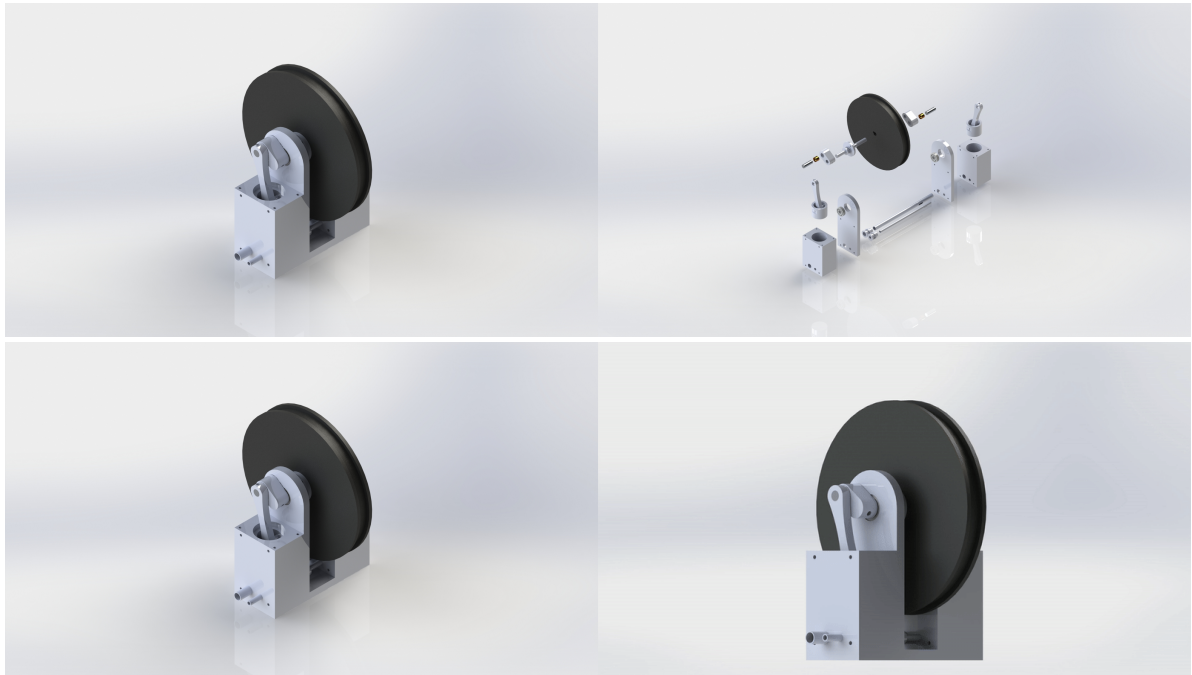


Greensteam Design Report: 2 Cylinder Inline Engine

Tae Rugh, Summer 2020

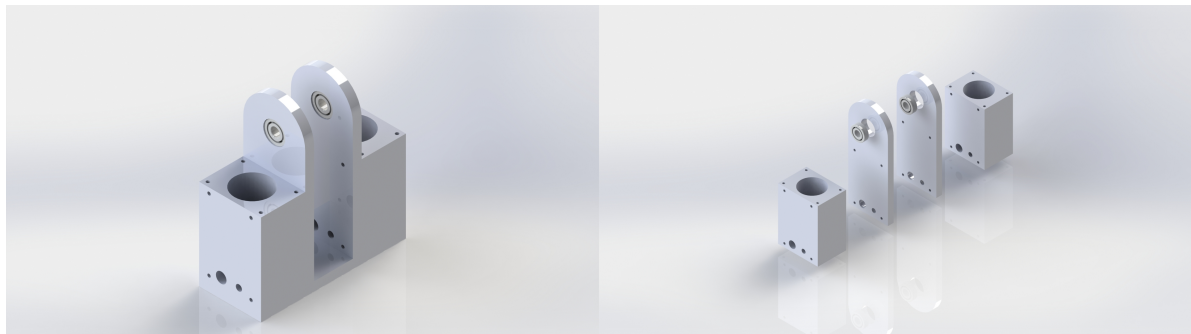


This engine has 2 cylinders, one on either side of a central flywheel. The cranks are offset from each other by 180° , so while one piston is in power stroke the other is in return stroke. Since there are 2 overhung cranks, the flywheel also acts as a pulley which links with an external driveshaft. There are 2 rotating hollow pipes that run below the head of the cylinders, parallel to the crankshaft, and act as the inlet and exhaust valves. These pipes are linked to the crankshaft via a timing belt. The inlet tube is fed a constant supply of steam from one side and sealed on the other, while the exhaust tube is open on both sides to atmospheric pressure. Both pipes each have 2 slotted cuts that open into the cylinders for a period which determines timing for inlet, expansion, exhaust, and compression. The benefit of this valve system is that the 2 pipes essentially replace the need for 4 valves, reducing the number of moving parts while maintaining perfect control over valve timing. The drawback is that there are concerns with sealing between the pipes and their bores which could result in leakage between cylinders. Additionally, thermal expansion of the pipes must be taken into account when determining clearance so as to prevent the pipes from seizing in the cylinder block.

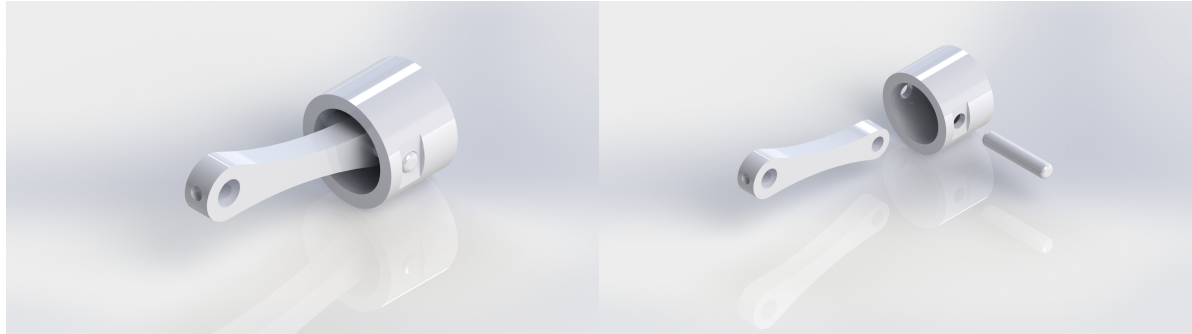
Part Breakdown



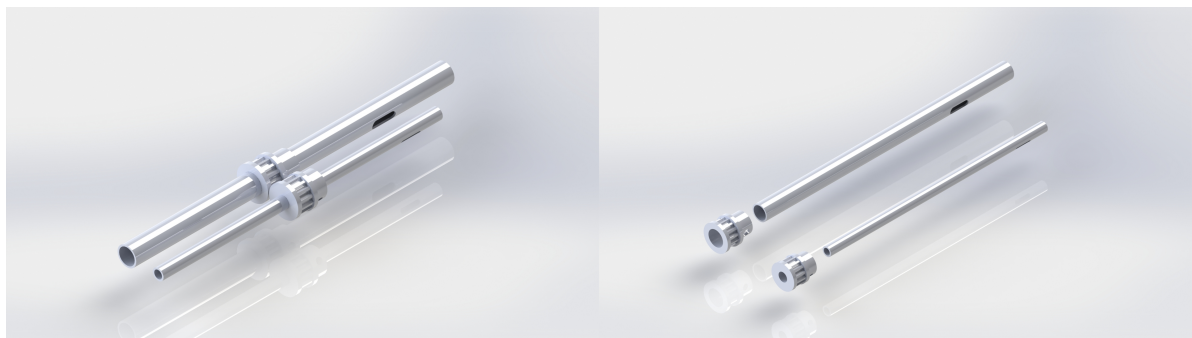
This crankshaft is of a unique design as it has overhung cranks on both of its ends. The cranks are diametrically opposed so that the pistons have opposite cycles. In the center are the flywheel and valve pulley. The valve pulley links the crankshaft to the 2 pipe valves with a belt so that they all rotate with the same frequency. The valve pulley is screwed to the flywheel. Apart from making the engine run smoothly, the flywheel also acts as a pulley for linking the crankshaft with an external driveshaft. An external driveshaft is necessary since both ends of the crankshaft are overhung.



Each cylinder block has a piston bore and 2 holes running below the cylinder head for the valve pipes. On the inner side of each cylinder block is a plate that holds the support bearing. A base plate holds the 2 cylinder blocks together.



The piston consists of the piston head, piston pin, and piston rod. The pin is press-fit to the rod, but given clearance through the head. The pin stays in place by slight contact with the cylinder wall on each side. In this way, the rod is free to rotate along the axis of the pin, but held in place otherwise.



The valve pipes have 2 slotted cuts that line up with each cylinder manifold and are diametrically opposed from each other. Since they are hollow, the pulleys are attached on the ends with 2 set screws. The pulleys hold a belt which connects between the two valve pipes and the crankshaft.

Files:

- [Master CAD](#)
- [Renders](#)