Weston Performance.com | Performance Car Tuning | Engine TuneUp | Power Tuning Packages

Performance Car Tuning packages for all areas & aspects of the car tailoured to your specific needs..

We are aware that every customer has different demands on there vehicle so the tuning packages are more to give you an idea of what can be done to the vehicle. And not a strict guide line to follow.
We offer four basic power train, chassis/suspension transmission and braking packages for all vehicles. We believe it is best to enhance the complete vehicle and not just one area at a time.

Power Tuning Packages
Weston power stage one
The stage one power train focuses on engine breathing.

To gain more power you need to gain more torque, to gain more torque you need to increase the engines volumetric efficiency.Think of your engine as a complex air pump the more air you can get into and out of the engine the more power you gain.

Stage one will typically include, air filter panel or induction kit, exhaust system including hi-flow catalytic converter or De-cat pipe and a Stage one Weston ECU Re-program.

On a turbo charged vehicle you should expect to see around a 15% increase in power at this stage.

Weston power stage two
The Weston stage two focuses on extracting the highest potential from the standard power plant.

With a turbocharged vehicle this will normally involve higher boost pressures, as the boost pressures rise the turbo system efficiency decreases heating the intake charge, among other solutions a good quality correctly sized uprated intercooler will decrease the intake charge temps and give substantial power gains.

At this level the standard fuel pump will need changing for a high flow model and you may need larger injectors, the car can then be re-set up with a Weston stage two re-program.

On a turbo charged vehicle you should expect around a 30% increase in power at this stage.

Weston power stage three
Stage three will focus on bolt on engine components.

At this level of tuning we recommend a multi layer steel head gasket. Components to change at this level of tune will come from the following list. Turbo's, exhaust manifolds, conrod bolts, steel head gaskets, camshafts and vernier pulleys, lightened flywheel. Fuel system upgrades injectors, regulators, fuel rails.

Stage three could involve engine re-build work depending on type of vehicle, condition and wear.

Weston stage three re-map or stand alone engine management. On a turbo charged vehicle you should expect to see roughly a 50% increase power.

Weston power stage four
As this guide is generic covering a wide range of vehicles by stage four it gets very difficult to predict specific modifications.

At this stage we are talking about huge gains in power and torque.

High specification engine re-design and build work, one off conversions and custom jobs possibly with a particular target in mind i.e. Circuit racing, drag racing, rallying, drifting, auto trials and fast road, all these areas can be discussed, designed and catered for by our team of engineers and technicians.

Power Tuning Technical
Before we can fully understand the engine tuning process we must first look at Power Torque and Volumetric efficiency.

Power is defined as the rate of doing work, and has units of Kilowatts (kW - named after James Watt) used widely in Europe or horsepower in the old Imperial units used here in the UK and in America.

To see what power actually is, we look at the experiment that James Watt carried out in order to give a quantifiable standard for how much work could be carried out in a set amount of time. He wanted to know the rate at which work horses could raise coal from a coal mine.

To do this he measured the mass of coal brought up the mine shaft, the distance that the coal was raised, and divided this by the length of time that it took to do this. He found that the horses would lift 33000 pounds 1 foot in one minute (or 1 pound 33000 feet in one minute), this unit of power became known as the "Horsepower."

In metric terms, the Watt is defined as the power to do one Joule of work per second. One horsepower is equivalent to about 746 Watts, or 0.745699872 kW Now, we need to understand that power and torque are closely related and that by adding time to a force will give you power. Torque is basically the rotational equivalent of a force and is really the potential to do work and power is the rate of doing work? So, with a combustion engine, power is the torque multiplied by the radial velocity (speed) which is a measurement of time.

So to calculate an engine's horsepower at some given speed, you use the following formula:

power = Torque * RPM % 5252

To prove this formula we must look at the proof, which is as follows:

Rev the engine to the desired speed. Measure the torque at that speed. Multiply the torque by 2 * PI * the engine speed in RPM. This gives you:

X foot-pounds * 2 * PI * REVOLUTIONS % MINUTE

Which, if you look closely, is a FORCE (in pounds) times a DISTANCE ("one foot * 2 * PI * revolutions" is the distance the tip of our one-foot moment arm travels, in feet) divided by TIME (in minutes). As we know, FORCE times DISTANCE divided by TIME = POWER.

We now have power expressed in foot-pounds per minute. To convert to horsepower (33000 foot-pounds per minute, remember), we simply divide by 33000.

So Horsepower = Torque * 2 * PI * RPM / 33000

so Power = Torque * RPM / 33000/(2*PI)

so Power = Torque * RPM / 5252.

This incidentally, implies that an engine's torque and horsepower curves cross at 5252 RPM.

So, as you can see, power and torque are very closely related, but it is important to realize that they are different. Remember that you can be applying a lot of torque for no result. Looking at the fact that power is the rate of doing work, it is obvious that if you are doing no work, you generate no power!

So, no matter how hard you push that spanner, if the bolt doesn't turn, you generate no power.

There are two ways of increasing the amount of torque generated by an engine - either increase the capacity (or, more correctly, capacity times volumetric efficiency), or increase the length of the lever arm (or stroke).

For increased power, you can increase either (or both) the torque, or the revs at which that torque is generated. Increasing stroke will increase torque, so theoretically it would be good to have very long stroke engines. The problem is, if the stroke is too long, the volumetric efficiency decreases, particularly as the engine speed increases (which is why long stroke engines don't like high engine speeds, apart from the rotating friction and harmonics).

Now this decrease in engine speed more than compensates for the torque increase, which is why very high power output engines tend to have very short strokes (once again, engine strength issues ignored).

So as we can see the most important factor in increasing your engines performance is its volumetric efficiency.

The volumetric efficiency of a 4-stroke engine is the relationship between the quantity of intake air and the piston displacement. In other words, volumetric efficiency is the ratio between the charge that actually enters the cylinder and the amount that could enter under ideal conditions.

Piston displacement is used since it is difficult to measure the amount of charge that would enter the cylinder under ideal conditions. An engine would have 100% volumetric efficiency if, at atmospheric pressure and normal temperature, an amount of air exactly equal to piston displacement could be drawn into the cylinder.

This is not possible, except by supercharging, because the passages through which the air must flow offer a resistance, the force pushing the air into the cylinder is only atmospheric, and the air absorbs heat during the process. Therefore, volumetric efficiency is determined by measuring (with an orifice or venturi type meter) the amount of air taken in by the engine, converting the amount to volume, and comparing this volume to the piston displacement.

Volumetric efficiency= Volume of air admitted to combustion chamber / Volume of air equal to piston displacement x100

Volume of air equal to piston displacement Put simply the volumetric efficiency is the measure of your engines ability to process the charge (air fuel mixture entering the engine).

For example an engine with a high volumetric efficiency would be the Honda F20 engine found in the Honda S2000 this engine produces 240bhp and 208nm of torque from a 2000cc displacement, this is achieved through finely calculated gas flows through the engine combined with high engine speeds.

By tuning a vehicles engine we are increasing its volumetric efficiency, from fitting a larger turbo to carrying out major engine work down to removing negative pressures in the induction system by fitting an induction kit we are always trying to achieve the same thing higher volumetric efficiency, hence greater torque which can then be converted to power through speed.