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The Wright engine that grew hot

Sixteen horsepower at the start, twelve when it was running hot — and the official cycle behind the motor.

NASA's Glenn Research Center says the Wright brothers' 1903 engine "used the Otto cycle, developed by the German, Dr. N. A. Otto, in 1876." Dugald Clerk, writing in the 1911 Encyclopaedia Britannica, describes Diesel's engine as a later, and different, official story.

Subject	Official wording
Otto, dated by NASA	The Wright design "was based on early automobile engine designs which used the Otto cycle, developed by the German, Dr. N. A. Otto, in 1876." NASA presents an ideal Otto cycle, and is careful to say "in reality, the ideal cycle does not occur."
Wright 1903, on the same pages	Four cylinders, each piston on a common crankshaft, driving two counter-rotating propellers. "The crankshaft makes two revolutions for every one revolution of the cams." NASA gives that engine "about 16 horsepower when the engine was first started" and "about 12 horsepower when it was running hot." Those figures belong to that engine.
Diesel, in Clerk, 1911	"Two very original features": it "operates at compression pressures very much higher than those used in any other internal combustion engines," and it "dispenses with the usual igniting devices by rendering the air charge incandescent by compression." "The engine operates generally on the Otto cycle, but it is also built giving an impulse at every revolution."
A 1911 test, as Clerk reported it	From a test of a 500 B.H.P. Diesel oil engine by Michael Longridge: three cylinders, 22.05 in diameter, 29.52 in stroke, each on the "Otto" cycle; indicated power 595 horse, brake 459, mechanical efficiency 77%, indicated thermal efficiency 41%, brake thermal efficiency 31.7%. Those figures belong to that test only.

A short quiz

1. In which year does NASA date Otto's cycle?
2. According to NASA, how many revolutions does the Wright crankshaft make for every one revolution of the cams?
3. What two "very original features" does Clerk give for Diesel's engine?

Answers. 1. 1876. 2. Two. 3. Much higher compression pressures than other internal-combustion engines, and no usual igniting devices, because compression makes the air charge incandescent.

Wording from NASA Glenn, "Internal Combustion Engine – Otto Cycle" and "Engine Mechanical Operation," and from Dugald Clerk, Encyclopaedia Britannica, 1911, "Oil Engine." Checked 17 November 2026. Photographs are not reproduced on this typographic sheet.

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