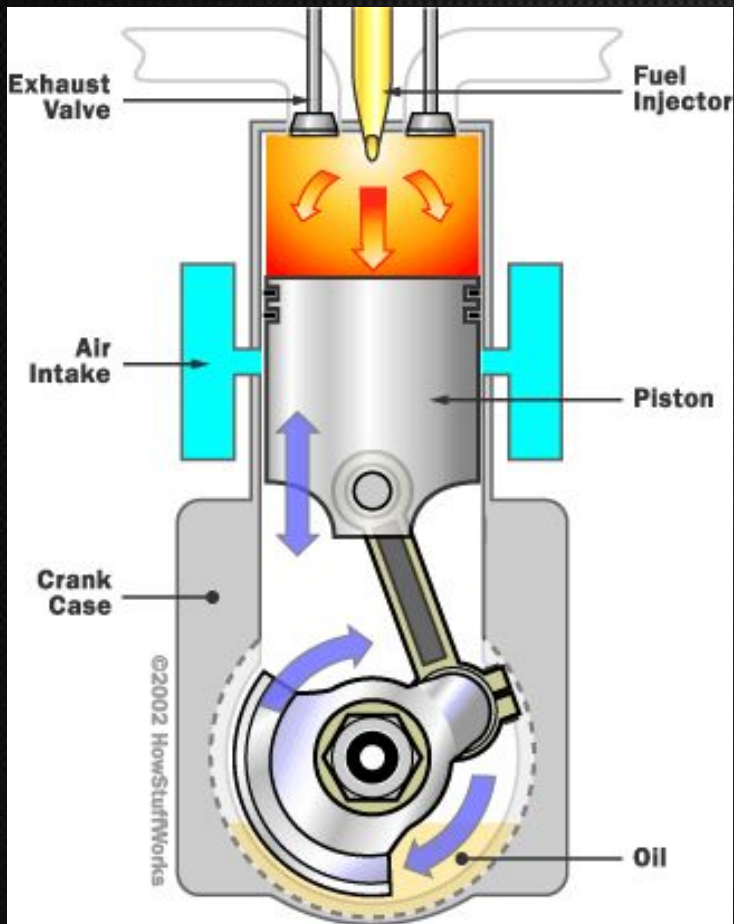
Engines can be classified in many different ways: By the engine cycle used, by the layout of the engine, source of energy, the use of the engine, or by the cooling system employed. But we are both interested in enging cycle classification.



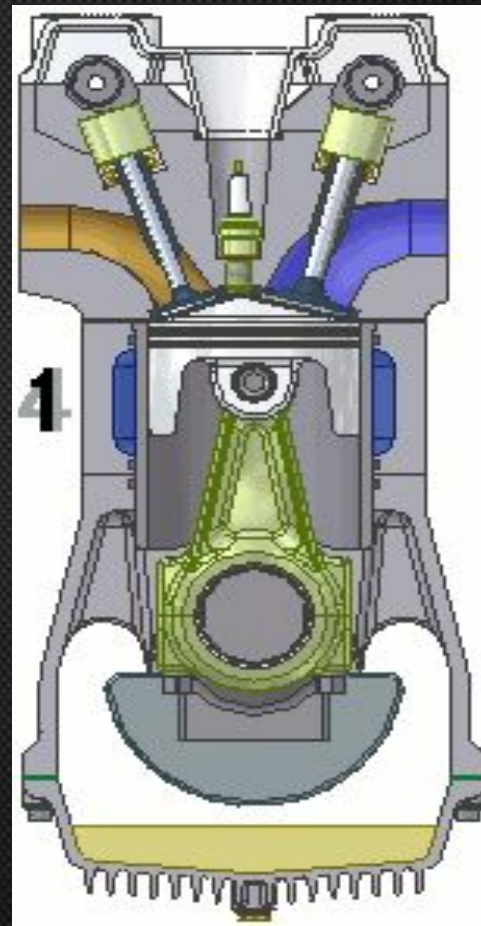
1 - головка цилиндра; 2 - цилиндр; 3 - поршень; 4 - шатун; 5 - коленчатый вал

The two main parts of it are

- Two-stroke cycle

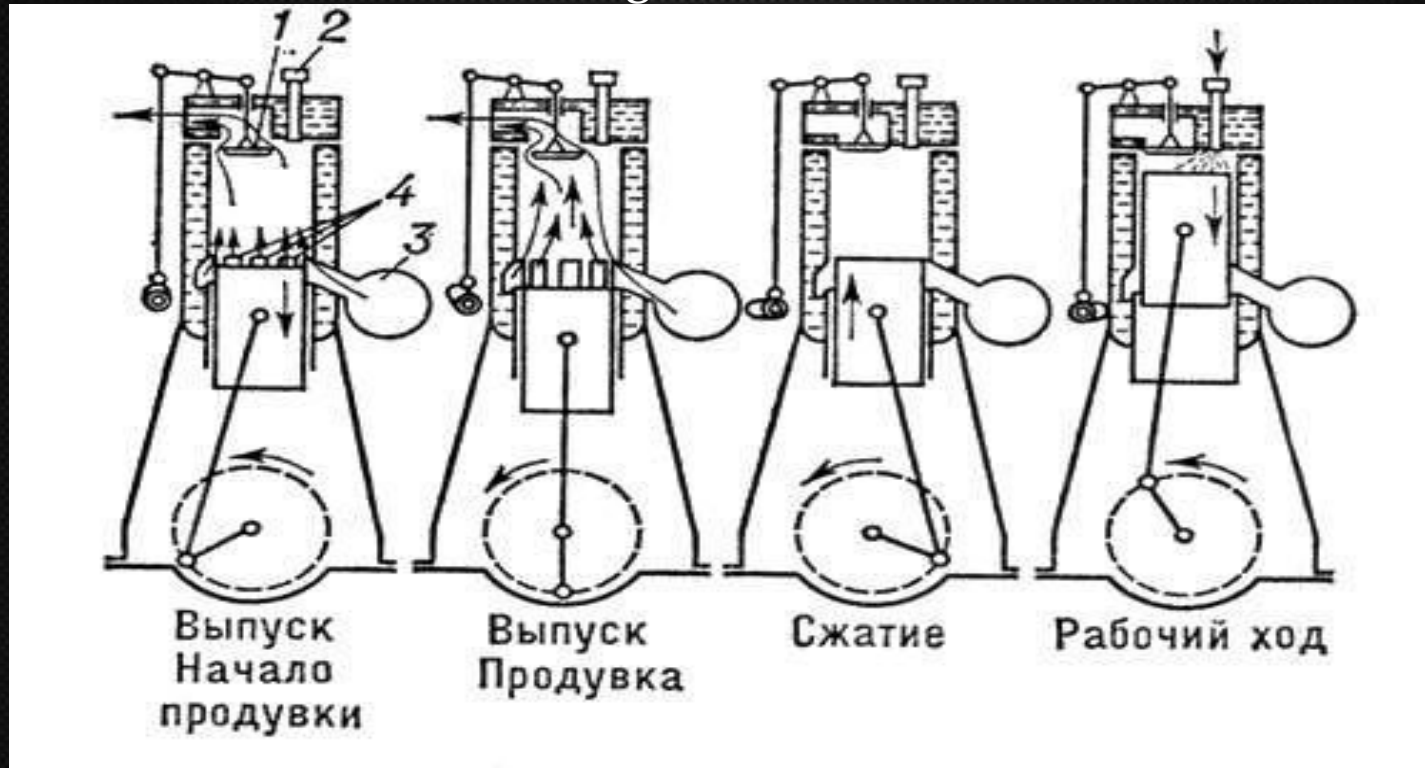


- Four-stroke cycle



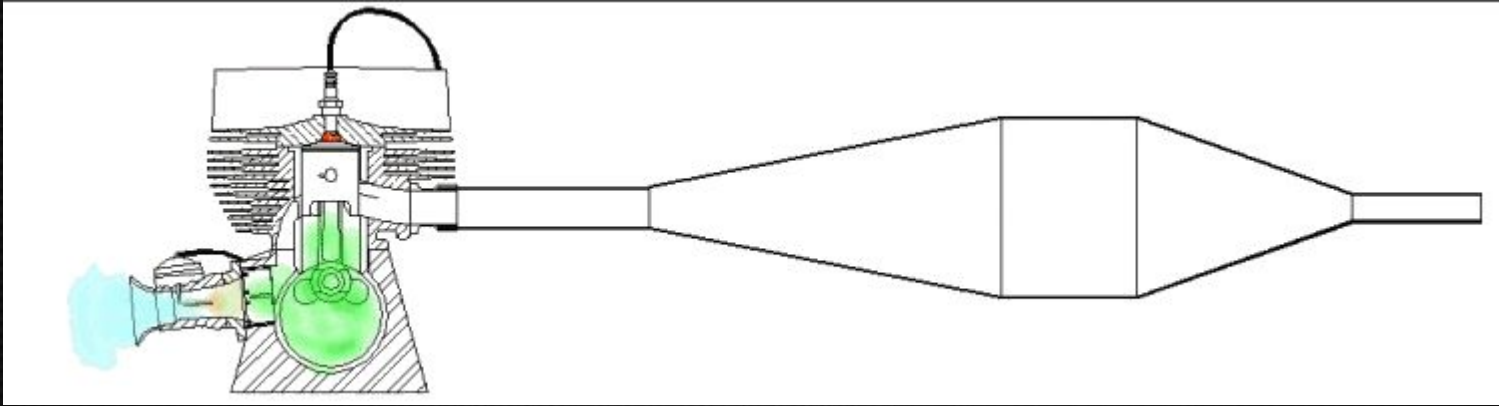
TWO-STROKE CYCLE

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.

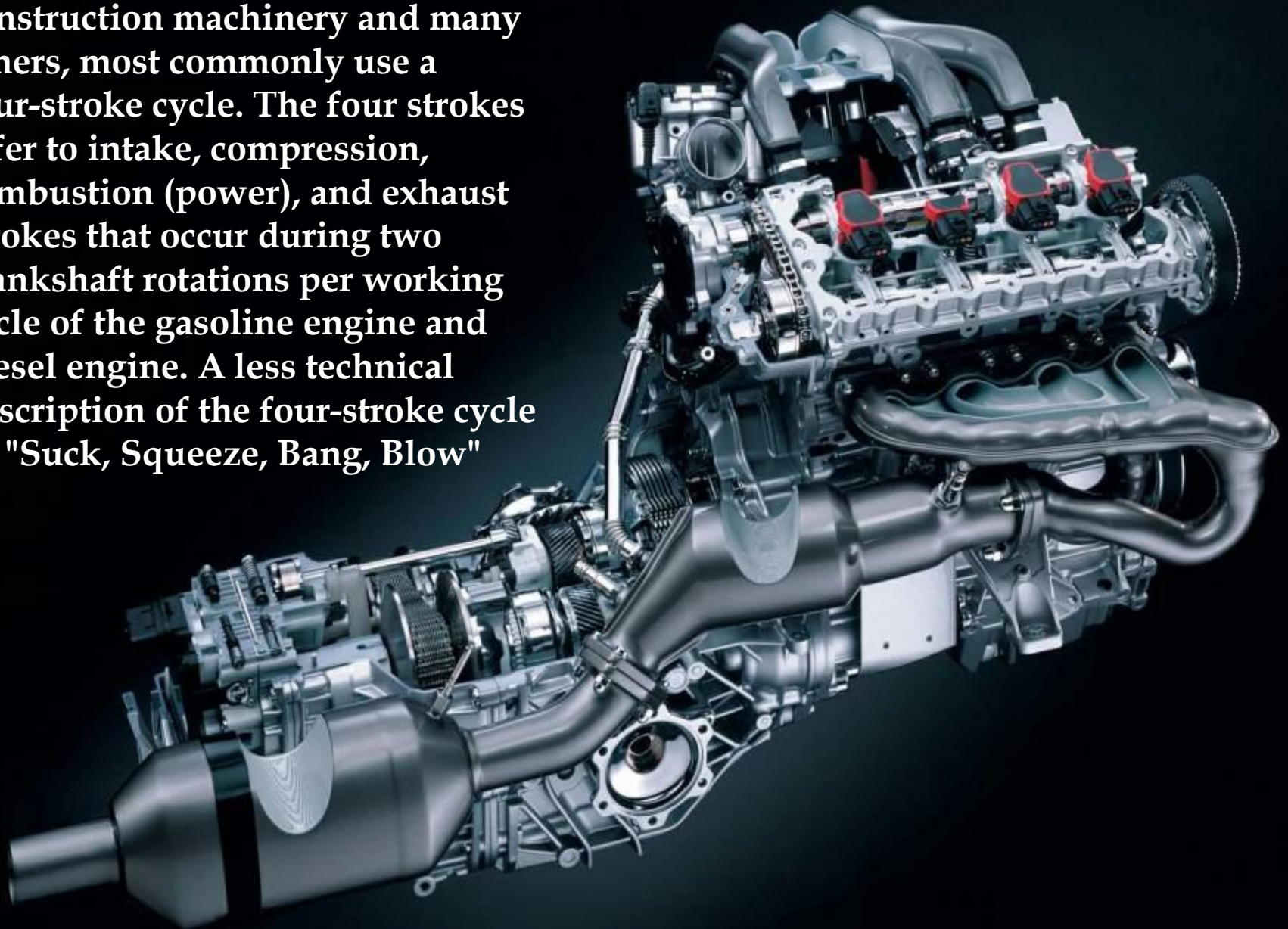
Two-stroke engine



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

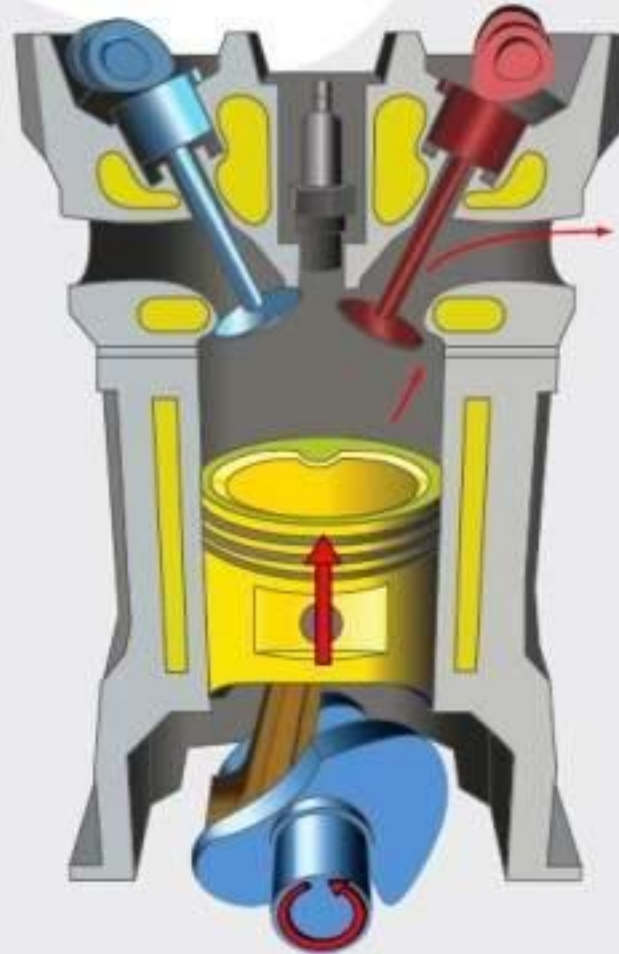


How it works

The compression 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. Ignition of the fresh compressed mixture occurs just before the piston reaches TDC. As the piston rises, the poppet valve is forced shut by the increased cylinder pressure. Flywheel momentum drives the piston upward, compressing the fuel/air mixture. Some engines have a drop-down intake valve which is drawn open by the vacuum produced by the intake stroke. Some have a side valve and this way, however, most

modern engines include a side valve as seen on the exhaust valve. The



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

SUPERCHARGING

On each cycle, the supercharger draws in fresh air and compresses it before it enters the engine.

Superchargers are engine driven and compress air into the engine's intake manifold. When the engine is running, the supercharger is also running.

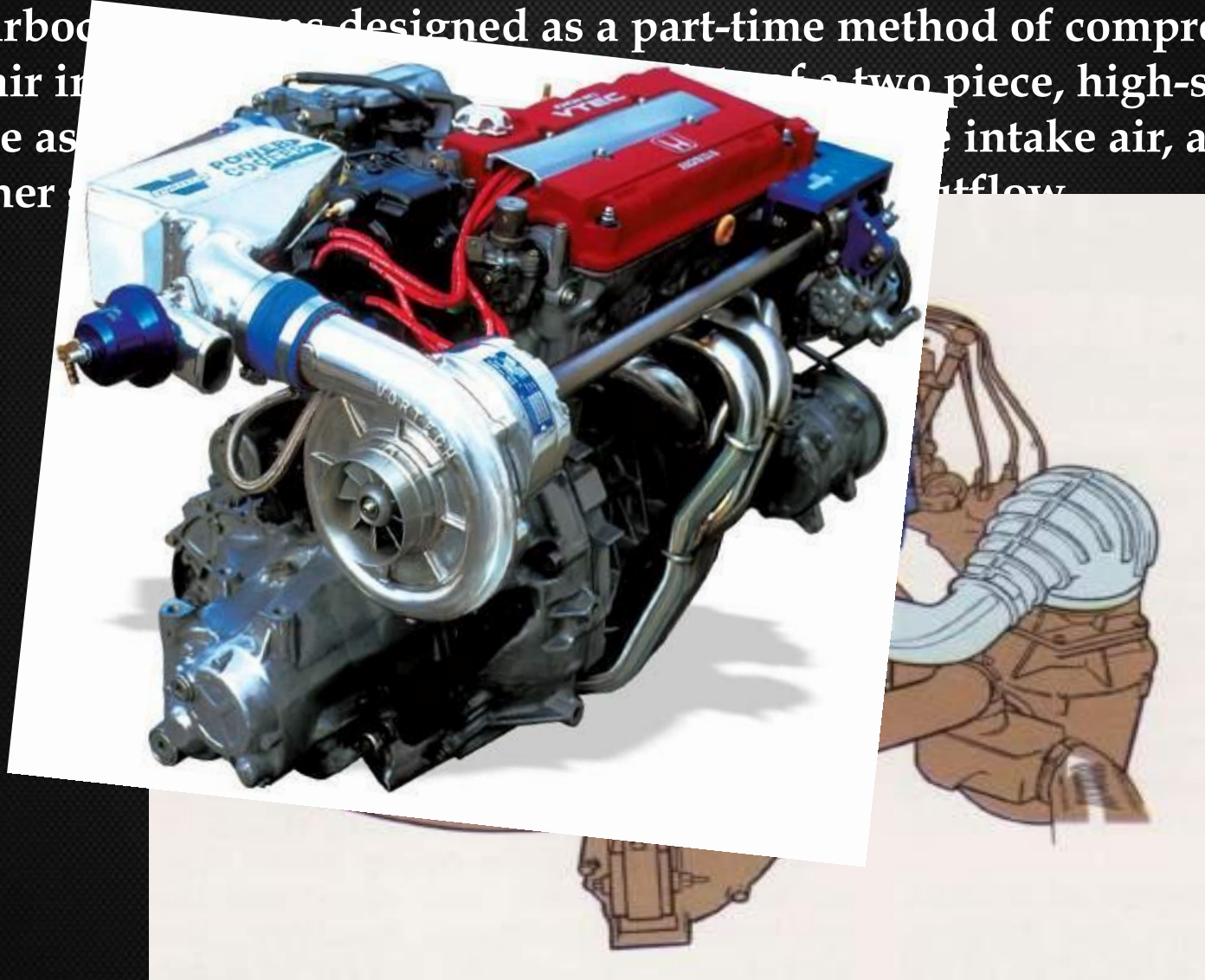
Force more air into the engine and get more power from each power stroke.



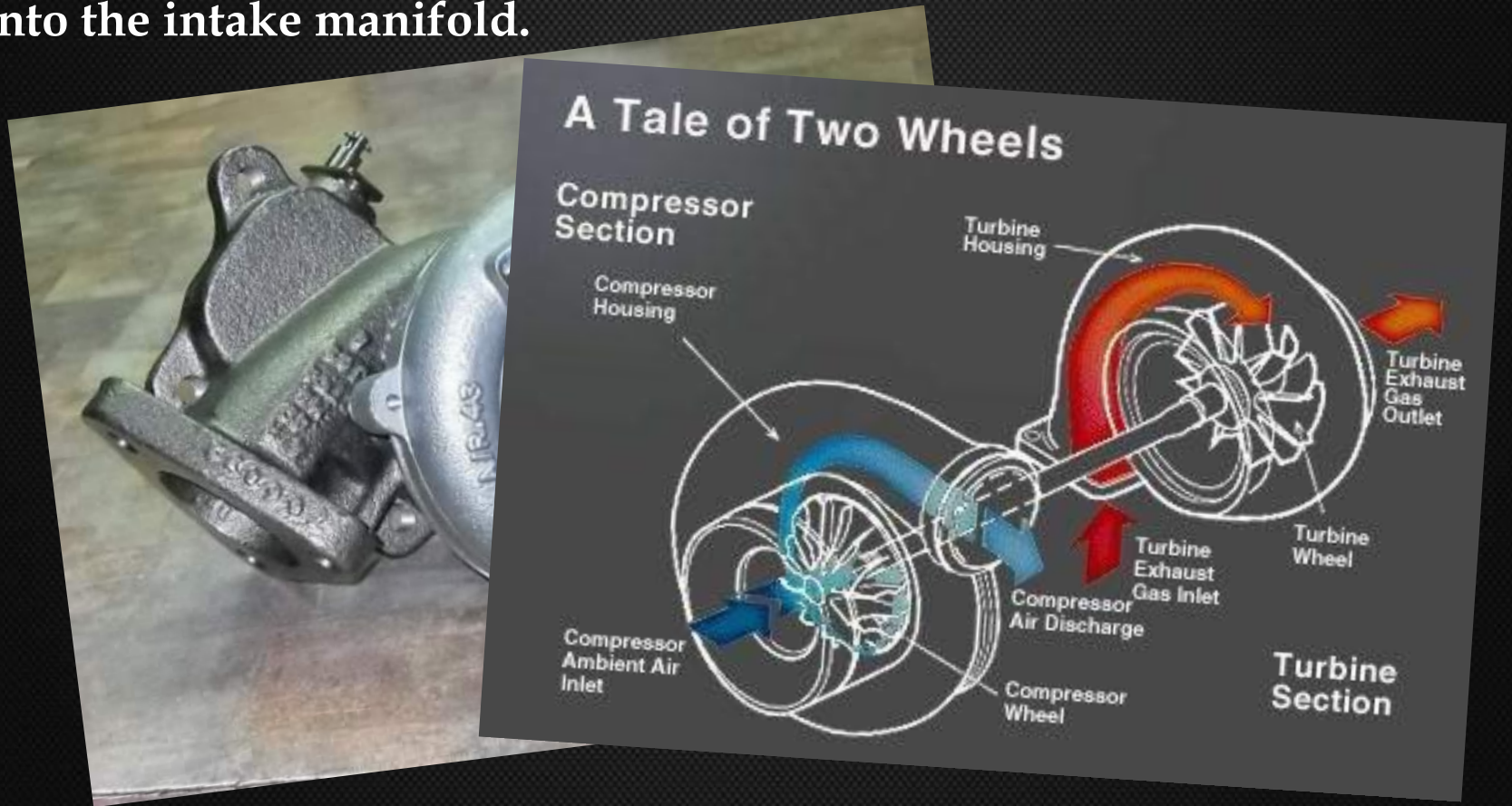
(c)2007 Bill Gercken

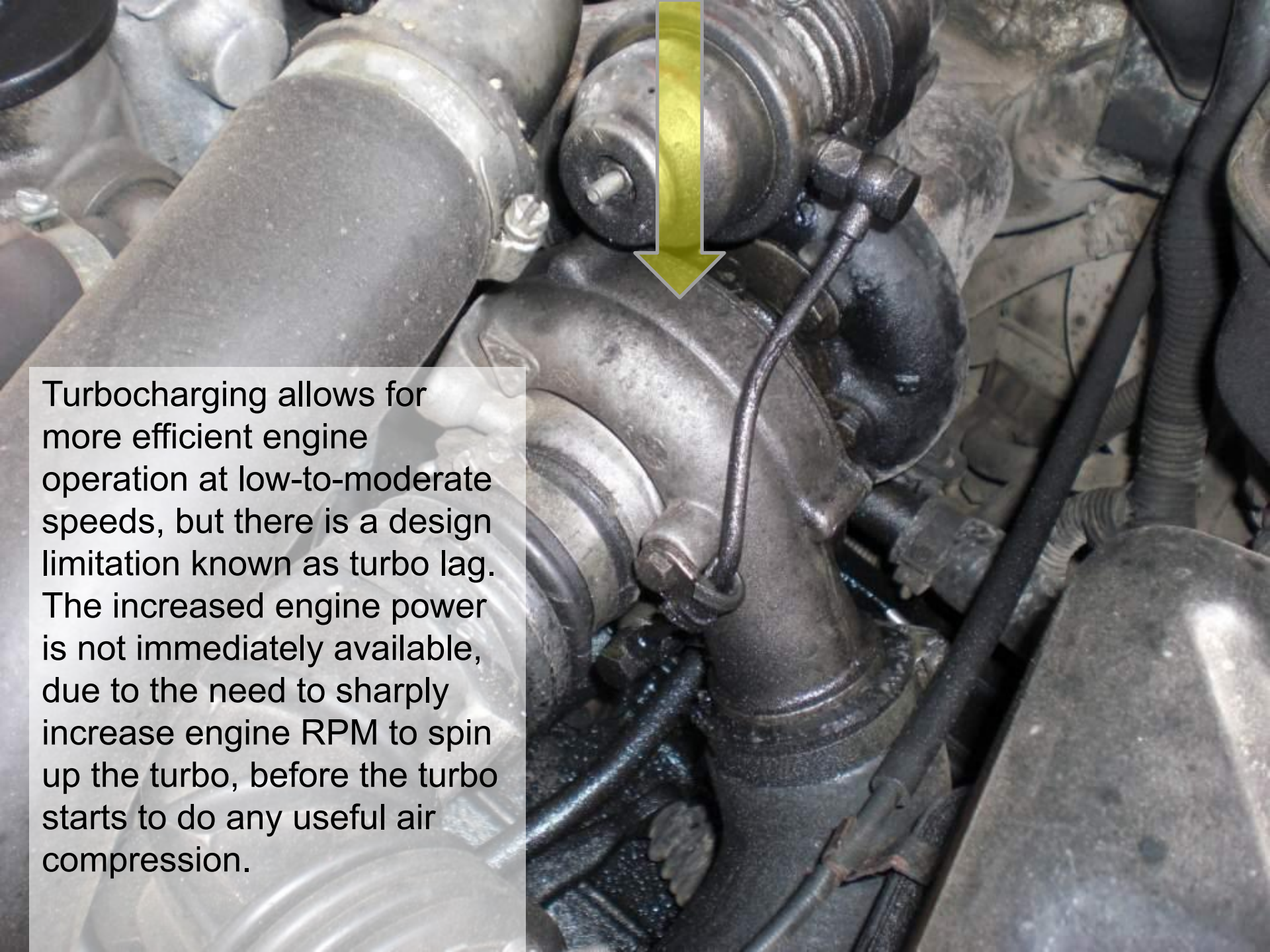
Turbocharging

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 compresses the intake air, and the other side of the turbine is connected to the exhaust manifold to draw off the 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.



A close-up photograph of a turbocharger mounted on an engine. A yellow arrow points to the wastegate actuator, a small cylindrical component with a pin, located on top of the turbocharger housing. The surrounding engine components are metallic and show signs of use.

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.