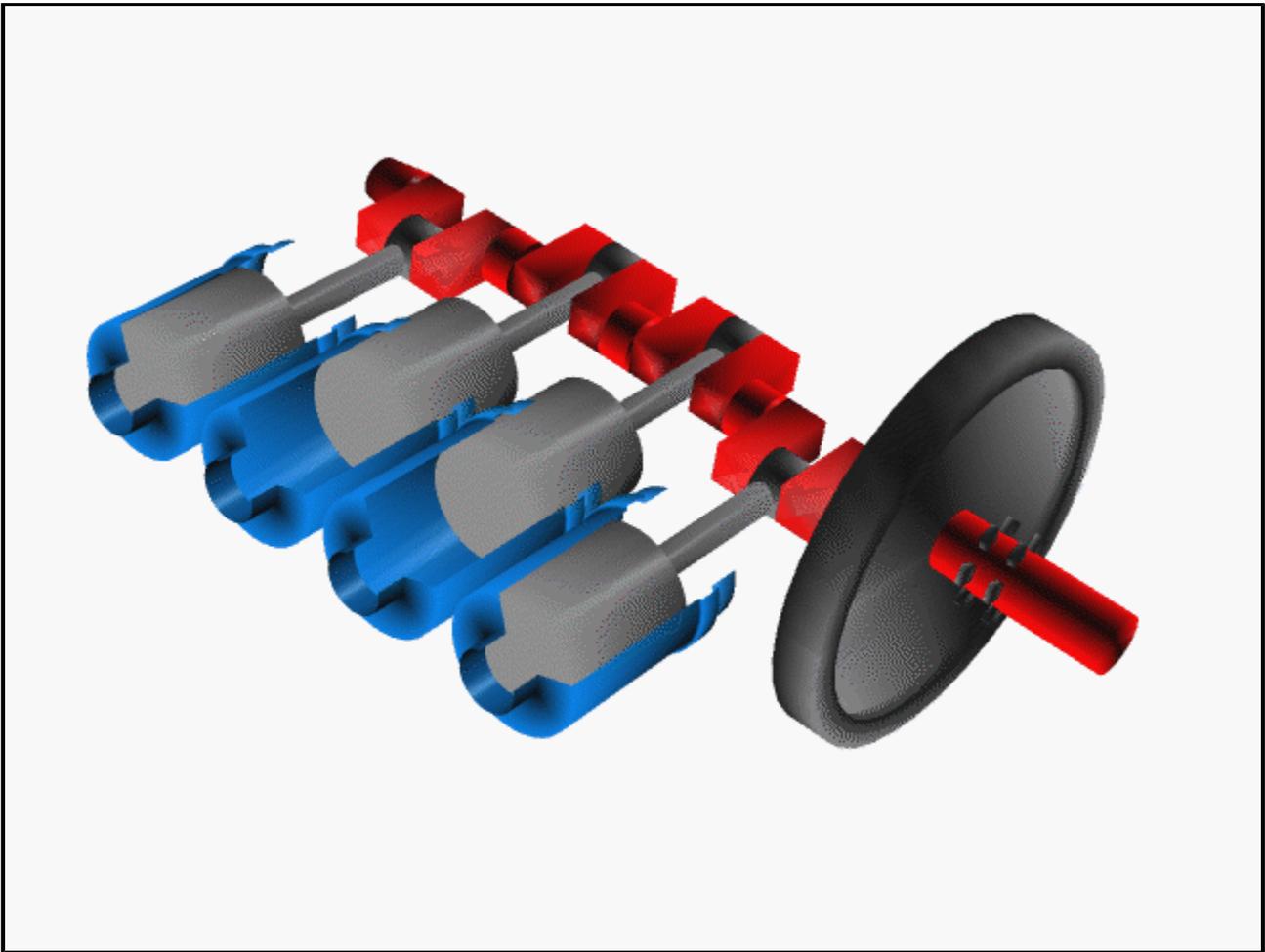
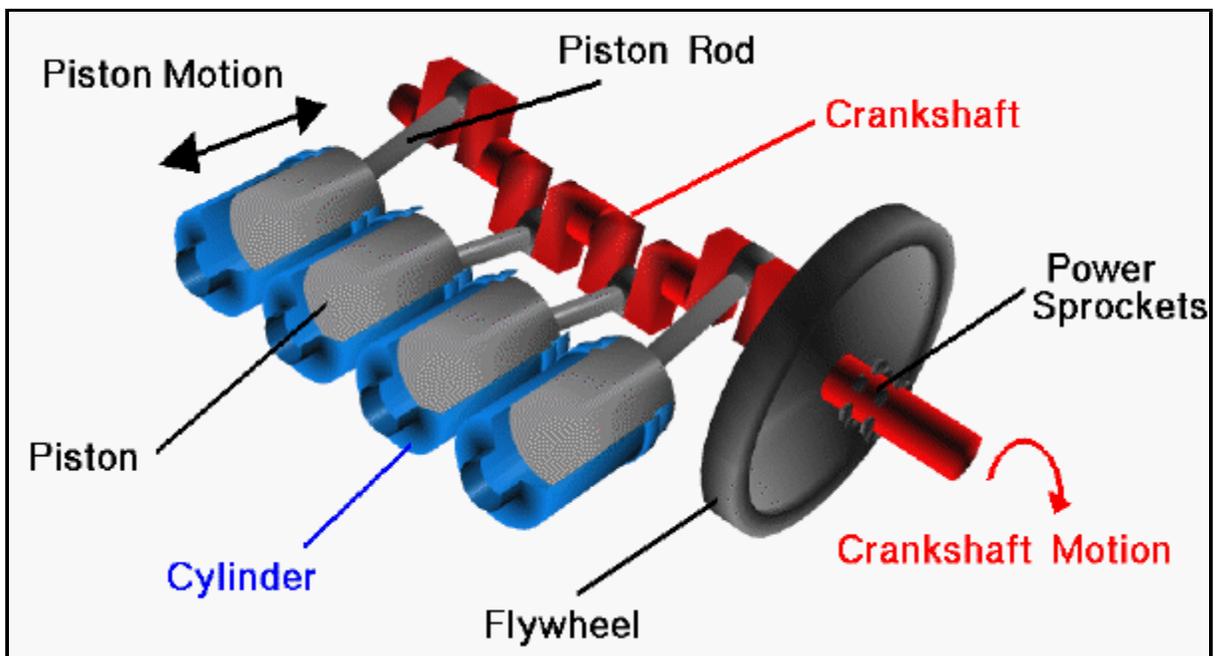


Engine Power Train



For the forty years following the first flight of the Wright brothers, airplanes used internal combustion engines to turn propellers to generate thrust. Today, most general aviation or private airplanes are still powered by propellers and internal combustion engines, much like your automobile engine. We will discuss the fundamentals of the internal combustion engine using the Wright brothers' 1903 engine, shown in the figure, as an example. The brothers' design is very simple by today's standards, so it is a good engine for students to study and learn the fundamentals of engines and their operation. On this page we present a computer animation of the **power train** of the Wright brothers' 1903 aircraft engine. In this animation, and on the figure below, we have stripped away all of the engine parts except those associated with the power train. The view is from above the rear of the engine.

As the name implies, the job of the power train is to provide the power to turn the aircraft propellers. For the brothers' propulsion system, two **power sprockets** are located on a rotating **crankshaft**, colored red, which turns large "bicycle" chains to power the propellers. The energy to rotate the crankshaft is provided during the power stroke of four **pistons**, colored gray, moving in enclosed cylinders, colored blue. The power train converts the linear motion of the pistons into rotational motion of the crankshaft. There are three main parts to the power train; the crankshaft, the pistons, and the cylinders.



The crankshaft is a single, long piece of metal which is cut into a very specific "snake" shape. The ends of the shaft are rounded to accept the **flywheel** and the sprockets at the right of the figure, and the timing sprocket on the left end. The three rounded sections in the middle of the crankshaft ride on bearings in the crankcase of the engine. There are four additional rounded sections of the crankshaft which are enclosed by the ends of the **piston rods**. The piston rods are connected to the pistons by **pins** which you can't see in this view.

Four combustion chambers are connected to the opened ends of the **cylinders**, to the left in the figure. During the combustion of the fuel, the pressure is increased in the combustion chamber and in the volume formed by the piston head and the top of the cylinder. The pressure on the head of the cylinder generates the force to move the piston and the crankshaft. The pistons fire one at a time in a specified order. The job of the **flywheel** is to store the energy from the individual firings so that the engine runs more smoothly.

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