## BACKGROUND OF THE INVENTION

When the first fire was started by man, energy was created much the same as today, however, the fuel used and the means of the extraction have improved slowly, but steady.

Over 150 years ago, the first practical steam engine, built by James Watt, started the industrial revolution. Low pressure and temperature was the sign of the times. A new technology and lack of materials set the pace.

At the turn of the century, power generation brought in the turbine high pressure boilers and steam powered automobiles. At that time steam was the king. The Stanley steamer was the name. In 1906 they set the land speed record of 127 mph. The next year their car crashed at around 150mph, almost killing the driver. They vowed never to race again. It took four more years for a gasoline car to break the 1906 record. From that point the gasoline car became the prominent prime mover. The Stanley's were getting old, retired, and little development continued. A few developers did experiments, notably Doble, Williams and Carter.

Electric power generation by steam still remained the dominant means. Over the years efficiencies have grown in these areas, by using high temperatures, high pressures and heat regeneration. These Supercritical power plants are able to deliver efficiencies in the 46% range, far exceeding the best diesel engines, without the pollution they carry.

If we had known how toxic the internal combustion engine was it probably would not have become the dominant player in the small engine arena. It appeared to be easy to build as there was a rotating shaft, and then it became difficult as the add-on's appeared to make it acceptable after a hundred years of development. And it is still dirty and at the “end of its physics.”

In 1929 Prof. J. Stumpf wrote a paper on the seven losses of the steam engine and the high efficiency of the high compression uniflow system. In the 1970s the Williams' developed it further. They were a very small company and their virtues went mostly unheard. When a technology gets a foothold any change is difficult, retooling and engineering as well as re-marketing makes something new a tough haul unless there is an overwhelming need.

At this time the need has arrived. With sky rocketing fuel prices, dependency on unfriendly sources of oil, air polluting engines that are far more complicated than the total system need be, and engine efficiencies that are at a stagnation point, we can NOW look to the new beginning.

# ENTER THE SCHOELL CYCLE CYCLONE ENGINE.

This engine is more closely related to a power plant than the car engine of today, as it operates at Supercritical (SC) pressure, high temperature, and heat regeneration. The base engine is of a piston configuration of the high compression uniflow type.

In 1929 Prof. Stumpf stated the seven losses of the steam engine.

1. Surface loss
2. Clearance volume loss
3. Losses due to throttling or wire drawing
4. Friction loss
5. Loss due to leakage
6. Losses due to heat radiation and convection
7. Losses due to incomplete expansion

These have been dealt with by the Schoell Cycle Cyclone Engine

1. The engine is directly connected to the heat exchanger (boiler SC does not boil)

2. Using high compression uniflow with a variable compression where a constant SC can be maintained, high compression, as in a diesel, fills the clearance volume and adds to the expansion temperature.

3. The Cyclone has no throttle valve, as steam admission occurs at the head admission valve, where high density fluid of SC operation slows down the admission velocities, which minimizes wire drawing.

4. Friction losses are at a minimum because of only one throw on the crank and small pistons because of the high BMEP from the high pressure and slippery water lubrication

5. Leakage is at a minimum because the engine is at one with the condenser and the piston rings are of a special design where there is no metal to metal contact

6. Heat losses are at a minimum because the flame front travels towards the center where the flame is the coolest inward through the heat exchanger giving a very small surface exposed to the insulation. The engine can be run with hands on it.

7. High compression with high super heat eliminates saturation before exhausting

GUIDELINES OF THE CYCLONE ENGINE DEVELOPMENT

- Higher temperatures = a higher efficiency
- Higher pressure = a smaller machine
- Smaller the tube = a higher pressure
- Smaller the machine = less radiant heat loss
- Super heat will determine the expansion ratio
- Steam is an insulator
- Metal is a conductor
- Water is a semi-conductor
- Everything after the highest heat is a condenser
- DON'T WASTE THE HEAT

The Cyclone is a new patented concept where increased efficiency is included in one package.

- Environmentally clean
- Multi-fueled, also mixed and gaseous fuels and some solid fuels
- Compact size
- High horsepower to weight ratio
- Self-starting at a high torque output
- High well to wheel efficiency

SUMMARY

- The Cyclone engine is a new development in its infancy and is not at the end of its physics, as the internal combustion engine is.

- With further development the efficiencies can have further improvements.

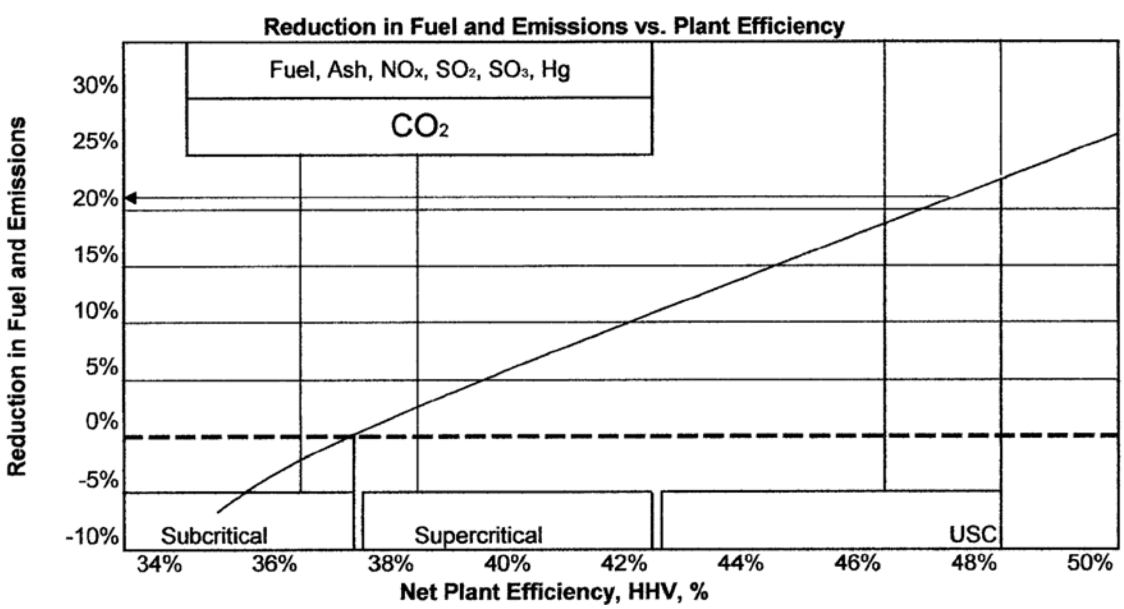
- The fuel burn efficiency will be dependent on the BTU of the fuel use where as an internal combustion engine relies on expansion ratio of the fuel.

- Burning a gaseous fuel which is pre-expanded loses a lot of power where as using hydrogen in a cyclone is a plus.

  Assume JP-8 @ 6.819 lbs per gal fuel burn at .06 gal per hp per hr
  19,810 fuel BTU per lb
  .06 X 6.819 =.40914 X 19,810 = 8105.063
  2545 / 8105.063 = .314 or 31.4% thermal efficiency ±10%

- Whereas, diesel is about 30% to 35% and gasoline is 20% to 25% after a hundred years of development.

- The new electric power plants are at 46% and still climbing. The Cyclone is following these regimes. (see diagram below)



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