

Exhaustive Research

Project GT3 needed a new exhaust – badly! Enter Cargraphic and one of its UK made systems. More power and lighter weight guaranteed, and it didn't disappoint. Nor did a remap at DMS. Result: more extra power than we could ever have dreamed of

Words and photography: Antony Fraser



Left: In all its finished glory - Project GT3 has an exhaust to be proud of. Above left to right: Hand packing with steel wool and glass fibre. Addison tube bender is invaluable and impressive. Below: Welding silencer. As if by magic, weld is cool by the time it emerges, seconds later. Performance cats in casing

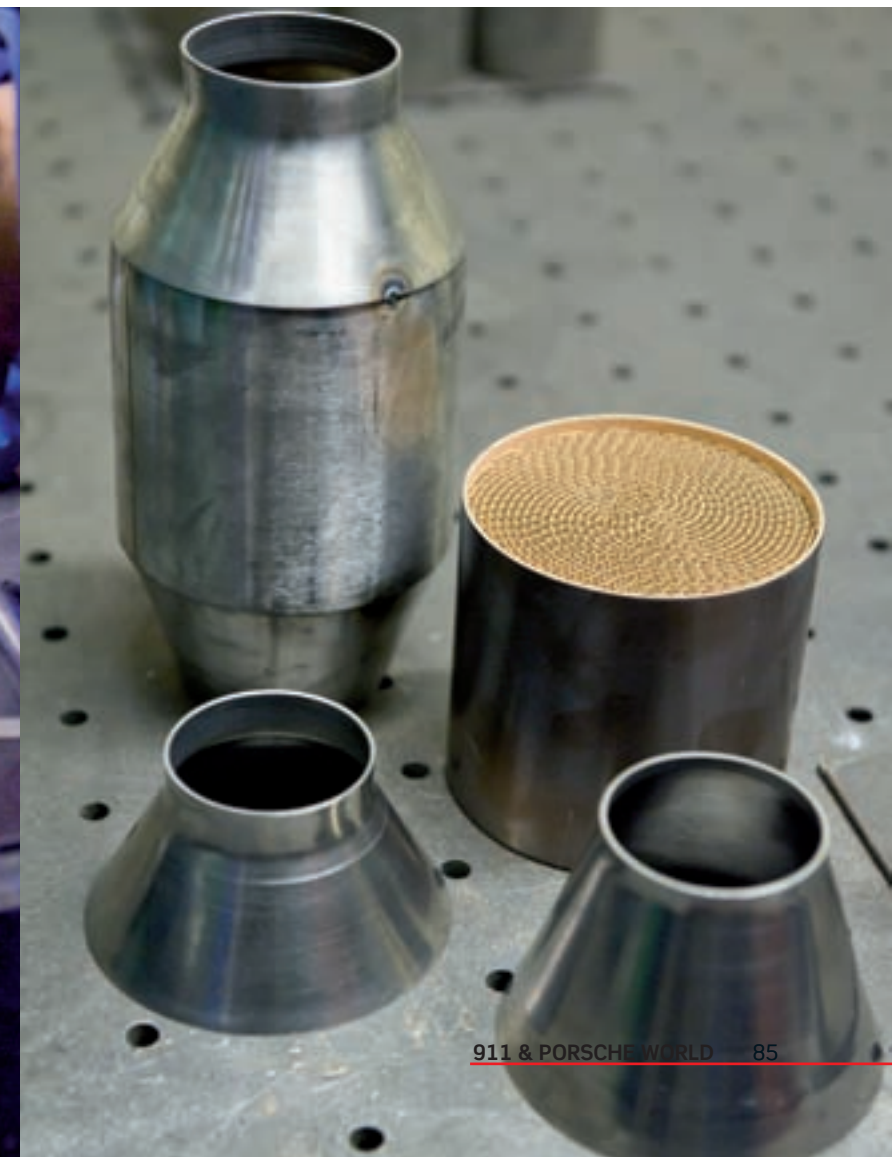
Project GT3's exhaust had fallen into a Victorian decline. Bedridden and stricken with a deathly pallor, it was only a matter of time before the arrival of the gaunt gentlemen in the top hats. This was no way to go, for components that had survived the Danté's Inferno produced by such a corking engine. My Gun Gum had done its best, as had a previous owner's self-tappers(!), but to no avail.

No, the misery had to cease, and I took matters into my own hands, scouting around for a suitable replacement. Clearly, another stock item would be far too dull for a project car, a nice sporty stainless number being much more like it. At length, I fell upon a system from Cargraphic that looked just the ticket. A motorsport product, developed to comply with the German DMSB Sports Cup regulations, it promised reduced weight and freer flow. What more could you ask? Well, actually, I did have one more question: how do you make them? I was already aware that, though a German company, Cargraphic makes its exhausts here

in Dear Old Blighty. I also knew – as does anybody who's ever tried this at home – that stainless is completely impossible to work, turning drills, saws, (and usually your fingers) to pulp in a matter of seconds. So, safety boots on, and down to deepest Devon for a factory tour.

I'm greeted by boss Simon Young – a man with over 25 years' experience in the industry, and a safe pair of hands to guide me through the engineering labyrinth ahead. We start with the most obvious question: how did a German tuning company end up producing exhausts in the shadow of Exmoor? The answer is simple, of course; Simon met Cargraphic chief Thomas Schnarr as a client in the early nineties, while in a previous employ. Their business relationship quickly developed to the point where they went into exhaust manufacturing together, producing systems for a broad spectrum of cars, from classic Triumphs and MGs to Porsches, Ferraris, Maseratis and the like.

Design seems to be something of a black art – a curious mix of CAD and good-old-fashioned empirical





Above left to right: Tubes are argon filled during welding. All important ID plate, complete with TUV number. Jumping ahead somewhat, but exhaust in situ. It's a quality piece of kit. Below: Our exhaust fits the set-up jig like a glove

wisdom. It's a collaborative process between Simon and Thomas, with testing in conjunction with RS Tuning. It's probably fair to say that the basic overall shape of most aftermarket exhausts is constrained, at least to some extent, by that of the original, in order to fit under the car. But it's the details that count, as we're about to discover, as we enter a world of high-tech electronics married to big, oily machinery, with grinding and welding lighting up every darkened corner. Jigs and formers hang from every wall and fill every shelf, with all sorts represented. Ferrari 328 Euro-spec silencer, anyone? Or how about Carlsson? Quite. This factory is the final resting place of all the world's supermarket trolleys. They're the perfect transportation devices for batches of components; the business would grind to a halt without them. It reads like Bedlam, but everyone knows exactly what they're up to, and it all seems to run like clockwork. Nobody with even a vague interest in tin-bashing could fail to be enthralled with it all. I have to try very hard to resist the temptation to have a go and make a fool of myself.

First stop is the kind of tube bender every man should have in his ultimate shed. It's a full CNC Addison mandrel bender. Set it up, give it a tube to play with, and it will give you back that tube bent into any number of different angles and planes, amazingly quickly and accurately, time after time. I put it to Simon that this is clearly impossible, as any DIY-er will tell him that stainless just ruins any tool foolish enough to come near. He reassures me that it's all about two things: being properly equipped, and using high quality material. Cheap stainless will crack all too readily, but the good stuff is much more workable than you might imagine.

Any exhaust system will require all sorts of angled cuts where tubes come together, and it's the same story – with the right tooling, you'll have no trouble. I'm shown a 2.5 inch tube clamped to a circular saw bench, gradually succumbing to the relentless teeth. The saw spins slowly, so heat isn't an issue, and no liquid coolant is required. It's not quick, but it's fuss-free and the cut is clean and perfectly straight. Impressive.

Silencer boxes are created from sheet, and formed with rollers or, as in our case, in a press. The rolled cans are worth a quick look here, if only for the clever welding machine that joins the longitudinal seam. The work-piece is clamped to a long bed, a bit like a lathe bed, and welded automatically – no real surprises there – but the copper clamps that hold it down wick away heat so effectively that you can hold your hand on the weld as soon as it leaves the machine. And this is something that was white-hot only seconds before. It's really, er, cool...

These cans are filled from the ends, but the broad, flat boxes familiar to Porsche owners are a different matter. The interior architecture means that they must be filled from the side, and then assembled and

around. This is then clothed in a (comparatively) low temp 1100° variant, which fills most of the voids. Thus, by the time the gases hit the glass fibre E-Mat at the outer fringes, the sting has been at least partly taken out. With this complete, the second side (the lid, if you like) is applied in a press, then hand-welded into place.

Of course, before your exhaust gases get as far as the silencer boxes, they must pass through the catalysers. Am I the only one who's never seen inside one? Come on, tell the truth. Our system boasts twin 200-cell cats, containing a specialised crinkly metal honeycomb. This is probably the point at which I should whip out my green credentials, but frankly, if they pass the next MOT test, that's all I need to know. Call me a Philistine, but I'm just impressed that you can see

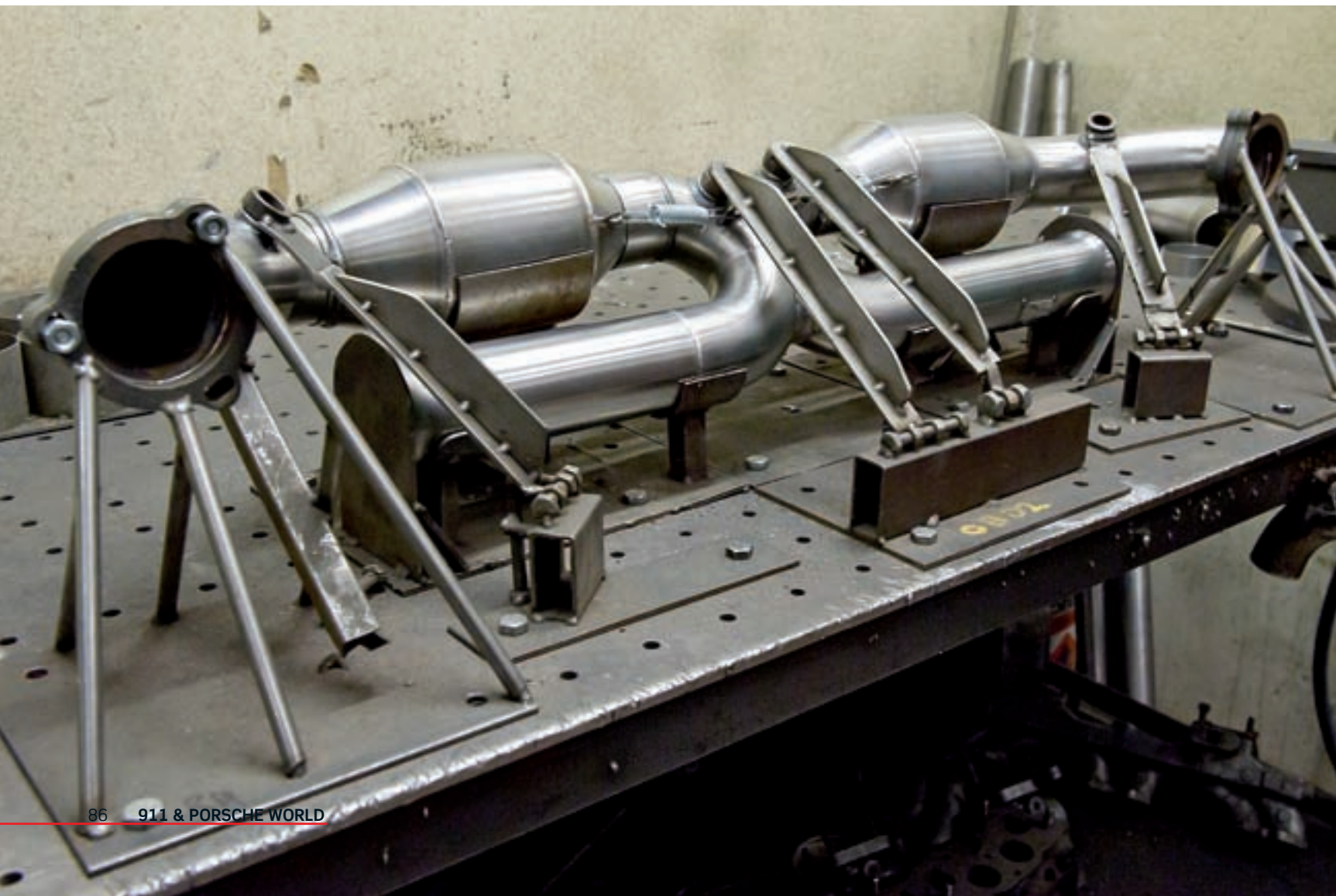
“Our system boasts twin 200-cell cats, containing a specialised metal honeycomb”

welded. I don't doubt that, in a mass-production environment knocking out thousands of units a day, every last process would be automated, but in this low-volume, batch-production arena, the silencers are filled by a skilled operative, and quite right too. Working around the convoluted maze of tubes and baffles, he uses a combination of wire wool and glass fibre matting. The wire wool is all stainless, and two grades are used, according to heat resistance. Closest to the perforated sections (or “perfs”, as they're known around these parts) the 1400° high temp is wrapped

through them. Who knew? Really, of at least as much interest is the crossover arrangement in which they sit, which gives improved flow and a little extra silencing for free. Furthermore, the sprung connectors, designed to counter the effects of expansion and vibration, give a suitably racy look for anyone sufficiently short or keen to look that far under the car.

I'm given a demonstration of the jig on which this section is assembled. Our exhaust fits it perfectly, which is reassuring. The jig process goes something like this: a system is developed for a given car, is

Below: A session on the sateener produces nice, tidy brushed finish. Mark at Parr Motorsport at beginning of what turns out to be a long day



CONTACT:

Cargraphic
 www.cargraphic.com
 One of Germany's leading Porsche tuning outfits. Impressive exhaust system for Project GT3 delivered the goods and is over 14kgs lighter than stock. And it's made in the UK to the highest stainless steel standards

DMS Automotive
 www.dmsautomotive.com
 Experts in remapping and not just on Turbos. Rob at DMS power ran our Project GT3 at a near standard 358bhp. With the Cargraphic exhaust it made 373bhp and then with a bit of DMS magic on the fuel and ignition map, we saw a whopping 403bhp. For a normally aspirated car, that's a hell of a gain

Parr Motorsport
 www.parr-uk.co.uk
 Parr have a wealth of knowledge when it comes to the GT3, much of it gained from first hand experience running cars in the Carrera Cup. We'll be returning soon for a bit of chassis set up magic. Meanwhile if you're after any Cargraphic bits, then Parr is the UK distributor

HOW MUCH?

The Cargraphic exhaust system costs a not unreasonable 2850 Euros and is available in the UK from Parr Motorsport. The DMS remap costs £795+VAT

proven to fit properly, and becomes the template around which the jig is created. After that, anything that fits the jig is, by definition, correct. I'd cross my fingers, but, from what I've seen, I don't think I need to worry.

The cat section mates up to the silencers via flared joints covered by external compression olives. To watch a stainless tube being flared to the appropriate size and shape is an education as to what can be achieved with the right former and enough brute force. Like so many of the processes here, you wouldn't be surprised to see it in, say, copper, but I can't help rubbing my

wonderful gadget rejoicing in the title of the Sateener. Twin 3M belts abrade the surface, while the whole outfit revolves around the tube, creating an even, brushed finish. It's just sheer cleverness. Larger components are offered up to a succession of abrasive wheels, by men who really earn their wages. What a job, but what results. Our own tailpipes are subjected to a three-stage process, ending with the delicately-named Airflow soft cotton mop. The resulting finish is a flawless mirror.

With our exhaust collected, and an education under my belt, it's time for fitting. We choose Parr in Crawley

“The crumbling original system rises from it sickbed for a final rage against the world”

eyes in disbelief to see cold stainless steel stretched so nonchalantly in a press. Don't get your finger in there. Really.

Where tubes are welded, they are flooded with the inert gas argon during the process. This purges the oxygen from inside, leaving nice flat welds where it would be impossible to grind them down later. Clever. And where tubes slot into each other, it's always small into big as you go downstream. It seems like a minor point, but it's all about gas flow, and minor points make a difference to horsepower. And who doesn't want more of that?

A word or two about finish. Every visible part of a Cargraphic exhaust has some kind of finishing treatment applied to it. Tubes are passed through a

for this task, not least because they are the UK agents for Cargraphic, but also because of their rock-solid reputation in motorsport and all things GT3.

And this is where the crumbling original system rises briefly from its sickbed for a final rage against the world. I know all old exhausts take a bit of shifting – and so they should, bearing in mind what they've been through – but this is beyond a joke. Cutting off all the bracketry is pretty much to be expected, but even after all the bolts have been laboriously drilled out of the flanges to the manifolds, and huge quantities of heat applied, it takes hours to budge its cloying, bony fingers. Ten out of ten to Mark the mechanic for sticking with it; I think I'd have feigned an illness and gone home.



Above left to right: Inside the ECU. Yes it does look like a tiny city! DMS's Rob Young: The Chief Wizard of horsepower. On the rollers

Once the old curmudgeon has finally been consigned to the bin, the new system slips in with a total lack of drama. Thank goodness. We take the opportunity to whip out the scales, and the Cargraphic system weighs in at a highly laudable 14.6 kilos less than standard, largely due to significantly smaller silencer boxes. That close to the back of a 911, this can only be seen as a major result.

After all his efforts, the least I can do is let Mark turn the key and unleash the beast. The ensuing roar is exactly what we'd hoped for; louder, for sure, woofy and beefy, but not call-the-cops outrageous. Phew. A couple of enthusiastic passes in front of Parr's HQ endorse our choice, with a very peaky reading on the Grinometer (pat. pending).

The question remains, though, will it release any more power? Well, before fitting the new system, we had taken the car to Rob Young at DMS Automotive in Southampton, to put it on his rolling road. The verdict was 358.7 bhp. Porsche claim 360 for this model, so it's pretty much on the money, which is good news. The return visit with our shiny new pipes sees me chewing

my fingers with trepidation. What if it's less? No need to worry, of course, as the Dyno Dynamics rolling road flashes up a figure of 373.8 - a gain of just over 15 bhp. With the weight loss thrown into the equation, that's pretty impressive, especially as the mid-range has been given real extra shove. How does the idea of 40 extra horses at 5500 rpm grab you? Thought so.

But there's more to be had. Oh yes. Now with a DMS map installed, Rob runs the car up on the dyno again, and up comes a figure that has us all standing agape: 403.5 bhp. Now that's what I call performance! In two simple steps, we've improved the car's breathing and made the most of that advantage, to give an extra 45 bhp – nearly 60 in the mid-range, where it really counts most often, especially on the road. Yahoo! It was always pretty good, but my word it's fast now. The journey home is a thirty-mile battle with my dark side to keep to a subsonic speed, such is the addictive thrill of the mid-range punch in the back. We'll be figuring it in the near future, to quantify just how fast the car has become, but I don't think we're going to be disappointed. Stay tuned, fun fans... PW

The proof. Red trace is the original, purple is the exhaust alone, and blue is exhaust plus remap and thus the final result. Headline horsepower at a tad over 400bhp is stunning enough, but it's the mid-range that really impresses. That's nearly 60bhp extra at 5600rpm

