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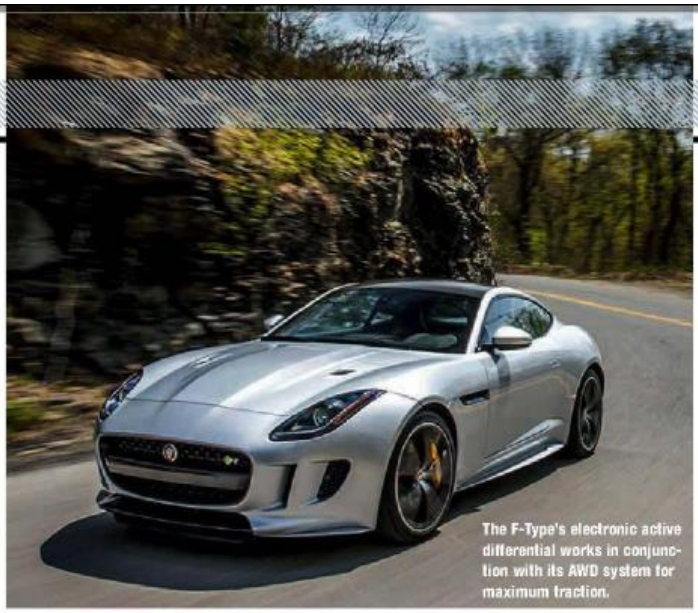
THE POWER OUTPUT PROBLEM

AS CARS GET CARTOONISHLY MORE POWERFUL, MAINTAINING TRACTION IS THE NEWEST ENGINEERING HURDLE FOR AUTOMAKERS.



The F-Type's electronic active differential works in conjunction with its AWD system for maximum traction.

Five hundred kilowatts is the new 350 kilowatts, and every performance car worth its carbon-fibre diffuser is packing either a supercharger or a turbo. Traction problems were once confined to the launch – once you were rolling, you could hammer down. The new reality is epitomised by the Dodge Hellcats and the BMW M5, cars that could lay rubber all the way down the quarter-mile if you please. With power numbers heading ever higher (who'll be first to 1 000?), finding a way to deploy all that energy is becoming the paramount challenge for chassis engineers. Here are three approaches to keeping big power from going up in smoke.

SOLUTION 1

All-wheel drive

For 2016 Jaguar endowed all V8-powered F-Types with all-wheel drive, thus solving any traction problems that might have afflicted the newly upgraded F-Type R coupé. On a test drive at Monticello it powered through and out of corners at borderline crazy speeds without the slightest complaint. "There's a limit to the acceleration you can achieve with front-engine, rear-drive," says Tim Clark, Jaguar's chief technical specialist for power-trains. "Somewhere between 8 and 8,5 metres per second squared – a little less than a g – is about your limit. Now with all-wheel drive we can reach 10 metres per second squared and above. You can access more of the performance more of the time in more conditions."

SOLUTION 2

Better tyres

What would happen if you mounted a state-of-the-art performance tyre from ten years ago on the 480 kW 2015 Corvette Z06? "The Z06 would fry that tyre," says Oscar Pereda, a former engineer who's now director of marketing for Michelin ultra-high-performance tyres. Over the past decade performance tyres have changed significantly in terms of construction, compounds, and even in the basic matter of size. "The overall diameter's been going up dramatically," Pereda says. "The taller the tyre, the longer the contact patch, and the better the longitudinal traction to put the power down and accelerate. Compounds and internal materials have come a long way. We now have super-high-strength steel belts that are more flexible, so the tyre can conform to the shape of the ground. With the Z06, I think you're getting the maximum possible acceleration for a front-engine, rear-wheel-drive car."

SOLUTION 3

Go mid-engine

Every car in McLaren's line-up is a beast, with the least powerful model cranking out 420 kilowatts. Not coincidentally, every McLaren has its engine mounted behind the passenger compartment, moving the weight distribution rearward, closer to the drive axle. That's a boon from an acceleration standpoint, but there's a cascade effect of benefits. "It's about straight-line traction, getting the power down, but it's also about cornering," says Dan Parry-Williams, McLaren's chief designer. "With the weight concentrated around the middle of the car, you make it very nimble." You also reduce overall mass (and, subsequently, inertia), since the engine is closer to the transmission and to the rear-driven wheels, quickening response time. Meanwhile the driver is up front, closer to the front tyres, shortening steering inputs. "You can get a good weight distribution in a front-engine car," Parry-Williams says. "But you might have a long propshaft, with the driver seated farther rearward and outboard." So the future isn't solely about deploying 420 kilowatts in the most efficient way possible. It's about doing it with style.

The manufacturing process for Corvette's tyres is kept top secret.