



FORCING THE ISSUE

After decades of eschewing turbocharging in its gasoline-fueled cars, BMW turns to forced induction to make the new 335i Coupe's inline-6 perform like a V8.

by JEFF GLENN photography courtesy BMW

The horsepower wars between Stuttgart, Ingolstadt and Munich have given us plenty to bubble about for the better part of a decade, as each player adds cylinders, more power and higher performance to their respective sports cars. At BMW, the battle has trickled down past the flagship M cars into the

330Ci replacement, the new 335i Coupe. The goal, according to 3 Series powertrain chief Udo Lindner, was to create a coupe that would go like a V8 but drive like a six in terms of weight distribution and fuel consumption. The solution was two small turbochargers and a new generation of direct fuel injection.



Normally, combining a high compression ratio with a couple of turbochargers would create a fuel-thirsty grenade. Thanks to fuel delivery technology developed largely in diesel engines and BMW's double VANOS variable valve timing, not only is 10.5:1 a viable compression ratio with forced induction, but the fuel efficiency of the familiar inline-6 hasn't dropped into gas-guzzler-tax territory.

Direct injection isn't new; in fact, it dates back to the Mercedes-Benz 300SL in the '50s. Simply put, the injector is pointed directly into the combustion chamber instead of an intake manifold. The injectors are located squarely above the piston to supply it with a highly directed and precisely timed dose of fuel. Piezo, a type of quartz, is used for the valve that opens and closes the fuel spray. It reacts to an electronic impulse within approximately 0.0002 of a second—quicker than any solenoid. This allows up to three separate sprays in a single combustion event, which allows the combustion chamber to be optimized. The fuel is ignited before it ever hits the combustion chamber wall, making for a very lean burn, and thus greater fuel efficiency.

A pair of small Mitsubishi-supplied watercooled turbochargers spool up quickly with very little lag. Their housings are welded to each exhaust manifold (which

service three cylinders apiece), and are constructed from a highly heat-resistant cast steel alloy that allows for the higher exhaust-gas temperatures associated with the lean-burning design. Other tricks like an electric water pump that is only used when needed and an aluminum crankcase minimize power losses and weight.

It all adds up to a 3.0-liter six that performs like a 4.0-liter V8 without the 150-pound penalty BMW says the extra cylinders and all the associated trimmings would bring. The engine produces 300 horsepower at 5,800 rpm, and the ultra-flat torque curve maintains the peak figure of 300 lb-ft from just 1,400 rpm all the way up to 5,000 rpm. The 335i reaches 60 mph in just 5.3 seconds, compared to 6.1 seconds for the normally aspirated 330i sedan.

Yet increasing power by 15 percent and torque by 30 percent reportedly hasn't drastically changed the inline-6's thirst; the EPA hasn't yet tested it, but BMW says the engine should rate similarly to the standard 3.0-liter engine's 20/30 mph city/highway rating.

However, the two engines perform quite differently. The normally aspirated six delivers the goods relatively high in the rev range, waking up at 4,800 rpm and building towards the redline. Step on the 335i's throttle, and the little turbos hardly make any noise—the familiar, crisp inline-6 howl

remains. What's unfamiliar is the instant torque at anything above 1,300 rpm. Passing a Vanagon pickup truck struggling uphill, overloaded with a giant cow in the bed? (Pardon the Austrian Alps.) You're gone before the cow can even moo. The immediacy of the engine's response is impressive, plus it doesn't wheeze out above 5,000 rpm like some low-boost turbo setups; it keeps faithfully catapulting the coupe forward right up to the 7,000-rpm redline.



Left: With the turbos hidden from view, the 335i's engine bay looks just like a 330i's. Below middle: Surprisingly enough, Mitsubishi supplies the tiny turbos. Below left: Cutaway shows Piezo injector aimed directly into the cylinder, as well as the extremely tight exhaust/turbo plumbing.



While the Coupe currently only accounts for seven percent of 3 Series production, Munich is optimistic about demand. As a result, a serious effort to differentiate the Coupe from the sedan was made, although the stylings didn't go too far out on a limb. The look isn't radical; it's actually quite smooth and flowing, with a few crisp folds to move the eyes along the sides. The Coupe has a noticeably lower roofline, making it look more hunkered down. While the two cars share the same wheelbase, the Coupe is actually 2 inches longer, giving it a slightly more stretched-out appearance. (This combined with the extra turbo hardware means that the 3,571-pound Coupe weighs 154 pounds more than the four-door.) The front headlights seem to frown more than the sedan's where the hood line covers the tops of the round lamps. At the rear, the horizontal taillights further emphasize the lower and wider look, while the more aggressive kick under the rear bumper brings your eyes down to the dual exhaust exits.

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November 2006 SPORTS CAR INTERNATIONAL 55

As with the sedan, the Coupe's interior is a blend of well-designed surfaces and textures. The layout is clearly focused on driving, with pedals perfectly placed for heel-and-toe downshifts. Unlike the four-door, the Coupe has small retractable arms that pop out to deliver the seatbelts to front-seat passengers. Rear occupants will appreciate the fact that the seats are lower to compensate for the sloping roofline.

All U.S.-bound Coupes will share the same sport-tuned shock, spring and anti-roll bar combination—essentially a Sport Package-equipped sedan's suspension setup. However, unlike the 330i Sport, the 335i rolls on 17-inch wheels, not 18s, with 225/45HR17 run-flat all-season tires all around. An optional Sport Package delivers a larger wheel and run-flat tire combination—8 x 18-inch alloys with 225/40WR18s up front and 8.5 x 18-inch wheels wearing 255/35WR18s in the rear. (Europeans can choose 19-inchers, but our roads are deemed too ragged for those.) Vented 13.7-inch front and 13.2-inch rear rotors grabbed by single-piston calipers reside inside the alloys.

On the standard wheel/tire combo, the 335i understeers slightly more across the apex of tight switchbacks than a 330i Sport. At the limit, it's apparent there's a bit of a safety margin built into the suspension tuning, compounded by the taller sidewalls of the standard wheels and 83 pounds more weight from the turbo motor. The front wheel bias is 51.2 percent with the manual, and slightly more for the automatic, versus 50.6 percent up front for the current manual sedan. When pushed hard, the front end of the Coupe will wash out first, but if you stay on the throttle, you can overcome it with mid-corner and exit oversteer.

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but even during a short excursion on a well-groomed dirt road the ride was more elegant than expected. Given this, we'd recommend the 18-inch wheels for a little more grip up front to counteract the understeer.

The Dynamic Stability Control (DSC) and Dynamic Traction Control (DTC) functions are largely similar to the current E90 sedan's. DSC's individual wheel braking and engine management are intrusive when you're trying to hustle the car; thankfully, you can hit the DTC button and back it down to allow a bit of sliding (i.e. fun) before intervention. With the DTC turned off, you can slide the car at will, but tight uphill corners light up the inside rear tire in a smoke show fueled by the open differential. It's noticeable in the 330i, but the turbos worsen the situation with the 335i.

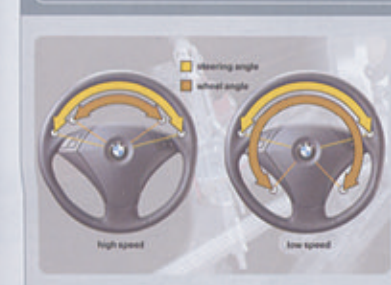
The 3 Series has come a long way in 30 years. With age has come refinement, and thanks to safety regulations, a bit more girth. Thankfully, great handling remains central to the equation. While BMW will continue to send its M-cars to the front lines of the horsepower battlefield, the 335i marks a solid step forward for the performance of its rank-and-file soldiers. ●

(halving the shift times of the previous automatic), match revs on downshifts and be controlled manually via the shift lever or optional steering wheel-mounted paddles.

Unlike SMG II on an M3, the 335i's left and right paddles each shift up and down instead of one function for each side. The paddles themselves feel a bit bicycle-like, and we're not talking Shimano Dura-Ace. They lack a solid mechanical feel, and we found it awkward to pull them back with the wheel turned. In automatic mode, shifts are smooth and well timed. If you're loping along in a high gear and pin the throttle, the gearbox can skip as many as four gears in the same 100 milliseconds, giving the 335i amazing passing power.

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Who's Behind the Wheel?



WHILE IN AUSTRIA, we got a chance to sample the newest version of BMW's Active Steering. The electronically controlled variable-ratio system now interacts with the DSC stability control, adding an Orwellian dimension to active safety. As DSC analyzes data from the yaw, wheel speed and steering-position sensors, it has a pretty good idea what direction you're trying to go. If undulations or bumps necessitate a steering input, the active system (Big Brother) makes the small correction without giving feedback through the wheel. That's right, the car is steering for you without letting your hands know what it's doing.

Engineers claim that the 3 Series is actually a bit faster through a slalom with this system engaged. In the DTC mode, it can make inputs with the front wheels before it uses the brakes to correct, allowing a faster correction with less speed scrubbed off. We weren't able to play with it at speed on a winding road, but around town and even with the car in a power-induced slide, it felt less awkward than expected. Still, the question remains, how far are we going to go with this stuff in the future?—J.C.

2007 BMW 335i

GENERAL	
VEHICLE TYPE	Front-engine, RWD 2-door coupe
STRUCTURE	Steel unibody
MARKET AS TESTED	Europe
MSRP	\$42,000 (incl.)
ENGINE	
TYPE	Turbocharged inline-6
DISPLACEMENT (cc)	2979
COMPRESSION RATIO	10.5:1
POWER (DIN)	300 @ 5800 rpm
TORQUE (lb-ft)	300 @ 1400 rpm
INDUCTION SYSTEM	EPI
VALVETRAIN	DOHC, 24 valves
TRANSMISSION	
TYPE	6-speed manual
FINAL DRIVE RATIO	3.46:1
DIMENSIONS	
CURB WEIGHT (lbs.)	3571
WHEELBASE (in.)	108.7
TRAC, F/R (in.)	59.1/59.6
LENGTH (in.)	180.3
WIDTH (in.)	70.2
HEIGHT (in.)	54.2
SUSPENSION, STEERING, BRAKES	
FRONT SUSPENSION	MacPherson strut, gas shocks, anti-roll bar
REAR SUSPENSION	Multi-link, coil springs, gas shocks, anti-roll bar
STEERING TYPE	Rack and pinion
WHEELS, F/R	18x17 alloys
TIRES, F/R	225/45HR17
BRAKES, F/R	13.7-, 13.2-inch vented discs
ABS	Standard
PERFORMANCE	
0-60 MPH (sec.)	5.3
TOP SPEED (mph)	135 (governor)
CONTACT	
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