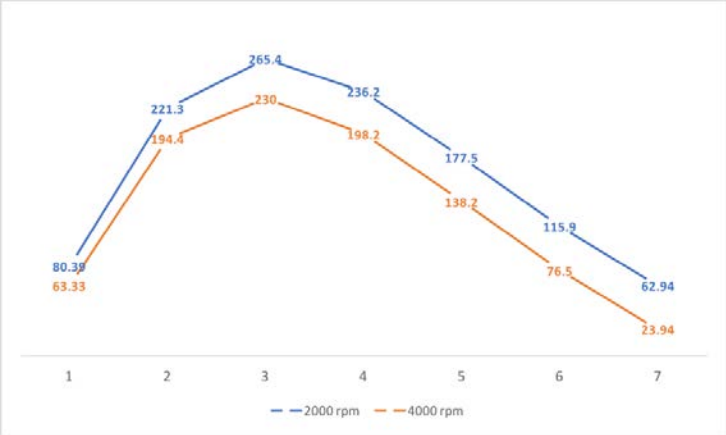
Experiment 1

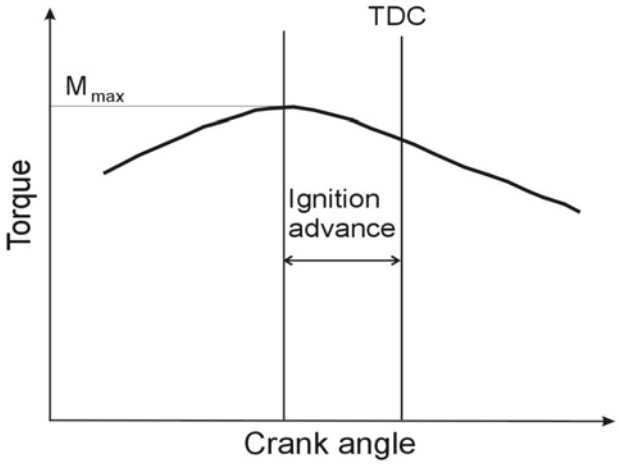
Throttle Opening Angle: 90°

		Ignition Period Angle[BTDC]						
		0°	10°	20°	30°	40°	50°	60°
Engine Speed[rpm]	2000	80.39	221.3	265.4	236.2	177.5	115.9	62.94
		16.84	46.35	55.58	49.46	37.17	24.27	13.18
	4000	63.33	194.4	230	198.2	138.2	76.5	23.94
		26.53	81.44	96.33	83.04	57.88	32.04	10.03

[Table 1 Relation between Torque and Ignition Period Angle]



[Fig.1 Ideal Diagram of Torque and Crank Angle]



[Fig. 2 Ideal Diagram of Torque and Crank Angle]

Phenomenon:

Simulation results shown in Figure, about the ignition advance angle of 20 °, the engine torque and output net power to reach the maximum.

Analysis:

The ideal engine compression stroke should be such that when the piston reaches the top dead center of the stroke, the combustion gas in the enclosed space between the piston and the combustion chamber is fully combusted to a maximum pressure and thereafter the piston is pushed down by the pressure, External work. There is also the problem of the pressure angle of the piston rod, even if the constant force in the piston down the process, the engine torque and output power are not the same. Of course, this requires a more specific model to optimize each separate work itinerary.

But the actual engine work, the fuel combustion takes a fixed time, so if the engine reaches TDC before the start of fuel combustion, you can make up for this section of the burning time, so that the work of the trip to achieve optimal conditions. Naturally, premature ignition of fuel, will reach the top dead center in the piston when the reverse to promote the piston, resulting in knock, lower power and torque; too late to ignite the fuel, cannot be the best pressure angle, to promote the piston work, power and torque will be reduced.

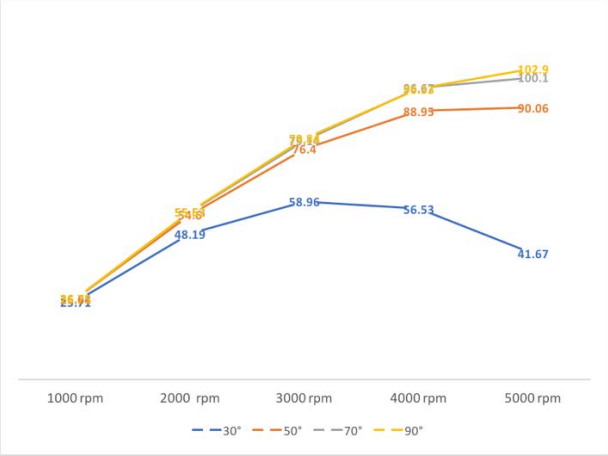
From the Fig. 1, the impact of the engine output torque and power factors in addition to the ignition advance angle of the fuel itself, combustion characteristics, combustion chamber temperature, atmospheric pressure and oxygen content, engine speed and many other factors.

Experiment 2

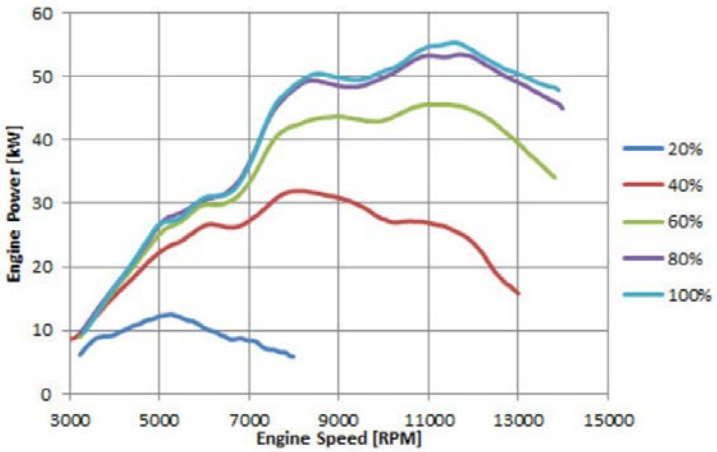
Ignition Period Angle[BTDC]:20°

		Throttle Angle[BTDC]			
		30°	50°	70°	90°
Engine Speed[rpm]	1000	245.5	254.4	255.1	255.4
		25.71	26.64	26.72	26.75
	2000	230.1	260.7	265.1	265.6
		48.19	54.6	55.53	55.62
	3000	187.7	243.2	251.9	254.1
		58.96	76.4	79.14	79.84
	4000	134.9	212.4	226	230
		56.53	88.95	96.67	96.33
	5000	79.5	172	191.1	196.6
		41.67	90.06	100.1	102.9

[Table 2 Relation between Torque Angle and Engine Speed]



[Fig. 3 Diagram of Torque and Engine Speed]



[Fig. 4 Ideal Diagram of Torque and Engine Speed]

Phenomenon:

The simulation results shown in the figure, the throttle opening under the same conditions, probably at a speed of 2000r/min, the engine torque and output net power to achieve maximum. 30 ° throttle opening produces the lowest torque and net output power, with the throttle opening gradually open to the maximum 90 °, the engine torque and output net power gradually increased, and the same section the valve opening gap conditions, the torque and the net output power gap is getting smaller and smaller.

Analysis:

An ideal model for the problem described above is that the ideal engine compression stroke should be such that the piston reaches the top dead center of the stroke while the combustion gases in the enclosed space between the piston and the combustion chamber are fully combusted to a maximum pressure, , By the pressure to promote the piston down, external work.

Fuel combustion time is certain, the same ignition advance angle conditions, the higher the speed of the engine, leaving the fuel combustion time is less, and the engine speed is too low is easy to do work on the piston to produce reverse force. Therefore, at the appropriate speed conditions, torque and net output power can be maximized.

In addition, a large throttle opening can inject more oxygen into the combustion chamber, allowing the fuel to burn more fully and produce greater torque and power. The amount of fuel injected per cycle is constant and the amount of incoming air is increasing and eventually reaches the upper limit of the oxygen required for the complete combustion of the dosed fuel. Thereafter, the air is opened and the throttle is opened to generate a noticeable torque to the experiment and the power to improve the effect, the same throttle opening gap conditions, the torque and output net power gap is getting smaller and smaller.