The trochilic engine:

The Trochilic engine is a theoretical design composed of two mirror image gull wing segments intermeshed and rotating about a common central axis. Varying the relative segment velocities in rotation, forms four variable quadrants. The quadrants are functionally a Wankel engine requiring no mechanically driven valves and centric rotation. Each segment is integrally connected to a rotating gear cage that converts the undulating piston motion to a liner rotating output shaft. The segmented piston has a preferred direction of rotation imposed by the mechanically leveraged action of the gear cage.

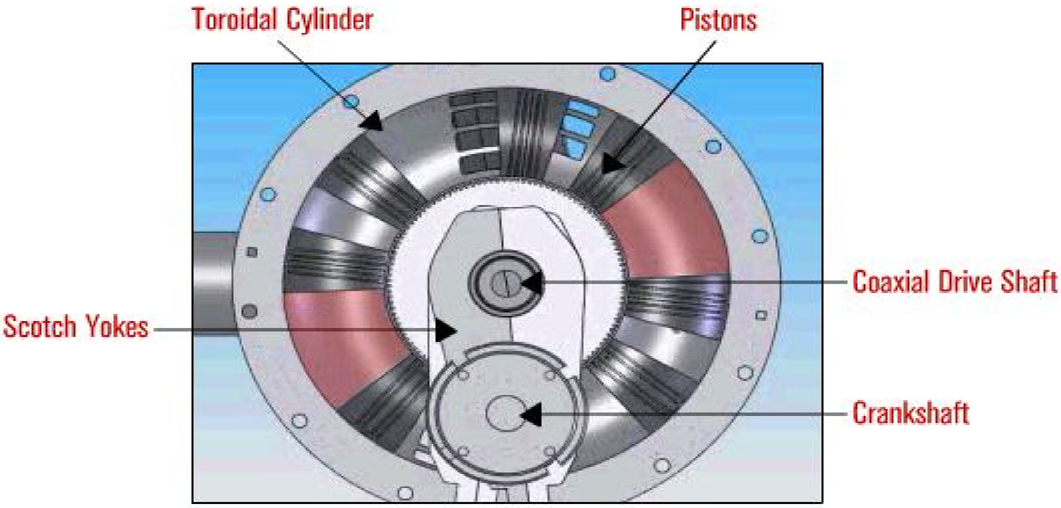
Similar to a Wankel engine: Intake of a working gas or combustible mixture is initiated by a quadrant expanding as it passes the intake port drawing in the working fluid. The gas is compressed and transported to a heated expansion cavity in the Stirling engine or ignited in the internal combustion engine. Expanding gas drive the quadrant through its power phase that ends when exposed to an exhaust port, followed by a decreasing volume exhausting the expended gas.

All four quadrants operate in a like manner providing a continuous power stroke through the entire 360°of rotation. This gives a power to weight advantage in the trochilic design. Engine efficiency can be enhanced by the addition of a trochilic expansion stage or pre-stage compression piston.

The major disadvantages of a trochilic engine are:

- It requires the use of a synchronous gear system to transmit the power of the pistons oscillating at the same time in different directions, which makes it very complicated.
- The pistons are free to move in any direction, which makes it possible for them to be thrust backwards due to ignition.
- Even if they are not pushed backwards, some combustion energy is wasted in stopping the oncoming pistons, which makes it same as reciprocating engines.

The rotoblock engine:



Also known as the oscillating piston engine, it has been designed in the following manner:

The Oscillating Piston Engine design incorporates four pairs of pistons, each alternately attached, via two opposed oscillating adjacent thrust disks, to two coaxial driveshafts extending from one face of the cylinder block.

The thrust disks use coaxial shafts and a dual scotch yoke mechanism to couple the motion of the oscillating pistons to a single crankshaft.

The round cylinder block containing the pistons, connecting discs and coaxial output shafts continuously rotates in a counter-clockwise direction, with a 90° rotation for every complete revolution of the rotating crankshaft. This action is accomplished by a four-to-one ratio gear reduction mechanism that couples these two components together.

Rotation of the cylinder block causes a pair of inlet and exhaust ports, as well as two diametrically positioned spark plugs, to regularly appear in the intervening spaces formed between the faces of the oscillating pistons as they move back and forth through 22.5 degrees of axial rotation within the confines of the toroidal cylinder housing. The movement of the pistons forms combustion chambers of variable volume in the toroidal cylinder.

The major disadvantage of the rotoblock engine is:

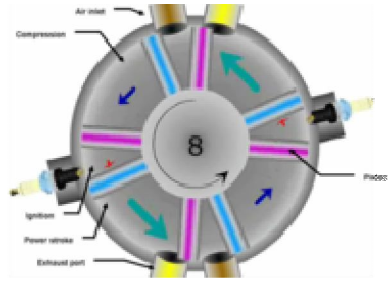
- The scotch yoke design to transmit power to the couple the motion of oscillating pistons to a single crankshaft is again, very complicated to make.
- The whole toroid of the engine moves as the pistons oscillate in side the moving toroid to provide for the inlet and outlet of gases, which makes it very difficult to accurately time.
- As the whole toroid has to be rotated, the rotational inertia is very high. Waste of energy during start.

The MYT engine:

The engine moves pistons on different rotors relative to each other to form combustion chambers of variable volume in a toroidal cylinder. The pistons move in stepwise fashion, with the pistons on one rotor travelling a predetermined distance while the pistons on the other rotor remain substantially stationary.

Fuel is drawn into a chamber as one of the pistons defining the chamber moves away from the other, and then compressed as the second piston moves toward the first.

Combustion of the fuel drives the first piston away from the second, and the spent gases are then expelled from the chamber by the second piston moving again toward the first. An output shaft is connected to the rotors in such manner that the shaft rotates continuously while the rotors and pistons move in their stepwise fashion.



The cycles of the MYT engine. Click to enlarge.

Disadvantages:

- As with the trochilic engines, pistons are free to move in any direction, which makes it possible for them to be thrust backwards due to ignition.
- Also, even if they are not pushed backwards, some combustion energy is wasted in stopping the oncoming pistons, which makes it same as reciprocating engines.
- The need to synchronize discontinuous power from two different rotors to the same shaft makes it complicated.

The roundengine:

A charger injects air-fuel mixture into the toroid, which is compressed by pistons attached to a common flywheel, against a timing disk, which has a cutout shape in it to allow the pistons to pass through. A combustion chamber is provided under the toroid where the air is compressed and sent to be ignited, and then released into the toroid at the other end of the toroid.

Disadvantages:

- The sealing if a moving disk sideways in the toroid is very difficult and hard to implement.
- The ignited gases are never in direct contact with the pistons, causing much wastage of energy.
- The energy of the explosion of the fuel mixture is never utilized. Instead, only exhaust gases push the piston.