



PROJECT CARS

Heart of a beast

2ZZGE powered 1993 Toyota Corolla E100

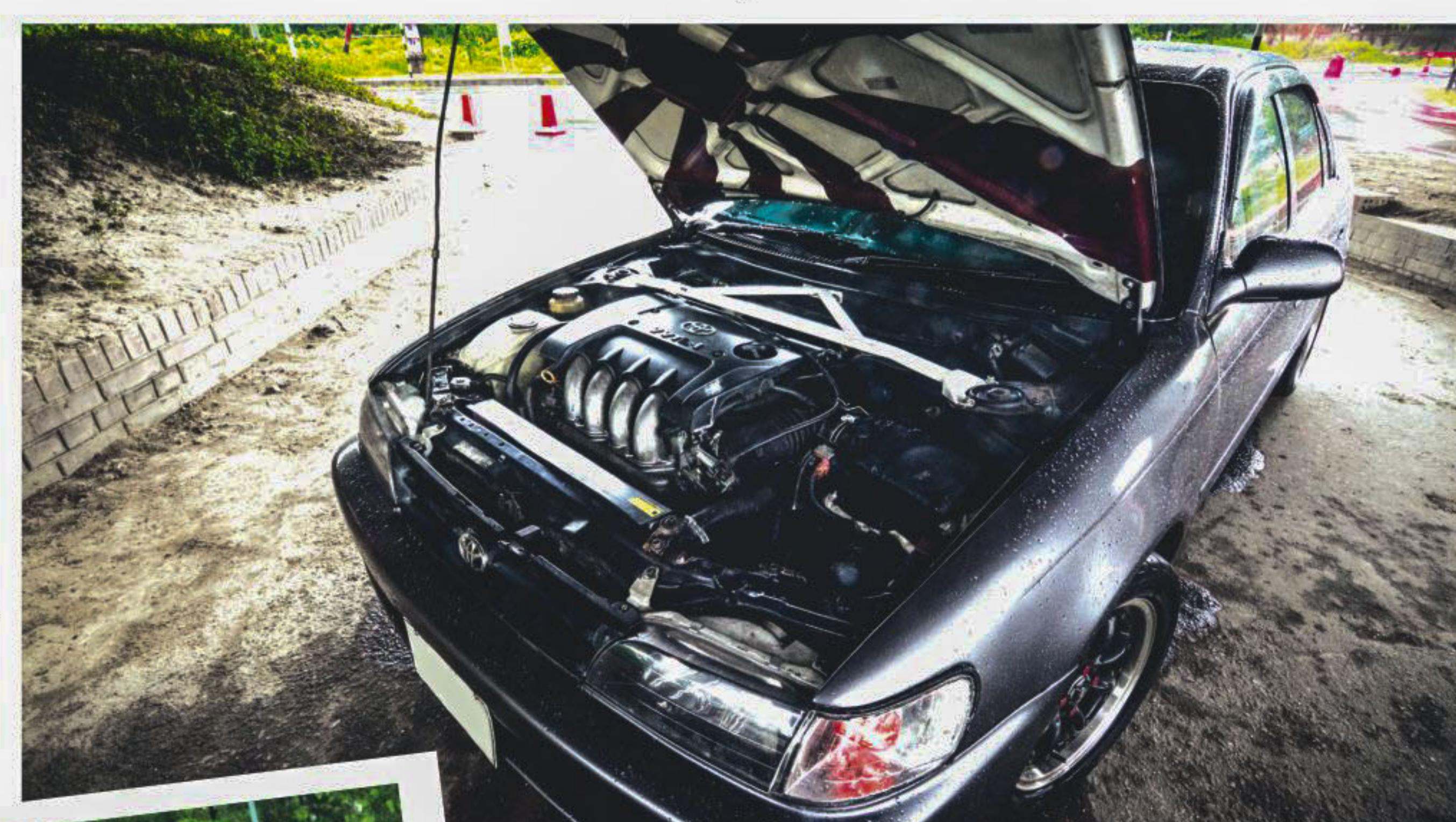
The "GT-Lift" for the 7th generation Toyota Corolla E100 has been the long-standing trend for the boring old Corollas. There is a very good reason for that: it works. There are about a gazillion 4A-GE swapped E100s out there. And pretty much everybody knows their potential. About 160hp, a simplistic 5 or 6 speed manual transmission, and a kerb weight of 900-1000 kilos. All of these translate to a fun daily driver and a cheap project car, and that's why it's so popular here.

The car in question here today, belonging to Omar Shah, is a little different. If you've read our coverage of the AE101 Corolla meet a couple of weeks back, you will probably recognize this particular E100. For those who don't, this particular E100 has a heart transplant from the top of the line 9th generation Corolla Aerotourer Z and is also commonly found in the Celica GT-S: the 1.8 liter 2ZZ-GE engine. The 2ZZ-GE was the only motor by Toyota to feature variable valve timing with lift intelligence.

Designed for Toyota by Yamaha, the 2ZZ-GE engine owed a lot to motorcycle engines, and the wide-angled valves and variable valve timing and lift system enabled the high-revving engine to develop 170-190 bhp based on tune. The engine has a remarkable 100 horsepower per liter. The car only weighs around 1100 kilograms with its new found power.

How does it feel?

Pretty damn awesome. This is a wild car. The car rides on a set of 15" wheels and lowering springs, and on a chassis that was originally designed for a maximum of 1.6 liter 160 hp engines, those 20 or so extra horses really make themselves known in this mid-90s family sedan. These are newer and smarter ponies. In the dry it's a little easier to tame, the wheels like to lose their grip frequently and there is substantial torque steer. I had a ride in this in the rain once, and boy was that an experience. As soon as a stretch of empty



Is it any different from a 4AGE-equipped Corolla?

4A-GEs to these cars are like jelly to the bread. It's been tried and perfected, they work together brilliantly. The instant response of the 4A-GE and wide powerband is incredible for a 1.6 liter engine of its time-period. The 1.6 feels at home in the 101, sadly, the 2ZZ-GE doesn't. It feels out of place, like it doesn't want to be there. Maybe I'm just used to these engines in heavier cars, but this particular motor feels more comfortable in newer cars, namely the 9th generation Corolla(s) and Premallions.

Okay so it has a big bad heart, what else?

Suspension nicked from a AE111 GT, Corolla T-Sport braking system and an assorted set of Ultra-racing strut bars help stabilize the car, and having access to a huge workshop consisting of almost every part needed certainly was a big help. Omar Shah is the son of the owner of MA Automobiles in Uttara, the workshop that was solely responsible for the project. While it didn't exactly get the GT-lift, he did get the BZ-Touring facelift.

asphalt lay ahead of us, Omar kicked the clutch and downshifted. The tires spun all the way up to 4th gear before gaining adequate grip, Omar fighting the torque steer in an attempt to stabilize the car in the rain. The way the power is delivered, it felt like the car gained an additional 50 horses.

A few words with the owner:

Why this motor?

"The 4A-GE will be extinct someday, and I had a lust for more power, since the 3S-GE/GTE swaps have already been done in this chassis, I wanted to try something different. The 2ZZ-GE with the short gear ratios and lightweight aluminum block was the obvious choice really."

How long have you had this car?

"Little over two years, out of which it was powered by a 4A-GE black-top 5-speed manual transmission for one and a half."

Future plans for the 'Rolla?

"Aftermarket clutch, reducing rotational mass on the crank, intake and ignition system."

WORDS: ZAER ZUBAB AHMED
PHOTOGRAPHY: RAHIN SADMAN ISLAM

The new sheriff in town

2ZZGE's are fast replacing the age old 4AGE, so we take a look at its main claims to fame.

If you are looking at a post-2000 Toyota engine that is reliable, economical with some performance aspirations, chances are, you will be looking at the 2ZZ-GE engine. Based on the 1.8L VVT-i 1ZZ-FE engine, the 2ZZ-GE was completely reworked by Yamaha. Following Honda's approach, it had to be a small displacement, high-revving naturally aspirated engine.

The 2ZZ-GE was the first Toyota engine to feature "VVT-i" technology, which stands for Variable Valve timing with Lift intelligence. In the 1ZZ-FE, the VVT-i system uses engine speed, intake air volume, throttle position and water temperature to calculate optimal cam timing. The ECU can advance or retard the intake cam depending on light, medium or heavy load, optimizing output throughout the entire powerband. The system was taken one step further in 1999 by Yamaha, by incorporating a changeover mechanism which varies the amount of lift seen by the intake and exhaust valves while the engine is operating at high speeds. By adding variable lift to the innovative VVT-i system, the 2ZZ-GE powerplant produces a very broad powerband.

The VVT-i system engages fairly high at 6000-6200RPM compared to Honda's 4400RPM changeover point in the B18C. Once the "hot-cam" activates, it stays active and the engine screams to the 7800-8600 RPM redline. The high-

pressure cast-aluminum-alloy engine block features Metal Matrix Reinforced (MMC) cylinder walls. MMC is a reinforcement material composed of ceramic parts and fibers. Compared to iron liners used in the cylinder walls of the 1ZZ-FE, MMC has superior wear resistance. Bore and stroke was changed to 82mm x 85mm allowing the engine to safely rev over 8000RPM. Compression ratio was increased to 11.5:1. Peak power output was rated at 160-190hp depending on tune. The 2ZZ also scores an astonishing 100 horsepower per liter in relative to its displacement and power output. The 2ZZ-GE had very light internals, and as a result the motor itself was very light and rev happy and had the response of a mosquito, which is probably why Lotus went with it for the Exige, Elise and 2-Eleven, which have a reputation for being some of the most pure and enjoyable sports cars of all time. The 2ZZ-GE was also found in the sleeper 9th generation Corolla XRS, Celica GT-S/ SS-II and Pontiac Vibe GT.

ZAER ZUBAB AHMED



We're not the only ones raving about the 2ZZ-GE's abilities. Autoexpress UK, one of the most respected automotive publications in Europe, had this to say about the (supercharged) 2ZZ-GE in the Lotus 2-Eleven (above):

"Powered by the same 1.8-litre supercharged Toyota engine that's found in the Exige S, the 2-Eleven has a 252bhp output and tips the scales at only 745kg. On the road, performance is sensational. With the supercharger offering power all the way through the rev range, the Lotus is much more driveable than some other road-legal track-day cars - and that's thanks to the versatility of the four-cylinder engine."

COLLECTIBLES

Pullback wars



This week we have pullback wars. The highlight is the intricately detailed cars by Welly compared to other, more popular and commonly available brands. We will highlight all the pros and cons and what to get if you are a serious collector or just prefer to run a miniature demolition derby course. Of course, you are here mostly because you want to ogle at some cool scale models. We have got that covered this weekend. Head over to www.thedailystar.net/shift for the full feature and more collectible mania every week.

WORDS AND PHOTO: E. R. RONNY

QUICK BITE



Smart recently showcased the "forRail" concept, which is exactly what its name suggests. It's a mini train that gets you from point A to B using rail lines, thus eliminating the issue of traffic jams completely. It can also reportedly run on regular roads as well. ForRail? For Real. Its ridiculous, and we love it.

ONLINE EXCLUSIVE

MYTH Adding an aftermarket fuel pressure regulator **always** improves performance



AIR + FUEL + IGNITION = MAGIC. If you want to go fast, is increasing one of these a solution? Noob tuners believe upping a few psi of fuel via an aftermarket adjustable fuel pressure regulator (FPR) will give you plenty of more power. Utter fail. Truth be told, aftermarket FPRs are not necessary and the factory OEM FPR will do the job just fine. Even installing a high pressure fuel pump and/or larger injectors does not require you to switch to an aftermarket FPR as the factory one will cope just as well. Then when is an aftermarket FPR required? This week we give you an insight into the aftermarket FPR dilemma. Head to the SHIFT website at www.thedailystar.net/shift this Friday for the full feature.

MAHBUB HUSSAIN

Ford GT V6 powering Shelby GT500?

The upcoming Ford Mustang based Shelby GT500, slated to be released around late 2017 or early 2018, might come with the biggest weapon in Ford's engine arsenal.

Rumour mills are spinning as a result of clever PR work from Ford which indicate that the Ford GT's twin turbo 3 liter Ecoboost V6 might be powering the Shelby GT500. While the figures for the GT are sky high (600 plus hp from a tiny engine), the GT500 will most likely feature a slightly detuned version of the ultra-efficient Ecoboost

engine.

The GT500's smaller, less powerful little brother, the GT350, is already on the way to the showroom floors, and will for now, hold the barrage of muscle car fans foaming at the mouth for some Shelby Mustang action. Initial reaction from the same fans towards the Ecoboost V6 in the GT500 are negative, since traditional muscle car fans are a conservative lot, resistant towards anything more or less than a V8 configuration.

However, Ford's plans for the GT500 might include a charge at the European sports car market, although the GT500's possible horsepower-torque figures place it squarely in supercar territory where it'll have to battle with more refined machines. As Jeremy Clarkson showed us on Top Gear though, a big American muscle car with stripes and Cobra badges on European roads is not that shocking a sight. Europeans don't know what kind of hooliganism they're missing.

