Great Scott

SAUNIER DUVAL AND SCOTT have a mutually beneficial arrangement which is working extremely well — the Spanish team gets to ride the best bikes in the business and Scott sells more and more

WORDS Simon Richardson **PICTURES** Luc Claessen

All twenty ProTour teams receive substantial backing from their bike and equipment suppliers, and Scott's investment in Saunier Duval is no different.

For Swiss company Scott, sponsorship of Saunier Duval has brought it quick results, especially in America where the brand only relaunched in 2004 after a 10-year absence, and it is now catching up with the likes of Trek, LeMond and Specialized.

The team has helped Scott develop its bike, and unsurprisingly, two key areas have been focused on — weight and rigidity. These are the two areas in which the CR1 team issue bike is almost unbeatable.

Scott's unique manufacturing process allows it to build the lightest frame in the pro peloton, and this process provides the strength to deal with the rigors and intense use of equipment in the pro peloton.

The construction process is a closely guarded secret and to make sure of it, Scott has exclusive use of a factory in Taiwan. Many other companies share facilities in the Far East, but Scott feared this would make it vulnerable to industrial espionage, so bore the cost of setting up on its own.

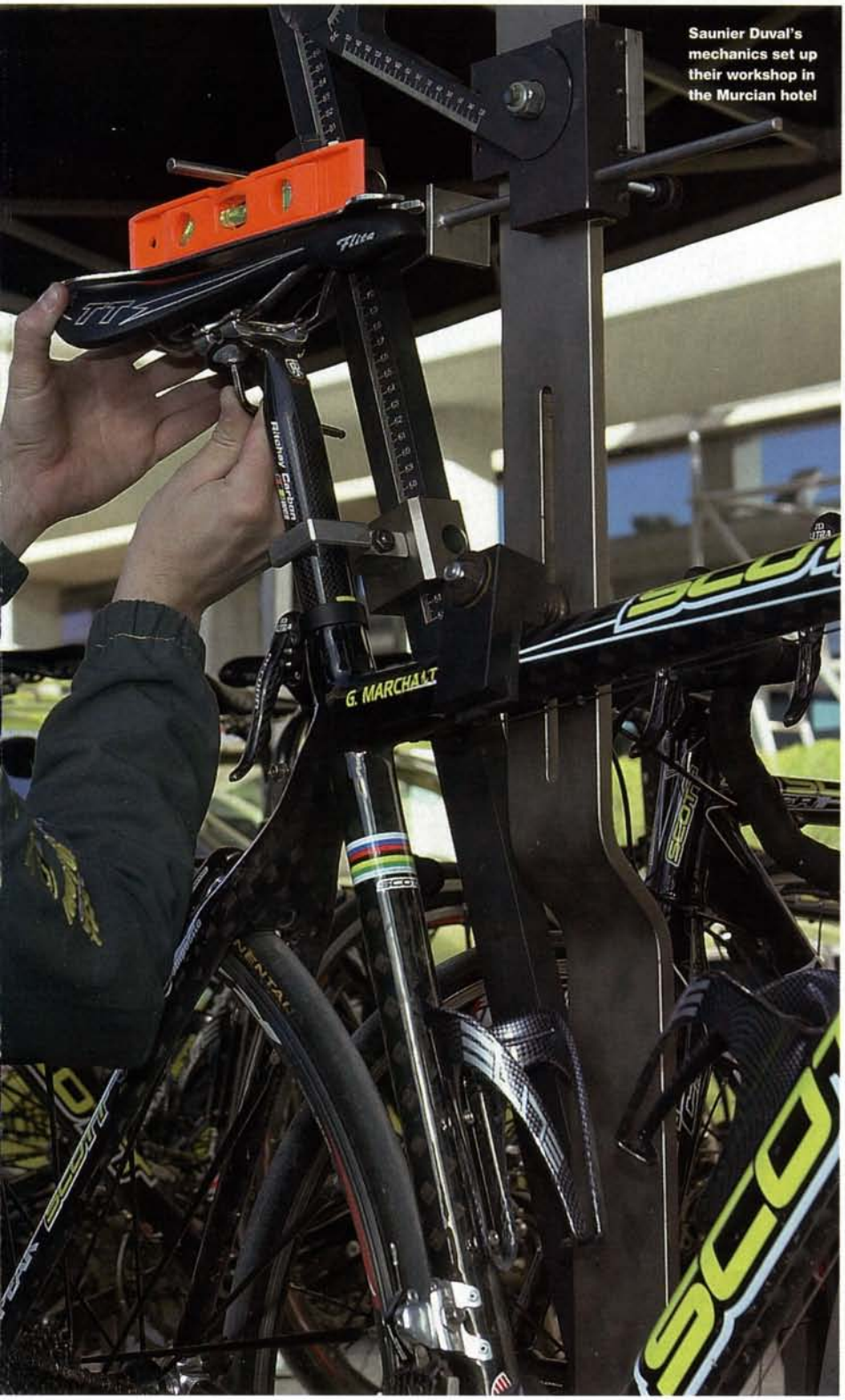
Scott's basic premise in constructing a light frame is to build with as little material as possible. Each tube is cut to length and mitred at its end, allowing it to sit flush onto the adjoining tube and eradicate any wasteful overlapping material

"By using carbon welding we can remove about 30 percent of the weight from a joint," Scott's Adrian Montgomery explained.

"The end of each tube is serrated to hold the glue, and the tubes are then bonded in place. You could ride these frames before they're carbon welded. They wouldn't pass our fatigue tests, but they could be physically ridden."

"Many other companies share facilities in the Far East, but Scott feared this would make it vulnerable to industrial espionage, so bore the cost of setting up on its own"

Flaps of carbon are then stretched and wrapped around the joints. "You prestretch the carbon to ensure there are no voids or folds in material which would weaken it when put under pressure," Montgomery said.



Saunier Duval's mechanics set up their workshop in the Murcian hotel

David Millar constantly adjusted his new time trial bike

Riders discuss the highly individual measurements of their TT bikes

SCOTT BUYS WISE

CARBON SHORTAGE AVOIDED

WITH a brand so heavily reliant on its top-of-the-range carbon bike, Scott could have come under pressure from the recent shortage in high-modulus carbon-fiber that came about as a result of the production of the new Airbus A380.

The firm has, however, been unaffected and continued its production levels thanks to a shrewd move.

Several years ago the company's owners noted that high-modulus carbon-fiber was at its cheapest price for some time, so they decided to buy extra. In fact, they bought a huge amount of the stuff, and stockpiled it.

So, with carbon fibers having an indefinite shelf life, Scott is still using material it bought years ago.

The more rigid a frame, the more force can be transferred directly through it. A pro rider will suffer the accompanying discomfort (and, with hours in the saddle, will eventually get used to it) that comes with the performance benefit of a rigid frame, but comfort cannot be ignored.

Any increase in rider fatigue will decrease their performance over time, so the CR1 has to deal with this too. At the back of the frame, straight, wishbone seatstays look unforgiving. but Montgomery explained that this isn't the case: "There's a negligible difference between straight and curved stays," he said.

"Shape and thickness can do so much for tube harmonics. If you place the material in a certain place it will affect the movement. A pole vault pole will be slightly thinner down one side; this ensures that the pole only bends in one plane. The same is done with the seatstays. The inside of the tube is very stiff while the outside is softer. It doesn't bend because the stiff part holds it in place, but the thinner and more flexible outside edge dampens the vibrations.

"You can prove these things. You can put in a force at the dropout and measure how much of that force makes it up to the seatpin."

FRAME HARMONICS

Scott has focused on "harmonics" to get the most out of the materials it is using, and any one tube can contain more than one type of carbon.

The main tubes on the CR1 are built to be laterally stiff, but compliant on the top and bottom to dampen vibration and road shock. If a section of the tube needs to be especially stiff, high-modulus carbon (HMC) is used; if not, there is no point using it. "Some manufacturers are overusing the HMC, you don't need a whole bike made of HMC," Montgomery said.

It's these areas where the HMC is used, for example, in the sidewalls of the top tube. By not using it in the top and bottom of the top tube, Scott can create a tube that has very slight give in the vertical plane for comfort.

A CR1 road frame requires around 26 man-hours from start to finish, but weighs in at a miniscule 880g.

Riccardo Ricco checks that everything is perfect

A DAY OFF? NO CHANCE!

TECHNOLOGY AND FITNESS CHECKING

EVERY RIDER GETS one day off from riding with the team, but it's not a feet-up rest. A day off training actually means undergoing medical testing by Saunier Duval's team of doctors. Each rider must undergo a maximal test on a turbo trainer set up in one of the hotel's meeting rooms.

It's a standard protocol for a ramp test with a rider starting at 125 watts and increasing their power output in 30-35 watt increments each minute to exhaustion.

The doctors take constant blood lactate measurements and monitor how the body reacts to the lactate and what the build-up is at each power level. This then allows them to set personalized training zones for each rider.

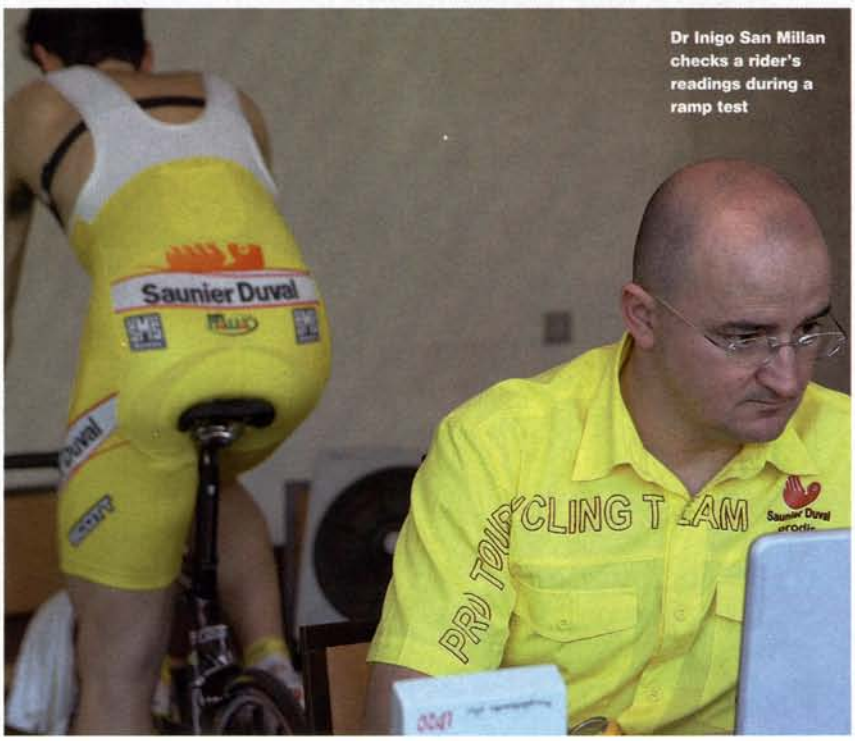
The riders are also subjected to ECG tests which can highlight any potential problems.

"It's mandatory to do the ECG tests," Dr Inigo San Millan explained." "We check for any problems and all tests are submitted to the UCI for medical purposes. If we found something wrong we would send the rider to a cardiologist."

After their test, each rider has his pedaling action monitored by an independent biomechanic with the use of a video camera and pressure sensors to measure the amount of force they are using.

Despite the back-up at the teams disposal, Dr San Millan is left frustrated by many of the Spanish riders on the team who refuse to embrace modern training techniques. "You have to drag some of the riders in," he explained, "the old-school riders do it the way they've always done it."

He believes this is the reason that traditionally strong cycling nations like France and Spain are now struggling to keep up with American and Australian riders.



Dr Inigo San Millan checks a rider's readings during a ramp test

GILBERTO SIMONI'S

Scott CR1

"Simoni is crazy about bikes. He knows each screw and bolt. You don't tell him about the bike, he tells you!"

said Hermann Pacal of Scott. This was Simoni's race bike that had been kept locked up in the back of the team truck. It will be taken to the races for Simoni and he'll train on a second, similar bike. Each team rider gets three road bikes and a time trial bike

Pictures: Luc Claessen

Record carbon groupset

Carbon lugs for an ultra-light frame


TOPE
Non-replaceable dropout

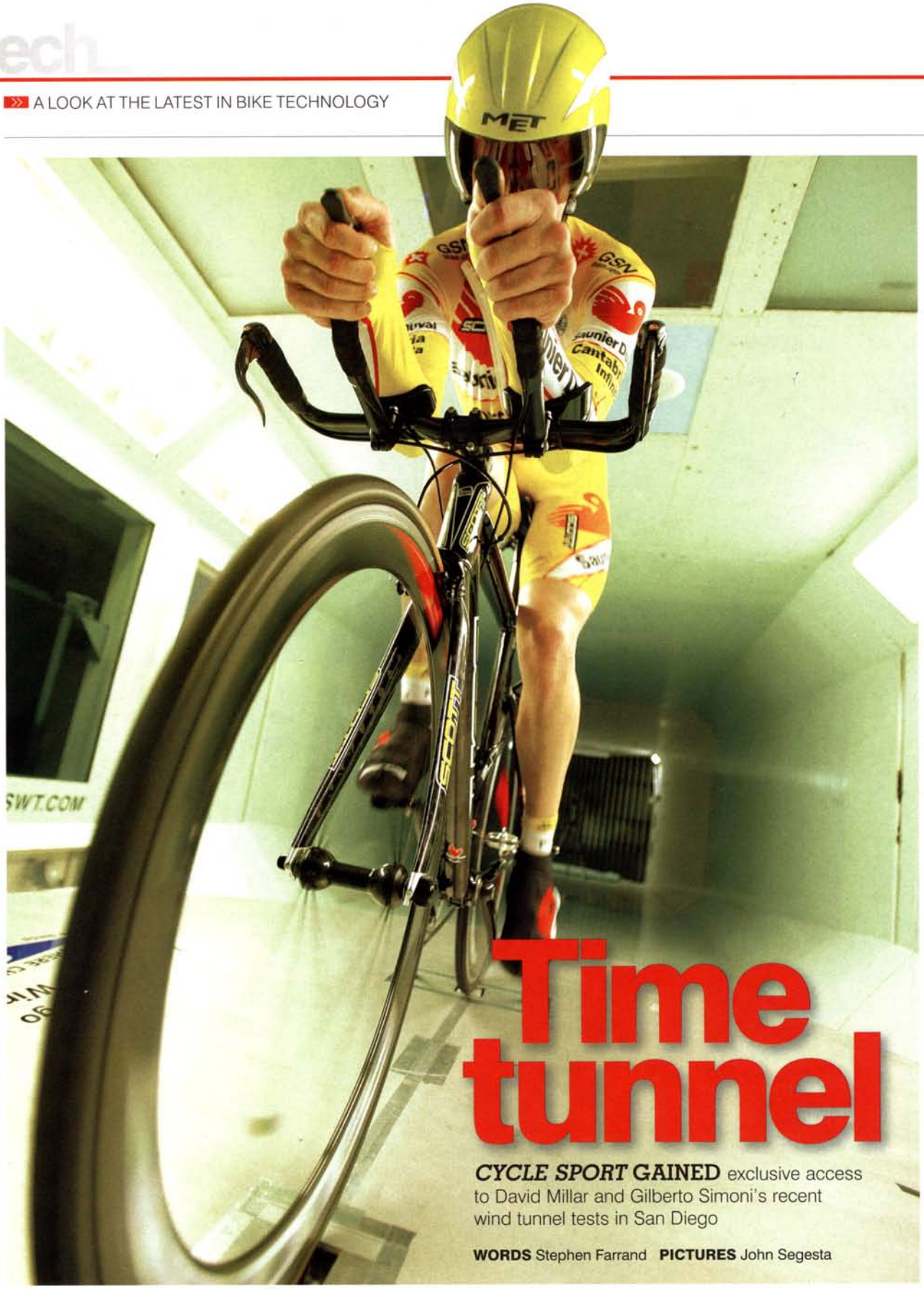

Super-strong head tube works with overbuilt fork

REAR HANGER: The rear dropout is stiffened by the ridge running around it. The main reason for this (and for keeping it non-replaceable) is precision shifting. With such minimal differences between gears on a 10-speed set-up, and so little movement required to knock the chain out of line, the rear mech hanger needs to keep flex to a minimum to ensure perfect shifting.

LUGS: Scott can build its bikes so light because of their lugs. Bare tubes are mitred so they slot together with minimal overlap. Tubes are first glued together before flaps of pre-stretched carbon-fibre are wrapped around the joint. This process allows Scott to build up areas that are put under greater stress.

FORK AND HEAD TUBE: Scott's overbuilt fork resists fore and aft motion, but this puts greater stress on the head tube. Scott has therefore engineered a head tube to the same strength as the forks so that one doesn't overpower the other. This also eradicates any potential weak points that could compromise steering.

GROUPSET: Campagnolo has clamped down on the teams it supplies when it comes to other manufacturers' cranks and bottom brackets. It's now all or nothing.



Time tunnel

***CYCLE SPORT* GAINED** exclusive access to David Millar and Gilberto Simoni's recent wind tunnel tests in San Diego

WORDS Stephen Farrand **PICTURES** John Segesta

SCOTT may boast about the technology packed into its bikes, but it can also back up its claims with specific data collected in the low-speed wind tunnel in San Diego.

The new Plasma carbon-fiber time trial bike was developed and perfected in San Diego during 2005 and last month Scott sent Saunier Duval riders David Millar, Gilberto Simoni, Koldo Gil and Jose Marchante to the wind tunnel for two days of testing.

The bill was over $5,000 when the consultancy fee for cycling aerodynamicist Kraig Willett was included, but it was money well spent, because all the riders greatly improved their positions. New aero bars, helmets and even a rubberized skinsuit were also tested.

Changes the engineers made were recorded on DVD and digital pictures. Power output, heart rate, cadence and profiles were all displayed on computer screens, and team doctor Inigo San Millan took blood lactic samples to help measure how riders adapted to the new positions.

Top secret 'proprietary data' was given only to the riders and Spanish directeur sportif Joxean 'Matxin' Fernandez. However, Millar apparently lowered his profile even ➤

Millar's Scott time trial steed gets the fine-tune treatment

GILBERTO BUYS SOME TIME

Simoni still in the hunt for time trial perfection

GILBERTO SIMONI IS nearing the end of his career, but the Italian is still keen to improve his time trialling skills in time for this year's Giro d'Italia.

Simoni knows that the team time trial and the flat stage 11 time trial near Pisa will be decisive if he is to win a third pink leader's jersey.

Simoni was stunned when he was told David Millar's position only produces slightly more drag than his own, despite a considerable difference in each rider's size.

"I thought mine would be a lot lower because he's taller than me. But he's much more aerodynamic than I'll ever be. Dave manages to drop his head below the level of his shoulders and can flatten his back. He can also pedal really well in that position and get all his power out efficiently."

"My position is not bad but I can get lower, especially with my head. I need to rotate my position rather than just lowering it. Because of my build I can't have my arms too close, it makes me feel like I'm tied up. It's a case of finding a balance."

"I know I've left it late to start really training for time trials but it's something I've got to do for the Giro. I know I'll have to win the Giro in the mountains but I can't give anything away in the time trials."

Leaving it to the boffins: scientists who get to work in the wind tunnel

more to create an 'extreme' prologue TT position that could slice four seconds from the seven-kilometer Tour prologue course.

Simoni, Gil and Marchante improved their positions even more, saving 1-16, 1-20 and 1-30 respectively over a one-hour TT.

"It's all about finding the best compromise between comfort, the power a rider can produce, and how aerodynamic the rider's position is"
Kraig Willett

ANALYZE THIS

The engineers at San Diego follow a step-by-step plan, analyzing each change they make to a rider's position. "We put them on the custom-built cycling rig and measure what we call the drag CDA ratio of their original position," aerotest manager David Sanford explained.

"We then work on improving the position and measure the drag after every change. The differences can be related to a time saving over the length of a course and that's the most important result for the riders."

Simoni, Gil and Marchante struggled when their positions were lowered and their arms extended and shifted inwards, but if they want the benefits they will have to adapt.

"That's the key factor," aerodynamicist and former rider Willett told *Cycle Sport*. "The human body is wonderful at adapting and if the riders stick with the changes they'll see long-term benefits."

"It's about the reach, stretching out on the bars, and the general lowering of the body. It's about finding the best compromise between comfort, the power a rider can produce, and how aerodynamic the rider's position is."

Willett helped Floyd Landis create his "praying mantis" time trial position and there are dozens of framed photos showing illustrious clients like Lance Armstrong and the Discovery Channel team, Levi Leipheimer, the US luge team, and several superbike racers.

As Landis's success in the Tour of California time trial showed, aerodynamics can make a big difference. Simoni and Millar will find out just how much of a difference at the Giro d'Italia and Tour de France.


Millar: focuses on his position

AERO FREEBIES

Wind tunnel boss reveals all

A DAY IN the San Diego wind tunnel costs several thousand dollars. A one-hour workshop is $850 per rider.

It's big money, and San Diego is probably not on your doorstep either. Fortunately aerotest manager David Sanford gave *Cycle Sport* readers some exclusive aero tips for free.

"If you are riding time trials get a good aero helmet and make sure you wear it with the tail down on your back," is his first piece of advice.

"For time-saving per dollar that's the best thing you can do. Triathletes used to refuse to wear aero helmets, but when we showed them how much time they could save 90 percent immediately got one.

"Another key piece of advice is to find a good position on your aerobars and stay on them as long as possible, even when climbing or descending. When you sit up you might get more power but there is more drag."

"The position of the head is also important. It's about keeping your head low and reducing your frontal area as much as possible. It's not about looking down, that tips up your aero helmet. It's about extending your neck forward."

"Even road riders should think about their position when they get in a lone break. In the bunch there isn't much you can do, but when you're on your own or in a small break you should try and stay low, flatten your back and keep your head low. But you must still watch where you are going."

For more information see the San Diego wind tunnel website at www.lswt.com.