

DIFFERENCE

It's important to realise that the SC (smart carby) is different to a Holley so they are approached in a different manner.

The SC is a laminar flow carby with divorced transfer circuit to the mains. The SC does not have emulsion.

The SCA does not have a normal venturi in the body.

The SC has a transfer slot that is removable (it's an insert) that then allows you to shape the transfer slot so the fuel follows the vacuum of the camshaft.

Please note that you can do this to some extent with a holley transfer slot, ive done plenty of them, it is difficult to do (shape them) and although you can shape it that doesn't have the same effect as the SC because of what's behind the transfer on the SC, the way the fuel is delivered to the transfer slot.

Bruce realised long ago that the majority of engines like and needed a combination of 2 droplet sizes.

Small and large.

The size of them depends on the engines and in particular where an engine gets a large portion of its input energy from.

ENERGY INPUT RELIANCE

When engine tuning (which is analysing), it's important to recognize what the energy inputs are and prioritize them to a certain degree from greatest impact to least.

It's handy to be able to summarise them into an order of most influential to least influential.

There are always a few that are very domineering and when this happens the engine becomes very reliant on perhaps one or both of them which can be good or bad depending on what source it is.

A balance is what is required but you will find when out on a job tuning, there is quite often a poor balance, meaning one is very domineering.

Please note that you have to be on the job to work this out of the engine, no remote tuning here.

The more experience you get at tuning you can do pretty good remotely but it's still difficult as you need the client to be good at carrying out tests and being patient.

Whenever you take away from one source you need to replace it from another, it's a balanced input that required ultimately. Does it always happen? No it does not.

The following is an example of some of the most influential energy input sources you will come across:

- Exhaust energy – Heat retention and suck back.
- Compression energy – Adiabatic and isothermal.
- Air temp energy – Heat energy into the fuel.
- Oil type – Temp change to piston crown.
- Intake vacuum energy – vaporisation increase.
- Fuel temp energy – warm fuel temp.
- Piston temp energy – chamber temp increase.
- Water temp energy – chamber temp increase.
- Squish & Turbulence energy – agitation energy.
- Plug heat range energy – radiant heat retention.
- Spark arc energy – kernel heat retention.

The balance of the above is the key to a successful engine combustion. It's when the balance is out that the engine can become too reliant on one source and the combustion equivalence ratio is upset, the engine becomes hard to tune and they are fussy and change their performance in different conditions.

All carbys to some degree are a great tool for assisting in balancing the input energy in an engine. It's just how much control you have over the carby and what you can do with it when you are tuning.

Bruce built the smart carby so that he could have control over the fuel droplet size and once he started to use them he started to see how changing the droplets sizes impacted the gasses the cylinder produced and in turn how this impacted performance and a whole lot of other interesting things.

You see, with his carbys you can make max power at a leaner afr, that's a key point there. He had access to different styles of engines to do testing on, that's another key point also and is why when I tune engines it's a vast array of types, it's very very important to your learning.

He did testing on standard engines and race engine used on the street.

He did testing on boat engines, both social and race boats.

He did testing on race engines used for racing, drag speedway and circuit.

He did testing on tractor pull engines, very interesting these.

He did testing on bike and go kart engines.

He did testing on all types of carbys and many types of efi applications.

He did testing with a lot of ignition systems and he did analysing on engine failures both social and professional.

It was through this testing and constant analysing and learning that he become extremely good at his job, he was always bettering himself and the clients vehicle.

He kept making improvements to his carbys but it was his injection system that he was working on that was going to be exceptional really I think. But it never got to the light of day completed unfortunately.

So, he was smart. And this is why he pursued the following:

He knew that all performance stuff will one day need to pass emissions and that is why he tested so much with his carbys to see whether he could do this and that is why he went down the path of making power with a cylinder producing more CO₂.

The conventional explanation for afr for maximum power is that it is the crossover point of gas volume production via CO and the heat of CO₂.

However, when he was doing dyno work with SC on various engines they made the same power at an afr of 14.3 compared to richer mixtures over the course of many days of testing. It's important to note that.

That is not a normal experience I can assure you.

The engines did not change their HP or Torque output by more than 5 ft lbs or 5 hp.

These were on 600-800 hp engines.

He could do standard and mild engines real easy.

An engine will normally lose a lot of power at those leaner afr's, but when he leaned it with his carby he got more gas levels that compensated for the lack of CO.

He noted that with all scientific research, it is being done with gas fuels and they don't have problems with vaporisation so they are not studying vaporisation they are studying combustion. In a real petrol engine you have the additional problems of vaporisation and gasification.

He mentioned that what he was seeing was examples of gasification increasing resulting in increased CO₂ and heat production heating the atmosphere substituting for low heat CO with volume producing burns.

If the power output is the same then that is the fact of substance and if the afr changes from lean to rich then there must be a change in CO and CO₂ levels, and because the power level stays the same then something must be gaining cylinder pressure at the same rate that something else is losing it.

During the tests the exhaust temps remained the same.

The only changes that were observed were plug colours.

So the pursuit for Bruce was always about passing emissions and making power at the same time and really all the other benefits came from the added gasification and vaporisation of the fuel allowing for a smooth powerful burn that gave a certain driving style of the vehicle in question, reduced HC's in the oil and having engines to run cooler and maintain power under load for great lengths of time.

When you get smoother combustion, boy does it make a difference to the drive of the vehicle.

Pursue smooth combustion with whatever carby or efi that you are using and you will not keep a smile off your face, that what I do with my tuning and I can't get enough of it.