Power on the pedals



There has been a quiet revolution in the world of cycling, and one that might have been overlooked by the leisure cyclist but for the radical technological and fashion developments involved. These changes have been noticeable not only in shirts and shorts, but in helmets and shoes too. Cycling shoes in particular have certainly not been priority gear for 'bikers in the past, except for professionals and those who have sustained injuries through not having the correct footwear. But the situation is changing dramatically.

One of the biggest hazards in cycling for long distances, whether in a professional or casual capacity, has been the feeling of being strapped to the pedals and unable to free oneself instantly. Clip-less pedals changed this forever. Developed originally by the French ski-boot binding manufacturer Look during the 1980s, and based on its quick release ski bindings, clip-less pedals did away with straps by replacing them with a metal or plastic plate attached to the cycling shoe which in turn engages with the pedal.

The idea was developed further by Shimano bringing these to the general public with the launch of Shimano Pedalling Dynamics (SPD). Originally developed for mountain 'biking, the SPD cleat was soon a 'must have ' for touring and leisure cyclists who also benefit from its easy access and the fact that there are no toe-clips or straps to collect twigs, stones and mud, nor to create pressure on the foot. Another advantage of the recessed SPD cleat is that it does not come into contact with the ground when walking and so avoids the need to change footwear immediately after getting off the 'bike.

This revolutionary idea led directly to new designs in cycling footwear. The shoes no longer had to fit into toe-clips and required additional strength to achieve stability. New lasts were developed, the shoe elements had to be assembled in a different way, and uppers needed physical reinforcement to cope with the additional stress. This was achieved through the use of modern materials, some of which were developed originally for space programmes.

Fashionista emphases

Looking through the ranges of cycling shoes shown in Friedrichshafen at the Eurobike 2002 exhibition in September, the overriding impression was of aerodynamic designs in a range of eye-catching colours with the emphasis on grip, both on the pedals and in shoe fastenings. Air and temperature control, weatherproofing, comfort, easy handling and safety all played their particular part in this high-tech revolution.

Carbon fibres made their appearance in cycling footwear through the direct influence of developments in the aerospace industry. It is used for outsoles, providing rigidity and an ultra-thin profile, as well as improved aerodynamics. When combined with other materials it provides strength and rigidity and facilitates the transfer of power from the body, through the foot and shoe, to the pedal.

New injection techniques, such as those devised by Diadora technicians, permit the combining of three different types of materials to create new soles for mountain bike shoes. These require heavier treads, and here the further development of vulcanised rubbers offers increased rigidity and high abrasion resistance. Some styles offer interchangeable studs for extra grip.

The upper hand

Among a number of new materials Lorica, a high-tech material created from a combination of very fine micro fibres (and featured in World Sports Activewear in Summer 2002), stands out as an example that lives up to its historical



Diadora's road-racing shoe Veloce EV employs the latest innovations to enhance ventilation, comfort and strength.



adidas adiStar Road Comp edition shoe with Roadcycling sole.

antecedents. Each fibre, a thousand times finer than silk, is saturated in special resins and processed to achieve an extremely strong, but soft, lightweight and breathable microporous structure. Lorica is also noted for its high-tensile strength and abrasion resistance, making it an invaluable product for sports footwear.

Other synthetic leathers, such as Suprell - a highly waterproof and non-deformable product - are popularly combined with nylon air-mesh inserts, as featured in the Diadora range, as are the polyurethane coated split leathers and kangaroo and nubuck leathers used by several companies including Carnac of France.

The search for stability has also led to new designs in shoe closure including a number of new ratchet buckle and crick fastenings, most of which are quick release or adjustable on the move via the so-called multi-step micrometric system. These feature steel mechanics, are interchangeable and, due to their swing-out opening, are easily cleaned of mud and soil. EVA shock absorbing inserts are found in some of the more advanced micrometric buckle support plates. In others the fastening system features a polyester strap that passes over a strap-lock made of techno-polymers and an anodised aluminium brake for one-handed adjustment while on the move.

Adidas was pushing its adiStar Road Comp model as the latest 'bike shoe for competition and training in track racing, time trials and long-distance riding. The aerodynamic form of the shoe is achieved through the moulded cowling, which has a zippered closure over the inner lacing. The perforated sock liner, insole board, mesh inlays and Windstream ventilation system are said to keep the foot cool all round and at all times. A nylon injected inset plate mated to a carbon fibre composite for lightness and rigidity supports power transfer. The company's three-stripe logo, complemented by strategically placed spots on toe and heel, are in a retro-reflective material to increase visibility. The sole mounting options include LOOK, SPD and the SPD-R pedal systems.

When 'out of the saddle' the mountain 'biker uses exaggerated movements and the float on the pedal is no longer sufficient to keep the joints aligned. To deal with this adidas has developed a mountain bike shoe constructed so that the heel rotates separately to the forefoot - as happens naturally in foot movements. Its Jaltona shoe uses a further development of this Cycle Torsion plate concept that offers even more stability and support. Adidas too has a new ratchet buckle system closure for easy adjustability.

The road-racing shoe Veloce EV from Diadora of Italy boasts a carbon fibre sole that does not need any pedal adaptor. Its D-Skin concept upper material is a union of microfibre and 'air plus' mesh which is said to enhance ventilation and comfort. The product has easy-to-fasten micrometric buckles, two with automatic locking 'Tech stopper' ties, which - together with the Politech bi-density heel cups - improve the shoe fitting to prevent slip and tendonitis.

The asymmetric and anatomic cut of Diadora's Skorpione mountain bike shoe gives the foot a much better hold. Here again, the D-Skin concept permits the reduction of seams in contact with the foot, and the combination of a Diapan Fiber and Politech insole and an outsole in vulcanised Duratech rubber offer additional rigidity, flexion control and good ground holding.

Specific styling for women is on the increase as the sport becomes more popular with the gender. Diadora has a fully fledged women's range for both road and mountain 'bikers that incorporates all the functional characteristics of the men's shoes while adapting these to the women's feet. Specific lasts have been developed to match the women's foot morphology.

One quick release buckle and one hook 'n' loop fastening give the Diadora Ergo Lady a stylish look for road racing, while its Chili women's mountain style has a laced and doubled hook 'n loop fastening. The specially designed cone-shaped sole tread pattern is in vulcanised rubber, highly resistant to abrasion and with excellent grip and traction.

Matching pedal to shoes

Shimano has been a driving force in the production of modern cycling shoes to keep pace with its developments in pedal construction. It was one of the first companies to provide shoes in small sizes down to a European size 36 which brought in 'bike shoes for the women's expanding market. For the 2003 biking season Shimano's women's models for road and off-road cycling are specifically designed on specific lasts, with a lower, narrower heel section, contoured inner sole and a reduced volume toe area.

Shimano has expanded its SPD shoes lines this year by an additional 12 models. Here, PVC and polyurethane-coated split leather and mesh predominate in uppers on the off-road designs. The glass fibre reinforced midsoles are more rigid and lighter than previous models, and the company says that specific attention has been paid to the stability of the foot on transfer of power to the pedals.

Thirty years of experience back the latest bike shoes from Northwave. Its new top model for competition road line is Genetix. Uppers are in Lorica and Aeromesh - a three-layered extremely breathable open knit. The insole is in natural cork,



Like natural leather, Lorica breathes for wearer comfort. It's also water-repellent, doesn't stain, can't be scratched and improves with age!

while the outsole of glass fibre reinforced Dupont Zytel resin has a titanium arch, a system with a screw plate and an outer strengthening of titanium making it compatible with Look, Shimano and Time Impact pedals. In the Northwave MTB line the Iguana in lizard green or black is not only optically attractive but also meets the tough requirements placed on it by 'bikers. Unique to the brand is the micrometric clasp on the instep strap that can be adjusted both on opening and closing the shoe.

Spinning away

Enabling 'bikers to keep in physical form all-year-round are the latest bike shoes for spinning from Italian manufacturer Biemme. Spinning is indoor fitness cycling, an activity that has been on the increase over the past few seasons, particularly during winter, in North American and European fitness studios. Either laced, or laced and hook 'n' loop strapped, the outsole is in a soft rubber while the inner is of high-density poly-nylon. Uppers are of chamois leather and net. These are a complementary line to the Biemme road and off-road styles that have optical as well as technical appeal and the new crick fastening buckles.

French manufacturer Carnac proudly presented racy spinning and triathlon shoes that are stunning in their simplicity. Just one hook 'n' loop fastening gives them the same aerodynamic look of the company's track and time trial lines, where the lacing is concealed behind a zipped front. Three top race models from this company, which has been manufacturing shoes since 1949 and specialising in the production of cycling shoes for the past 30 years, incorporate the use of kangaroo leather with either a lined tongue or an airy Neoprene instep. They are equipped with glass fibre hook 'n' loop straps and the SMC-system speed memory clip that recalls the setting used when last worn. Although this clip is the result of high-tech precision engineering it is quick and easy to use.

An additional feature of the three new Carnac race shoes is said to be the exceptional power transfer dynamics afforded by the new Tri-Vector glass fibre ankle belt. This surrounds the Achilles tendon without applying pressure, permitting the direct transfer of power from the heel to the front of the foot and so to the pedal. This company has also developed the Variable Stiffness Sole (VSS) - in three interchangeable rigidities - that uses a carbon fibre bridge under the arch of the foot. When coupled to the shock absorbing carbon-enhanced polyamide sole it firmly positions the foot in the shoe and on the pedal.

Other Carnac developments in sole construction for leisure riders include compatibility with all clip-less pedals with micro-cleats to enable walking in a natural manner, and, stemming from a new technological concept, its MPS2 MTB sole is rigid to enable the right distribution of support in traction as well as under pressure, while remaining supple at the metatarsal crease to make walking easy. The silver and black colourways of the racer styles coupled with strong red, blue or yellow touches are intended to add to their optical attraction.

Nike presents its cycling shoes in the European marketplace for 2003 built on Italian lasts which include women's and, in some instances, wider versions. Its top road racer design for men is Poggio II that is alleged to have a superior fit to previous models. The attractive look of the upper of the shoe, that comes in and red/white-black, and true white/black in the US, and in chrome/black variations for Europe, is in Teijin's Aero Technora, featuring a hollow microfibre substrate reinforced with para-aramid. This makes the shoe lighter and stronger. Three non-stretch, reinforced straps secure the foot to the sole and the new heel counter is larger and more supportive for a better heel fit. The PVC-free construction comes in non-stretch mesh that seamlessly surrounds the foot, providing cool climate control.



The Quartz shoe is part of Carnac's Racing Route range.

Women benefit from the Nike Ventoux model with its lighter weight and added support. A newly developed nylon sole is said to provide the rigidity of a racing shoe. Uppers are in tough, water - and abrasion - proof KNG 100 synthetic leather coupled with 3D knitted mesh for breathable comfort.

Nike's mountain bike shoes, Carnerso and Ligure, come with carbon fibre insole plates to provide the standard of stiffness required for hard riding, but still maintaining close proximity to the pedals. The use of BRS1000 for outsoles has proven its durability in all conditions and appears on these models. For extra traction dual toe cleats have been added and TPU external tips protect toes from rocks and roots. Fastenings are adjustable. Carnerso has a tough thermoplastic polyurethane (TPU) ratchet, that adjusts 'on the fly', and two hook 'n' loop straps. Ligure boasts three straps, and both models have cleat slots and soles designed for interaction with the best 2-bolt pedal systems.

Not to be outdone indoors, Nike showed its Pedali spinning models for men and women that can also be used for leisure riding. Built on its new Italian Gumjuac last, the shoe has a choice of soles - either rubber for grip when walking, or a nylon sole to provide the required stiffness for efficient pedalling but which still retains an easy-walk facility.

In total the latest shoe designs are destined to help cyclists improve performance on track, road, mountain ridge and fitness floor, making rides safer through better pedal adhesion in any situation, and adding to the all-over speed image by the inclusion of technical know-how of the highest calibre in their construction and optics. The 'biker's feet will thank them for it.

Kay Turtle



The Biemme 057 is designed for indoor fitness cycling (Spinning).