



# BLUEPRINT TO

Of all the new roadsters about to go on its single-mindedness: the Lotus Elise.





# BLAST-OFF



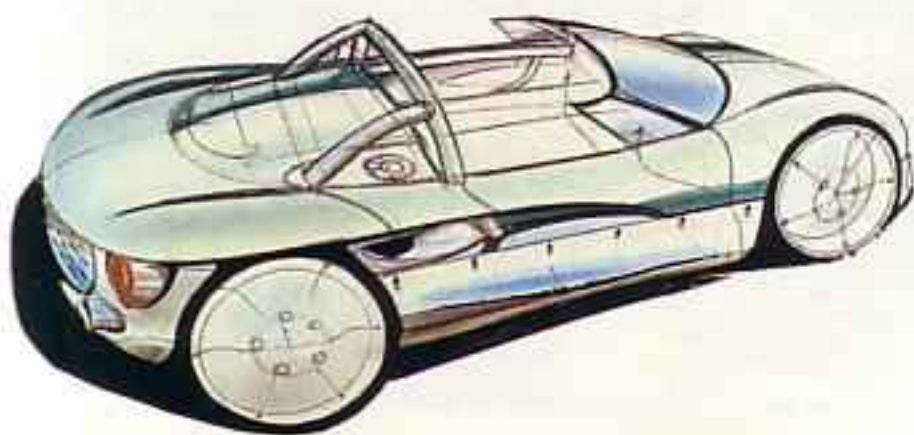
sale, one stands out from the crowd in  
Overleaf **HILTON HOLLOWAY** talks to the  
men who designed it and on page 90,  
**PAUL HORRELL** joins in the  
'destruction' testing of  
this car, which could  
make or break Lotus





# We can work it out

The Elise designers wanted their car to be revolutionary. Here's how they did it



An early sketch for the project that would become the Elise. Even at this stage, pronounced side-scoops, clever integrated roll-bar and buttresses are major features



Concept sketch of the cockpit is surprisingly close to production version, with plenty of exposed aluminium. Centre divide dropped, as was the Ferrari-style shift gate





PHOTOGRAPH BY TIM ANDREW

**L**OTS OF TROUBLE, Usually Serious. If it wasn't the cars themselves, then the fortunes of the company have certainly been deserving of this acronym. Lotus seems to have staggered from one crisis to another: the market failure of the Elan, being bought and then sold again by General Motors, and then being snapped up by the Italian company Bugatti.

Yet despite the Norfolk-based company's rollercoaster ride, its reputation still burns as brightly as ever. Nothing, it seems, can dull the motoring world's enthusiasm for the famous green and yellow roundel.

Lotus has always been a technology-led company. Over the years it has given tastes of such futuristic paraphernalia as active suspension systems and in-car noise-cancelling. However, in terms of car manufacturing it has always relied on the relatively simple: composite bodywork, outrageous handling and even more outrageous amounts of horsepower extracted from small, four-pot engines.

But when it tried to present a modern, high-tech face in the guise of the 1989 Elan, it all went horribly wrong. The Elan, Lotus's first front-drive car, was powered by a Japanese engine and was radically styled. Although it was received well, it was doomed to fail: its development costs had spiralled out of control and it was both difficult and expensive to make.

The launch of the Elise roadster at the Frankfurt Show in September failed to provoke quite the same flag-waving as its Elan predecessor had done. Yes, it arrived amid a tidal wave of new roadsters, but even so one would have expected a little more excitement. After all, the Elise seems perfectly suited to Lotus's heritage: small, light,

fast, advanced, race-tuneable and classically styled.

Indeed, once you've been talked through the elegant aluminium chassis by Richard Rackham, senior design engineer and father of the project, any doubts about the wider significance of the Elise are dispelled.

Lotus has a world production first in the bonded and extruded chassis, and is likely to use it again in future Lotus cars, including an eventual replacement for the Esprit. The idea is simple. The chassis is constructed from around 25 different aluminium extrusions which are bonded and riveted together to give a light, cheap-to-make, super-stiff construction that's easy to adapt to other uses.

Aluminium extrusions are best described as hollow beams, some square, some rectangular, some triangular. They are formed by squeezing liquid metal through a die, rather like squeezing icing through a shaped nozzle, and are usually used to construct the frames of double-glazed windows.

The great thing about using extrusions is that it costs just a few thousand pounds to make a die, so the whole chassis can be tooled up for a fraction of the cost of just one conventional metal pressing. It also allowed Lotus's engineers to design each beam so that it's the perfect shape for the loads it needs to carry. The various beams are then 'harmonised' using computer technology into one unit that is uniformly stiff all over. This would be almost impossible with conventional materials.

Lotus's method of construction is also uncommon. There isn't a single weld in the aluminium structure: all the beams are glued and riveted into place. The adhesive is cured at 200deg C. 'We have to anodise [a smooth, microscopically thin, diamond-hard finish] each beam before assembly,' says Rackham. 'This

not only gives corrosion protection, but also gives the aluminium a surface suitable for gluing.' The rivets are not strictly necessary structurally but, according to Rackham, they prevent the joint 'peeling' apart in a heavy smash.

Safety, as you would expect, is heavily featured. The two main side beams are huge and, combined with the aluminium door beam, give excellent side-impact protection for a car of this type. Front and rear 'sacrificial members' have been built into the structure to make the Elise cheaper to repair after a crash.

The front member is made of composite material and includes the radiator, which is bonded in and lies horizontally in the nose. At the rear it's the subframe that is sacrificed in a crash; it's the only part that is made from sheet steel. The 40-litre fuel tank is hidden in the main cross-member (torque tube) behind the seats and in front of the engine.

Although the chassis is made in the same Danish factory as the Renault Sport Spider, Lotus claims its method of construction is superior. The Renault is a welded chassis which, says Rackham, is not the best way to treat aluminium. 'Welding distorts the material and reduces strength at the joint. Because our chassis is bonded it can be made with incredible accuracy. The hard points (suspension mountings and so on) are accurate to 0.5mm - unheard of in a conventional car.'

Rackham also says that the accuracy of construction and stiffness of the chassis has allowed 'a very pure suspension set-up'. The Elise has double wishbones at each end and to save money the system uses the same wishbone bush and outer ball joint for all four corners. The suspension is tuneable like a racing car's and is designed to be dropped by 50mm with different dampers. There's also an optional NACA-



Early quarter-scale model of Elise more modern in execution of details than production car. However, controversial looks of Elan may have encouraged retro-moves



Final car beautifully detailed and nicely echoes classic Lotus Europa in nose design





ducted undertray which acts as a diffuser and adds downforce. The chassis is symmetrical, so it can be built for either left- or right-hand drive.

Just like Elise stylist Julian Thompson, Rackham was inspired by Ducati motorbike design, because 'everything is functional and stylish'.

Importantly, Rackham reveals that the Elise chassis 'is scaleable' – using the same tooling, it can be lengthened or widened for minimum expenditure. This makes a next-generation Esprit both less costly and more likely.

The styling of such a car might be taxing Julian Thompson's mind as you read this. After all, the shape of the Elise has caused some controversy for being, well, not controversial enough. Thompson seems genuinely puzzled by the criticism; after all, his design team fought off big-name proposals from Zagato, IDEA and Elan stylist Peter Stevens.

The design brief came direct from Bugatti vice-president Giampaolo Benedini, a successful racer and a Lotus 23 owner. According to Thompson, it was pretty straightforward: 'Everyone should know that it's a

Lotus: light, simple, elegant, dramatic. We've steered away from that in the past and caught a commercial cold. Firms like Ducati and Harley Davidson that have succeeded in a niche have done so because they've understood their customers. Why do people buy a particular product? It's because of history – which is what sets us apart from Toyota, Mazda and the rest.

'The Elise is not deliberately retro, but has some of those elements. After all, nobody criticised the VW Concept One or Chrysler Atlantic. Using retro elements is very much a contemporary move, and the Elise's styling has plenty of modern touches, too.

'We can't understand why the press are so enthusiastic about cars like the Fiat Coupé, Barchetta and Alfa GTV. To us, they're not beautiful. I think we've made the right decision with the Elise: it's beautiful in the way old cars are beautiful.'

Thompson's greatest problem was to minimise the number of bought-in components to avoid a kit-car look. For the record, well known bits include Cavalier column stalks, Peugeot 306

**Side profile of the Elise more in keeping with supercar aesthetic than a sub-£20,000 roadster. Aerodynamic requirements necessitated addition of spoilers to tail and chin**

switches, Rover interior door-pulls and Alfa 33 circular face vents – the latter also to be seen in the Ferrari F50. Plus, of course, Lotus used the Rover engine and transmission from the MGF, although there's an 'Elise' cam-cover.

One detail it was important not to buy in was lamps. So Lotus tooled up a single round lamp unit in two colours – red and amber – with a clever mounting system, for use in six different places: indicators front and rear and rear stop lights. Up front, the headlamps are stock circular units with convex lenses mounted under plastic cowls.

'To make the car more jewel-like,' says Thompson, 'we've created our own steering wheel, pedals [stunningly extruded from aluminium], seats, gear-knob and wheels.' Viewing the Elise in the open air, I would suggest that Thompson's own Ferrari Dino GT has influenced the Elise as much as his Ducati.

Like the Dino, the Elise has pronounced front wings, cowed headlights, a large body-side air scoop and huge Ford GT40-style ducts in the bonnet. At the back, the (aluminium) engine cover is

a riot of grilles and bulges. The pert rear end has a duck-tail spoiler in order to reduce lift. In truth, this and the chin aerofoils have slightly compromised the purity of Thompson's design, but even so, the Elise looks far prettier in real life than it does under show spotlights.

Because the body panels are non-structural, effecting styling changes would be both easy and cheap. It's also clear that Thompson would countenance adaptations of the Elise: the designers have plenty on the drawing board already.

The cockpit has a real sense of drama. Once you've clambered in over the huge side member and settled into the Ferrari-esque seats, you feel a genuine sense of excitement. It's that huge space in the footwell, the straight-armed driving position, the expansive view over the curvaceous nose and the starkness of the aluminium dash extrusion. Of course, the sills and floor shine brightly in silver anodised aluminium, resulting in an interior that is truly unique.

There was a lot of debate about weather protection. In the end the car got wind-up win-



**MGF's 125bhp 1.8-litre engine could be boosted to 200bhp, we are told. And that radiator could handle it. What can this mean?**

**Interior the most radical aspect of the car. Huge sills are hard to climb over, but they make the Elise chassis fabulously flex-free**






'Everyone should know it's a Lotus: light, simple, dramatic'

dows, a clip-in rear window and a clip-on roof. This system makes use of the huge steel roll-bar, which also houses mounts for RAC-approved roll-cages and five-point harnesses (the company is looking at a one-make race series). Rackham says that he packaged the most powerful heater he could, and it is *really* powerful.

Power hikes are likely from the 125bhp that will initially be on offer. Rackham reveals that the radiator is capable of handling a 200bhp engine: what price a 1.8-litre K-series turbo?

The Elise is clearly the product of a small and dedicated team. Rackham's chassis department consisted of just four people, the design team was little bigger, and the integration of the two was helped by the fact that Rackham and Thompson are close friends – in fact, Rackham was best man at Thompson's recent wedding.

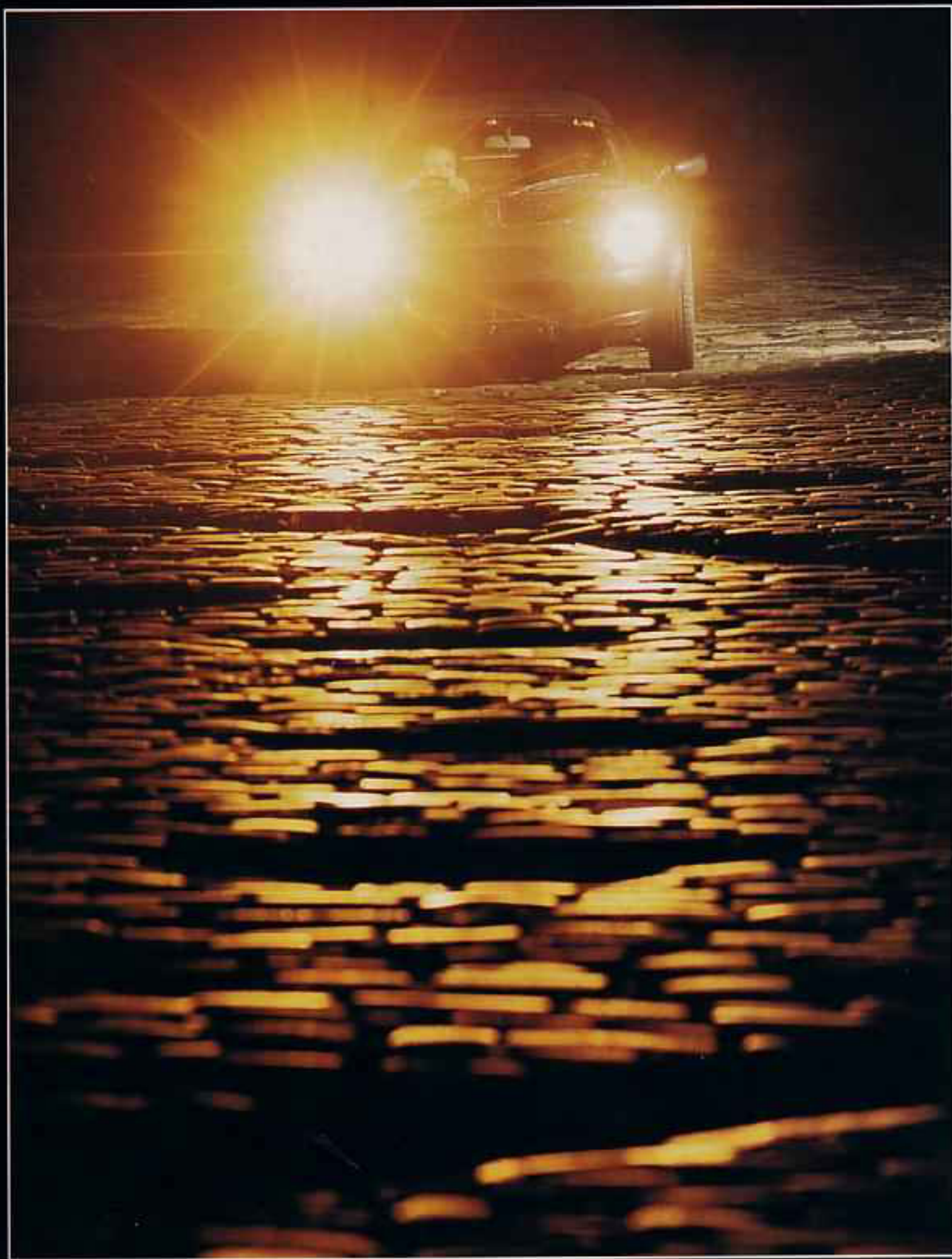
The rigorous simplicity that has characterised the Elise project might finally be the saviour of Lotus as the maker of high-performance sports cars. Perhaps from now on, Lotus can stand for Lots Of Technology, Unique Styling. 



Pedals look stunning and are made from a single extrusion







# A hard day's night

Testing the new Elise to destruction

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**W**HAT'S THE WORST you could treat a car? Thrash it flat-out and non-stop down an autobahn? Overload the boot with stationery samples for a couple of seasons' fast-lane full-ashtray repping? Lend the keys to a Naples taxi driver? Pah. Mere bagatelles, these. No, to stretch your mechanical sympathy to breaking point, take the car and head for the Millbrook proving ground in Bedfordshire, to put it through the General Motors P1 durability cycle. This is the cruellest thing you can possibly do to a motor vehicle.

The P1 is a straightforward paradigm: it has been shown to simulate accurately a year's hard use in the hands of an unsympathetic owner. It does this in two and a half weeks. By the time the Lotus Elise is released for public sale, three prototypes will have endured the P1 cycle, and each will have done it eight times on the trot. The Elise will be the best-proved Lotus ever.

'Don't bother with breakfast,' says Lotus's man, 'You'll only lose it.' Because this morning CAR is to sit in the passenger's seat of Lotus Elise prototype number 04, for a segment of its third P1 torture schedule. Motion discomfort will be integral to the assignment.

I meet the Elise. It looks, frankly, shagged out. Its body is unfetching matt black, streaked with salt splashes, acned in stone chips and peppered with mounting holes for the now-redundant disguise. None of the body panels is particularly intimate friends with its neighbour, especially the doors which have both dropped by inches. The fit of the hood is even more inexact. The side windows are scratched and crazed. It's grimy and unkempt inside, full of dust and gravel, strung about with extra cables leading to a tachograph mounted in front of the passenger's seat. The gear linkage and much wiring are exposed.

But remember this is a prototype. The body and hood are strictly provisional, and the doors don't even have proper frames, they're just hollow glass-fibre shells with screwed-in perspex windows in place of proper glass. The door hinge posts are rusted iron, but they'll be aluminium in production.

I shake hands with Millbrook driver Gary Lacy. He's a slight, gentle bloke, working systemat-

ically through a schedule on his clipboard. He doesn't look like a torturer, but what he does to this car would make the Spanish Inquisition blush. Almost the whole of the Elise's durability test programme has been subcontracted out by Lotus to the folk at Millbrook.

It makes sense. Millbrook's drivers and engineers work for car companies big and small from all over the world. It's all cloaked in 'client confidentiality', but there are some well respected names among them. Millbrook has test facilities for durability, corrosion, hot and cold climate, noise, emissions, brakes, crash-testing, you name it. This is Millbrook's main work; car magazines, using the place to knock off a few 0-60 runs, are small beer.

I can barely get into the Elise. The chassis owes much of its strength to two giant aluminium sill-spars. They are deep enough to provide major sideways support when you're sitting down, but when the roof is in place, they limit the aperture through which you have to insinuate yourself. Once I arrive in the passenger seat, things aren't helped by a wretchedly sharp-edged tachograph wedged tightly between my knees.

Lacy twists the key. The motor sounds like a bag of bolts. But again, this is a prototype, its engine bay totally un-insulated and provisional, the engine lid a wobbly paper-thin excuse for the real thing. The 1.8-litre K-series engine is taken over from the base-model MGF, including gearbox, intake, catalyst/exhaust (tailpipes excepted), engine mounts and some of the cooling system. So we've no reason to suspect it'll be unrefined in the Elise, just fairly loud, because Lotus isn't too interested in weighing down the Elise with sound-deadening material. Certainly prototype 04 starts and idles cleanly. Lacy runs a check on all the electrics and accessories. We're go.

First up, three and a half laps of Millbrook's two-mile circular speed bowl at a tedious 50mph. Don't you get bored? Lacy nods, 'Especially when some of the tests have 14 laps, then two at a different speed, then 14 again.' For relief, there's a stereo in prototype 04 (although it's tuned to Radio 2, which to your reporter would only redouble the soporific effect).

This isn't an out-of-focus photo but Elise prototype 04 on Millbrook's Belgian pavé – the most severe part of the test-cycle



Not just fun on the hill-route curves for the Elise driver, but a serious sequence of pre-set gear-shifts, hill starts and a test for the handbrake



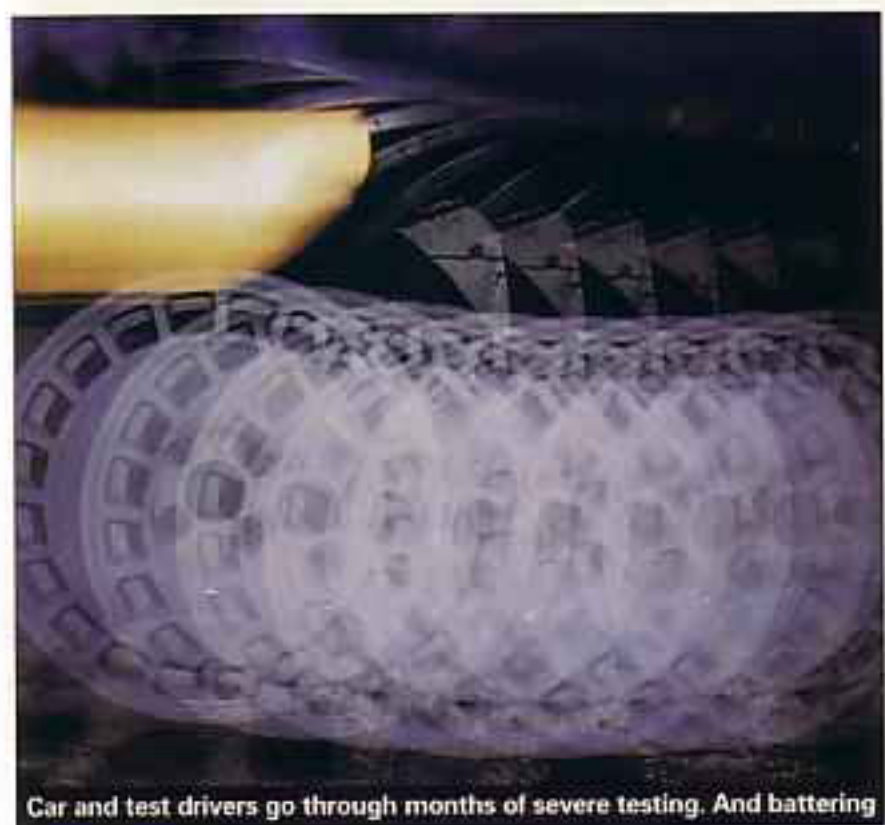
Time for the test driver to get the rear-end out on Millbrook's gravel track. Loose stones shot-blast the Elise's bodywork



'I meet the Elise. It looks, frankly, shagged out'

PHOTOGRAPHS BY TIM ANDREW





Car and test drivers go through months of severe testing. And battering



Saline dip for corrosion test - no worries for alloy and glassfibre Elise

## 'So, what's gone wrong so far? Well, the

Lacy uses the trip recorder so he doesn't lose track of the laps. After the allotted seven miles, he floors it. Down to third, revving to 7000 in second - just over 100mph - then flat in fourth and into fifth for seven laps. The Elise sits at 130mph and just over 5000rpm, perfectly stable. The wind noise is a shriek, but then this mock-up body's cabin is as well sealed as a sieve.

Back down to 90mph for some brake tests: three stops at one-mile intervals, with full-bore acceleration between, the last of which is a full-pedal stomp. There's amazingly little drama as the Elise slows. After all, there's not much energy to shed in a car that weighs little more than half of a Golf VR6, and runs on similar size tyres. Lotus is talking of a phenomenal 1.2g stopping ability, and claims pedal feel - there's no servo or ABS - is fantastic. Gary Lacy volunteers the same opinion, and he works for Millbrook, not Lotus, so has no axe to grind.

Subtle torture follows. The P1 cycle is regularly punctuated by visits to the corrosion trough, a long concrete bath into which is sprayed an eye-wateringly strong salt solution. You drive the car, still tick-ticking with heat from

the bowl run, through the splash fast enough to force the stuff into all the car's most intimate crevices, and then drive off and leave it to get to work.

An aluminium chassis was never going to cause the Elise team any corrosion worries, and neither was a GRP body. But where steel meets aluminium, you've the perfect mix for insidious electrolytic corrosion. When there are aluminium brake discs, steel hubs, aluminium uprights and tubular steel wishbones, you realise faultless answers have to be found.

Lacy executes a three-point turn, running lock-to-lock to listen for any binding or clonks - there are none - then heads for the hill route, a twisting alpine-style road of hairpins, ascents, crests and descents where you can really have some fun with a decent chassis. Lacy, though, is the pro, and this simulated back-roads meander isn't for his recreation. There are pre-set gearshift sequences to be observed, a handbrake-hold test on the steepest part, a stop-start test, a reversing sequence. 'The torque of this engine is really impressive here,' he says as the K-series claws its way up a steep incline in third. 'Some of the Opels can't

make it in this gear.'

A quick 'ignition stop' follows - stop car, handbrake on, cut engine, restart engine. No complaints? Then drive on to the Belgian pavé. This section (in Millbrook-speak it's pavy to rhyme with navvy, rather than parvay in a hammed-French accent) is the most viscerally brutal part of the P1 cycle. Until recently it was common, having driven the one-mile loop of pavé, to have to take a deep water-splash to cool off the dampers. 'Strapped in tight?' Lacy asks me. 'I took my old Astra van around here once.' Pause for effect. 'Ve-ry slowly.'

He takes it in third. The set speed is 30mph, but the violent shocks and thumps have his throttle foot bouncing on the pedal, which only adds to the strain on engine mounts and driveline. The first section is regular cobbles of the traffic-calming sort. But at Millbrook they aren't allowed to be calmed, and 30mph remains the rule.

It feels too fast for sanity. Still, that's a light curtain-raiser ahead of the pavé's main section, where the setts are bigger and irregular, and at intervals slashed by trenches running obliquely across the course like inverted

sleeping policemen, to punish dampers and flex chassis. Pot-holes and ridges follow along. Bodywork shimmies, mechanicals shudder and the wiper fuzzes on the screen-base; my vision blurs and Lacy's speech trembles. You wouldn't put your worst enemy's car through this. We do another lap.

And yet, throughout, the Elise's integrity is intact. Nothing in its main structure gets the wobbles: the punt-chassis is as rigid as you like, the steering column remains sternly unflexed and your seat keeps its relationship with your surroundings. From where I'm sitting, this is a deeply impressive structure.

Then onto the 'gravel road', basically a dirt-track section, again taken at a decent lick, the Elise slithering about as if on a rally stage (it's rear-drive and why should Lacy resist?) while its underside cops a right little shotblast of dirt and stones. Back, straightaway then, to the bowl for seven flat-out laps, and that's the end of our eight-item segment, out of 482 items in a full P1 phase. And this Elise will do eight phases.

So what has gone wrong with the car so far? Well, the radiator fell clean off. A new bonding





Pavé fails to upset Elise's chassis – there's no flex, no skuttle shake

## radiator fell clean off'

agent is now in place, and Lotus principal development engineer David Minter is confident it'll be a fix. One specialised AP Racing brake calliper has seized, so AP has gone to work there. Also, there was a seizure of a brake disc to its hub. The corrosion tests are meant to highlight this sort of thing, and Minter reckons it's nothing grease or a gasket can't sort out.

Oh, and prototype 04 doesn't have a working fuel gauge. Lacy and I ran out on the bowl. The Elise's tank, for lightness, is just 40 litres. Actually, in normal use you wouldn't want more. Minter says they drove Elise 03 rapidly down to the Nardo high-speed track in southern Italy and did 30mpg-plus. Not bad for something with a K-series; fantastic for something with super-car performance.

So reliability has been excellent. The Elise embodies advanced thinking, but it's fundamentally simple, and is probably the sort of thing they've always done best at Hethel. A lot of thought has gone into its compressed and lean gestation. The Elise, if it completes on schedule (and the signals are that it will manage to) will have been developed in one third of the time,

with one third of the people, that the Elan absorbed.

The first Elise ran on Christmas Eve last year, just as darkness fell on the Hethel test track. It didn't have a body, and went for just a lap and a half before a cooling hose burst. 'But we felt elated,' says Minter. 'It rode well, steered nicely. Christ, we thought, all the calculations were right. We went home for Christmas happy.'

In January that car went to Millbrook for a 1000-mile pavé test. 'We expected cracks in the chassis, but there were none,' Minter says. That car was given a new chassis to become prototype 02, for 'load tests', which amounts to extended abuse on pot-holes and kerbs.

Number 03 was a brake test car. They might look like regular grey saucers, but those brake discs are one of the Elise's most techno-whizz features. They aren't iron, for the first time on a production car. Ultra-hard, lightweight aluminium-metal matrix composite (MMC) is the stuff in question, made up of aluminium alloy mixed with 30 percent silicon carbide. So brake testing is paramount: 03 went to Nardo for fade tests, as well as cooling and high-speed stability work,





Interior is simple: Stack gauges mounted onto aluminium dashboard. Occupants are held tight by race-style buckets and high sills

## 'If Colin Chapman were still alive now, he'd fully approve of this'

and on the way home was caned down Europe's most notoriously brake-killing passes, the Stelvio and Grossglockner, and around the legendary Nürburgring. Brake tests continue, mostly to ensure a reliable bedding-in period.

It was then used as the legal homologation car, passing the paperwork on 29 September – a significant date, because on 1 October a raft of new regs came into effect. Minter says the Elise would comfortably have passed, but it would be a crippling expense to prove it. Another prototype is used for signing-off from Rover. Rover won't sell Lotus the K-series engine and driveline until everything is just so. The only issue outstanding is

to ensure that the Elise's horizontally-mounted radiator can be easily bled.

Finally, when the car is signed off for production and so its kerb weight is known, tuning of the ride and handling can begin in earnest.

There will be nine pilot-build cars before production starts. With just 20 people on the production 'line' (they'll build the cars in teams) and rigorous component cost control, the Elise should make money on 750 cars a year – the number of deposits received in the month between the Frankfurt and London motor shows.

The Elise, Minter says, came from two ideas. Some at Lotus, Ducati-owning designer Julian

Thomson included, wanted to appeal to people who commute in a saloon and then ride a fast motorbike for recreation. 'So the Elise had to be nice to look at,' says Minter. 'Not just the body but its individual components. Pseudo-racing motorbikes are a work of art.'

The other strand came from the traditionalists at Lotus – 'and there are a few of us old boys left' – who wanted a light, advanced, Chapman-esque car. 'And if he were alive now he'd fully approve of this,' says Minter. Except that unlike any old-school Lotus, the Elise stands a very good chance, when it goes on sale, of actually being properly finished, and therefore being reliable.

**H**OOD-UP (AND THE final production roof hasn't yet been seen), getting into the Elise is a struggle: I feel a bit like Robbie Coltraine squeezing through a cat flap.

'Slide the seat right back first,' says Dave Minter, Lotus's principal development engineer. Lotus agrees it's a problem, but the very dimensions and structure of the Elise, with its deep sill members, preclude a full solution.

You sit, braced sideways by a sill and a shell-like seat, with your legs horizontal afore you. The gearlever's an over-long wand, part of a Rover 800 pivot and lever assembly. Lotus doesn't want to shorten the lever for fear of introducing new resonances, but a new knob will cut the apparent height by two inches and so make the shift feel better. Currently, there's a long-throw vagueness at odds with the car's nature.

Pedals are light, concise, sharp. Even at rest, you can twiddle the little Momo easily. Light weight





# Straight from the cockpit

So, how's it drive? That's what this is all about, after all

has some potent advantages, among them the happy discarding of both the power steering and a brake servo.

Ahead is a Stack instrument pod, the tachometer's slim orange needle dancing right along with the engine's motions. The 'dash' is an understated roll of aluminium.

Under way, prototype 004 is a rolling collection of rattles and squeaks, of course, but it feels *immensely* rigid. On the most hostile lumps there are none of those trembling little wobble-wobbles you get with every monocoque roadster. The ride, as it's now set up, is as supple as a hot-hatch's, but far better capable of damping to oblivion

any sloppy body motions in twists and bends. Pitch and roll? Hardly there, and feels even less because you sit so low and are so well clamped into a lightweight competition-style bucket seat.

These springs and dampers were specified before an Elise ever rolled a wheel: serious ride and handling development won't start until later in the prototyping schedule.

The Elise's steering is mighty direct at the moment. It uses a rack from Caterham's supplier, but Minter says he'll probably specify a less nervous rack on production cars, to make the thing feel more fluid. Already it's a lot less fussy about bumps than a Seven. There's also work to be


done on the front wheel angles – caster, camber and toe-in – to hone the way the car feels through the steering wheel. Elise 004 has inconsistencies right now. Mostly, the helm's spot on, zesty and talkative, but it can load up unexpectedly or hit a dead spot and lose self-centring.

Praise be, this car isn't about grip at all cost. It's about delicacy, about the tactile process of balancing tyres against tarmac against throttle against direction. On a second gear bend, a sharp extension of your toe will flick the tail out like a lizard's.

Currently, there's a little (unintended) rear steering: a hint of superfluous hip wiggle. As with the steering geometry, we can be

confident of a fix. Lotus, and Minter, have no tradition of getting these things wrong. They've got until April.

The Elise goes hard. There's big-hearted torque backing up a willingness to rev to the 7000 cut-out. Gearing isn't desperately short (third will do 100mph), but with 63 percent of an MGF's quoted weight and much less frontal area, it should pull strongly enough to make the sixish-second 0-60mph claim look perfectly reasonable.

And it stops even better than it goes. Ask the brake pedal to lose you a little speed, and it delivers with precision. Tell it to knock off 100mph, and it'll do it with iron-willed confidence. 

**All is not sacrificed to outright grip – handling is the issue, and it's been handled delicately**