ENGINEERING DETAILS:

The most important modifications made to the basic design of the air engine were changing the number of pistons, modifying the air engine assembly to fit within a blender base, and recreating the rotor to resemble a blender blade. Because blender blades spin fast and encounter significant forces caused by collisions with tough ingredients in the jar, we deemed it necessary to increase the number of pistons in the engine. By making this change, the piston assembly has more points for power generation per rotation of the cylinders in the engine, resulting in greater torque generation. While the piston count could have been increased, we wanted to make sure that there was a consistent and high-speed rotation, which can only be achieved with an even number of pistons. The smoother delivery of power reduces vibration and improves the performance and longevity of the system, decreasing chances of excessive wear. We also shortened the length of the long shaft because it had to fit within a reasonably sized blender base. In the original design, the long shaft connects directly with the rotor. However, in our design, the long shaft connects with the blender blade rotator which is part of the base. Our rotor (the blade + blender jar) is detachable from the engine, which is a unique change. By doing this, we eliminated the need for the washer, nuts, and bushings required to hold the rotor in place. Because the whole system is subject to substantial vibrations, we decided to change the way the short shaft was mounted to the base by using a threaded hole instead of nut at the end of the shaft. This change was made with the intension of using a thread locking adhesive during assembly on the threaded part of the short shaft so that it would not be able to twist out easily during run cycles. Implementing these changes to the air engine helped us seamlessly incorporate it into a functional blender design.