

Highly charged motoring

Fast cars will go even faster with electric power.

SOME people think sports cars are threatened with extinction by tightening restrictions on carbon-dioxide emissions and unacceptable fuel-guzzling. They fear the roar of the V8 will be replaced by the whirr of the electric armature—and that motoring will never be the same again. Well, it ought to be quieter, that is true. But the Jeremy Clarksons and J. Bonington Jagworths of this world need not fear that it will be slower.

The secret (whisper it, lest puritanical greens find out) is that electric motors are better than combustion engines. They have more oomph, and no need of a gearbox to deliver it. No self-respecting supercar should be without them. And, at this month's Geneva motor show, at least three supercar-makers showed that they had got the message. Lotus, Porsche and Ferrari each unveiled vehicles driven partly by electric motors. These cars have petrol engines, too, to back the electric ones up; technically, therefore, they are hybrids. But that should change in the future as batteries' storage capacity goes up, and charging time comes down. Most importantly they show that, sometimes, doing the right thing can be fun.

The launch of the Tesla roadster two years ago demonstrated that electric cars do not have to be slouches. The Californian company's small plug-in sports car can accelerate from zero to 96kph in 3.7 seconds. It has a range of 393km (244 miles) once its lithium-ion battery pack is fully charged (which, admittedly, takes several hours). The Tesla's rapid acceleration comes from the ability of an electric motor to deliver its maximum amount of torque at whatever speed the motor is turning.

Torque is the scientific term for turning force, and it is measured in newton-metres (Nm). The Tesla's motor has a torque of 400Nm all the way to 5,100 revolutions per minute. An internal-combustion engine, by contrast, produces maximum torque only at certain speeds. The 2.0 litre engine of a Lotus Elise S2, for instance, peaks at 213Nm at 4,400rpm. And, whereas a gearbox is needed to use the torque from a combustion engine efficiently, it is unnecessary with the heft of an electric motor.

The motorist's liberation front

Of three hybrid systems seen at Geneva, Lotus's is the most electrified. The British company's experimental Evora 414E uses two electric motors, each providing 400Nm of torque. They power the rear wheels independently. In addition, the car is fitted with a small "range-extending" combustion engine. This does not drive the wheels, but tops up the batteries if they are in danger of going flat. Like the Tesla (which is based on a small Lotus), the Evora does not need a gearbox. Nevertheless, it has been fitted with a "virtual" one. This is to provide the driver with the familiar sensations he would expect from a petrol engine. So, even though no actual gears are being changed, using the paddle-shift modulates the torque to provide the jolts of acceleration and deceleration that would happen if there were a real gearbox.

It is not all made up. The paddles also give the driver control of regenerative braking, which translates the kinetic energy that is dissipated when the car slows down into electricity that tops up the batteries. This slowing effect is used by Lotus to simulate engine braking, in which resistance inside an internal-combustion engine decelerates the car. "Shifting" down into a corner will thus slow the car in the same way it would a car with a gearbox. "We believe it will be completely intuitive to drivers," says Colin Peachey, one of Lotus's senior engineers.

Porsche has adopted a different approach with its 918 Spyder. Its petrol engine, a V8, is connected to the rear wheels via a seven-speed automated gearbox. It also, though, has an

electric motor that provides additional power to the rear wheels (through the same gearbox) and a second electric motor connected directly to the front axle.

Four different running modes are available. "E-Drive" powers the vehicle using only the electric motors for a modest 25km—enough for commuting. "Hybrid" mode uses electric motors and combustion engine separately or in combination, according to the driving conditions. "Sport hybrid" emphasises performance. "Race Hybrid" really lets rip. It includes a "push-to-pass" button that boosts acceleration by piling on the electrical power.

Porsche expects the 918 Spyder to emit 70 grams of carbon dioxide per kilometre travelled, which is about the same as the output of a tiny city car. Yet it will be able to accelerate to 100kph in under 3.2 seconds (a second faster than a Porsche GT3 with a combustion engine) and will have a top speed of more than 320kph. Moreover, if driven carefully, it will consume just 3 litres of petrol per 100km (or 78 miles per American gallon).

Porsche and Lotus both use a trick called "torque vectoring" to improve handling. When wheels are being driven directly by electric motors, different levels of torque can be applied to improve stability on corners. At low speeds, torque vectoring can be used on the Porsche to assist with steering by powering the rear wheels at different rates to create a turning action. This can make parking easier.

Ferrari's experimental 599 has the car's V12 engine coupled to a seven-speed automated gearbox which also contains an electric motor. The same design could be used in both Ferrari's front and mid-engined cars. With the batteries below the floor pan, the car's centre of gravity has been lowered, which improves handling. Performance is enhanced, says the firm, and carbon-dioxide emissions are cut by 35%. Luca di Montezemolo, Ferrari's boss, expects hybrid systems to be available on all its models within five years.

Many of these features will make their way into all-electric cars too. Some firms are already looking at all-electric high-performance models. The Audi e-tron, for instance, is an experimental sports coupe that relies on a battery alone to drive four electric motors—one for each wheel. By using torque vectoring, it will be capable of an even more responsive version of the brand's famous "quattro" four-wheel drive system.

The quiet future that electric cars could usher in, though, may have to be postponed. Lotus is adding simulated engine noises to the Evora. In part this is to meet expected pedestrian-safety legislation, because hybrid and electric cars can be hard to hear at low speeds. But it also provides drivers with an audible feedback similar to that produced by a combustion engine, which makes driving easier—at least, that's their story and they're sticking to it. And the noise will be selectable. A gentle, futuristic spaceship-type hum on the way to work, perhaps? And the rumble of a mighty V12 on the way home.

Fonte: The Economist. Disponível em: <www.economist.com>. Acesso em: 22 mar. 2010.