

GODZZ TWIN

Melbourne's Ian Drysdale has revealed a world-beating cruiser engine with unique engineering and an appetite for power

Engineer Ian Drysdale is an exponent *par excellence* of Australia's can-do doctrine, as exemplified by the motorcycles powered by his own 32-valve quad-cam V8 powerplant that he's hand-crafted over the past decade or more. Now Drysdale is focusing on finding a home for a different kind of motorcycle engine. He's been developing a V-twin for the past five years, an engine rejoicing in the improbable name of Godzilla!

Drysdale, 52, is a man with a formidable record of thinking outside the box. Besides competing with varying degrees of success in almost every branch of two-wheeled sport from desert racing to motocross, flat track to road racing, he's conceived a huge variety of innovative machinery down the years, some conventional, others avant-garde, others weird.

As well as the V8 ultrabikes he's best known for, Ian's CV includes many esoteric projects in myriad specialist fields. Like creating the Dryvtech 2x2x2, a hydraulic two-wheel-drive, two-wheel-steer, two-stroke enduro bike. Or taking the mechanical swan used in Ballet Australia's production of *Swan Lake* and adapting it to radio control. Or converting

ATV quads for use by paraplegic farmers when working the land.

Or supervising the fabrication and installation of rolling-road dynos in the GM/ Holden and Ford Australia R&D operations, as well as helping build the wind tunnel at Melbourne's Monash University.

Or producing a range of ATVs for Chinese manufacturer Linhai, some powered by Drysdale Motorcycle Company (DMCo) engines. Or... but you get the picture. This is a guy who makes things.

Indeed, Drysdale is a 21st century motorcycling maverick whom it's impossible not to admire, an engineer of eclectic vision and infinite imagination who asks not why, only how. As such, he'd be the prime candidate to create a leading-edge American-style air-cooled eight-valve 50° V-twin cruiser engine delivering anywhere from 59kW in 1400cc naturally aspirated guise to 106kW in supercharged 1600cc form, incorporating technology derived from the ultimate Cold War radial aircraft piston engine, matched to traditional two-valve pushrod engineering so beloved of the cruiser customer.

Revelling in the in-house nickname of

Godzilla, the result may outwardly appear to be a classic American-style air-cooled V-twin pushrod design, but inside those castings the Drysdale V2 cruiser motor is very different.

Starting at the crankshaft, Drysdale was eager to circumvent the hallowed knife-and-fork roller-bearing conrod layout featured in an air-cooled Harley motor, or any of its clones. In recognition of the limited life such a traditional design has at high power outputs, the current cruisers from Japan have plain-bearing conrods arranged side-by-side.

But Drysdale wanted to achieve the classic inline cylinder configuration without sacrificing the ability of the engine to deliver high performance, so capitalised on his fascination with radial aircraft engines from the WWII era. He had the idea of using the master-and-link type conrods that many of these employ, for the first time in a V-twin bike engine.

The Pratt & Whitney R-4360 Wasp Major – affectionately known as the Corn Cob, on account of its appearance – is the largest-capacity aircraft piston engine ever to enter series production. A massive hunk of metal, it's a 28-cylinder radial engine with a total cubic capacity of 4360 cubic



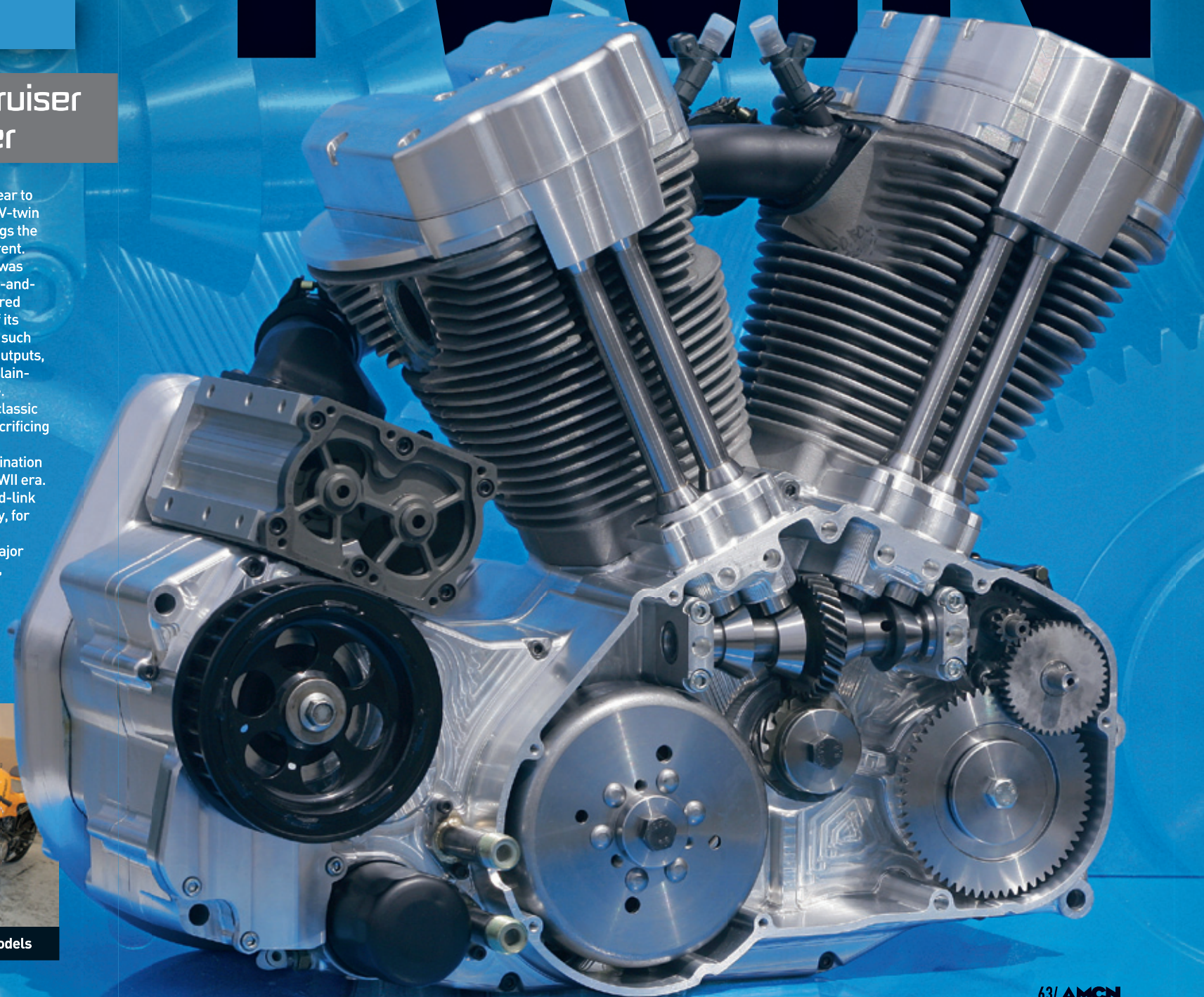
The awesome Drysdale V8 Bruiser 1000



Ian Drysdale could be the most successful engineer you've hardly heard of...

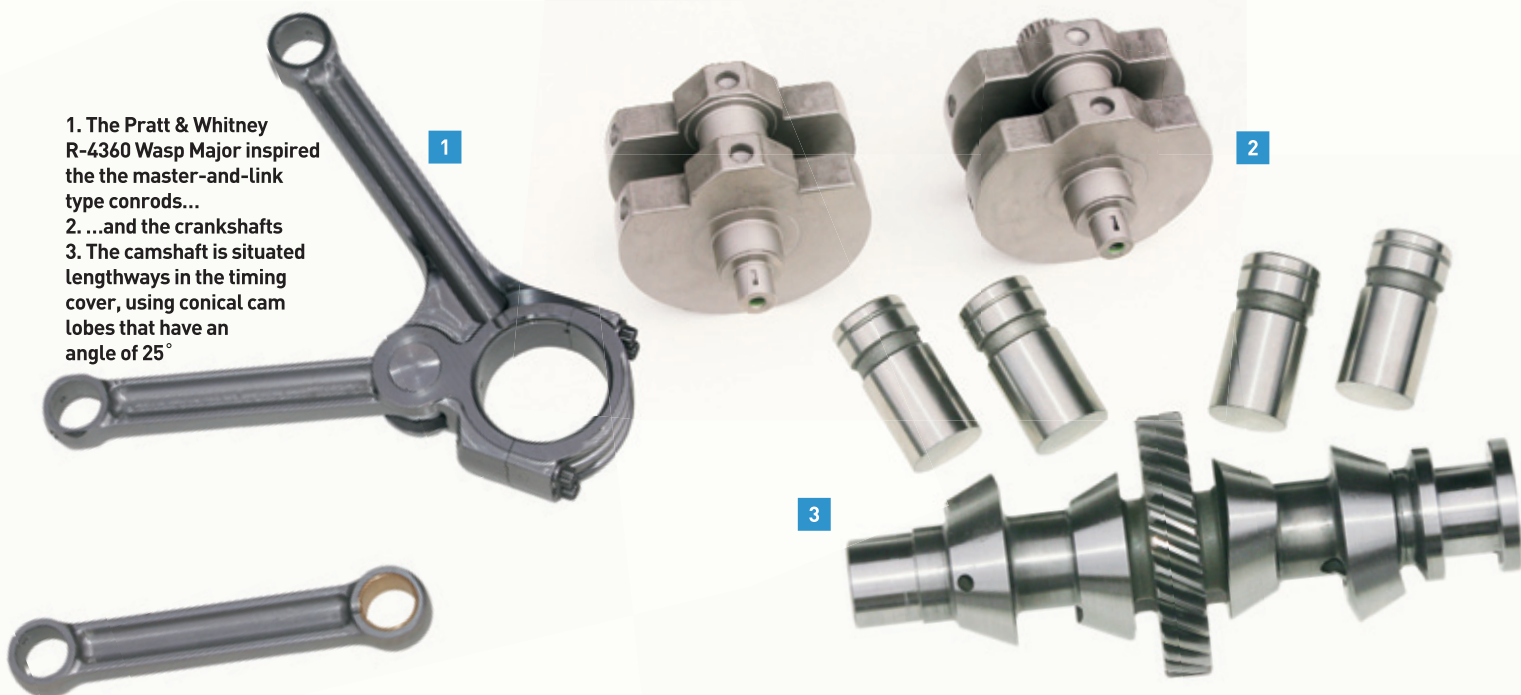


Some of Ian's older V8 Superbike models



1. The Pratt & Whitney R-4360 Wasp Major inspired the the master-and-link type conrods...

2. ...and the crankshafts
3. The camshaft is situated lengthways in the timing cover, using conical cam lobes that have an angle of 25°



To operate the pushrods, Drysdale drew on a relatively unknown camshaft design dating back to the 1930s

inches [72,000cc]! Rated at 3500hp (2642kW), it entered production in 1945, and represented the pinnacle of piston-engine airplane technology.

Ian only needed a conrod to study, but things got out of hand, and he ended up importing a complete Corn Cob engine from America!

"Sceptics predicted that the master-link rod in a V-twin configuration would give wildly different TDC timing, and even different stroke specs front to rear," Ian says. "But with the help of British chassis design guru Tony Foale, and after a dozen designs were evaluated, we were able to get the link-pin geometry to a point where the timing and stroke came to within near perfect tolerances front to rear. So we fixed on that as the basis of the project."

Aimed at the traditional cruiser market, where Harley's modern-engined V-Rod has been scorned by many, the projected Godzilla 50° V-twin needed a pushrod valve train – a format entirely consistent with the radial aircraft engine theme, since both have relatively low redline figures.

To operate the pushrods, Drysdale drew on a relatively unknown camshaft design dating back to the 1930s, where it was used in engines powering a diverse variety of vehicles, ranging from Mercedes-Benz grand prix cars to utilitarian

farm machinery. This format has the camshaft situated lengthways in the timing cover, using conical cam lobes that have an angle of 25°, thus allowing the roller-bearing hydraulic lifters to run in a direct line to the cylinders.

The advantage of this layout is that the camshaft comprises a single piece of metal, and is driven by just one pair of gears, instead of the multiple camshafts and gears required by most pushrod V-twins. This results in much less gear noise for Godzilla, and also a much simpler assembly process, in turn reducing manufacturing costs.

MV Agusta (on the F4) and Aprilia (on the five-valve 650 Pegaso single) have also rediscovered tapered cam-lobe technology, although they both use it in an overhead-cam configuration. Godzilla features more up-to-date design technology in the cylinder head and combustion chamber shape.

"Ever-tighter emissions rules dictated a thoroughly modern four-valve cylinder head design," Ian says. "So-called smog-pump galleries have been included in the four-valve cylinder heads, to help meet the tightest exhaust emissions regulations, although these galleries have been very well hidden."

One further concession to contemporary engine design in Godzilla is a pair of gear-driven balance shafts, which calm the vibes of the V-twin in all three of its different design capacities (100 x 89mm, measuring 1398cc; 100 x 102mm for 1602cc; or 105 x 106mm, displacing 1836cc) so completely that the engine can be started and revved up on a work bench with no clamps holding it down!

"The counter-balancer weights can be reduced to dial in the right feel for purists who argue that a cruiser engine needs some vibration to give it character," Drysdale says.

In standard configuration, Godzilla is normally aspirated, but it was designed from the outset to accommodate a supercharger that's so well integrated into the design that



GODZCRUISER

Former Alfa Romeo employee Nic Butti (pictured above) is not your average motorcycle designer. The Italian is a fluent Mandarin speaker, has road raced in China, and is currently setting up his own Chinese-registered design company as well as lecturing in Industrial Design at JiangNan University in Wuxi.

A graduate of MV Agusta's CRC design centre, Butti moved to China in 2006 to become PTS Motors' design and project manager, working with DMCo in putting the Vento Reptile 400 ATV – powered by the three-cylinder Drysdale-designed motor – into production.

In 2008, he switched to working freelance on various industrial and transportation design projects, including several joint projects with DMCo, such as the Caffè Triplo 400 prototype. To illustrate the potential use of the Godzilla engine, Butti produced the preliminary designs under the GodzcrUISer tag!

"I was free to explore different stylistic languages," he says. "The added incognito of not knowing the identity of the potential buyer of the whole project made it all the more interesting."

"What if some wise Indian or Asian new player in the cruiser business steps onto the scene, and decides not only to attack the biggest existing markets for this kind of a bike in the USA and EU, but also to create new ones, maybe in Asia itself, or Brazil or Eastern Europe, using Godzilla as the platform for this?"



The gigantic Pratt & Whitney Corn Cob engine that Drysdale imported in order to study



The DMCo-powered Vento Reptile 400 ATV



Drysdale's inline three-cylinder engine that powers the Vento ATV



The triple fitted to the Vento 400 Caffè

it's almost unnoticeable. To achieve this, according to Ian, the DMCo design team effectively started with the blower and wrapped the rest of the engine around it.

In consequence, the twin-screw Autorotor supercharger has no external drive belts or shafts, culminating in a very neat installation. It's driven from the back of the clutch by an enclosed toothed belt which runs in the engine oil, a technology only recently made available.

that fuel injection is a must-have, mainly for its emissions benefits but also for instant starting and more even fuelling across the entire rev range. DMCo has thus developed a dedicated EFI for the Godzilla engine, using a Delphi throttle body, a single Honda Blackbird injector per cylinder, and an ECU from Melbourne-based MoTeC, a world-class company whose products are widely used on world Superbike and Supersport grids.

supercharged or unblown guise."

Comparing the claimed 75kW delivered by the 1602cc naturally aspirated version of the Godzilla engine to, say, the 69kW of Victory's latest 1731cc version of its Freedom 106/6 eight-valver, the Australian-built engine certainly seems to be competitive on paper with its potential rivals.

But when will there be a direct face-off with this competition? Surely DMCo hasn't invested

The twin-screw Autorotor supercharger has no external drive belts or shafts, culminating in a very neat installation

"We plan a moderate the boost figure for production engines, but the design is such that the owner can increase the boost to a high-performance setting using only one new part, and a few basic tools," Ian says.

With an engine claimed to be capable of producing more power and torque than any production V-twin to date, Drysdale reasoned that an extra-strong gearbox was required. He claims that Godzilla has the biggest gearbox in the business, designed in both five- and six-speed configurations, each with gear primary drive and accepting either a hydraulic or cable-operated clutch.

Godzilla has been designed with enough space for a belt final drive pulley, but will also accept chain final drive when fitted in a more sports-oriented chassis.

Large-capacity, narrow-angle V-twins are tall, and the Godzilla engine being no exception is a dry sump design to maximise space in the chassis, states Drysdale.

While the naturally aspirated version of the engine has been produced using a 40mm carb for ease of development, Drysdale recognises

The Godzilla prototype was entirely conceived and created in-house at Drysdale's CNC-equipped premises in Melbourne, with only the gear cutting and the crankshaft and cam grinding farmed out to specialists. Detail design and CAD work were handled by Richard James, 46, previously the CAD designer of the avant-garde Hunwick Hallam V-twin superbike of the late 90s.

The normally aspirated version of Godzilla has been extensively dyno tested, and the results have been promising, Drysdale says.

"We've seen 78hp (58kW) at the gearbox from the naturally aspirated 1400cc version with a very mild camshaft spec, and torque to match," he declares. "The engine has significant potential in any of its three capacities, and in either

all those years in producing such an innovative and successful design without a customer.

"First off, we see the Godzilla project as a further showcase for our company's proven capabilities as design and prototyping consultants," Ian says. "We believe the unique features of the Godzilla design advertise that our company can think outside the square – be it for the cruiser market, sportsbike market, or for more cost-sensitive models such as ATVs and scooters, where we've already been successful in getting engines we entirely developed in-house, into production.

"But we're indeed having ongoing discussions with several parties with a view to putting the Godzilla motor into production – but nothing's inked yet. Watch this space!"

This good-looking powerplant that's so completely traditional in some ways, yet highly innovative in others, is surely too promising a design to be stillborn. Let's hope Ian Drysdale's can-do attitude extends to finding a guardian to give Godzilla a home! 🏠

For more on Ian Drysdale's designs, check out the website at www.drysdalev8.com.

Ian with his two Godzilla V-twin creations – the supercharged version is on the left

