

CAREERS IN AVIATION THRU STEM? THE AIRPORT IS A GOOD PLACE TO START

COMBINED WITH YOUR CLASSROOM PROGRAM IN SCIENCE, TECHNOLOGY, ENGINEERING, & MATH

GET THE GEARS TURNING

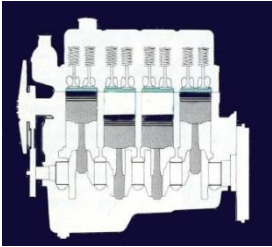
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ANOKA COUNTY-BLAINE AIRPORT

BLAINE AIRPORT PROMOTION GROUP

TOURS AVAILBLE K-12

ENGINE DESIGN



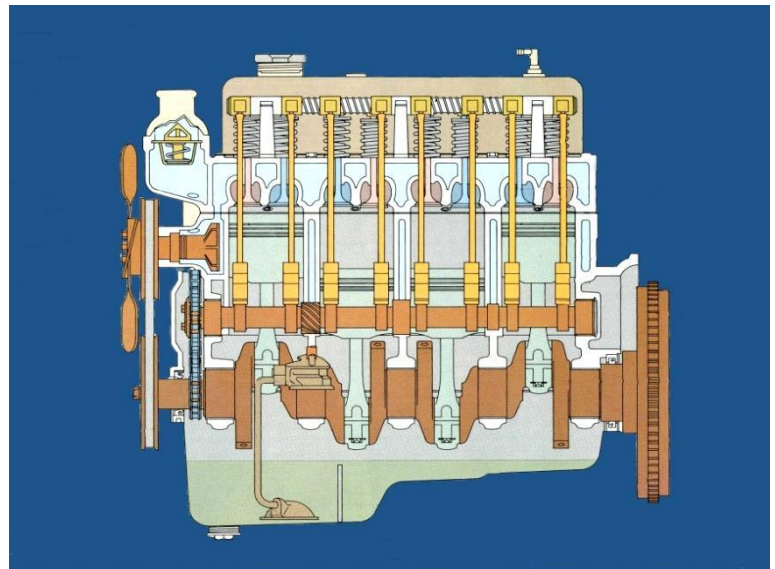
Concepts of the four-stroke and compression of a fuel mixture before ignition was patented as early as 1854 in London by Italian inventors Eugenio Barsanti and Felice Matteucci and in Germany by Christian Reithmann in 1860.

In 1861 the French inventor Alphonse Beau de Rochas published results of his work emphasizing the previously under-appreciated value of compression of a fuel mixture before ignition and he is known for origination of the principle of the four-stroke internal-combustion engine.

In 1867 the German engineer Nikolaus August Otto patented and is recognized as the inventor of the first internal-combustion engine to efficiently burn fuel directly in a piston chamber designed as a stationary engine.

All modern engines operate in much the same way as the in-line four cylinders available in the past motor history. Variations of the number and arrangement of cylinders provide a variety of power and smoothness of operation.

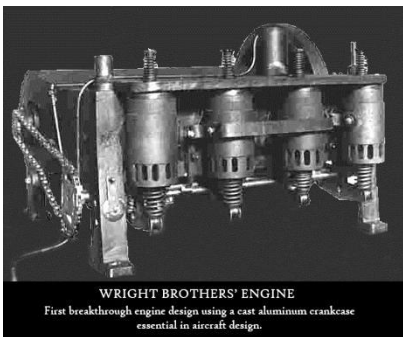
New breakthroughs in technology for engine design still exists but are predominantly limited to fuel economy, power to weight ratio, durability and reliability, operating flexibility, and compactness.



RECIPROCATING ENGINE CROSS SECTION-FOUR-CYLINDER
TWO MAIN PARTS OF THE ENGINE ARE CYLINDER HEAD AND CYLINDER BLOCK.
BASIC PARTS INCLUDE CRANKCASE, CYLINDERS, PISTONS, CONNECTING RODS, VALVES, VALVE-OPERATING MECHANISM, AND CRANKSHAFT.



LIGHT WEIGHT ALUMINUM ESENTIAL IN AIRCRAFT DESIGN



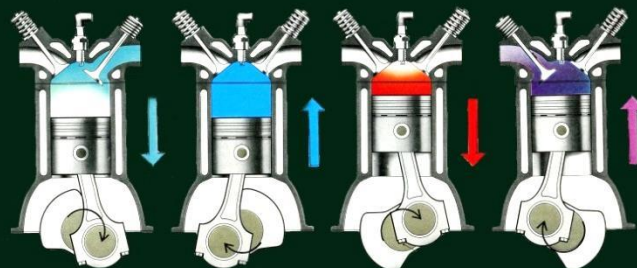
WRIGHT BROTHERS' ENGINE

First breakthrough engine design using a cast aluminum crankcase essential in aircraft design.

On December 17, 1903 the Wright Brothers flew the very first powered flight ever. Their success may be attributed to the breakthrough materials contract they made with a Dayton foundry, *The Buckeye Iron and Brass Works*, to cast an aluminum crankcase that was water cooled and with its lighter material would provide a power to weight ratio necessary for lift and power to drive the twin propellers of their flying machine. Buckeye company acquired the aluminum from Pittsburgh Reduction Co. renamed Alcoa in 1907.

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THE FOUR-STROKE CYLINDER



INTAKE

The intake valve opens allowing a mixture of gas and air to enter the chamber as the piston is being moved away from the valve opening.

COMPRESSION

The piston moves against the resistance of the closed valves compressing the fuel vapor into the area of the spark plug.

POWER

The compressed fuel vapor is ignited by the spark plug creating heat energy forcing the piston to move the connecting rod that creating a force to rotate the crankshaft that move pistons in rotation.

EXHAUST

The exhaust cycle forces burned gasses out through the open exhaust valve and the cycle continues with the opening of the intake valve and closing of the exhaust valve.