

JUST WHAT THE
DOCTOR
ORDERED

Words: Alan Cathcart Photography: Phil Masters

Dr John Moto Guzzi 8V





The impending arrival of the first all-new Moto Guzzi engine in a quarter of a century, a 1200cc liquid-cooled double overhead-cam eight-valve 90° V-twin, inspired **Alan Cathcart** to look back to the debut, 25 years ago, of the 8V Daytona hi-cam eight-valve engine that finally reached production in 1992.

Of course it's impossible to do that without recounting the saga of American dentist John Wittner, and his various Dr John Guzzi racers, which reawakened awareness of the historic Italian brand in a way that the marque's present owner, Piaggio, must surely be envious of.

The story of Wittner and his Moto Guzzi racers is a motorcycling fairy tale which finally resulted in a happy ending, with the owner of Moto Guzzi back then, the mercurial Italian-Argentinian Alessandro de Tomaso, in the unlikely role of a fairy godfather.

Dr John Wittner was a tooth doctor, in Philadelphia, USA, and a very successful one, too. But while he repaired fillings and extracted molars, his mind was elsewhere, dreaming of when work would be over for the day and he could lock himself in his garage, where he played with Harley-Davidson motorcycle engines, and learnt how to make them go faster, proving the worth of his efforts at drag strips, dirt tracks and road race courses around the northeast USA.

"BUT WHILE HE REPAIRED FILLINGS AND EXTRACTED MOLARS, HIS MIND WAS ELSEWHERE, DREAMING OF WHEN WORK WOULD BE OVER FOR THE DAY AND HE COULD LOCK HIMSELF IN HIS GARAGE."

One day, he decided to buy a Moto Guzzi Le Mans, for no other reason than he thought it looked neat. Having trained as a mechanical engineer before he took up dentistry, Dr John also appreciated the Guzzi's rugged engineering, and traditional looks. "I bought the bike with the sole intent of forming a team of friends to go endurance racing with it," says Dr John, today living in retirement in Philadelphia, "I had worked on and ridden a number of Guzzi, and knew they were extraordinarily reliable, the perfect weapon for endurance competition."

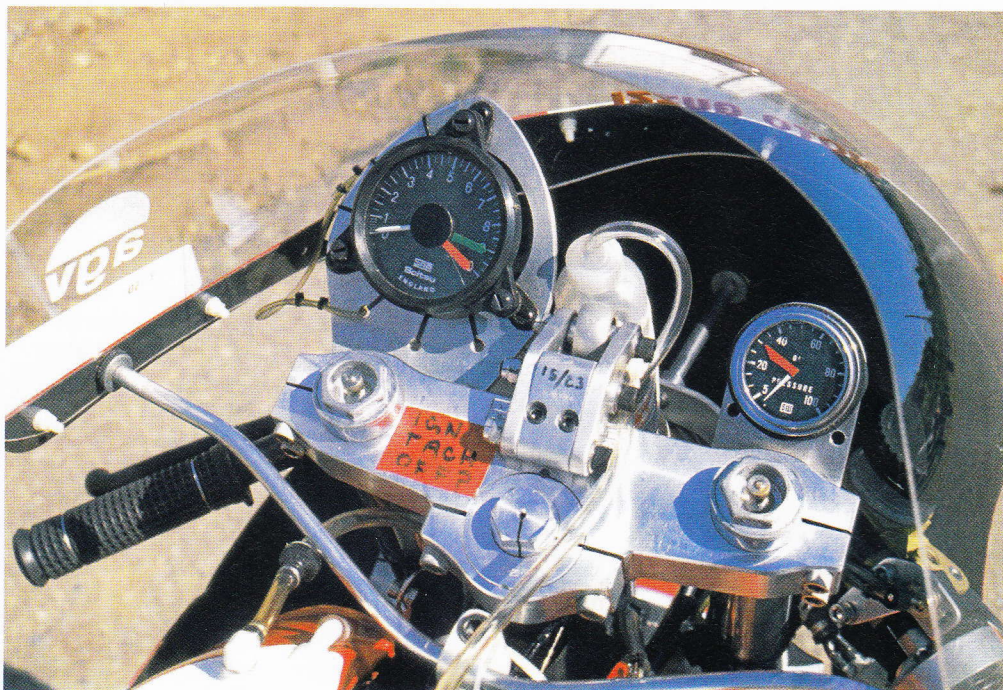
That's how Dr John's Guzzi racing team was formed, which in its first year of competition won the 1984 US Endurance Championship's Middleweight class, with a perfect 100% finishing record. The following season, with Dr John having sold his dental practice to concentrate on bike racing, Guzzi won the overall US endurance title from the Japanese fours, which were not only slower, but more thirsty than the pushrod V-twin, a fatal combination.

A year later Dr John's fortunes slumped as he looked further afield for new challenges, reasoning that trying to defend the US endurance title was the racing equivalent of getting stuck in a rut. The lack of suitable races, outside the USA where Dr John could race the Moto Guzzi was the key problem, meaning that it hardly raced at all, and his money was fast running out.

Almost flat broke Dr John took a desperate gamble. He staked everything on a one-way ticket to Italy, camped on the doorstep of Moto Guzzi's boss Alessandro de Tomaso at his private hotel in Modena – and got lucky, albeit at a cost. "I went with the intent of staying two weeks, but got so involved that I didn't return home for two months," says Dr John. "One December morning, I woke up and remembered I had left my car in the airport long term parking lot. It cost me more than a few dollars to extract it."

De Tomaso recognised in Wittner the man who could help rejuvenate the Moto Guzzi marque's staid image. Dr John returning to America with a box of business cards identifying him as Moto Guzzi's engineering development consultant – North America, plus enough money to build the Stage 3 Guzzi racer he'd already mapped out, complete with an all-new box-section spine frame and cantilever swingarm, with floating shaft final drive.

The rest is history. In 1987, in the hands of Georgia rider Doug Brauneck, the new Dr John Guzzi broke the six-year Ducati/Harley-Davidson domination of US ProTwins racing, by winning the AMA Championship title to become the most successful Moto Guzzi racer in three decades. The Godfather was delighted, and now Dr John could have an even better toy to play with, plus even more \$\$\$ to pay for doing so. He was given the prototype otto valve V-twin engine the Guzzi engineers had been working on for two years, with the instruction to build a race bike around it. This would help develop the engine ready for production.



Above: Although the redline is set at 10,000rpm there was no need to buzz the 8V Guzzi that hard.

Below: Regular rider Doug Brauneck made the Daytona rostrum on the Dr John Guzzi.

Opposite page: There is nothing conventional looking about the naked Guzzi.

DAYTONA GLORY

The fact that the 8V Dr John Guzzi ridden by Doug Brauneck finished third behind Roger Marshall's victorious Quantel Cosworth and Stefano Caracchi's NCR Ducati in its first race at Daytona in March 1988, just adds icing to the cake. That rostrum finish in the world's premier ProTwins race came without the barely finished bike ever having turned a wheel under its own power until the second day of practice, with the engine still in prototype street form, and tuning restricted to open exhausts, a pair of camshafts from Crane Cams, twin 41.5mm flat slide Mikuni carbs.

During the rest of that season Wittner and Brauneck ran increasingly strongly to fifth in the final points table, inevitably encountering the usual R&D problems you would expect with a brand new engine. However, overall the 8V bike

was faster and better than the previous year's two-valve title winner.

I was invited to the Loudoun track in August 1988 to evaluate the eight-valve. This had by now adopted the Daytona name, presumably by virtue of its rostrum finish first time out. It was the first journalist test of an engine seemingly destined to form the backbone of Guzzi's future road bike range.

The designer of the air-cooled 90° V-twin 8V Daytona motor was Umberto Todero, a former aide to legendary Guzzi designer Giulio Carcano, as one of the engineers involved in the firm's title-winning GP team of the 1950s, when they won the world 350cc championship five years in succession.

Todero designed the 8V engine in 1986 as a cost-efficient option for Guzzi's future, and with

full silencing and emissions equipment it produced 92bhp at 7400rpm in 90 x 78mm 992cc form running 10:1 compression. In this guise it finally reached the marketplace in 1992.

Wittner ran it in this form at Daytona in 1988, making that third place result all the more impressive. However, in pursuit of the higher revs, at which he believed the four-valve heads would come into their own, Wittner short-stroked the engine after Daytona to 95.25 x 70mm for a full 999cc – the same dimensions as his 1987 two-valve Le Mans-derived BoTT title-winner.

To achieve this, he fitted a crank from a 750cc V7 Sport, with the same Carrillo rods and Ross high-silicone three-ring pistons he had used on the 1987 bike, with bored-out cylinders fitted with Gilnisi chrome liners, with compression raised to 11.25:1, and larger 41.5mm Mikuni flat slides fitted. This raised the crankshaft power to 115bhp at 9300rpm. For 1989 the engine was fuel injected with a Magneti Marelli ECU and twin 52mm Weber throttle bodies; Guzzi had become the first manufacturer to fit Marelli EFI to a motorcycle, on the California tourer.

With new Crane cams, Wiseco flat-top pistons, and re-reported cylinder heads with modified combustion chambers, the 8V engine ultimately delivered 128bhp at the gearbox at 9500rpm (121bhp at the wheel), good for a top speed of 167mph at Daytona. However, Brauneck retired two laps from the end of that 1989 race with a broken cambelt, when lying fourth and reliability had become an issue. This led to John Wittner retiring from racing at the end of that season, and moving to Italy to work full time on development of the Daytona 1000 street version of his 8V racer.



RACE PROVEN

Todero's cost-effective 8V engine used the same crankcases and longitudinal plain-bearing crank as the two-valve Moto Guzzi big twins of the day, although the first test prototypes had extra metal welded in after casting to allow a wider spread of cylinder studs for the four-valve cylinder heads.

The design saw what was formerly the solitary central camshaft on the pushrod engine replaced with a crank-driven countershaft, driving two 19mm wide Pirelli toothed rubber belts up the front of the engine, which directly drove the end of the single camshaft positioned in the side of each cylinder head.

Looking at the engine it didn't really look so much of an overhead camshaft design, more a high-cam layout like a 175/250cc Parilla motor, or a BMW/Bristol car engine. "Not so!" said Dr John. "I agree it's not obvious, but the camshaft is in fact entirely located above the combustion chamber, and uses only cam followers, not pushrods."

The camshafts actually lay alongside the exhaust ports, almost parallel with the exhaust pipe's exit, and this clever layout permitted Todero to avoid adding unduly to the height of the already quite tall engine; he'd already made a

double overhead-cam version in 1986, which de Tomaso had rejected on the grounds it was too high. At right angles to the camshaft were two long rocker arms operated by round-radiused cam followers, with forks on the rockers actuating the paired valves per cylinder. These had a much narrower 44° included angle than the pushrod twins, and on the Dr John's engine were each 0.5mm larger than on the factory prototype (34mm inlets/30mm exhausts), operated by uprated special-profile camshafts from Crane Cams in Florida.

Twin separate megaphone exhausts for faster tracks were welded up by Rob Muzzy to replace the factory-made titanium two-into-one pipe used at Daytona, which was however better suited to

slower, tighter circuits. Dyna S/Raceco electronic ignition (total loss, to save the weight of an alternator) was fitted, running 31°-34° advance.

Compared to the previous two-valve motor, the 8V engine was only 40mm wider, thanks mainly to the bulkier valve covers needed to enclose the extra valve gear. Weight-wise, according to Wittner the 8V engine was only 5.5kg/12lb heavier than the pushrod design, and from my memories of riding the previous title-winning pushrod bike with essentially the same chassis, I'd say that far from noticing any extra top-heaviness, it actually seemed at Loudoun to be more agile and easier to lay into a turn or swing from side to side. Frontwards weight bias was a steep 55/45%, good for promoting front wheel grip in turns.

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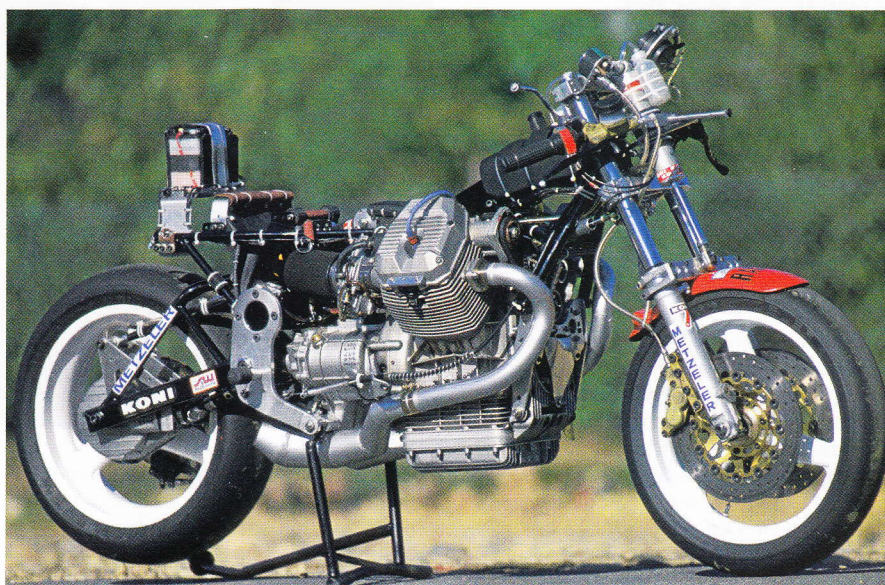
TALKING TORQUE

I also found when I rode the Dr John 8V Guzzi that the motor was reluctant to rev as high as the 10,000rpm peak John Wittner had been told it was supposedly capable of. Midrange performance was its strong point, with the engine coming alive at 5200rpm once the megaphone exhausts cleaned up, with a strong build of power as it revved eagerly to around 9000rpm, and maximum torque available at just 7300rpm, according to Wittner.

At just over nine grand it ran out of breath, which in turn meant that the benefits of those four valves per cylinder and reduced inertia and friction obtained by using paired valves with an overhead camshaft design, weren't yet as great as they should have been. Nevertheless, there was a notable improvement in performance over the old two-valve pushrod engine, which had delivered 103bhp at the crank the previous season in race form – so, around 95bhp at the rear wheel, once transmission losses on the shaft final drive were taken into account.

But remember, the new 8V motor had yielded 115bhp at the crankshaft at 9300rpm, good enough for a Daytona trap speed of 162mph back in March, since when Dr John's continued efforts had definitely improved performance. "We're only at the beginning of our R&D programme," said Wittner. "For sure there's a heap of power in there waiting to be unlocked, but till now we've been concentrating on street development through racing. I see over 120bhp at the rear wheel as a reasonable target for our full-race engine." Time would prove that forecast to be realistic.

The traditional Achilles heel of the shaft-drive twin, its transmission, had been completely resolved in the Dr John Guzzi, via its Swiss-made Transkontinental clutch/flywheel unit, comprising a single sintered-bronze driven plate coupled with a diaphragm spring and an aluminium flywheel,



combined with Wittner's own design of floating rear end to eliminate torque reaction from the shaft final drive.

This employed a floating drive casing pivoting on the axle, with the drive shaft no longer enclosed in the box-section steel swingarm, but featuring a secondary, exposed, universal joint. A torque arm running parallel to the swingarm transferred forces from the drive case to a fixed point on the frame, and this parallelogram principle – already proven on the Magni Guzzi bikes – removed the torque-induced rise and fall of the chassis as it tried to climb around the rear axle, instead directing the forces into the frame. The result was a bike that felt like an across-the-frame twin with a chain. Only by revving the engine at rest did you feel any torque reaction. Pull the clutch in and the effect disappeared.

On track the Guzzi's behaviour was completely neutral, with no attempt to under steer off into the bushes on a closed throttle, nor was there any rear wheel hop under engine braking. This meant I could enter a turn fully committed, yet back off the throttle to change line, without any noticeable effect on the Guzzi's handling. And the lack of a heavy flywheel didn't affect the low-down acceleration. Too bad the production version of this engine never had an alloy flywheel.

The close-ratio factory gearbox had a street-pattern one-up left-foot change that was way smoother than previous Guzzi gearshifts I'd encountered, but the bottom three gears were closely spaced, with quite a large gap to fourth, and again to fifth. It was presumably designed to get the heavier Le Mans production racer out of the chicanes at Guzzi's local Monza test track,

with much higher ratios for the high-speed stretches on the Autodromo.

This layout may also have worked okay at Daytona, but at a tight track like Loudoun was more of a handicap. Dr John's bike, which even in 8V form, scaled only 158kg/347lb with oil, but no fuel. That's pretty respectable for a one-litre shaft-drive twin, making more evenly spaced gear ratios desirable which would allow you to ride the torque curve.

There were no plans at that stage for the six-speed gearbox that would be adopted in 2004 on the ultimate development of the 8V Guzzi engine, on the bored-out 1225cc MGS-01 Corsa. It's worth noting the performance of that factory production racer compared to the final version of the 999cc Dr John bike: 128bhp at 9300rpm at the crankshaft, so around 118bhp at the wheel.

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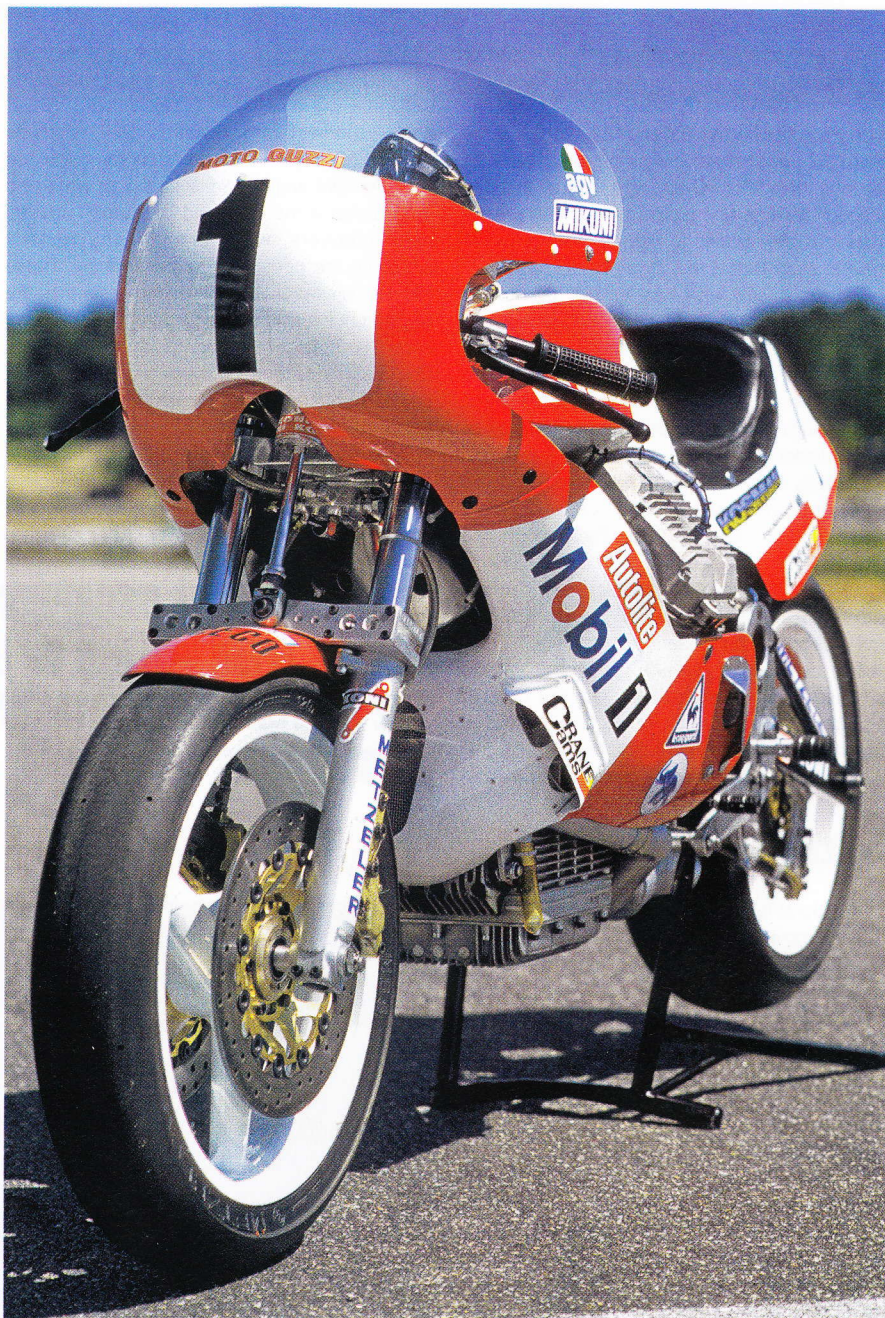
FREE REVVING POWER

The most noticeable characteristic of the 8V engine was how freely it revved, with the tach needle flying round the dial almost as eagerly as a two-stroke, belying the motor's apparent nature. Conditioned to think of previous Guzzi racers I'd ridden, even Dr John's title winning pushrod bikes, as thundering mega-tractors with the grunt of a Caterpillar, it came as a surprise to find myself seated aboard this easy-revving, light-feeling bike which felt almost delicate in operation.

This feeling applied equally to the chassis. With a wheelbase of 1460mm this was not a short bike. Seated aboard the Guzzi I still found myself aware of those jutting-out barrels, the right further forward than the left, giving my long legs a little more room on that side than the other.

Though the chassis employed on the 8V racer was made by Guzzi in Italy, it was a slightly modified version of Wittner's 1987 BoTT title-winning frame, consisting of a central rectangular-section 2 x 3in (about 50 x 75mm) backbone fabricated from 4130 chrome-moly steel, attached at right angles to a 2½in/63.5mm round steel tube located transversely along the swingarm pivot.

This carried twin half-inch/12.7mm thick aluminium plates bolted to it either side, which located the gearbox as well as acting as the pivot for the box-section cantilever monoshock swingarm with fully adjustable Koni F1 shock pivoting on the frame backbone. The engine was carried as a semi-stressed member, bolted to two triangulated tubular steel subframes which were in turn bolted to the subframe, and was tipped back two degrees from horizontal to rationalise the angles of operation of the non-homokinetic universal joints in the articulated drive shaft.



It was also offset a half-inch/12.7mm to the right to allow use of a 5.50in wide cast aluminium 17in rear wheel specially made for Guzzi by Marvic, shod like its 3.50in wide front partner of the same diameter with Metzeler radial slicks. This enabled Brauneck to get the power down much earlier coming out of turns than was possible with the previous 18in rear, via the 170/55-17 rear Metzeler that was skinnier than one of today's 600 Supersport rear tyres.

I too found the way the 8V Guzzi put the power down at Loudoun very impressive, especially considering the appalling road surface of the track, despite the fact it hosts an AMA Superbike round each year. The cantilever rear end soaked up all but the most obscene bumps and potholes, and had been set up with just the desirable amount of antisquat to make the most of the radial tyre.

The fully adjustable Koni unit had been well dialled in and seemed really compliant, delivering responsive feedback without bottoming out in the dip at the bottom of the steep hill. It was definitely a big improvement over the last time I'd sampled this chassis on its debut appearance in practice for

the Daytona BoTT race in 1987, when there was obviously still a lot of work to be done on it.

Up front the 41.3mm Marzocchi M1R forks which Wittner had previously employed, set at a 25° head angle via Kosman triple clamps with 102mm of trail, had now been gutted, leaving only the springs inside the fork tubes, and the sliders merely providing a convenient means of locating the front wheel.

The damping had been transferred to another Koni F1 shock mounted externally in front of the headstock, where it was quickly and easily adjustable for fine tuning, as well as offering the superior response of a fully adjustable gas-charged unit with sophisticated damping, and increasing the lateral stability of the fork as a whole, according to Wittner.

It was a home-brewed but no less successful version of the similar GCB fork fitted to the Gazzaniga 250 and Paton 500 GP racers of the day, but more importantly also to Marco Lucchinelli's works Ducati 851 Pantah when it won the 1987 BoTT race at Laguna Seca, which is where John got the idea from.

At first I did have a problem with the front bottoming out on the many bumps, but a quick damping adjustment by Dr John, on the easy-access shock damping, soon fixed that, and thereafter the 8V Guzzi handled excellently, especially in the way it handled those bumps on the angle, without being deflected from the line.

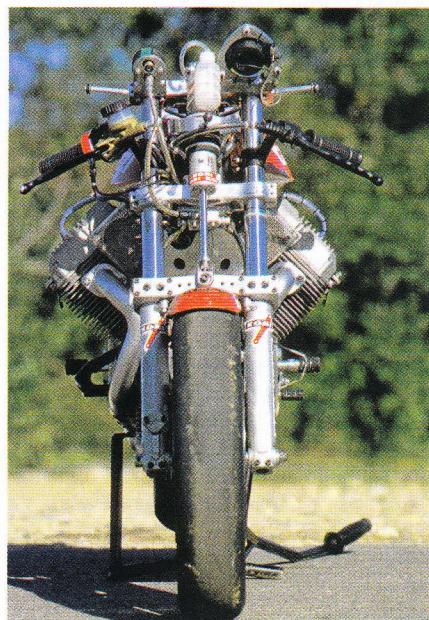
The 8V Guzzi stopped superbly too, thanks to the linked brake system that saw the front lever perform all braking functions; the foot brake pedal was nonexistent! For someone like me, who has never normally used the rear brake on a disc-braked bike, this came as a convenience that took some getting used to, even if I was ultimately grateful for it, since it not only increased effective stopping power, but also seemed to set the bike up nicely for turns.

It was desirable to get all the braking done in a straight line, and then pitch the bike decisively into the corner under power, rather than trail brake into the turn. In spite of the extreme forward weight bias, the Guzzi didn't like that, as I found a couple of

times when the slightly hard Metzlers slid away under over-enthusiastic cornering, but it did respond well to a firm hand on the throttle, powering out of a bend with a glorious thunder from those twin open meggas. The brake balance was usually set at 90/10% forward, using a Kelsey-Hayes (the US then-owners of Brembo) proportioning valve mounted on the left of the chassis.

Three similar bikes, chassis-wise, to the Dr John Guzzi, fitted however with pushrod engines based on the 1987 title-winning motor but producing just 100bhp as delivered, were built by the Moto Guzzi factory for use in European BoTT racing by their various European distributors. One went to Germany, another to France.

But Wittner was already looking further ahead to the Daytona 1000 street bike, powered by the 8V engine, in a similar chassis to his ProTwins racer, which was launched in November 1989 at the Milan Show, but for various reasons finally entered production only in 1992.



Above and below: The design of the Dr John Moto Guzzi was definitely one of function over form.

“THE 8V GUZZI STOPPED SUPERBLY TOO, THANKS TO THE LINKED SYSTEM THAT SAW THE FRONT LEVER DO ALL THE BRAKING.”

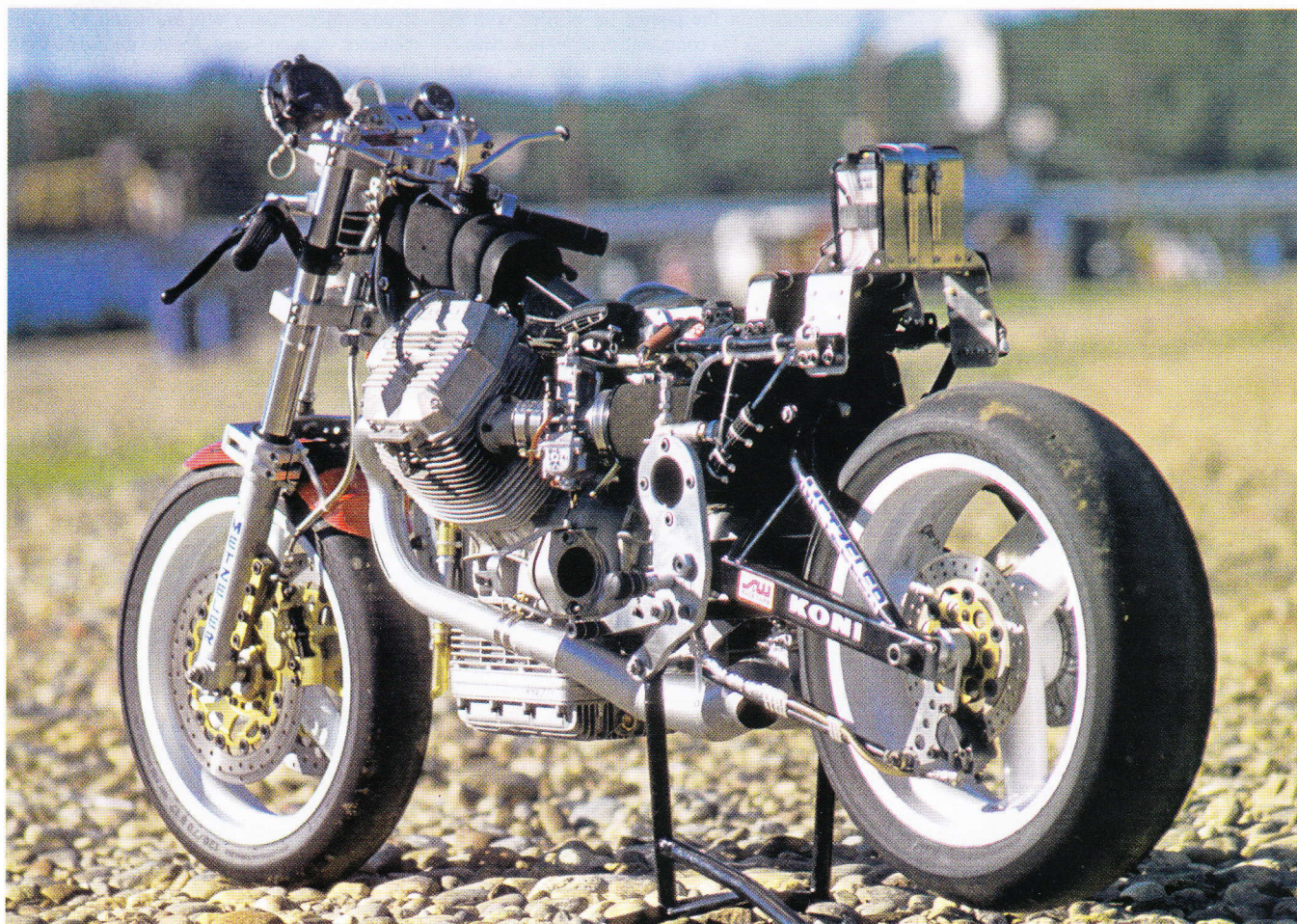
TOO LATE

By this time Guzzi had been upstaged by Ducati, who had become serial winners of the World Superbike Championship with the 888 Desmoquattro, and consequently the Daytona 1000 never received the acclaim it deserved, not even from Guzzisti and certainly not from conquest customers.

Just 486 examples were built and sold in the model's debut year in the marketplace in 1992, with numbers declining to 283 bikes in 1993, 155 in 1994, and just 100 motorcycles in 1995. In 1996 the greatly revamped Daytona RS

was launched, but Guzzi customers preferred the less costly 1100 Sport pushrod model of near-comparable performance, and so just 113 examples of the RS were made in 1996, and 195 in 1997.

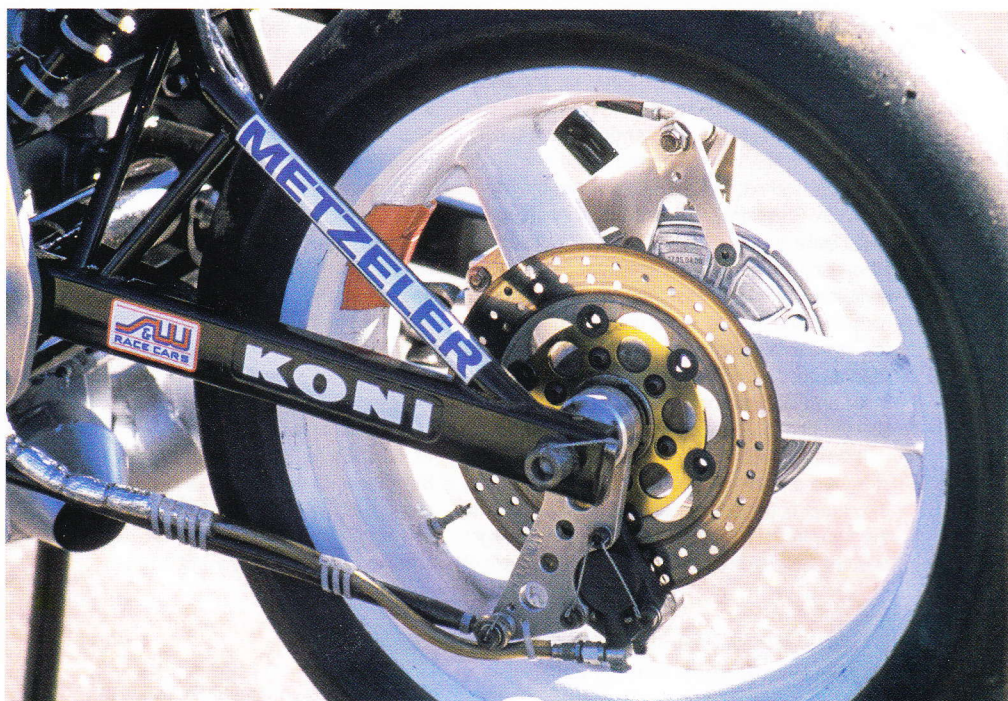
The introduction alongside it of the better selling and more accessible Centauro power cruiser, powered by the same 8V motor ensured the sport bike's demise, until the advent of the bigger-engined MGS-01 prototype at the 2002 Milan Show turned a new page. It was a sad end to a project that had started so well.



SPECIFICATION

Dr John Moto Guzzi 1000R 8V

ENGINE: Transverse 90° air-cooled V-twin four-stroke with belt-driven Single overhead camshaft, and four valves per cylinder
DIMENSIONS: 95.25 x 70mm
CAPACITY: 999cc
OUTPUT: 115bhp at 9300rpm at the crankshaft
COMPRESSION RATIO: 11.25: 1
CARBURATION: 2x 41.5mm flat-slide Mikuni
IGNITION: Dyna S/Raceco electronic CDI
GEARBOX: Five-speed with shaft final drive
CLUTCH: Transkontinental single-plate sintered bronze diaphragm clutch, aluminium flywheel
CHASSIS: Chrome-moly fabricated square-section backbone frame
SUSPENSION: Front telescopic forks with single centrally mounted fully adjustable Koni F1 shock. Rear box-section steel cantilever monoshock with fully adjustable Koni F1 shock
HEAD ANGLE/TRAIL: 25°/102mm
WHEELBASE: 1460mm
WEIGHT/DISTRIBUTION: 158kg/347lb with oil, no fuel, with 55/45% distribution
BRAKES: Front 2x 300 mm Brembo floating cast iron discs with four-piston Brembo calipers, interconnected to rear brake at handlebar lever. Rear 1x 230mm Brembo floating cast iron disc with two-piston Brembo caliper, operated by handlebar lever on 90/10% linked ratio
TYRES/WHEELS: Front 120/70 x 17 Metzeler slick on 3.5in Marvic cast magnesium wheel. Rear 170/55 x 17 Metzeler slick on 5.5in Marvic cast magnesium wheel
TOP SPEED: 166mph (Daytona 1989)
YEAR OF CONSTRUCTION: 1988
OWNER: Moto Guzzi SpA, Mandello del Lario, Italy



Tester Cathcart found the cantilever, tubular, swinging arm and Koni shock absorber worked well on the bumpy track.

The Dr John Guzzi 8V racer is now on permanent display in its 1991 final development form in the Moto Guzzi factory museum at Mandello del Lario. John Wittner is currently in the process of restoring the 1987 two-valve AMA BoTT championship-winning bike which he still owns, and when completed he plans to take it to the track once again in demo events for the first time in over a quarter of a century, to record the contribution of the people he worked with at Moto Guzzi as the company struggled to survive.

"I loved my time with Moto Guzzi and I miss the wonderful people there whom I was so

honoured and privileged to work with," he says. "They were the ones who kept Moto Guzzi alive through the most difficult times, with their hard work and faith in the company. They were the ones who gave the best they had to give, and then gave some more.

"My very small story in the scope of the great history of Moto Guzzi would never have happened without them. Too often people associated with a struggling company are maligned as being mediocre, or even worse. For the people at Moto Guzzi back then, nothing could be further from the truth. I salute them."

