

POWER NEWS Magazine

Presents:

The Factory Superbike Spy



MotoMan

Viewer Feedback

MotoMan:

I appreciate the Power News E-mails !! As a matter of fact, I swear by your website. I'm an instructor at Motorcycle Mechanic's Institute in Phoenix, Arizona where I teach 4-stroke performance. Part of our curriculum covers head flow, flow benches and porting.

Needless to say, I've incorporated much of the info from Power News into my presentation (with the proper credit) and encourage my students to visit the site for additional information.

Again, many thanks for providing this information that some refuse to divulge or have a need to charge for.

Regards,
~Mr. Kohlbrecher

Hi Mr. Kohlbrecher !!

Thanks for giving Power News the "thumbs up" ... it's truly a great honor to be recognized by the MMI !!!!



Sincerely,
~MotoMan

Dear MotoMan,

Your website is fantastic and the information is the best available on the web. Thanx and keep up the good work,

~Stu

Dear Stu !!

Thanks for your feedback !!

I promise to keep working hard to keep it that way !!



Sincerely,
~MotoMan

MotoMan:

Your website is a total JOKE. It's unscientific, and unprofessional. This so-called "secret info" goes against all accepted theory about engines. You need to get educated before you write this garbage.

~Kent

Hi Kent !

Thanks for your feedback !!

Lots of people are skeptical of this information, because it directly opposes so many accepted theories. Don't worry, this is the normal process of **science**.

As always, I work extra hard to make each **NEW** issue better than the last. 😊

Hold on to your hat ... This Is The All New Power News Magazine !!

Sincerely,
~MotoMan

Breaking News:

Power News Reader Has **Never Ported A Cylinder Head Before;** Beats Famous Professional Tuner By **6.6 HP !**

Hey MotoMan:

OK, I race a 2001 Yamaha R6. Well, I just got my engine together and running when I found your web site. I read every page on the damn thing, ok I read it more than once a day for the past week.

So I called up my friend who has a portable dyno and ran the bike to him and ran it. The head was ported and polished by { *Famous Race Tuner -- Name Withheld* } Key word was ported and polished !!!!!

I've never ported a cylinder head before, but as I read Power News, it made total sense, so I ran into my bike room and yanked it back apart ... this was last Tuesday.

Well luckily I have friends at the local Yamaha shop... I used to be service manager there. So I got all the tools I didn't have. I got engine back together around 9 a.m. Sunday...

I just got home from the dyno and it gained 6.6 hp !!! ... all of my friends including many mechanics from my local area told me "sounds like it may work" but were still skeptical.

I had 101.3 before and I got 107.9 and the damn bike pulled till redline, I mean off the charts. Air temp was only 3 degrees colder today then last Tuesday when I dynoed it the first time and I ran the same gas that was in the tank from then also. The tech who dynoed it was like "what do I got to rip apart to do this !!!!!" HAHAAHAHAHAHAHA

Well thanx for all the help soon as you gimme great ideas for my exhaust, I'll be pulling it apart also keep up the great work !! Thanx for having faith in all of us to do this ourselves ... I can't believe I gained 6.6 hp !!!

~Anonymous Racer

(If you want to publish this letter, please keep my name anonymous, I don't want my

competition to
know about this.)

Hi Anonymous Racer,

Right On !!

It's great to see that people are benefiting
from Power News !!

Now that you've beaten { *Famous Race
Tuner -- Name Withheld* } by such a
massive amount of horsepower, you're
actually one of the best now ...



Sincerely,
~MotoMan



It's true, you could spend **\$50,000 dollars** on
one of these engines, and not
one modification will
gain as much power at all RPMs as
high velocity porting does !!

**Where else can you learn how to
mercilessly beat famous professional race engine tuners
all for the incredibly low cost of... (free) ???**



" It's **'unscientific'** it's **'unprofessional'** and perhaps **worst of all:**
" it goes against all accepted theory about engines..."

But, when real people go against the accepted theories and scientifically test this info,
they soon find out that they're beating the professionals !!

Welcome Engineers !

Since Power News began, I'm happy to say that engineers from 3 of the world's
major automakers, 2 construction equipment manufacturers, 1 world renowned
audio company, and even 1 motorcycle manufacturer (hint: orange & black )
have subscribed.

In this issue, we'll take an inside look at some advanced engine technology from
Suzuki, and I'm also going to introduce a concept which I call "Championship
Horsepower".

At the same time, we'll consider ways in which engineers can **increase** their
ability to
come up with **creative** new innovations.

**What if, like the Anonymous Racer above who gained 6.6
horsepower ...**

you're not an engineer ???

Consider this:

the moment we even *think* about modifying a motorcycle or car or snowmobile (or just about anything) from it's stock condition to increase performance ...

We All Become Engineers ... Yes, Even You !!

(Welcome Everybody !!!)



The \$ 50,000 Factory Superbike Engine !!

Caution:

Studying this engine may cause us to question some of the many common engine performance myths that have gone unanswered for a long, long time.

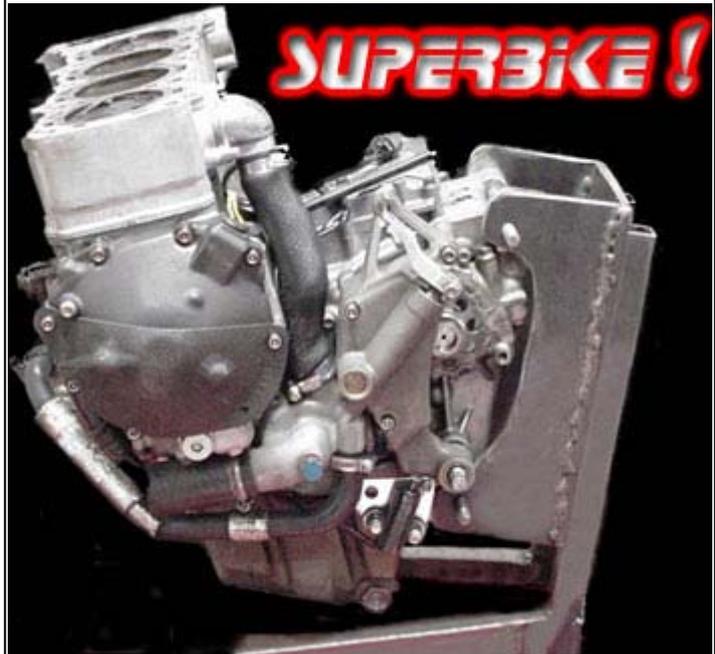
And, if we look really close, we may even find out that the factories aren't perfect !!

(A few gasps are heard in the audience)

Now, this can be a **huge disappointment** for those who refuse to let go of the power-**less** idea that the factory race teams are somehow "un-beatable"...

Or:.

It can be a **huge opportunity** to learn how to build more power-**full** engines... even better than the factory race teams do !!



'97 Factory Suzuki Superbike

Although Suzuki is using newer technology today, this is still representative of some of the most current tech on the racing circuit.

About The Engine

All of the engine photos on this page are from a superbike which was originally campaigned in the British Superbike Championship.

It was then purchased by a customer of **Fast Bikes** in Oslo, Norway. Last winter, **Fast Bikes** invited me to come over to do a Power News article about this engine as it went through a rebuild.

How could I say no ???



The 2003 European Supersport Champion *and* The 2003 Norwegian Supersport Champion both had their engines built at Fast Bikes AS !!

This is a place where "Championship Horsepower" is achieved.

Now let's imagine that we're in Mr. Kohlbrecher's Motorcycle Mechanics Institute class,
and
" pay close attention "



There will even be a test at the end of this article to see if you've noticed a **very subtle horsepower trick** which is fully visible in **2 of the photos** but it hasn't been pointed out in the text.

(Sharp eyes will find the secret clues.)

Note: All of the small (thumbnail) engine photos are "clickable" so you can see the more detailed larger version.

Inventions

When Thomas Edison announced his first successful light bulb,
another top inventor from the same era said:

"Such startling announcements as these should be deprecated as being unworthy of science and mischievous to its true progress."

~ Sir William Siemens, 1880

.....

... Then 15 years later, Thomas Edison had this to say about the possibility of airplane flight:

"It is apparent to me that the possibilities of the airplane, which two or three years ago were thought to hold the solution to the flying machine problem, have been exhausted, and that we must turn elsewhere."

~ Thomas Edison, 1895

.....

Oooops !!

if it had **only** been up to Sir William Siemens, we'd still be reading by candlelight,

and if it had **only** been up to Thomas Edison, we couldn't fly in airplanes.

.....

There's something peculiar about the way that all people think, when even these 2 creative geniuses and (mostly) open minded thinkers could make this same mistake ...

A "99.999 % open mind" is still 100% closed to all of the possibilities !!

It's true !!

How can **all** of the possibilities be considered if one's mind is closed off to even .001% of the possibilities ???

That seemingly teeny-tiny little .001% is actually a **huge barrier** to the inventive process and slows it waaaaaay down.

Since most great innovations are found where people least expect to find them, this area is in what I think of as "the .001% zone" !!

(The .001% Zone = Electric Light Bulbs & Airplanes, Smaller Ports, Turned In Exhaust Pipes & Hard Break-In !)

... so how can we speed up our inventiveness ???

What is it that makes creative inventiveness ??

It's a combination of 2 seemingly opposite qualities...

Artistic - Creative and Scientific - Logic.

<p>Think:</p> <div style="border: 2px solid blue; padding: 5px; display: inline-block;"> <p>Outside of the Box !!</p> </div>	<p>First, the right side of the brain generates a creative thought ...</p> <p>... then the left side of the brain uses logic to test it's validity.</p>
<p style="text-align: center;">Aha !!!</p> <p>When it's put this way, these "opposite qualities" suddenly aren't so opposite !!</p> <p>There's something about this statement which hints at the secret to how you can:</p> <p style="text-align: center;">"Think Outside Of The Box"...</p> <p style="text-align: center;">Can you see it ???</p>	

Consider the qualities that make up "Invention Intelligence":

Scientific - Logic Intelligence

As we learned in the last issue of Power News, **cognitive dissonance** can often subvert even the most highly intelligent people's ability to think logically.

Another way of saying this is:

Whenever new information pits the emotional mind against the rational mind....
emotion usually wins.

Not so with Mr. Spock !!!

	<p>In the '60's TV show <i>Star Trek</i> ... the adventures were different each time, but did you notice the one theme that remained constant ??</p> <p>If you boil down the <i>Star Trek</i> " formula " it was this:</p> <p>Mr. Spock didn't require the whole episode for the truth to gradually "soak in", the way his human counterparts Captain Kirk and Dr. McCoy did.</p> <p>In fact Spock instantly understood what was going on in a given</p>
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Mr. Spock
(Scientific - Logic)

situation !! The humans couldn't "see" it, despite their high levels of training and intelligence.

Why ?? Mr. Spock's advantage was that whenever he faced a tough challenge, he didn't go through the usual ego / fear battle, and so his mind was never distorted or frightened away from immediately seeing the exact truth.

My point is:

Spock wasn't any more intelligent than Kirk or McCoy !!

The only difference was that it was **impossible to fool his rational mind !!**

This seemingly small difference made Spock immensely more intelligent in the "real world" application of intelligence.

(which is all that really matters when you think about it ...)

(Of course "Spock" is a fictitious TV character. The lesson in this TV show is that even the smartest humans can have a huge "IQ" increase, just by practicing pure emotionless logical thinking the way Spock did.)

What was Mr. Spock's weakness ???

Far from being the "ultimate creative inventor", Spock's **strength** as a purely un-emotional logical thinker was his **weakness** as a **creative** thinker !! Whereas logical skills come from the left side of our brain ...

Artistic skills come from the "emotional" right side of our brain,
and are critical to **creating** new ideas ...

Artistic - Creative Intelligence

He had the absolute **coooooooooolest** mustache
the world has ever seen !!!



Salvador Dali

Spain's **Salvador Dali** "invented" surrealism, which is the really the juxtaposition of common, ordinary things in a new way that made the result quite **un**common and very **extra**ordinary.

Dali's genius was an amazing ability to put familiar things together
in a whole new way

(Artistic - Creative)

(This is the essence of invention)

Take a moment to unlock the creative (inventive) right side of your brain:

Although there are more famous examples of Salvador Dali's surrealism, I chose this painting because it also illustrates another, more subtle kind of intelligence.

As you look at the full sized version of this picture, you'll quickly notice that if you only look at the spheres in this painting, you can't actually see the "big picture" Dali has painted. Once you take the focus off the details, your brain easily fills in the blanks.

Think about the message here:

Like most things in life,
the harder you focus on all the little details,
the less you can actually see.

(It's impossible to see the forest, if you only look at one tree at a time !!)

Click Here :



Galatea of the Spheres
~ Salvador Dali

When both sides of our brain work towards a 50-50 balance, we get super intelligence.
but

When one side tries to dominate or fight the other side, we never see the "big pictures".

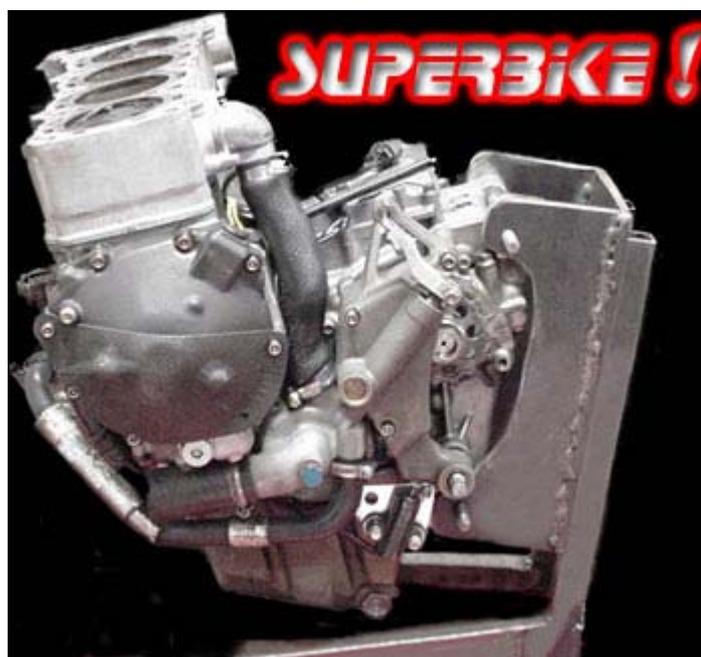
Here's a big picture:

"Wouldn't it be great to see **Harley-Davidson** get back into roadracing ???



I'm 100% sure that with a little help,
Harley can WIN !!! "

(so, let's take a little peek at what Suzuki's doing ...)



Wow ... O.K. let's go totally berserk and start ripping this motor apart to see all the cool trick parts !!!



That water pump is all magnesium !! Not exactly a mass-produced part...

The countershaft sprocket has been drilled to the max... 



Super light clutch actuator and magnesium cover !

Even the small bolt is aluminum...

Whoa, whoa, whoa ...not so fast !!!

It's easy to get excited and let our emotions take over.... we may be tempted to just rip into this motor to see what's inside.

What's the first logical thing we should always do before taking apart an engine ???

Hint: this was the subject of the most important, yet least "glamorous" Power News article.

(*Clean it 'til you can eat off of the parts*) !!



MotoMan eats his Cheerios out of a really clean engine oil pan !!

O.K... this is a \$50,000 engine, but even 1 speck of dirt in the internal parts of any engine is too way much dirt.

Practice this concept on the \$1000 engines, and someday you will be working on the \$50,000 engines !!!

Even Professional Race Mechanics Make This Mistake !!

Watch carefully at the next time you're at a superbike race, and you'll see that "clean" isn't usually a priority. You'll see it all ...dirty tools panicky mechanics setting oily clutch parts on the pavement, then putting them back into the enginesetting a greasy axle down and then running after it as it rolls away, only to re-install it with a fresh layer of grit ...

... and who can forget that famous line heard at racetracks all over the world:

" Oooops, I think a little dirt just fell down into the ports while I was tuning in the jetting ".
Ironically, there's often more power lost to dirt ruining the valve seal, than gained from re-jetting.

In addition to the massive power loss from friction and valve leakage that dirt particles cause, many preventable engine blow-ups and wheel bearing failures "happen" from not heeding this rule 100%.

I can't emphasize this enough:

Don't even disassemble or work on engines outdoors or in any dusty environment !!

Think surgery, no, think even cleaner than surgery. :)

Now we're ready to get out the wrenches wait a second, are they clean too ???

Pistons & Combustion Chamber Design

By making just one change in the design philosophy of the piston and combustion chamber, Suzuki engineers have reaped many benefits. In this case, it's not just one change that makes more power, but rather that one change then allows for the added synergy of many advantages.

This is the quality that distinguishes "genius" level design from "really good" design !
It's the ability to see the big picture...

A Quick Review of "Squish" Area

The purpose of the squish area in an engine is to force the fuel and air mixture into the center of the combustion chamber as the piston approaches the top of the compression stroke.

This motion keeps the fuel and air moving (and mixing) as the flame spreads through the fuel/air charge, and it also minimizes charge heat loss from the outer edge of the combustion chamber.

To maximize these effects, the squish area must match the cylinder head perfectly. The easiest way to do this is with flat squish area on the piston which easily matches the perfectly flat surface of the cylinder head, and this is how most production squish designs work.

The "Curved Squish" Design

These Cosworth pistons have a curved squish area on the sides of the pistons. The front and back use the traditional flat type squish areas.

It's much easier to match 2 flat surfaces, than it is to match 2 curved surfaces. Especially since 2 different companies (Cosworth & Suzuki) are making the components !!!



The curved squish areas are on the left and right raised sides of this piston. The flat squish areas are on the top and bottom in this picture.

I recommend numbering



The bottom of the piston.

Although these are very light pistons, they're not as light as some newer designs.

The curved shape of the piston matches the cylinder head angle very well. This is hard to do in a production engine, so that's one reason this engine is so expensive. The fact that these parts match as well as they do indicates a high level of quality control at **both** companies.

the pistons before they're removed from the rods, so they can't get mixed up.

(No, it's not an 11 cylinder, I just used roman numerals)



Notice the machined out area above the wrist pin boss ...

Cosworth really "Goes For It"



Here you can see **how** the fuel/air mixture is forced to the center of the chamber.

The red arrow on the left indicates the curve of the piston, the arrow on the right indicates one of the white spots where the piston is getting closer to the head than the rest of the curved squish area.



Here's the evidence that it worked ...

The darker center of the combustion chamber is where the burn is initiated. The 2 white spots are where the piston **lightly** touches the head at max RPM. The light brown outside areas are where the rest of the piston **almost** touches the head at max RPM's...

Here's an opportunity for more power !!

To Improve This Engine

The ideal situation is for the "white spot" to be in the entire squish area. That way 100% of the fuel/ air charge is forced out of the squish areas and into the center of the combustion chamber.

I'd start by sanding down the 2 areas of the piston that are creating the "white spots" by .001", and then tighten up the overall piston to head clearance by .001" (.025mm)

This kind of work is "blueprinting" each individual piston to cylinder head fit; beyond what's possible with even the most precise production standards.

Needless to say, it would be very "trial and error" to get an engine 100% right. The engine would have to come apart after it was run awhile, to see if the contact is correct, and then maybe a second clearance adjustment would have to be done to get it perfect.

Go For It !!



.001" is very small, just like the .001 percent zone.

99.999 % would say:

"That's way too much work, besides it's already close enough".

If you want to beat the factory teams, you can't afford to think this way !!

Hey ... wait a minute

Older "high dome" style piston designs increase the compression while

incorporating the squish effect also ...

So, you may be wondering ...why go through all this effort to accomplish the same thing ??

(That's a good question the answers reveal the genius of this design !!!)

The "Hidden" Benefits:

1) Un-Shrouded Valve

The valve flow is more open near the (side) edges of the combustion chamber, so the incoming fuel and air charge flows around a greater percentage of it's circumference !!

2) Less Surface Area

The combustion chamber and the piston are less convoluted. This is especially true of the piston, where a traditional "high domed" high compression piston adds a lot of extra surface area to the combustion chamber.

3) One Combustion Chamber

That's right ...with very high compression ratios, a "high dome" style piston effectively splits the combustion chamber into 2 halves as the flame is beginning to spread. This inhibits the flame travel and lowers combustion efficiency.

This design eliminates this problem by concentrating all of the mixture into one small uninterrupted area right around the spark plug !!



**Less surface area =
Less heat loss =
More power !!**

In keeping with this philosophy, you can see that the factory titanium valve is a flat-face type, not seen on most production engines. Again, this allows for a combustion chamber with less surface area.

The only production motorcycle engine that I know of that used perfect dimple-less flat faced valves was the '94 Kawasaki ZX6. The newer ZX6Rs use flat faced valves with a small dimple...

Money Doesn't Automatically Buy More Horsepower !!

Notice that this engine uses surface gap (non-electrode) racing spark plugs. These are brutally expensive ... they're around \$60-\$80 each !!

I once tested the NGK CR9EK spark plugs featured in the *2 Free Horsepower* article against these racing plugs in a '98 supersport GSXR 750, and we found that the off the shelf \$8 CR9EK's were actually better !!

It's possible that this engine requires this type of plug for piston clearance or other reasons, but it goes to show that just because it says "RACING" on the package, doesn't automatically mean it will make every engine faster.

Accurate Scientific Testing = the **best** way to find out the truth.
Reading The Package = the **worst** way to find out the truth.

"Break In Secrets Part 3" ...

In the *Future Horsepower* article, we found out some startling news

... in Japan, the manufacturers warm the brand new engines up and then blast them right up to redline at the end of the assembly line !!

Of course, this breaks all the "rules" they set in the owner's manuals !!

(I wouldn't be surprised if some non - Japanese motorcycle manufacturers run their new engines hard too ...)

A Little **Knowledge** Changes Everything

Fear of "severe engine damage" has long kept people from thinking about what actually happens inside of a new engine during it's first few hours of operation.

Suddenly, the premise of taking it easy on a new engine has a whole new perspective for Power News readers who are **in the know** about this situation.

V i e w e r F e e d b a c k

Hey MotoMan:

At the Harley factory in York, PA. they put the new bike on a dyno and run it for about 5 minutes at 75 mph.

~ B 68

Thanks B 68 !!



Sincerely,
~MotoMan

More Evidence:

This Factory Suzuki Superbike engine costs as much as 5 complete brand new bikes, and the entire bike costs as much as a nice sized house for a family of 4 ...

Yet the owner warmed it up and broke it in with hard acceleration and deceleration

according to the Power News *Break-In Secrets* article !!

Was he "Totally Crazy" or just "In The Know" ??

Dude, who stole the 2nd piston ring ????

No one did ... 🤖

To minimize friction, these pistons use only 1 compression ring instead of the usual 2 !!

This engine seals it's super high compression ratio perfectly well with 1 ring !!

Yet, without the "backup" 2nd compression/oil scraper ring, it would be an oil burner if it had been broken in "easy".

Plus, it would be a very slow bike ...



Only 1 Compression Ring !!

Like "magic" there is absolutely no scuffing or distortion on the piston...it looks almost brand new !!



.The cylinders are in perfect condition !!

Like "magic" there's no scuffing in the cylinders either !!

" Yeah, but it's a racebike and they don't go as many miles between rebuilds "

That's true, but consider this:

Anyone who's taken a lot of engines apart will agree that most street bike pistons & cylinders don't look this good, yet the average RPM most street bikes are run at is about 1/3 of the average RPM of this bike !!

After 2 seasons of ultra high RPM roadracing use ...

There's really no wear at all !!

The key to exceptional engine reliability is to first achieve an exceptional ring seal



Power & Reliability Are 100% Connected !!

Viewer Feedback

Hi MotoMan,

Thank you for the "damn the torpedoes, tell the truth till it hurts" approach on your site.

I wish the rest of the world would behave this way.

I have a question about the pictures you have of the two pistons in engines broken-in differently. [Note: these photos were featured in the *Break-In Secrets* & *Future Horsepower* articles] The one piston with obvious signs

of blow-by explains your point very well. The other piston shows no blow-by and that's OK, but I am mystified by the total lack of combustion by-product discoloration on the top of the piston. That piston looks like it was cleaned whereas the other piston was not.

How do you explain this?

Thanks for the great site !

~Alan

Hi Alan !!

Thanks for writing , you've brought up a great point !

The pictures of the pistons are un-retouched & the pistons themselves are un-cleaned or otherwise modified to make my points. It wasn't a freak occurrence either ... there are lots of pistons like this in my "collection".

I realize that these clean pistons seem almost magical ... kinda like "pulling a rabbit out of a hat", but I assure you that there's a rational explanation for it:

The rings seal so well that no significant oil ever reaches up past the top ring land, and it never even gets near the combustion chamber. Since the top ring doesn't allow combustion leakage below it, the heat and oil never meet ... there's no burnt oil !!!

There is carbon on the very top surface of the "clean" piston in the other articles, but it's only fuel carbon. You can't see it in the photos, because the piston is tipped to highlight the ring area, not the top (combustion chamber) surface of the piston.

There's also a very simple explanation as to why most people have never seen such clean pistons: most haven't broken in their engine this way !

They say a good magician never reveals his tricks ... (Oooops.)



Sincerely,
~MotoMan

Like Magic !!

The second compression ring on a piston also acts as an oil scraper, so this single ring superbike piston is seriously "handicapped" when it comes to oil control...

That's what makes it an even more impressive example of this phenomenon than the pistons in the original *Break In Secrets* article.

ABRA-CADABRA !!!



No burnt oil in the ring lands !!

After 2 seasons of racing,
there is a slight brown residue
developing
by the valve reliefs ...

Titanium Connecting Rods

Allow for increased **high** & **low** rpm power potential !!

The High Rpm Advantage

Super light titanium connecting rods allow a higher RPM limit, because the crankshaft isn't stressed as much. This might seem like a really big deal, until you consider that the engine is only at the maximum RPMs where Ti rods are required for a relatively short period of time during a lap of the racetrack.

Of course, the very lightness of these rods is an acceleration advantage. When you think about how fast these parts have to accelerate, stop and accelerate ... lighter reciprocating parts always do this easier and with less power loss. This could be called **"The Obvious Low RPM Advantage ..."**



Titanium Rod
is a
Work of Art !!

·
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·
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·

The Secret Low Rpm Advantage

Since steel rods stretch more than Ti rods do at high rpm, an engine using steel rods needs more initial piston to head clearance to keep the piston from hitting the head at redline. As a steel rod stretches, it's like the head is being "milled" .024" (.6mm) !!! That's right, the compression ratio increases considerably as the engine revs up ...
because of rod stretch !!

But, since Ti rods don't stretch as much, they allow for tighter initial piston to head (squish) clearance. This means that with Ti rods, the actual compression ratio will be higher at low RPMs than it is in a steel rod engine !!!

This means that anytime the bike is accelerating it has this advantage. Note that during a race, this condition exists for a lot more time
than max RPM does !!

Here's the catch ... most tuners don't know about this !! Most set the piston to head clearance to the same spec that steel rods require. Since the Ti rods don't stretch as much, an engine set-up this way will lose it's potential low RPM advantage. Worse yet, it will actually have **lower compression** at high RPMs than a steel rod engine does !!
That's a lot of money to spend to make less power ...

Oooops !!

Many people spend around \$1,600 - \$2,000 for a set of 4 Ti rods, completely unaware that the biggest potential power increases from these expensive parts isn't even being exploited !!!

...

How racing helps to develop a better product for street use ...

Rod failure plagued the '96 - '98 Suzuki 750's; the problem was that the small ends were too thin. Most racers found this out the hard way after 4 or 5 weekends of racing, and occasionally some street riders' engines failed because of this same problem.

Suzuki has since turned this situation around, and today their stock rods are some of the best in the business !!

Right on Suzuki !!

<p>Here's where some of that knowledge came from !!</p> <p>These racing rods are reinforced in the areas that the stock '97 rods weren't ...</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p>	 <p>The small end is very well reinforced and the top is much thicker than stock !!</p> <p>Oil reliefs in bronze inserts allow for small end lubrication.</p> <p>(I should have cleaned the oil off before I took this photo, but if you look close, you'll see the 2 relief areas, especially the highest one in this photo)</p>	 <p>2 piece Ti rods are so light, they feel like they're made out of plastic !!</p> <p>Look at the upper part. The extreme " H " beam shape maximizes strength while using the least amount of material possible.</p> <p>.</p> <p>.</p> <p>.</p>
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... we interrupt our regularly scheduled program to bring you this important

Late Breaking News:

	<p>Venezuela's First Power News Subscriber is Absolutely <i>Flyin'</i> !!</p>
<p>I met Antonio Piccioni at the Latin American Superbike Championship in Dominican Republic, at the start of his racing career. At first, we had a language barrier... but, my friend (& official Spanish translator of Power News) Marcos Peguero was there to help !!</p> <p>As I explained my 8 Phase Engine concept, Marcos translated it back to Antonio in Spanish.</p> <p>I handed him a Mototune USA.com card, and said "sign up for the Spanish Power News, read the next few issues, and if it makes sense, maybe we can work together someday."</p> <p>Would the Power News engine concepts be tested in South America ???</p>	

Sure enough, last summer the MotoMan "un-retired" from engine work to help out this up-and-coming new race team !! The first race with the new motor resulted in an impressive 2nd place in Venezuela's National Championship race in August !!

Incredibly, Antonio took his 2nd place ...
in the blazing heat of 107 degrees Fahrenheit (42 Celsius)

(ooooooo ... that's hot !!)

Then suddenly ...

Antonio Piccioni & Team Motore
 headed north to race in the USA.

So ... how did it go ???

" Go Picci "



Photo by Octavio Estrada

Antonio "**Picci**" Piccioni



The Pride Of Venezuela !!



Sponsored By:

Moroso

In his first ever roadracing trip to the USA, Venezuela's Antonio "Picci" Piccioni **won** 2 races and took a second place at Moroso Motorsports Park in West Palm Beach Florida !

Never seen the track, two wins & one 2nd place.

Unreal.

Daytona

With only the Moroso event to qualify for the Daytona Race of Champions, **Picci** had to start from the back of the grid.

Things looked hopeless, but **Picci** simply ripped through the huge pack of adrenaline crazed 600 riders, and finished 4th place in his first trip to the ultra high speed track !!

Outrageous.

Homestead

Another new track to learn ...

Results:

Two 2nd place finishes, a 3rd place and one very hard crash.

(**Picci** was not injured in the crash !!)

Sensational.

Motore SBK
Venemotos-Yamaha
Suomy Helmets
Repamoto
World Wide 750 INC
Leo Vinci Exhaust Systems
Superbike Moto Rentals
Mototune USA

Picci's stunning speed was noticed by everyone at the race events, and is another example of the amazing power increases that can only come from **thinking outside of the box !!**

Congratulations from Mototune USA and...

... the rapidly growing number of worldwide readers

of Power News who are all cheering

" Go Picci "

right now !!!

Hey Pat !!!!!

Here in Florida my bike is the fastest R6. Some guys ask me, if I have an R1 motor... :)

When I took my bike to the Dyno, one guy ask me, if I prepare the motor. When I said **MOTOTUNE USA**, the guy is going crazy !!!

For the next year, I'm looking for some sponsors to race the FORMULA USA !!

Thank you for your support.

~ *Antonio Piccioni*

Picci's Team Motore Venezuela Yamaha R6 contains many more
never before seen Mototune USA tuning secrets !

{  **Stay tuned to Power News to learn all the tricks**  }

Plus:

 **2003 Yamaha R6 Tuning & Set Up Info !!**



... and now back to our regularly scheduled program:

Consider This:

What's This ...



An Alternator on a Superbike ???
"Everyone" knows you don't do this ...

By running a very small charging system, one can use a much lighter battery. The result is better acceleration and handling !

Plus, this rider won't DNF* a race from a battery going dead with 3 laps to go ... (these kind of "mysterious electrical problems" actually happen more often than race tuners like to admit.)

(* DNF = Did Not Finish ... sponsors don't like it)

The **balance** between weight, power loss, and reliable race finishes has been well thought out here.

The result is:

" Championship Horsepower "

It's a lot easier to win a championship, if you finish all the races !!

The starter has been removed, and so has the starter clutch. In it's place, this **Mysterious Part** has been added

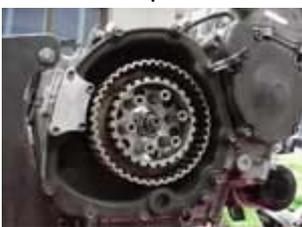
... behind the **Mystery Part** is the normal ignition timing rotor.



The Mystery Part

What is it ???

Dry Clutch



The center basket looks like the one on most bikes, except that it spins out in the open air when the engine's running !!

(Only the clutch plates



The aluminum piece on the left is the "oil cap".

The 4 allen bolts and the aluminum plug must be removed to add oil to the

One sure sign of a real superbike is a Dry Clutch. "Dry" refers to the fact that the clutch is outside of the engine's oil supply. There's a small gain of about 1-2 horsepower on this engine, since the clutch assembly isn't slinging oil around as it rotates.

On older superbikes a dry clutch might have gained up to 4 horsepower, but the stock "wet" clutches just don't fling as much oil as they used to.

and springs have been removed.)

engine !!

Nowadays, engine designers pay more careful attention to power loss from oil fluid drag, and there are baffles or other devices built into the crankcase design to limit the amount of excess oil that gets on the rotating parts.



The gear that transmits the crankshaft power to the clutch is the only part which contacts the engine oil.



Here you can see the large oil seal in the outer cover. The basket on the upper left is "Dry" and the gear on the upper right is "Wet".



Close up of the basket reveals more lightening efforts.

The aluminum hub is drilled, and the steel backing plate has plenty of "open spaces" as well !!

Here are 2 dry clutch plates. Think of clutch plates like a brake pad and a disc ...



When a streetbike wet clutch is slipped hard during a race start, a lot of friction plate debris gets into the engine oil.

This engine stays clean !!

With such a small power advantage, why is a dry clutch still used ??

Well, for 1 reason winning races mean big sales increases for the factories, so money (almost) doesn't matter when it comes to power gains.

The second reason is that the oil stays cleaner from the clutch particles that are shed during hard slippage at the start of the race. This engine's oil doesn't get contaminated no matter how hard the clutch is slipped. That can be a big savings in the long run if even 1 engine failure & DNF can be avoided.

There's that "Championship" concept again

... we interrupt our regularly scheduled program to bring you this important announcement:

Welcome Snowmobilers !!!

In the last few months, people have been posting the Power News articles on the snowmobile discussion forums. The response has been tremendous, and I'd like to take the opportunity to offer those who signed up for Power News, a special invitation...



Yessss:
You Can Own The Snow !!

The new Yamaha RX1 snowmobile uses the same engine design as the Yamaha R1 motorcycle engine featured in some of the Power News high velocity porting articles.

Why not venture beyond the "box" and high velocity port the RX1 snowmobile ??? You'll have the **fastest sled in the woods**, and if you race, get ready to **win** everything !!

I'm looking forward to doing an article on the riders who **win** in the snowmobile racing scene, so anyone who is thinking about using the Power News high velocity porting techniques on the new RX1, please let me know !!

~ MotoMan

... and now back to our regularly scheduled program:

Crankshaft Inertia

What's This ...



Why hasn't the crankshaft been lightened ?!?!?

"Everyone" knows that you should lighten the crankshaft when you build a real superbike !!
A lighter crankshaft allows the engine to rev faster, and besides ...
it says so in all the racing & performance magazines !!

And now, to put some real authority on the subject:

Here's a quote from the former Vance & Hines Yamaha & Ducati factory crew chief.
He was commenting on the new AMA Superbike rules in which 1000 4 cylinders are allowed,
but they require the use of the unmodified stock crankshaft:

"A {4 cyl.} 1000cc Superbike won't steer as well as a 750 {4 cyl.} or a 1000 Twin Superbike,
unless the factories make some limited production models with much lighter crankshafts."

The reason given was that heavier crankshafts have more gyroscopic force to overcome during direction changes ...
which seems to make sense.

Uh-Ooooh ...

Will MotoMan stick his neck out and **risk mass ridicule** by going against all those Cool Racing Magazines ...

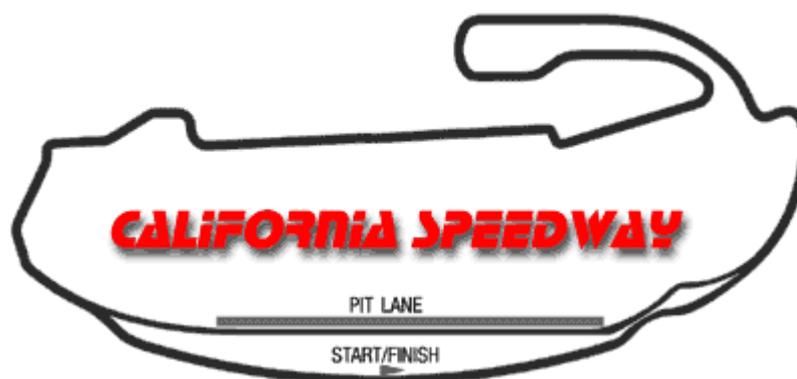
... and even a famous Factory Team Boss ???

Yup !!!

- 1) A lightened crankshaft gives less tractability on corner exits.
- 2) Usable power is much more important than less weight or having a cool revving sound in the pits.
- 3) Steering speed can be adjusted in several other ways.
- 4) The crank weight on modern engines is just right for roadracing.
(In fact, on some engines, they're almost too light...)

The Evidence:

California Speedway (also known as "Fontana")



The California Speedway packs an amazing **21** super tight twisty "chicane" style Left-Right-Left turns into a relatively short 2.36-mile circuit. This must be the most chicane infested track in the world !!

According to the "experts", the California Speedway ought to really bring out the worst in these heavy cranked slow turning beasts ... right ??

It looks like the poor riders of these behemoth lard cranked slugs are just going to have to line up behind all the super-duper-light-cranked-magic-rocket-bikes at Fontana ...

Oooops !!

It turns out that those behemoth lard cranked **Suzuki GSX-R1000**s were consistently the fastest after 2 days of recent testing at the California Speedway !!!

1. Mat Mladin	Suzuki GSX-R1000	1:25.70
2. Anthony Gobert ...	Ducati 998RS	1:26.67
3. Aaron Yates	Suzuki GSX-R1000	1:26.70
4. Ben Spies	Suzuki GSX-R1000	1:26.82
5. Larry Pegram	Ducati 998RS	1:27.20
6. Eric Bostrom	Kawasaki ZX-7RR	1:27.21

Incredibly, Mat Mladin was even quoted as saying: "The bike steers better than the old 750."

How can this be ???

It's easy !!!! By adjusting the steering angle and the ride height, one can make a bike steer much faster, even if there's a lot of gyroscopic force from the crankshaft to overcome. This is the solution to the "heavy crank blues".

The other interesting comment from this test session:

V-Twin Ducati rider Anthony Gobert remarked at how strong Mat Mladin's GSXR1000 was exiting corners. Here's why: with that heavy stock Suzuki crank, the flywheel effect gives a tremendous advantage in controllability. The bike is going forward instead of sideways, and that's how Mladin could get such strong acceleration out of the corners.

Heavy crank mass makes throttle control easier, even for the multi-time AMA superbike champ.

Are you sure you have better throttle control than Mat Mladin ??? ... No ?? ... better leave your crankshaft stock !!

Now for the answer to the "Mystery Part" ...



Mystery Part

The "**Mystery Part**" in the Factory Suzuki Superbike is in fact a very heavy flywheel weight !!!

That's right, adding weight to the crank can often produce better results !!

Suzuki's not the only company to do this, Kawasaki even offered **5% heavier than stock** cranks for their ZX7R Superbike kits.

A heavier crank increases acceleration ??? At first glance it seems counterintuitive. Until you think about the big picture !!!

In roadracing, most acceleration starts from a point of full lean angle, and near zero extra traction. Accelerating from a serious lean angle is about giving all the power the tire can take, and no more. Any sudden lurches in the power delivery from a super-light crankshaft will just break traction and excessively spin the tire out sideways. This kind of riding usually chews up the rear tire before a race is halfway over.

Once the rear tire is gone, forget about winning.

The Discovery of Perpetual Motion ??

What energy helps to perpetuate the endless cycle of the crankshaft lightening machine ??

It's That Incredibly Powerful Force Which I Call:

"M.M.M."

Mass Marketing ... Mostly ;)

Magnesium Madness

That famous "greenish-bronze" color is evidence of magnesium. This stuff is much lighter than aluminum !!

This oil pan holds the engine oil supply lower to keep it away from the crank. As we've seen in the "Dry Clutch" section, excess oil on the moving parts can rob an engine of a lot of horsepower, and oil on the crank is especially bad.

The drawback to keeping the oil low, is that it moves more weight away from the center of mass. This reduces the "roll rate" of the bike as it transitions back and forth through "S" turns.

To compensate, Suzuki uses ultra lightweight



Oil Pan
It's as light as plastic !!



Unbelievable !!
The oil pick-up is magnesium too !!!

(and expensive !!!!!) magnesium on both the oil pan and oil pick-up pipe.

To me, the shift drum was the most impressive part in this motor !!

What's so impressive ??

This shift drum tells us everything about Suzuki's attitude.



MotoMan



This photo is all about Suzuki's will to win !!

This part only moves when the rider shifts, so it's not as if there's a noticeable acceleration gain from the drilling, and there's really only a small overall weight savings.

The man who designed this part, must have realized that there isn't much to be gained in the actual performance of the bike. But, there's lots to be gained in the attitude of his team. As they wheel this superbike out onto the starting grid ...

...everyone on his team knows they are:
In It To Win It !!!

This a ".001 percent thing" and it gets MotoMan's undivided attention & respect.

Way to go SUZUKI !!!



It's not easy to beat a team that's willing to go to these kind of lengths to win !!

Wild Transmission

Like most superbikes, this one uses a close ratio transmission. This means that as the rider shifts up into a higher gear, the engine speed doesn't drop down as far into the RPM scale.

Since the engine is at a higher average RPM,



it's also higher up in average horsepower. This also allows the engine to be tuned for more top-end power, at the expense of some low-end power.

Most streetbike transmissions use needle bearings on the outer gears, and use bronze bushings in the inner ones. This trans used needle bearings on all the gears, and I immediately noticed how freely the gears spun as I lifted the gearsets from the cases.

Drilled To The Max !!

The holes drilled on the outer rim make the whole gearset lighter, but especially where it counts for quicker acceleration.

A lot of extra work goes into these parts !!

Weird Wild Bearings !!

Surprisingly, these needle bearings were of a 2 piece "split" type that I'd never seen before...

(At first, I thought I screwed something up and broke them !!)

Now, you're probably wondering:

Why are the gears drilled to lose a small amount of rotating weight, when a weight has been added to the crank to gain a large amount of rotating weight ???

The answer to this one is all about thinking outside of the box ...

Most of the time, the combined weight of the rotating parts in an engine is really like one mass.

But ...

Can you think of the one critical time on the racetrack when the mass of the crank is completely separated from the transmission ???

It's very easy to forget about this critical time in the mad dash for more horsepower !!

Woe be it to the tuner who can only measure racetrack success on a dyno ...

(This one has nothing to do with horsepower)

Since the rules limit the transmission ratios to six, the first gear in a superbike close ratio transmission is extremely tall. (Imagine doing a hard start with your bike or car in second gear.)

Now imagine an extremely light crank mass combined with 145+ peaky, high RPM oriented horsepower. (Remember, this engine has sacrificed low end power for more up on top.)

Frankly, this could be a problem.



The Mystery Part also helps the rider to get:

..

The start of the big race will be a "wheelie-bog-wheelie-bog" type of situation !!! (Plus it's much easier to stall, which is one of the most dangerous situations in racing !!)

The rider struggles to control the power as he slips the clutch. As the power hits, the bike wheelies, if the rider tries to compensate by pulling in the clutch or turning down the throttle, the engine mass is so light that it easily falls down into it's lower RPM range where there's no usable power. Any way you look at it, being off the power isn't good when everyone else has full throttle !!

Suddenly, the bike that looked so good on the dyno is getting totally smoked by the other riders during the start !!

Now our rider has to work extra hard to pass many riders to take the lead. This additional effort wears down the rider as well as the tires. After spending tons of money to reach this point, the big win is almost impossible.

What Suzuki does is to start with all light rotating components, and then the "Mystery Part" flywheel is added to compensate. Different weights are available, according to the preference of the rider.

This strikes the best compromise between good starts and tractable acceleration out of turns against the least amount of excess weight on the bike as possible.

..

Way Better Starts !!

You see ... that crazy "Mystery Part" is really all about the big picture ...

Faster lap times through tractability, and better starts will make a huge difference at the end of the season when all those final **championship** points are added up !!

.
. .
.

Say it with me now :
" **Championship Horsepower** "

This trick titanium intake valve photo is dedicated to Salvador Dali ...



[Click Here To See The Surreal Trick !!](#)

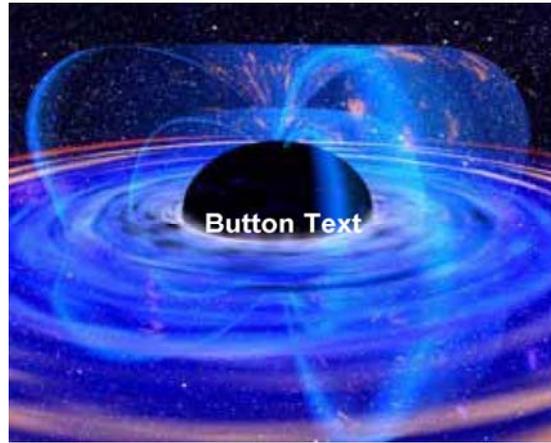
" A Study of Shape and Perspective During Winter in Norway "

By MotoMan

Where do innovations and inventions come from ???

Thomas Edison once said that ideas just came to him from "space"...

S



That may have worked for Edison, but for most of us, discovering a new idea is a more "Pro-Active" process, wouldn't you agree ???

Power News Exclusive:

The Explanation For What Thomas Edison Couldn't Explain

The "space" that Edison was talking about was simply that he balanced **logic** & **creativity** !!

It's important to note that this worked especially well because Edison wasn't afraid to "**think wrong**".

(He was a lot like **Mr. Spock** in this way...)

This unique combination of attributes allowed him to apply many seemingly unimportant or "**wrong**" concepts into a workable relation that had ***never occurred to anyone else !!!***

Think:

Outside of the Box !!

50-50

When both sides of our brain work towards a 50-50 balance, we get super intelligence.

but

When one side tries to dominate or fight the other side, we never see the "big pictures".

(This "fight" is the most common block to Thinking Outside Of The Box...)

Thomas Edison had skills that we are all born with !!!

The only difference was:
He just never lost them as he "grew up".

(How can we lose an intelligence we are born with ???)

The answer is: it gets learned out of us before we even reach adulthood !!!

Learning isn't the problem, just the process by which it usually happens:

As young kids, we learn things mostly because adults say
"No", "Don't do that", "Never", "Stop that", or even "Shut up"

... and then we get rewarded when we finally do the "right" thing.

Next, as we get a little older, we learn by the true or false system which
teaches us that there's a right way to think and a wrong way to think.

Eventually, we become afraid of thinking "wrong".

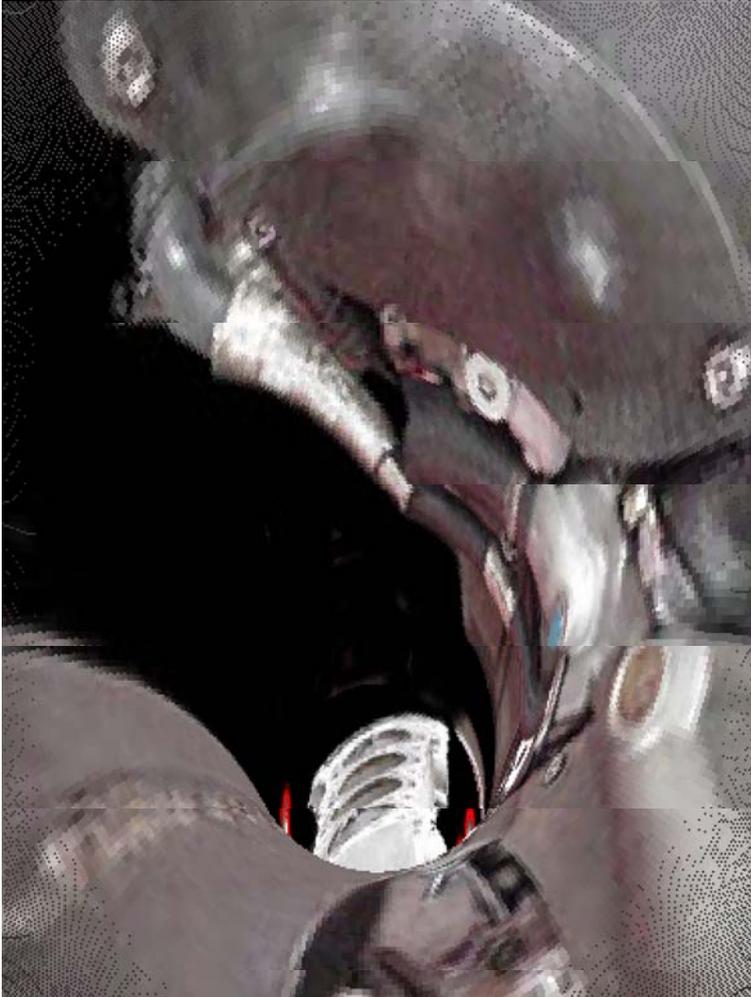
This has the effect of training the mind to only see 2 options for every problem !!

We have a conditioned tendency to think :

" it's either up or down " ...



... when maybe



sideways ...

or around the back ...

or inside-out ...

or over there ...

or through the
middle ...

or underneath ...

or hardly anywhere ...

are much better solutions !!

The result of the right and wrong thinking system,
is that by the time we reach adulthood, we gradually memorize a lot of facts
and lose the immaturity of childhood.

ironically ...

in this process of repeating the same patterns of fixed thinking,
we gradually lose the powerful ability
to " Think Outside Of The Box "

... even though we're all born with this natural talent !!

Those who've completely lost that ability

... are **completely** unaware that
they've ever had it !!

" When I examined myself and my methods of thought, I came to the conclusion that the gift of fantasy has meant more to me than my talent for absorbing positive knowledge."

~ Albert Einstein

" There are children playing in the street who could solve some of my top problems in physics, because they have modes of sensory perception that I lost long ago. "

~ Robert Oppenheimer

" The secret to developing a powerful intellect is to practice thinking with the same wild imagination as you did when you were a kid. "

~ MotoMan

What About The Factory Suzuki Superbike Intake Ports ???

Well, as you might have guessed by now ... they're just cleaned up stock ports, not enlarged for more "flow", but definitely not high velocity !!!

That's right:

The '97 Factory Suzuki Superbike Team didn't read Power News ... it wasn't even "invented" back then !!

(The entire audience gasps in shocked amazement)

Did you notice the **very subtle horsepower trick** ???

This oversized crankcase breather vent is a clue as to the source of the power gain:



Enjoy an Ice Cold Budweiser !!

(That's right the horsepower trick can be seen in the 2 Budweiser clues in this article !!)

Wow ... There's 21 More