TECH | Zipp Firecrest

INSIDE TECH

Zipp reinvents the wheel

WHEN YOU MAKE the most used wheel in the pro peloton and have relied on the same basic shape for years it's no small task to start over and up your game, yet that was the task Zipp set out for itself. The end product was the Firecrest...

WHEN Zipp looked to create the next evolution of its wheels it realised that it was going to be a tough job. Since the engineers started producing aero rims in the early Nineties their work had all been about honing the fastest shapes, so each time a new shape was found it took more and more work and the improvements became smaller — the returns on invested time and cost were diminishing.

Feeling like they had chased down the same road a number of times with previous wheel iterations, the engineers took a step backwards and looked at the overall picture. As Zipp's Josh Poertner puts it: "It was as if we had a bow tie and were looking closer into the centre, so we took a look at the whole thing and looked right to the outside too." The approach was perhaps best described as being scatter-gun. Take a whole number of very different shapes to the wind tunnel and see what works and at what wind angle, then start refining. At the same time CFD, computational fluid dynamics, were used heavily to cut down on the expensive wind tunnel time.

This fresh, clean-sheet approach led, eventually, to the Firecrest rim shape but came about because the guys from Indianapolis looked at things a little differently too. Instead of concentrating so heavily on the front portion of the wheel, the first part to hit the air, they realised that the new shape allowed them to better control the air flow as it came off the trailing side of the wheel. In the past they had concentrated on the front half almost exclusively rather than the wheel as a whole.

> "Computational fluid dynamics were used to cut down on expensive wind tunnel time"

Science of spin

This new 2011 rim shape works by not only having low drag where the air comes off the rim into the spokes, but makes its biggest improvement in reducing drag when air comes off the second half of the rim passing the tyre last. By managing to reduce the second half of the wheel's drag, the overall drag is much lower and the whole wheel rolls faster.

One rather attractive consequence of the lower drag level at the rear of the wheel means that the centre of pressure is moved rearward, closer to the centre of the wheel. In theory this means that when you are riding in a crosswind the bike will be less affected than with other deep-section wheels. In the real world, when you ride past a

Testing the hubs to destruction

Choose your weapon: the 808's a hoop with attitude

Zipp joins the carbon clincher club

Under pressure: the tyre inflation test

Photos courtesy of Zipp

RIMS THAT CAN HANDLE THE HEAT

Carbon clinchers

EVER wondered why there are so few carbon clincher wheels on the market and why they're so expensive? It all comes down to heat management. Brakes work by turning the energy of the rider and bike rolling along the road into heat and transferring the heat into the surrounding air. That's why your brakes get hot when you descend a steep hill.

Carbon fibres handle this heat well but the resin used to hold the carbon strands together doesn't. With a normal resin the heat causes the rim to go soft and despite the pressure of the brake pad forcing the rim halves together, the pressure in the tyre forces them apart and the tyre blows out.

To manage that heat and pressure Zipp has used a specific resin and lay-up combination in the rim area. It is this additional complexity that adds significantly to the costs.

gateway and a sudden rush of wind hits you, it will still steer the bike as it hits the front portion of the wheel before the rear — twisting the wheel — but it'll be less pronounced.

Go with the flow

One of the keys to the success of the Firecrest shape is that it encourages the windflow to reattach to the side of the rim and become 'controlled' — which is to say it's doing what the designers want it to do: bending around the rim rather than forming turbulent air and drag. In practice, this ease of attachment means that the wheel quickly reduces drag, rather than needing some considerable time to become smooth. It just so happens that UK riding and wind conditions are significantly different from those found in continental Europe, because we have so many hedgerows which slow down the wind, so we stand to gain more from the ease of reattachment. Marginal gains indeed.

Richie Porte puts the Zipps to the test


Packed, stacked and ready to roll

So true: adjusting by eye

THE ZIPP RANGE

The products

FOR 2011 Zipp has introduced four new rims based around the Firecrest profile: a tubular and clincher version of both the 808 and 404 lines. The highlight of the range must surely be the first full-carbon clincher Zipp has offered, the 404. Zipp has offered a clincher for many years but it's always had an alloy rim, adding weight and limiting the overall profile of the rim.

404 Firecrest Carbon Clincher
Front (F) £1,050, Rear (R) £1,250
List weight 1,557g, (F 728g, R 829g) F 16 spokes, R 20 spokes, 125psi max tyre pressure

404 Firecrest Tubular
F £850, R £1,050
List weight 1,278g, (F 582g, R 696g) F 16 spokes, R 20 spokes

808 Firecrest Carbon Clincher
F £1,100, R £1,300
List weight 1,759g, (F 821g, R 928g) F 16 spokes, R 20 spokes, 125psi max tyre pressure

808 Firecrest Tubular
F £950, R £1,150
List weight 1,519g, (F 701g, R 818g) F 16 spokes, R 20 spokes

The Firecrest: heavy price, featherweight

ZIPP'S AVIAN CODE

Why Firecrest?

WHEN Zipp heads to the wind tunnel to do the preliminary tests on new rim shapes it likes to test everything double-blind to make sure no one is tempted to make their idea come out best. To this end all the new rim shapes were given colours, but having tested many thousands of subtly different profiles the colours were starting to get a little surreal, things like 'cadmium red deep' or 'quinacridone gold'.

When the Zipp engineers started the quest for the new shape they thought it was about time they ditched the colour names and instead decided on names of birds to make things easier. As it turns out the profile that was given the name Firecrest was the fastest in the wind tunnel and was selected to be the new profile — hence the name. I suppose we were lucky it wasn't one of the tit family of birds — cyanistes caeruleus, perhaps — that was fastest.