

EXCLUSIVE! HARLEY XR1200 TEST SHOOTOUT: Ducati 696 vs KTM 690



CYCLE WORLD

At long last...

MAX

All-New
2009
V-MAX!



THE BIKE THAT WON'T DIE
It's back! Indian Chief for '09

AUGUST 2008 USA \$4.99



www.cycleworld.com

UK £3.25

TITANIUM FLYERS

NCR proves lightness is everything with its very special Ducatis

BY MARK HOYER



HORSEPOWER IS WONDERFUL. IT IS RELATIVELY EASY TO produce and even easier to understand. But lightness pays off in every dimension. And while Ducati specialist NCR is not averse to making horsepower, the Italian company's true obsession is with weight reduction.

This beautiful obsession is expressed through fine materials and elegant design.

With its close partner Poggipolini—a leading titanium parts maker—NCR builds incredible lightweight motorcycles. Recent versions we have ridden included the Millona and New Blue (*CW*, June, 2007), but these were strictly for racing use—no lights, no DOT certification. Just purity of form and purpose.



TITANIUM FLYERS

PHOTOS BY BRIAN BLAKES



Stroker crankshaft is machined from a giant steel billet. "Dimensionally, this piece is not going to move," says NCR's Joe Ippoliti. It costs \$6600 and is made by the same people who make F-1 car racing crankshafts. Performance cams are \$627 apiece, while the Ti valve kit is \$1400. Ti rods, machined from a forged billet for 8 hours, cost \$3800.

Now NCR has decided to take it to the street, with a *stradale* version of New Blue, plus the stunning titanium-framed *Leggera* Hypermotard, both due out this year. Even the hard-edged Millona racer will ultimately be made into a DOT-legal streetbike.

Ironically, I got the chance to ride all three of these bikes at a race-track. Contributing Editor and New Blue racing veteran Nick Ienatsch arranged for a day of lapping at Las Vegas Motor Speedway's Classic Course and even got in a few laps on the Millona himself in between his classroom and riding sessions as an instructor at the Freddie Spencer High Performance Riding School.

It was a dream day. NCR principal Joe Ippoliti brought \$200,000 (!) worth of rolling hardware, a mechanic, tire warmers and an excellent knowledge of the engineering and materials used to build these machines.

Poggipolini produces all the titanium parts for Ferrari's Formula One team. It also works in aerospace, supplying some very highly specialized alloys for helicopters. "They have very good metallurgical knowledge," says Ippoliti. "And they process 11 tons of Ti per year!"

That, folks, is a whole lotta titanium. So Poggipolini is always pushing the envelope with different grades of the stuff, as well as experimenting with ways in which to harden and



Gorgeous black-anodized fork bottoms are hewn from 7075 aluminum and cost \$1500. For the money you get 35 percent lighter yet stiffer pieces than the Öhlins parts they replace.

otherwise treat the metal to expand its usefulness and suitability for different applications. One high-temperature, high-pressure process fills the crystalline structure of the titanium to make it 40 percent stronger than your average alloy. But even in its pure, unalloyed form, titanium is still as strong as many types of steel but nearly half the weight. While weighing significantly more than aluminum, it is twice as strong, meaning that when replacing aluminum motorcycle parts, these can be made smaller and finer in titanium. Though titanium is quite an abundant element in nature, it remains difficult (read: expensive) to extract and produce in useful form. But it is clearly worth the effort.

A small example: "The advantage of an NCR forged Ti connecting rod vs. the steel one it replaces is that it is roughly 40 percent lighter," says Ippoliti. "But also stiffness is much greater, with 70 to 75 percent more torsion, shear and tensile strength. The rod basically becomes indestructible. It's not only stronger, but by virtue of being lighter it's putting less stress on itself."

What titanium doesn't do well is transfer heat or hold lubrication. So you won't see titanium pistons or cylinders soon; and while the advantage of lightness in valve applications is worth the trouble, beryllium-bronze (or other non-standard)

TITANIUM FLYERS



guides and special seats must be used to prevent seizure and reduce wear.

Titanium isn't the only specialty material used by NCR or processed by Poggipolini. If you love carbon-fiber, high-grade aluminum and, yes, even chrome-moly steel, these bikes are works of art that will make you weep with joy.

A quick spin around the parking lot on the Leggera gave me my first taste. Agility is already a Hypermotard hallmark, but when you subtract more than 50 pounds, only good things happen. Also, when you add Öhlins suspension front and rear, and BST carbon-fiber wheels, chassis response tips further toward effortless. It remains fully composed almost no matter what you do at the controls.

On the track, just as with a stock Hypermotard, you feel at first like you are riding on stilts because the bike is so tall. But after a few laps, it all feels perfectly natural, and the upright riding position and wide handlebars are kind of a relief compared to the more-focused arms-forward, pegs-high racing positions of the other two bikes. Soon, you are flicking it onto your knee in corners, braking later and riding faster, all while trying to forget about what would happen to that beautiful titanium frame if you crashed.

That tube trellis structure is a taste of true fabricator's art. The welds are perfect. There are none of the rainbows you have seen in some Ti welds (or that occur on exhaust systems from heat). Those colors you see are oxides on, and likely in, the metal, indicating imperfection in the joining process that can't be tolerated in a structural piece, but does look cool on



How does NCR focus on development? "Technology and quality first, price a distant second," says Ippoliti. "We offer what we build because it is the very best in technology available, and it is amazing how many people want it."

exhaust headers.

"The biggest thing with titanium is that the welds *have* to be perfect to be structurally sound," says Ippoliti. "If not, it forms a very specific weak spot in the frame, and that area would fail long before anything else."

As for chassis stiffness, NCR works very hard to build the right amount of flex into the right spots while providing a stiffer, more solid platform than provided by the mild-steel Ducati original.

"Some of the tube diameters of the titanium frame are larger than the Ducati pieces, but the wall thickness is decreased," says Ippoliti. "We control the stiffness in some areas to let

it flex or be more rigid to improve the handling."

Another advantage over, say, chrome-moly steel is titanium's corrosion resistance. "If you left it at the bottom of the ocean for 20 years, it would be in the same condition as when you put it there. The metal itself would be identical."

So, the original mild-steel Hypermotard frame is 29 pounds; the NCR replacement is 10.6 pounds. That, as they say, is a useful reduction.

In this "standard" street-legal \$49,500 Leggera, a stock DS1100 two-valve engine is spec'd, although the bike I was riding had the optional, 12-pound-lighter Ti racing exhaust system (normally the stainless Ducati system with catalyzer is retained for emissions purposes). There is plenty of snap, especially with the reduced weight, but selection from the extensive "racing use only" engine options menu spices things up a lot.



TITANIUM FLYERS



Such as with the engine in New Blue, a step up the seriousness ladder if only because this bike had one of NCR's lighter and more powerful two-valve Desmo engines displacing 1078cc. This was the so-called One Shot engine, with all the lightweight internals, billet crank, etc.

Output on our testbike was rated at 116 hp at the crank. Stock steel Ducati frames are delivered from Ducati without VIN numbers, and NCR essentially manufactures the bike around that platform and then numbers the bike.

There is a long reach to the bars as on the stock SportClassic, although this bike's suede seat is firmer and strangely grippy. That hike to the bars and the high pegs give

the bike very much of a classic Italian riding position that feels more extreme than that of a 1098.

Once up to speed, it is clear the setup is stiffer and more precise than that of the Leggera (the racing slicks didn't hurt here, either). Although there is wide adjustability available from the Öhlins fork

and twin shocks, all three of the bikes were dialed in with factory-developed settings and provided excellent handling and composure. If anything, given more time to play with settings, I would have liked to increase rear grip exiting corners as the tire was prone to wheelspin. Another minor complaint is that the titanium exhaust system crowds your boots a bit just above the adjustable NCR rearsets (a \$1600 kit).

TITANIUM FLYERS



"We're going to build more NCR bikes not based on Ducatis," says Ippoliti. "They will probably have Ducati engines. And while we like the simplicity and lightness of the air-cooled engines, some people want the horsepower of the four-valve, and you can't ignore that as a builder."

Overall, though, this roughly 325-pound bike gives racer-level performance available in a streetable package. Think of New Blue as a beautifully amplified Sport 1000S. The charm of its retro flavor survives, but it is backed by significantly boosted performance.

As much fun as New Blue was, the Millona One Shot is *the* bike. It weighs just 266 pounds, with 121 of those in the same 116-horse engine as used in Blue. Everything in the powerplant is pared down. The lightened steel crankshaft is machined from billet, heads are ported, a lightweight Superbike alternator is fitted. The chrome-moly frame is designed and fabricated by NCR, as is the 8.3-pound aluminum swingarm. As on the Leggera and New Blue, all the fasteners are titanium. The bodywork and wheels are carbon-fiber. The MyChron digital dash relays pertinent information while the special fuel-injection system can map itself using the oxygen sensors in the exhaust.

On the track, the Millona makes your average 1000cc sport-bike feel like a Gold Wing. Turning response is as weightless and quick as the thoughts that initiate it. To be honest, after all the years of testing primarily streetbikes, I wasn't even sure how much I could ask of this bike. It is just so light, nimble and snappy that I never found the limit. It just leaned and leaned on its Dunlop slicks, braked and exited corners as hard as I asked it to without ever scaring me. In fact, all it did was encourage me to find new personal limits. The slipper clutch, like New Blue's, worked beautifully. The riding position is quite compact, but the aluminum/titanium clip-ons and adjustable footpegs would give me some latitude to improve fit for



my 6-foot-2 frame. Further, a call to NCR can yield a custom subframe to make you fit better, whether you are large or small.

All three bikes were fantastic to ride, but the Millona's focus and seriousness were more enticing than the charm of New Blue or the comparative comfort of the Leggera.

You want options? NCR is there for you. All the specs are basically just guidelines. You want a 138-hp 1200cc two-valve Desmo engine? Call them up. They simply provide you with a complete, second engine for \$25,500. Not only is it significantly more powerful, it is also amazingly 29 pounds lighter than a stocker, weighing 121 pounds. You say you'd like your Leggera to weigh 303 pounds dry?

No problem, tick the Extra Titanium Kit box and get axles and other remaining hardware lightened up, to go along with the 5-pound-lighter carbon clutch (full MotoGP style!) and NCR Corse engine kit. But do bring along \$92,900 for the full-ride Leggera. You can go a similar route with New Blue and the Millona, but both of those end up being slightly less money thanks to the more conventional frame material.

For my money (at least theoretically), the Millona One Shot's starting price of \$52,000 or so makes it the way to go. A lot of times in this job, we get to sample some pretty exotic custom bikes that go for this kind of money or more. The difference is in the "reality" of these bikes, in the sense that they are designed and developed with little regard to cost and that all the pieces are evolved with only speed in mind. The static material beauty of NCR's machines is nearly overwhelming. Yet it is secondary to their beauty in motion. 