Tomorrow's Engine
A Short Explanation for Experts

by Pete Clay, October 2, 2015

Ramjets help illustrate Tomorrow's Engine. This information for ramjets is available at

https://en.wikipedia.org/wiki/**Stagnation_temperature**

In Air, with adiabatic constant $\gamma = \frac{7}{5}$, a ramjet traveling at Mach M (speed is local speed of sound times M) scoops up atmospheric air at T0 Kelvin degrees. When that air becomes stationary relative to the ramjet, by shaped flow through a de Laval nozzle, the temperature has risen by:

$$T0 \ \frac{\gamma - 1}{2} M^2 \text{ K} \text{ , to become, } T0 \ (1 + \frac{1}{5} M^2) \text{ K}$$

In the engine this is exactly what happens when stationary atmospheric air at T0 K is sped up to Mach M circumferential speed exiting the outer rim of the rotor. This is explained in great detail in the Technical Analysis paper.

Next the engine takes the T0 $(1+ \frac{1}{5} M^2)$ K temperature air traveling at Mach M and slows it down to approximately Mach zero through shaped flow alone, without de Laval nozzles. This is again high speed air becoming stationary, with the same temperature rise T0 $\frac{\gamma-1}{2} M^2$ K, added to the above T0 $(1+ \frac{1}{5} M^2)$ K, to become the final compression temperature:

$$T0 \ (1 + \frac{2}{5} M^2) \text{ K}$$

Reaching compression temperature of 2 T0 K would make the Carnot efficiency of Tomorrow's Engine 50%, with the Mach speed in the rotor rim becoming:

$$M = \sqrt{\frac{5}{2}} = 1.581 \ ;$$

The Mach speed above is the actual speed divided by the speed of sound in air at temperature T0 K. In air the speed of sound is proportional to $\sqrt{T0}$. For Temperature T0 K = 300 K, speed of sound in air is around 1116 feet/second, so the rotor rim must move at almost 1765 feet/second to produce 50% efficiency. How that is achieved is the subject of another patent.