





4

STROKES

In Hindsight, Cleaner & Better In Every Way

It's nearly ten years since Honda Marine released the 75/90hp pigeon pair of 4-stroke outboards in Australia, and the 4-stroke revolution began. With these two engines came a new era in recreational boating. Our first officially "clean" outboards, the Hondas also offered unparalleled fuel efficiency, engine smoothness, reliability and longevity. For boating consumers everywhere, the 4-stroke revolution couldn't begin soon enough.

In this special report, editor **Peter Webster** looks back over nine turbulent years of 4-stroke evolution.

Although it's nearly 10 years since Honda released their 'clean' BF-75 and BF-90 4-stroke engines, it has actually taken a lot longer for the 4-stroke revolution to consolidate its position in the marketplace.

Two-stroke dealers across Australia mounted the fiercest, most vitriolic campaign against the 4-stroke movement that's ever been seen in this country, and it was pretty damned effective.

However, slowly but surely consumer curiosity started to over-ride dealer scepticism, as the many practical advantages offered by the 4-stroke outboards became increasingly apparent – even to the first time consumer.

Honda Marine certainly spearheaded the initial assault on the 2-stroke bastions headquartered in Sydney (OMC – Johnson, Evinrude) and Melbourne (Mercury, Mariner).

For a tiny little operation, Honda's fledgling marine business created a surprising impact across Australia, as consumers clamoured to know more about these new "clean" engines.

Initially, Honda only offered a very small range of outboards, including (mainly) the 15hp, 25/30hp, 40/50hp, 75/90hp outboards, and 12 months later, the 115/130hp series.

***Time Out:** In fact, Honda Marine had been manufacturing smaller 4-stroke outboards since in the early 1980's, but nobody took them seriously prior to the release of the BF-75/90 in 1995.*

Many local dealers, egged on by the 2-stroke multinationals, hammered the new Honda 4-stroke outboards, claiming they were too heavy, more expensive to buy, too slow 'out of the hole' etc.

But their arguments fell on increasingly deaf ears.

Telling Australian boating consumers that Honda was some sort of backyard organisation, was never going to work, although the American multinationals actually thought it would. This too, in the Wayne Gardiner, Mick Doohan GP 500 era.

That Honda Marine had based their BF-90hp outboard on the Honda Civic engine block and cylinder head (and the Honda Civic is one of the biggest selling cars in automotive history) was

largely ignored by the American 2-stroke outboard manufacturers, but was taken onboard almost overnight by the local trailerboat owners.

Honda automotive's legendary reliability, service and back up was deeply entrenched in the Australian psyche long before Honda Marine ever produced its first big outboard.

By the end of the 1998 Show season, Honda Marine's singular 4-stroke push was boosted when Yamaha released a superb range of 4-stroke outboards too, notably the 15hp, 25hp, 40hp, 50hp and later, the 80/100hp and 115hp 4-stroke.

Yamaha's involvement in 4-stroke engines was pivotal for the ultimate success of the 4-stroke movement.

Honda Marine is a very small player

Asia and the South Pacific, let alone the widest spread of dealers throughout Australia and New Zealand.

Apart from the logistics involved, Yamaha had another big factor working in its favour – hardly anybody, out there 'on the street', doesn't like Yamaha.

Yamaha 2-stroke engines have always been extremely popular with boating consumers, as they've offered lightweight, reliable performance for many, many years. Although some of their 2-stroke engines are now a bit long in the tooth, that doesn't take away anything from their performance, reliability or importantly, their relative cheapness to purchase.

Into this market then, Yamaha introduced its own line-up of 4-stroke

Pages from the history books . . . Below: F&B's 1996 Haines Signature 702 Walkaround was one of the first twin installations of the Honda BF-90's in Australia, and was our first introduction to the world of big 4-strokes.



in the marine world, and they only produced half a dozen models in the early stages of their 4-stroke vision. Worse, they had glaring gaps in their model line-up, so it was fairly easy for the 2-stroke multinationals to roll them over, and keep the Honda 4-strokes in the back of mainstream dealer showrooms.

However, Yamaha introduced a completely new tier of professional activity when they brought their sweet-running Yamaha 4-strokes on line.

To begin with, Yamaha has the biggest network of dealers in the S.E

outboards.

Within months, boating consumers everywhere had a choice of two brands of 4-stroke outboards – the refined, elegant (but sometimes hard to find) Honda product, and the Yamaha 4-stroke range available from dealers from one end of Australia to the other.

Where Honda had been seriously restricted by its lack of dealerships, no such constraint affected Yamaha. Better still, by offering the consumer a choice of either 2-stroke or 4-stroke Yamaha outboards on the same showroom floor, intelligent discussion and debate was

finally happening between dealers and their customers. Importantly, too, the dealer could sell either way – and win the business.

Not surprisingly, Yamaha's share of the market accelerated rapidly as they pulled outboard business from both sides of the table.

Two Stroke EPA Problems

This wasn't unique to Australia. It was happening all over the world.

In America, the cracks were starting to appear in the mighty OMC Corporation's armour, and worsened rapidly when the first of their band-aid engineering jobs – the FICHT outboards – started to fall apart.

The two big American multinationals, the OMC Corporation

nationals, OMC and Brunswick, both tried to adapt their existing 2-stroke engines to meet the new CARB legislation, and similar legislation being mooted or introduced around the world.

Going down this road proved to be a disaster for both U.S. outboard manufacturers.

Both companies pursued sophisticated technical solutions (in the form of "direct" high pressure fuel injection systems) to clean up their "dirty" two stroke outboard engines to meet the progressively harder, clean air legislation. In the end, the increasingly desperate techno-race to meet the tough new emission standards, led to the \$2.5 billion international collapse of the OMC organisation, and cost

stroke technology for outboards in the early part of the 1990's. Indeed, Honda and Suzuki had been building lightweight automotive 4-stroke engines many years before then.

With typical Japanese vision, and the ability to invest vast sums into long term projects in a way that seems to defy western capitalism, the Japanese read the cards perfectly for the next millennium.

They knew 4-strokes were going to be needed by the end of the century, and would become mandatory in the early part of the new century.

Today, we are seeing the benefits of their investment in future technology, and their ability to 'read the tea leaves'.

Suzuki has switched across to

Below: The photo credited with launching a 1,000 plate boats across Australia - Ruth Cunningham climbs back on to F&B's charismatic 22' JBS "Genesis" off Gould Island in north Queensland. The Honda 90's were hugely successful in this role, combining 15-16 l/ph @ 4,000 (ea) cruise economy, with solid torque and absolute reliability.



(Johnson, Evinrude) and Brunswick (Mercury, Mariner) were put in a terrible position in the early 1990's when their own (Californian) legislature brought down the now famous Californian Air Resources Board (CARB) legislation.

Principally designed to tackle Los Angeles' horrible smog problem, the controversial legislation involved a massive reduction in allowable hydrocarbon and NOx emissions over the 10-year period 1996 to 2006.

Instead of seeing the writing on the wall, the two American multi-

Mercury Marine many millions of dollars.

Japanese Success

Whilst the Americans remained in denial and concentrated on shoring up their multi-national, colonial-style empires in the mid 1990's, the big three Japanese outboard companies, Yamaha, Honda, and Suzuki, were developing ultra-reliable, economical, "green" 4-stroke engines that would meet and/or exceed any known or proposed emissions legislation right up to 2008. They were all pursuing 4-

virtually all 4-stroke manufacture, and is expecting to phase out all 2-strokes completely within years.

Yamaha's 4-stroke production is now overtaking their 2-stroke production, whilst Honda has never produced anything other than 4-stroke outboards.

As we enter the summer of 2004-5, Australian boating consumers have a good range of highly competitive 4-stroke engines from three major Japanese companies available to them. And yes, there are still plenty of 2-strokes available, too.

However, from the writer's

viewpoint, apart from some cash savings that might be had with the purchase of older style 2-strokes, it's hard to support or rationalise the purchase of 2-stroke engines in the face of the engineering excellence we are now seeing from the Japanese outboard manufacturers.

History has now confirmed 4-strokes are

- At least 33%-50% more fuel efficient at most cruising speeds.
- They are up to 80% more efficient at trolling speeds.
- They don't use any outboard oil in the fuel (a huge saving in \$\$\$).
- The tiny little 4-stroke engine sumps are only changed every 100 hours (usually).
- The old oil is disposed of away from the marine environment.
- In their normal operation, they don't smoke at all.
- They are so quiet at idle one can scarcely hear them running.
- They are all just about vibration free.

All the 4-strokes meet the current U.S. EPA rules, mainly because 4-strokes don't have oil mixed in with the fuel.

Once a boatowner has experienced a 4-stroke, international experience has shown they never willingly go back to 2-stroke engines, no matter how refined the 2-stroke has become. Especially when the issue of reliability is taken into account.

There is no better evidence of this that everyone can plainly see just by observing how Australia's commercial fleet – fishing boats, crabbers, oyster barges, dive boats, party boats (etc) have all switched across to 4-stroke to replace their original 2-stroke outboard(s).

Oz Legal Situation

Australia does not have emissions control legislation yet, but the NSW Government's Dept of Environment and Conservation has just handed down an extremely comprehensive and well researched report ("**Measures To Encourage The Supply And Uptake Of Cleaner Marine Outboard Motors and Personal Watercraft – November 2004**") outlining the issues, the methodology and the benchmarking that will be required when – not "if" – the NSW government introduces the necessary

emissions control legislation. In its conclusion, the report's authors observe (in part)

"Reducing emissions from outboard motors and watercraft owned by the general public will require:

- *A rapid reduction in the sale of two stroke carburettor engines and a commensurate increase in the uptake of cleaner engines that comply with recognised standards;*

- *Consistent messages from manufacturers about the emission standards their engines comply with (so consumers have the ability to interpret claims about environmental performance); and*

- *Increased consumer awareness about the relationship between air quality and outboard motors.*

There are a range of voluntary measures operating in different product categories to increase the supply and purchase of cleaner products. These include industry Government agreements to increase sales of cleaner products, labelling schemes, web-based consumer guides and purchasing policies... "

The 2-Stroke Alternative

Mercury is still manufacturing 2-strokes, and more recently the Verado series of 4-strokes. However, it's hard to see the Verado range at this stage coming down into Mum and Dad land, especially when they are so expensive, and further, when there are so many questions marks hanging over the veracity of supercharging lightweight outboard motors in a recreational, much less a commercial environment.

Looking back with a historical perspective (better known as "hindsight") one must observe that the Americans' pursuit of high-pressure direct injected 2-stroke outboards has been less than successful.

For the OMC Corporation, the development of FICHT direct injection system brought the entire organisation down in a \$US2.5 billion-dollar global collapse. The hastily developed and poorly researched FICHT outboard engines went 'bang' all over the world, and virtually wiped the company out within two years.

Mercury Marine did not escape unscathed, as they too have experienced fearsome problems with their larger, 3.0L Optimax engines. They've had to face class actions in

various parts of the world as consumers sought relief from problems they've experienced with the direct injected 3.0l engines. Interestingly, the small block 2.5L Optimax seem to have escaped the problems that have affected the 3.0L model.

Time Out: *It's important to stress that both Mercury and Yamaha have done a good job standing by their product in Australia. Apart from acknowledging they have both had an unacceptable level of technical problems with their big direct-injected engines, there is no question that they have been other than 110% supportive of the dealers or consumers.*



Nevertheless, the (now) historic facts must be faced. The development of high pressure direct fuel injection systems for 2-stroke outboards by the big three – OMC, Mercury and Yamaha, has resulted in one of the most trying periods the international recreational boating industry has ever experienced, with losses and costs running into billions of dollars right around the world.

Reliability Issues

In the meantime, Honda Marine,

easily the smallest player in the outboard market (although they're part of one of the biggest companies in the world) has just been plugging away in Honda's time honoured fashion. Nobody has a better reputation for longevity and reliability than Honda and the growing legion of Honda fans across Australia (and indeed, around the world) attest to the phenomenal reliability of the Honda range of outboards.

F&B is aware of many cases where the Honda BF-90 has exceeded well in excess of 2,000 hours without a drama, and with no more service than the oil and plugs being changed at 100 hour intervals.

fundamental to the Honda philosophy. The writer remembers meeting the Honda R&D people back in the mid-1990's and being extremely impressed by the dedication of the young engineers. They were making sure that the Honda engines were so "under-stressed" and "virtually asleep" in terms of their power rating, the engines were almost guaranteed to go forever.

"There is no way we are going to let Honda Marine, our very small outboard division, have a detrimental effect on our world ranked car automotive and racing business," the quietly spoken Japanese engineer in charge of Honda R&D, explained to the writer "We have to make sure these

are the most reliable marine engines ever built."

Four-Stroke Today

Honda, Yamaha and Suzuki now have a wide range of 4-stroke engines to consider, and as new engines are released, the second and third generation 4-strokes are getting lighter and more powerful – so much so, some of the new releases offer higher power to weight ratios than equivalent 2-stroke outboards.

In each manufacturer's range of 4-strokes, a number of engines stand out for their exceptional combination of power, weight, and fuel efficiency.

Let's take a look at these exceptional 4-strokes.

Honda

Honda will remain a long term favourite, of that there is no doubt. They make a number of engines which have earned the previously identified reputation for reliability and performance – with the highlights including the remarkable, 93kg BF-50 outboard and the ever lovin' BF-90 which the writer believes will go down in history as one of the most reliable, fuel efficient 4-stroke outboards ever made.

Honda have also enjoyed a great deal of success in the Search and Rescue area with their Honda 225hp V-Tecs. These are fast becoming the by-word for SAR use in many parts of Australia and have been adopted willingly by the commercial sector looking for Honda's famous reliability.

More recently, they developed and released their 135/150 in-line 4 cylinder engines that appear to take this class of outboard to another level, and especially in the 150hp category where the V-TEC principle has been applied once again.

Over the years, F&B has trialed many Yamahas and used them in several major project boats. One of our all time favorites though, is the Yamaha 115 hp 4-stroke on the pretty Runaway 6000. This was (is!) a truly magic combination. Below: We're just putting together our latest venture with Yamaha, featuring the brand new EFI Yamaha 60hp 4-stroke installed on our 475 Trailcraft for a long term project commencing in 2005 and running through until 2007.



The Honda 50hp in particular, is an exceptional engine with a reputation for longevity that is only matched by its bigger brother, the BF-90. But the little BF-50 just goes on forever, with a number of mackerel fishermen in central Queensland running well in excess of 2,500 hours of regular use since they were first introduced back in 1996! And in houseboat usage, many of the Honda 50's have completed more than 5,000 hours of regular usage with only normal maintenance.

This is music to Honda's ears – and



These engines are exceptionally economical, and whilst they're pretty much on a par with the new Yamaha 150's, both engine brands are offering extremely high levels of fuel efficiency and reliability. This puts the consumer in the box seat when the time comes to make a choice – either way, the consumer can scarcely go wrong.

F&B magazine has purchased two of the new 220kg 150hp Honda V-TECs primarily because of the exceptional high amperage offered by the Honda alternators – we've confirmed with the engineers in Japan that even at 1,000 revs, we get an output of 35 amps from these smooth, silent 4-stroke engines, and with two of them, that is a

F&B magazine has always maintained a policy of incorporating as much of the latest technology, gear and equipment into our field test programs as we can - and working closely with the leading manufacturers in product development. Here, the outstanding 60hp Yamaha 4-stroke has been packaged with the Horizon 4900 Family fishing cuddy F&B developed for this project. Although this boat went on to live in Yamba NSW, the model was so popular, it has been in continuous production from the Horizon team ever since.

series, or 15/20hp outboards, for example) but the release of the mid-size 160-180 hp outboards next year, will certainly round out the range even more.

The most exceptional engine in the range is their 4-stroke, 2044cc 16 valve, dual overhead cam (DOHC) 140hp (in-line 4) outboard that weighs a remarkable 186kg for the long shaft (20") model.

This 140hp engine is actually lighter than its 90hp or 115hp cousins.

Needless to say, it has blitzed this end of the market and is said to be the biggest selling engine in this class in Australia today.

Close behind it as a class winner



phenomenal output approaching 70 amps per hour from a twin installation. Who needs a gen set with an output like that?

Given that we are exploring in some considerable depth the advent of the new technology refrigeration and freezer systems, combined with modern boating aids such as microwaves, entertainment systems, let alone big colour sounders and radar, our interest in this area was tweaked as much by the electrical power output of the new Honda 150's as it was by their freaky, 20-22 l/ph @ 4,000 r/min fuel

consumption.

F&B will be taking delivery of the new engines in the New Year when they are installed on our 2005-6 project boat, the Salty 27.

Suzuki

Suzuki has an excellent range of engines from 4hp right through to their magnificent 250hp turbine-like V-6. This engine is truly very close to the 'state of the art' in outboard manufacture today.

They have a couple of obvious gaps in their line-up (much lighter 50/60hp

though is the awesome 3.6L, 24 valve DOHC Suzuki 250hp V-6 weighing in at just 268 kg for the 30" model.

This is quickly becoming the biggest selling V-6 outboard in this class in Australia.

Yamaha

Yamaha has a number of outstanding engines too, but at the top of the heap is their superb 60hp EFI (electronic fuel injected) 996cc, four cylinder (SOHC) engine – this beautiful engine is an absolute joy to use. It has blown all the other engines away in its class

because it only weighs 111kg wringing wet, and that puts it comfortably ahead of the legendary Honda (50hp/93kg) and streets ahead of the much heavier Suzuki (60hp/152kg).

So Yamaha dominate this vitally important section of the market. Why? Well, the biggest selling boats in Australia are all in this critical 60hp class. When you add up all the 4.35m - 4.95m tinnies being sold in Australia, and realise they all need 50hp - 70hp engines, you can get some perspective of just how many of these extra 'clean' engines Yamaha are selling, and will continue to sell in the immediate future.

Yamaha has also just released a

economical – (try 18 l/ph @ 4,000 r/pm) we've had nothing but outstanding reports from this engine in recent years.

Yamaha's 2.67L, in-line 4 cylinder 150hp/220kg is another superb engine only recently released and yet to have the impact Yamaha wanted it to have – and frankly, it deserves. However, it has been knee-capped by Suzuki's much lighter 140, which goes from strength to strength and tends to throw the more expensive Yamaha (and Honda) 150's into the shade. It really deserves a better outcome, but it's only a matter of time before the advantages of this excellent engine become better known.

alone the consumer's desire for reliability, fuel efficiency and longevity.

Certainly, looking back over the last nine years, with the wisdom of hindsight, there is no doubt the consumer has been best served by investing in 4-stroke technology with any of the big three original 4-stroke manufacturers.

The Japanese had the 4-stroke vision in the 1980's, and worked hard on the development of their 4-stroke engineering in the 1990's. Now consumers are benefiting as 4-stroke outboard sales soar throughout the world, and prices keep tumbling down.

In the near future, we could see 4-

Unusual shot of F&B's new 6.8m cat with the author in the tower shooting pics of the CruiseCraft 625 Outsider featured in F&B #101 a few months back. Jeff Webster was testing the CruiseCraft at the time, and with Danny Nicholls at the helm, 'fired back' with this pic! The heavily built, beautifully finished 2.5 tonne cat is powered by 2 x 140hp Suzukis for 36 kn performance. It's early days yet, but the Suzies are certainly easy to live with, and exceptionally economical, working around 18.0 l/ph (each) @ 4,200 rpm.



major mid-range series upgrade, installing electronic fuel injection on the 80/90/100 hp in line four cylinder (DOHC) 1596cc/172 kg engines.

Yamaha also have a very special engine in their 115hp 4-stroke – this is worth using if only because its Ford rally car heritage becomes evident as it peaks up into the higher rev range. Two of these engines on the back of a fast boat evokes images of rushing through some dark German forest with a Ford-powered rally car locked up and sideways! Truly, a fun engine to use, wonderfully reliable and exceptionally

Conclusion

Badge engineered engines aside, the main thrust of the 4-stroke world as far as the average Aussie boating consumer is concerned, stems from Yamaha, Honda and Suzuki as the original equipment manufacturers.

All three companies have well funded, properly researched and trialled development programs ahead of them. All three company's R&D people have no doubt outboard motors in the future will have to be 4-strokes if they are going to meet the foreshadowed EPA requirements, let

strokes being offered for sale in Australia and New Zealand at the same price, or even less than their 2-stroke counterparts, especially as momentum builds up to drop 2-strokes altogether in favour of the infinitely "cleaner" "greener" and far more economical, 4-stroke outboard.

There's no doubt it's been a turbulent journey for the boating consumer, but at long last, it looks like the way forward is clear.

F&B