Wheelspin
NOVEMBER VOLUME 9

NEXT MEETING

Monday 7th November 2011

Greengate Hotel
Pacific Highway
Killara
7:30 pm

Dress Requirements
Shoes, Socks and Shirt.
No thongs or T-Shirts

Website
www.nsscc.com.au

Membership Enquiries

Lisa Emmerson
0411 140 596
secretary@nsscc.com.au

IN THIS ISSUE

FROM THE PRESIDENT'S DESK

Welcome to the November issue of Wheelspin and what a great month we have had with a fantastic khanacross at Ansell Park (see separate story) our annual motorsport trivia night at the October meeting.

The Ansell Park Khana was agreat day, fantastic weather and a great turn out of 21 entries in a variety of machines with Mick Smith in his rapid little Polaris RZR taking the win outright from Shaun Atkinson making a comeback to the sport.

It was also fantastic to see so many new young members running including Kris Muller (13), Oscar Middleton (12) and Tom and Ben Atkinson (not sure about their ages). This is what it is all about introducing young people to the sport and giving them a way of improving car control and letting off some steam in a controlled environment. Great to see and hopefully we will have even more at Hampton for our final event of the year on Saturday 19 December.

The Ansell Park wasn't so good for yours truly, debuting the presidential Datsun 1600 it had a brake failure on the very first test of the day, whichruined my chances. The car has been hauled off to Mark Thompson at Penrith Brake and Clutch to have the brakes overhauled and ready for Hampton, looking forward to it.

At our November club meeting on November 7th We will be handing out trophies and showing a video of the Ansell park event shot by master camaraman Rod Turnbull so get along to the Greengate have a few beers and perhaps a meal before hand and enjoy the night. Don't forget to tell the bar staff that you are there for the NSSCC meeting and that they record any meals or drinks you have before we head upstairs for the meeting at 7.30pm.

Thanks to Howie Grove, Craig Kenchington, Janice, Ross, Tom and all the official sho made the day possible, with out you we would have no motor sport. Also special thanks and condolences to Tom Quirk who spent the day on the stop watches only to lose his beloved dog after it picked up a tick at Ansell Park and it passed away a few days after the event. Our thoughts are with you.

The Trivia night was great fun and it is slowly building in 2012 we hope to have even more people there answeringthe motor sport brain teasers and enjoying the fun.

As we approach the end of the year its probably a good time to reflect on 2011 and the changes, innovations, blunders and frustrations that have accompanied this year.

We have had plenty of frustration with finding a new venue for club level khanacross events since Riverside Oaks evaporated. However Hampton and Ansell Park have filled the gap and we are edging closer to getting access to Western Sydney Drag way for khanacross and possibly rallysprint events. Fingers crossed approval will be coming soon.

We would like more or you as club members to have some input to come to the club meetings and to get involved in our events and to have a say in the running of the club. The club is only as good as you make it solet's make it great.

Look forward to seeing you at the November meeting until next time takes it easy and drive carefully.

Jon Thomson

NORTH SHORE SPORTING CAR CLUB

HAMPTON KHANACROSS

SATURDAY NOVEMBER 19TH

NSSCC will be holding its final sporting event for the year at the Hills District grounds at Hampton on Saturday 19th November with a khanacrossthrough the trees in the beautiful valley just off the Jenolan Caves Rd behind the Hampton pub.

It's a great day in the mountains with some challenging tests and plenty of shady trees so make sure you joinus for a fantastic event.

Food and drinks are available on site but feel free to bring a picnic and enjoy the day.

Note competitors, officials and spectators have to be in the ground early, as the gate has to be closed to ensure stage security

NOTE

1. ***Scrutineering is in the compound at the bottom of the hill from 8.00 am***
2. ***It is preferred that service vehicles that are not 4wd stay at the top of the hill, it is a steep entry and can be nigh on impossible to get out of if it rains.***
3. ***Trailers should be left up at the Hampton Halfway house***
4. ***The complex will be locked off at 10 am until lunch at approx. 12.30pm for half an hour then closed off again until event conclusion***

Entry is $50 Regs will be available at www.nsscc.com.au and for further info you should contact event director

ben_cullen@nsscc.com.au

SEE YOU AT HAMPTON !

Taylor Happy With Pace in Highland Fling

Australian rally driver Molly Taylor is pleased with her pace after last weekend's Rally of Scotland, having set some of the fastest times in her class.

While the 23-year-old Sydneysider and British co-driver Seb Marshall did not finish the event, courtesy of a broken control arm bolt, they were in a close battle for first in their class.

“I am really happy with what we achieved in this event,” Molly says.

“Obviously we're disappointed not to finish, but the idea was to drive as fast as we could, get some more miles under our belts and battle with the top guys in our class, and we did all of that.

“The conditions were very tricky – rough, slippery, definitely not easy – but it was the most fun I've had in conditions like that, and it was great preparation for the last Academy round in Wales next month [Rally GB, November 10-13].”

Molly and Seb were second in class and 21st outright, when the control arm bolt snapped 18km into a 25km stage, the final forest stage of the event. As a result, the drive shaft pulled out and they lost all drive, which they discovered when they turned into a corner and couldn't drive out.

“But we did what we wanted to do. Our goal was to increase our pace against the other Fiesta drivers, and we were right up there. We were in second, but the gap to first was very close. However the main thing is that we were on the pace – now we have to take that speed, and the confidence we've gained, into Rally GB.”

The final round of this year's world rally championship is also the final round of the WRC Academy, the one-make junior driver development series Molly has been contesting all year. But she is not prepared to leave the Scottish event as her only preparation in the lead-up to this crucial event.

“Rally Spain is on this weekend and if all goes to plan, I want to do the reconnaissance over there for some more experience. Then, the week before Rally GB, I have another meeting of the FIA Women & Motor Sport Commission in Paris. I'm going to go to Europe a few days before the meeting and do some more training at Vittorio Caneva's rally school in Italy.”

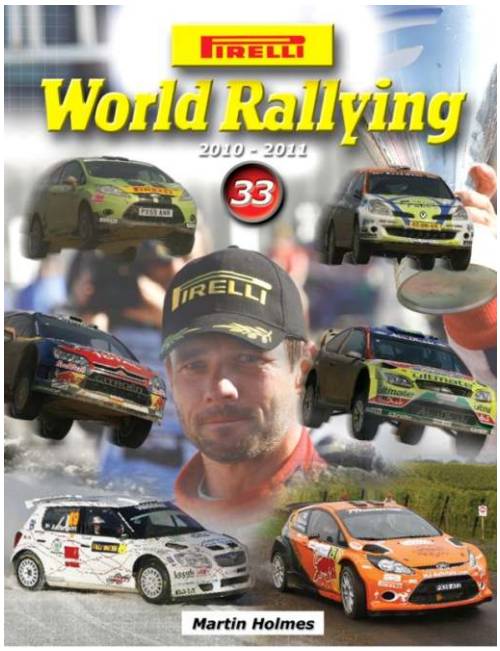
Molly spent two days with Caneva in the lead-up to the WRC round In France. He is well known in European rallying circles, having fine-tuned the skills of Kris Meeke, Guy Wilks and Xavier Pons. Wilks was one of the competitors in Scotland last weekend, along with other well-known international drivers such as Alister McRae, Toni Gardemeister, Toshi Arai and Fumio Nutahara.

They were among 40 entrants who lined up for the three-day gravel contest, which was the penultimate round of the hotly contested 11-event Intercontinental Rally Challenge series. Featuring some of the fastest and most spectacular roads on the IRC calendar, Rally of Scotland started at Stirling Castle and finished at Scone Palace, where the kings of Scotland were crowned in centuries past.

Molly and Seb drove a Ford Fiesta R2 in the Scottish event, identical to the model that all the WRC Academy competitors use. The Academy cars are prepared by Ford's WRC specialists, M-Sport, with tyres supplied by Pirelli. Molly is one of six drivers in the Pirelli Star Driver programme, which has provided a fully funded scholarship for this year, covering all her WRC expenses.

More information about Molly and Seb Marshall is available on Molly's website: http://www.mollytaylor.com.au

PIRELLI WORLD RALLYING 33 2010-2011



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DESCRIPTION:

Martin Holmes' World Rallying annuals, for the 24th time with the support of Pirelli, are recognised as the leading books on international rallying in the world. Previous editions have established this annual as the leading reference book of the sport, used by the industry, journalists and rally fans all over the world.

Centred on the 2010 World Rally Championships, there is also coverage of the IRC, European, Asia-Pacific, Middle East and African regional championships, and many national championships around the world. All the features are illustrated comprehensively, primarily by Maurice Selden's photography.

The book also gives a unique appendix of results of all the major national rally championships round the world.

FEATURES:

FOREWORD by 2007 Formula 1 World Drivers Champion Kimi Raikkonen, Jan Kopecky Skoda's national driver tells the story of his career, PETTER SOLBERG WORLD RALLY TEAM The team who dared to challenge the establishment teams, LEGENDS STILL ALIVE Ford Escort classic competition, WORLD RALLY CARS OF THE FUTURE explained by FIA Technical department chief Jacques Berger, SPA-SOFIA-LIEGE Stories from one of rallying's most amazing events, SINGLE-TYRE SUPPLIER reflections from Pirelli, PIRELLI STAR DRIVER how the Class of 2010 fared and the newly inaugurated WRC RALLY ACADEMY IN 2011.

AUTHOR:

Martin Holmes has been writing books, preparing reports and supplying rallying information and photographs to magazines and the industry in all six continents since the World Series started in 1973.

TO BUY CONTACT:

Greg Yard at Simpson Safety on ph. 9545 6662 or mob. 0407 108 103 or by email at sales@simpsonraceproducts.com.au Cost is $54 plus $5 postage and tell him you are from NSSCC

PIRELLI WORLD RALLYING 32

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Out now with all the regular features of 'the bible' of world rallying!
Forwarded by Petter Solberg, the now popular privateer this edition also features the Golden Age of Italian Rallying by Abarth's former chief engineer, Rallying in the New World – Brazilian style, Erik Carlsson who changed the image of Saab, Next Generation Cars on the development of the Ford Fiesta Super 2000 and more.
Included in the run down of the 2009 WRC season of course is Martin's report on our own first ever East coast WRC event filled with drama from beginning to end !

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From The Editor

ANSELL PARK KHARNACROSS

Sunday October 16th dawned fine and sunny and with some great spring warmth in the air. Cars were loaded on the trailers and we headed out to the Ansellpark grounds for a much-anticipated khanacross directed by Howie Grove with Craig Kenchington as the event secretary.

Over the past few months I have been refurbishing a Datsun 1600 and this was the big day for its competition debut after many hours hard work and great expense to the management.

With great anticipation the Datto was unloaded at Ansell and fired up for the reconnaissance runs which all went smoothly. The datto engine was crisp and there seemed plenty of runtunder the right foot and with some new Kumho rally tyres bolted onto the Minilites it seemed to handle pretty well.

All was in readiness and the first test was underway. The Datto blasted off and was proving fun to drive an easy to steer on the throttle. I blasted around the first test only to have the brake pedal go straight to the floor in the stop garage. Bugger!!!!

Investigation showed someone (the previous owner had bodgied up the banjo bolts on the front brake callipers and the right hand banjo had parted company with the calliper. In short it was a butcher job. Despite having a couple of guys check the car over this was missed, easy to do because it all looked fine on the surface only in the heat of battle did it fail. That was my day pretty much over. I spent most of the morning trying to find a replacement banjo, not easy in Richmond on a Sunday and when I couldn't we jury rigged the right hand front brake and competed anyway.

The really fantastic aspect of the Ansell khana was another crop of newcomers to the sport. Of the 21 entries eight were juniors.

The best of the juniors was Sam Walters, fast becoming a veteran and on the day punting Dad Boyd's Rodeo Safari car was spectacular to watch and did a great job finishing seventh outright, just three spots behind Boyd (watch out Dad!)

Peter King was the next best of the juniors in eighth outright just ahead of Aaron Casmiri in ninth, Ben King was 12th outright while Ben Atkinson (son of Shaun Atkinson) had the Mazda Familia in 16th heading a group of debutantes which included Kris Muller, son of Steve Muller (an NSSCC member from old returning to the club) piloting the little VW Golf, a car that cost Steve about $1500 and proved fun to drive taking 17th outright, while Oscar Middleton was 17th in the old Daihatsu and Tom Atkinson 18th in the car he was sharing with Dad and Ben

Great job to all the juniors.

Outright honours fell to Mick Smith in his rapid little Polaris RZR. These fantastic little machines are set to make a big impact on club level khanacrosses as Polaris pushes to sell more to entry level motor sport enthusiasts. There will even be a class for these in a special competition in the ARC next year.

Mick cleaned up the nimble little Polaris but Shaun Atkinson making a welcome return to the sport was very impressive in the Mazda Familia rally car finishing second ahead of Matt Hottes with Boyd Walters bringing the Rodeo home in fourth.

Khanacross is a fantastic day of fun even with mechanical issues and I will be back at Hampton with a repaired Datsun and a new addition to the Thomson Turnbull racing stable, a Hyundai Excel rally car (as seen recently on Top Gear) which we have purchased as a competition machine for our enthusiastic progeny and some of their mates.
See you trackside at Hampton!

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NORTH SHORE SPORTING CAR CLUB

CHRISTMAS CLUB BARBECUE

Come spend a day with other club members by the beautiful Hawkesbury River at Wilberforce on Sunday December 11th to celebrate the year past and to have a day of camaraderie and fun in the sun.

Wayne Elven has kindly invited us to his little riverside sanctuaryfor a Barbie (BYO meat and drinks) and Christmas celebration.

Wayne will have his ski boat there for those who are adventurous while there is plenty of shade for a great day ahead of the Christmas rush.

If you want to come we need to get a fix on numbers so make sure you contact us on secretary@nsscc.com.au so that we can plan the day properly

Details of location and time etc. will be published over the next few weeks

UK To Raise Highway Speed Limits to 130km/h

Regular readers of our eMag would know that we often highlight our concerns with bureaucracy and red tape, revenue raising, stupid road rules or nanny state regulations. So it is only fair that we also highlight what appears to be a positive step for bureaucracy in the UK, with their Department of Transport proposing a raising the motorway speed limits from 70mph (~112km/h) to 80mph (~129km/h) in what appears to be a win for simple logic.

The reason? The Transport department's press release says:

"Vehicles have changed dramatically since the current national speed limit was set in 1965. Technological advances mean that cars are significantly safer then they were - contributing to a fall of more than 75% in the number of people killed on British roads since 1965. That is why the Government feels it is now time to look again at whether the speed limit set in 1965 is still appropriate."

Car enthusiasts would surely feel a great sense of happiness when reading that paragraph. It's contrary to the typical attitude taken by the state operated transport departments here in Australia, which continuously insist that speed cameras are the reason for the reduction in the road toll.

The UK Department for Transport is instead going to focus some of its efforts on drink driving and removing uninsured drivers from the road, a noble cause. According to research conducted in the UK, raising the motorway speed limit would give the country a much need economic boost, worth hundreds of millions of pounds per year from the time saved travelling.

It's fair to point out that as it stands today, 49 per cent of all UK drivers already break the 110km/h speed limit anyway. According to the press release, raising the speed limit would help "millions of otherwise law-abiding motorists" be brought back inside the legal limit. Helping restore "the moral legitimacy of the system".

"I want to make sure that our motorway speed limit reflects the reality of modern vehicles and driving conditions, not those of 50 years ago. While we must ensure that our roads remain among the safest in the world, we must also consider the huge economic benefits that can be created by shortening journey times." Philip Hammond, the UK Transport Secretary, said.

But wait, there's more! Not only will the speed limit be raised to 130km/h, but truck speed limits will remain lower, essentially forcing them to remain in the slow lane at all times. Perhaps when Philip Hammond could give some advice and the UK reserach to our governement, and we could have a real discussion in this country too.

Politicians love popularity and votes, and this is looking like a winner for the government in the UK. Are any Australian politicians listening? Perhaps a national motorway speed review and reform woud not only be popular, but beneficial as well? Let your local member know your thoughts!

Sources: UK Department of Transport, Car Advice

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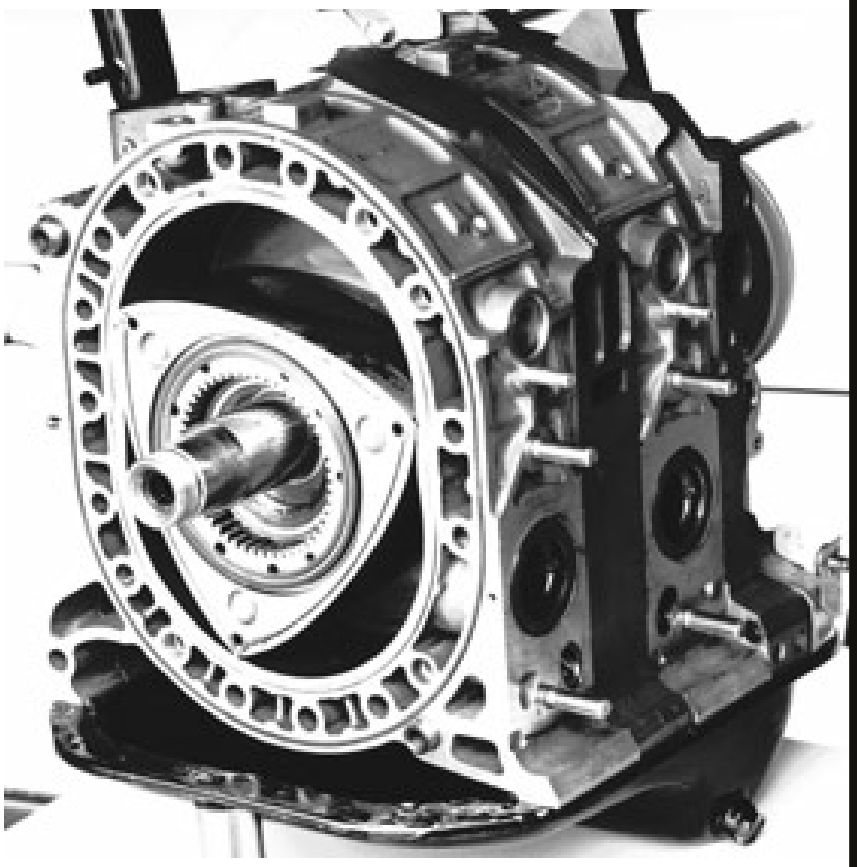
Is The Rotary Engine Dead?

Mazda has confirmed that the RX-8 will end production in mid-2012, with speculation that the RX-8 demise was largely due to tougher emissions standards resulting in the end of the unique Wankel rotary 1.3-litre powerplant. With the RX-8 the only car currently manufactured, does this also spell the end of the Wankel rotary engine?



With other manufacturers using turbo-charged small capacity diesel or petrol engines delivering good fuel economy, low rpm torque, high reliability and good power levels, is it too surprising that the future of Wankel's engine looks uncertaing with its poor fuel economy, low torque, questionable reliability and the requirement to rev the engine hard to get it working?

However, a Twitter posting from the Japanese car maker's PR team overnight suggests the Rotary engine may get a new lease of life.

"Thanks for all your messages of support about the RX-8 and the rotary engine - we're all so thrilled at the response," the post says. "Mazda is aiming for a breakthrough with its Skyactiv technology and is dedicated to bringing a new generation of rotary engine to our new models. We look forward to your support in the future."

Mazda's Skyactiv technology includes a new generation of more fuel-efficient petrol and diesel engines, as well as gearboxes that are designed to eke even better fuel economy out of each drop of fuel the vehicles use. It also includes more use of lightweight design throughout the cars to help cut down on the amount of effort the engines need to get things moving.

Speculation now turns to which vehicle will wrap around the new rotary engine.

Using the current MX-5 two-door convertible as a base, the freshly fettled RX-9 is believed to be dumping the RX-8's four-door layout - the rear doors open backwards to provide access to the two cramped rear seats - for a more conventional coupe shape.

Rumours are rife, too, that the RX-8 replacement will address one of the current-generation car's biggest problems - high fuel use and CO2 emissions that in Australia officially range as high as 12.9L/100km and 308g/km - by adding the ability to run on an alternative fuel.

Mazda is already working hard on hydrogen fuel as a means of powering future vehicles, with the RX-8 a testbed for a dual-fuel version of the vehicle, able to run on either petrol or hydrogen gas. Reports suggest that lessons learned over the last decade of hydrogen fuel testing will be incorporated into the new RX-9, due about 2013.

See the Technical Reading section below on more information on how the Wankel rotary engine works.

Sources: Mazda, Twitter, Drive

The Wankel Rotary Engine

The idea of a rotary engine has intrigued engineers and inventors since the beginning of the internal combustion engine's inception. Sparked by another industrial revolution, the need for efficient and feasible technological inventions brought the internal combustion engine into the 1900's spotlight. However, due to the rotary combustion engine's working principles, few engineers could overcome its challenges and in the end only one car manufacturer managed to achieve volume production. This article will focus mainly on that car maker and its successful Wankel engine design.

A Short History of the Rotary Engine

Well, in the beginning the first engineering approach was obtaining an engine architecture different than the one of the reciprocating internal combustion engine. And the first one to built and patent such an engine was Felix Millet in 1888. Millet created a 5-cylinder rotary engine built into the spokes of a bicycle's rear wheel. His power unit design was later put into production by Darracq in 1900.

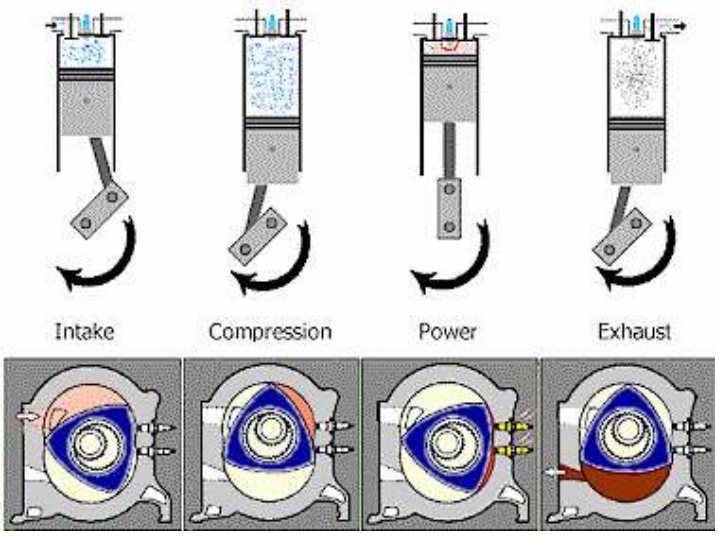
The early types of rotary engines had an odd number of cylinders displaced in a radial layout (usually 7 or 9 cylinders as this odd configuration resulted in smoother running thanks to its piston firing sequence). Starting from this design, at first the engine had a fixed cylinder block which directly rotated the crankshaft placed in the center and was called a radial engine. Now with a propeller fixed to the spinning crankshaft, the radial engine witnessed broad implementation in the aircraft industry.

However, this radial engine design raised a cooling problem, especially when operating stationary, as the cylinder block didn't receive sufficient air flow. The solution for this cooling problem came in the form of reversing the role of the rotating piece from the ensemble, meaning the crankshaft was now bolted to the chassis and the propeller spun with the whole cylinder block. And this gave birth to the rotary engine. The upside to this was the fact that the engine's cooling was improved, but the downside was that the aircraft became unstable and harder to control.

By the early 1920s, the rotary engine (which saw application mostly in the aircraft industry) became outdated and interest for continuing development of this type of engine plummeted. But all was not lost for the rotary engine as German engineer Felix Wankel invented a rotating design in 1957 that used a triangular shaped rotor spinning inside an oval-like housing. Because the design doesn't use pistons like a reciprocating unit, Wankel's rotary combustion engine is regarded as a type of pistonless rotary engine. Research about rotary engine designs really took off in the 1960s, but only Japanese car maker Mazda managed to successfully modify it and integrate it into the brand's identity, being the only car maker able to reach mass production.

How does it work

Wankel's rotary engine is an internal combustion engine which uses the same principle of converting pressure into rotating motion, but without the vibrations and mechanical stress at high rotational speeds of the piston engine. Dr. Felix Wankel and his colleagues obtained the engine's housing design by completing the following steps: they first fixed an outer-toothed gear on a white sheet and interlocked it with a larger inner-toothed gear; with the ration between the two gears being 2:3. Next, they attached an arm with a pen on the outside of the larger inner-toothed gear. When turning the inner-toothed gear on the small gear, the pen generated a cocoon-shaped trochoid curve.



The Wankel engine works in the same 4-stroke cycle as the reciprocating piston engine, with the central rotor successively executing the four processes of intake, compression, ignition (combustion) and exhaust inside the trochoid chamber. So, although both types of engines rely on the expansion pressure created by the combustion of the fuel-air mixture, the difference between them derives from the way they harness it to transform it into mechanical force. In a rotary combustion engine, this expansion pressure is applied to the flank of the rotor. Because of the rotor's triangular shape, the inside space of the housing will always be divided in three working chambers. This is fundamentally different from the piston engine, where the four processes take place within each cylinder.

Wankel's original design had an outer-toothed gear with 20 teeth, while the larger inner-toothed gear had 30 teeth. Due to this gear ratio, the rate of turning speed between the rotor and the shaft is defined as 1:3. This means that while the smaller gear does a single revolution, the larger inner-toothed gear rotates three times. Because the eccentric shaft, which is analogous to a crankshaft in a piston engine, is connected to the smaller toothed-gear it means that with the engine running at 3,000 rpm, the rotor will run at only 1,000 rpm. This not only means the rotary combustion engine runs smoother, but it also allows achieving a higher redline.

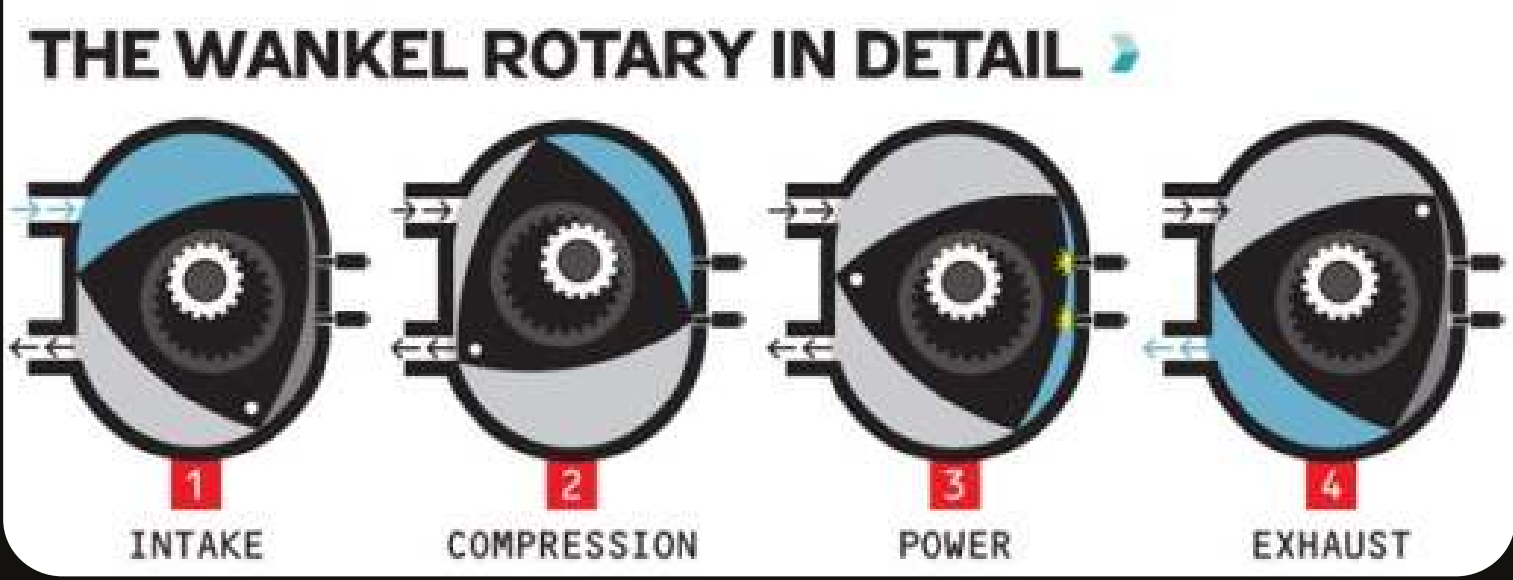
The displacement volume of the rotary engine is usually expressed by the unit chamber volume and by the number of rotors (eg. 654cc x 2). The unit chamber volume represents the difference between the maximum volume and the minimum volume of a working chamber, while the compression ratio is defined as the ratio between the maximum volume and the minimum volume.

The Pros and Cons of the Wankel Engine

The first things in favor of the Wankel engine are its small size and lightweight construction. This can prove crucial when designing a lightweight car with high power output and small engine displacement. It also allows for improved collision safety designs, more working space for aerodynamics or stowage compartments and better weight distribution.

The second favorable trait of the rotary combustion engine is its flat torque curve characteristics throughout the whole speed range. Research results showed that using a two-rotor configuration, torque fluctuation during operation were at the same level with an inline 6-cylinder reciprocating engine, while a three-rotor layout proved smoother than a V8 piston engine.

Other advantages of the rotary combustion engine are its simple structure, reliability and durability. Because there are no pistons, no rods, no valve actuation mechanism, no timing belt and no rocker arm the engine is easier to built and requires far fewer parts. Also, because it lacks these components the Wankel engine is more reliable and durable under high-load operations. And remember, when the rotor engine runs at speeds of 8,000 rpm, the rotor (which is the large part of the ensemble) is turning at only one-third that rate.



Disadvantages of the Wankel engine include imperfect sealing against the chamber ends, which counts for leakage between adjacent chambers, and unburned fuel mixture. The rotary combustion engine also has a 50% longer stroke duration compared to a piston engine. The engine's operation also allows for more carbon monoxide and unburned hydrocarbons in the exhaust stream, making it an obvious pariah among tree-huggers.

The biggest disadvantage, however, is its considerable fuel consumption. Comparison tests showed that a Mazda RX8 used up more fuel than a heavier V8 engine with over four times the engine displacement, but comparable performance figures. Another downside is the the fact that small amounts of oil end up in the working chamber and as a result owners must periodically add oil, increasing the running costs.

Mazda's Contribution to Wankel's Engine

Mazda introduced the world's first twin-rotor rotary engine car in May 1967 with the Cosmo Sport/Mazda 110S model. It featured a 491cc x 2 Wankel engine that developed 110 hp at 7,000 rpm. In 1970 Mazda introduced the first automatic transmission on a Wankel-powered engine and three years later the world's first pick-up truck with a rotary engine.

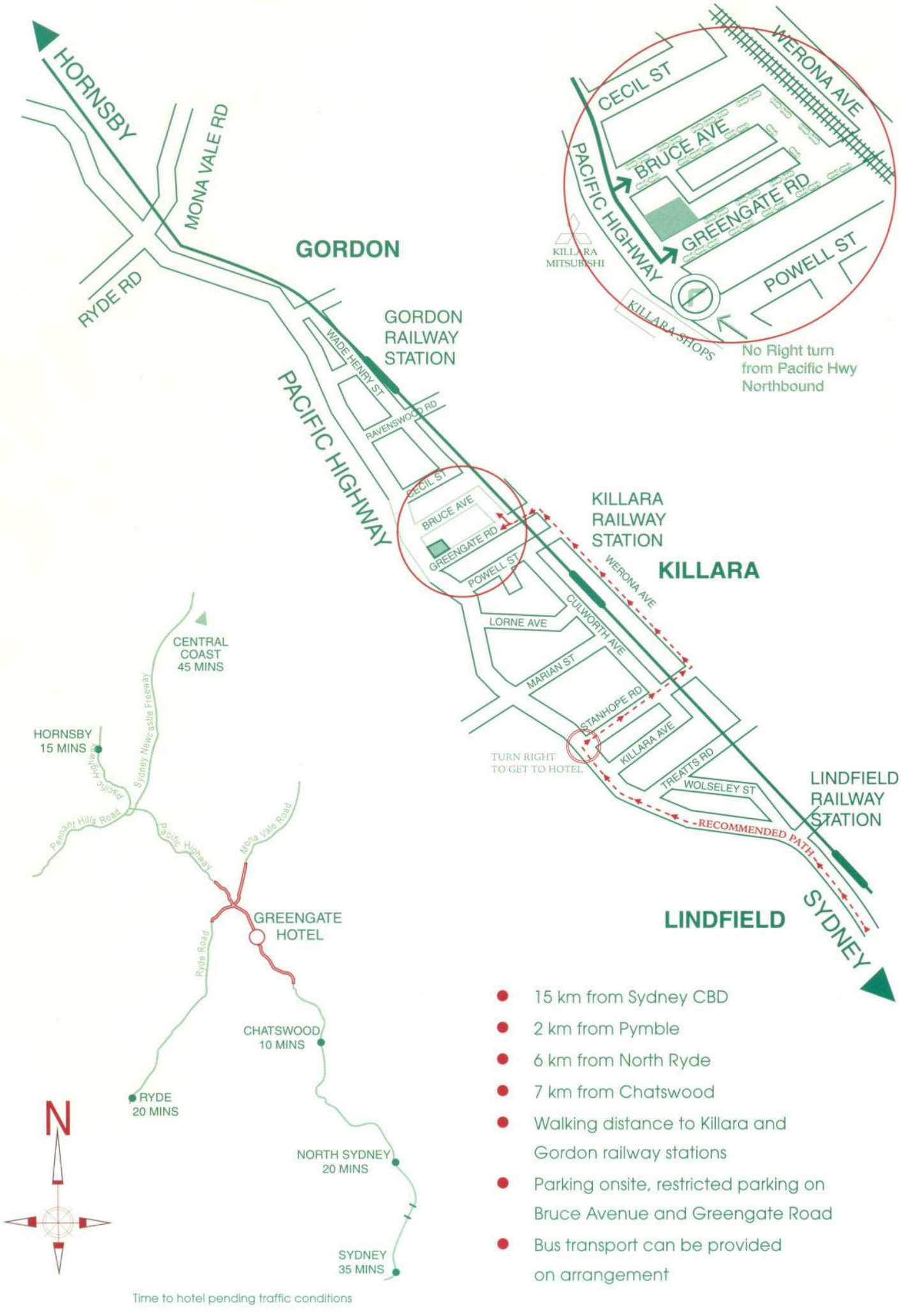
After implementing the six-port induction system for greater fuel economy and power, Mazda continued developing the rotary combustion engine in order to achieve low emissions. The six-port induction system featured three intake ports per rotor chamber and could achieve improved fuel consumption by controlling them in three stages. Another noteworthy development was the implementation of a two-stage monolithic catalyst.

The next era in Mazda's evolution of the Wankel engine was marked by the introduction of the turbochargers. In 1982 the Cosmo RE Turbo went on sale as the world's first rotary engine car equipped with a turbocharger. Building on that achievement, Mazda would later adopt the twin-scroll turbo, minimizing the engine's turbo lag.

However, the key innovation from Mazda came with its presentation of the RENESIS engine, which stands for the GENESIS of the RE (Rotary Engine). RENESIS is a 654cc x 2 engine that generates 250 hp at 8,500 rpm and 216 Nm of torque at 5,500 rpm. Besides its smooth engine operation and crisp response, the RENESIS engine achieves vast improvements in terms of fuel efficiency and exhaust gas emissions. Mazda's RENESIS won the International Engine of the Year and Best New Engine awards in 2003. Inspired by its international success with the RENESIS, Mazda presented a new Wankel engine capable of running on both hydrogen or petrol. However, this hydrogen RE engine didn't manage to raise as much interest as the petrol powered one, possibly down to the lack of hydrogen-based infrastructure at the time. On May 2007, the Japanese car manufacturer Mazda, celebrated 40 years of developing work on the Wankel engine.

The next-generation RENESIS rotary combustion engine is already in development and made appearance with Mazda's Taiki concept car. The next-gen engine promises a larger displacement of 1600cc (800cc x 2) which is expected to raise torque at all engine speeds and to increase thermal efficiency. But despite progress made in terms of exhaust gas emissions, power output and working chamber sealing, the Wankel engine may still struggle with oil and fuel consumption due to its specific functioning design.

Sources: Wikipedia, Auto Evolution, Popular Mechanics



- 15 km from Sydney CBD
- 2 km from Pymble
- 6 km from North Ryde
- 7 km from Chatswood
- Walking distance to Killara and Gordon railway stations
- Parking onsite, restricted parking on Bruce Avenue and Greengate Road
- Bus transport can be provided on arrangement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Train Line
Bruce Avenue
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Carpark open only during hotel trading hours from
Sunday | 10am - 10:30pm
Monday - Tuesday | 10am - 11:30pm
Wednesday - Saturday | 10am - 12:30am
Bruce Avenue
Greengate Road
exit
NO ENTRY
Adjacent Underground Carpark
entry ONLY
Greengate Hotel
NO RIGHT TURN
Pacific Highway
To Gordon
To Lindfield

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