Preview for pedal pushers

Cycling shoes are, without doubt, one of the most technical sports shoe categories in the vast athletic footwear catalogue. Along with cross-country ski and alpine ski boots, cycling footwear has undergone a quiet revolution whilst hardly touching the ground. This is not surprising considering the technical complexity of the pedal and crank mechanisms with which cycling shoes must interact. Shoes and pedals have evolved a long way since clipless bindings took over from toeclips and straps, and a flexi-soled shoe is an exception rather than the rule nowadays. Originally developed by the French ski boot company Look in the 1980s, and based on its quick release ski bindings, clipless pedals require a metal or plastic plate to be attached to the cycling shoe, which in turn engages with the pedal.

Cycling shoes fall into three basic categories – road, mountain biking and spinning, the popular gym and stationary indoor training routine. State-of-the-art road and track competition shoes have ultra-rigid nylon soles moulded with carbon fibre or titanium for optimum pedalling efficiency. Holes are bored through the sole plate to fit popular pedal systems such as Look, Time, Campagnolo, Shimano and Speedplay. In mountain biking, to facilitate walking, the binding is recessed and the carbon fibre plate is either covered with a heavier vulcanised rubber tread or a high abrasion resistant moulded PU material. Road soles tend to be narrower and more curved than in mountain biking shoes where the sole should be somewhat wider in the sole and heel and flatter for portage. Some shoes can be adapted for either road or mountain biking, but a specific, designated model that does not require an adapter plate assists in transferring power onto the pedals. The Shimano Pedaling Dynamics (SPD) system was originally developed for mountain biking and touring and is known for its easy access and elimination of mud and stone build-up on the sole. Some styles offer interchangeable studs for extra grip. Spinning, as it is now recognised, has gained great popularity as a winter indoor fitness cycling activity in both Europe and North America. Biemme, an Italian shoe brand, has developed a line of shoes especially for spinning. To prevent any damage



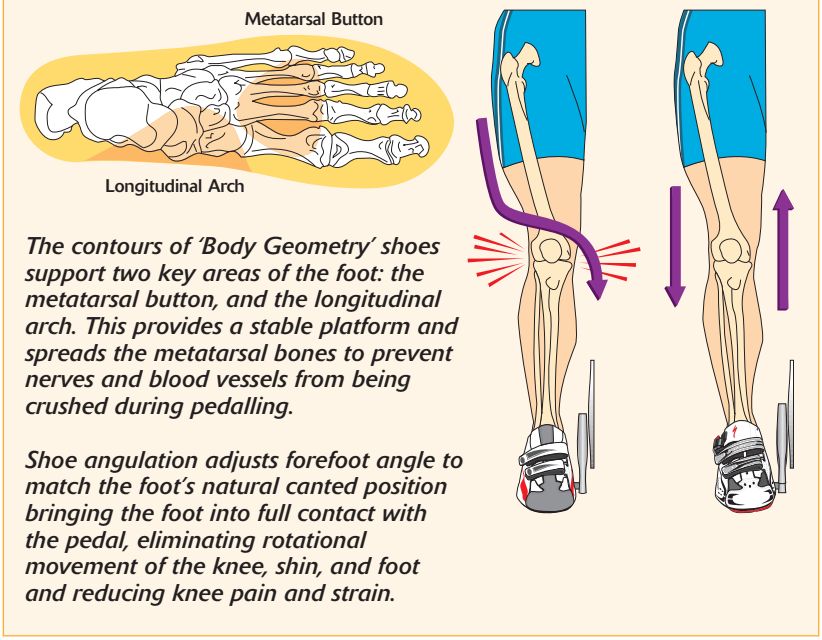
to studio flooring, the soles are covered with a soft rubber and the uppers are made from softer leathers with a high-density poly-nylon liner for comfort.

Carbon fibre with titanium provides stiffness

Cycling shoe manufacturers are continually trying to produce a comfortable, yet rigid-soled shoe for road racing, and, the only slightly less demanding, mountain bike shoe markets. The latest sole developments include the addition of carbon fibre with integrated titanium sections for stiffness and reduced weight. The rigidity of the sole is critical in giving riders the sensation that their legs and feet are bolted to the cranks and that there is no slippage at the heel. This helps foot alignment and knee tracking on the pedals to a great extent. Narrower fitting shoes are on the increase as the sport is becoming ever more popular with women. Additionally, to accommodate the Q-Angle of the female pelvis, women's cycling shoes may be canted with a valgus wedge, which helps to align the foot and the knee for better efficiency on the pedals.

Shoes are perhaps the most critical bike accessory in terms of getting an exact fit. Badly fitting shoes are not only uncomfortable and inefficient, they can also lead to injuries. Even if a cycling shoe is designed to perform well technically it will still create problems for the rider if it is not fitted correctly. In addition to adjustable, quick release hook-n'-loop closures, the search for greater stability in the uppers has also led to new designs in shoe closure systems including a number of new ratchet, buckle and click fastenings. The multi-step micrometric system features a steel mechanism that is interchangeable and thanks to its swing-out opening, it is easy to clean out mud and soil. EVA shock absorbing inserts are found in some of the more advanced micrometric buckle support mechanisms; 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 on the move.

Competitive cycling shoes are traditionally narrow, similar to a track sprint shoe. By compressing the toes, more power can be exerted at toe off or, in the case of the cycling motion (called ankling or tracking), on the down stroke of the pedal. This unique pull and push action on the foot leads to numerous complaints such as interdigital neuroma pain and metatarsalgia. In addition to wider lasts (E width) and construction modifications, modern bike shoe uppers have been improved to incorporate reinforcement and stronger materials to assist in preventing physical injury and to reduce the added stress on the dorsal area of the foot.



The contours of 'Body Geometry' shoes support two key areas of the foot: the metatarsal button, and the longitudinal arch. This provides a stable platform and spreads the metatarsal bones to prevent nerves and blood vessels from being crushed during pedalling.

Shoe angulation adjusts forefoot angle to match the foot's natural canted position bringing the foot into full contact with the pedal, eliminating rotational movement of the knee, shin, and foot and reducing knee pain and strain.

Body Geometry (BG)

Cycling shoe uppers are almost exclusively made from ballistic synthetic materials such as Lorica, a high-tech material created from a combination of very fine micro fibres. Each fibre, which is 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 shoes and equipment in contact sports.

Advanced synthetic uppers

Other synthetics being used in technical bike shoe uppers by companies such as Biemme and Nike feature a hollow microfibre substrate reinforced with para-aramid for strength with a very low weight ratio. Ballistic nylon mesh is commonly used in non-wear panels on cycling shoes for superior breathability. Diadora is also using Suprell–a highly waterproof and non-deformable material combined with ballistic mesh areas. Somewhat surprisingly, natural leathers are still being used by several companies such as Diadora from Italy and Carnac from France. However, split, nubuck and kangaroo leathers are coated with PVC or PU to improve abrasion resistance on the pedals. Also not to be overlooked as part of the upper package is the universal use of retro-reflective materials to increase visibility and safety for night riders.

Where there is a high degree of technicality involved in a specific sport, such as in cycling, footwear is developed by both the major "household" brand names such as Nike, adidas and Puma and a plethora of specialised brands often emanating from the sport itself. Shoe brands such as Carnac, Body Geometry (BG), Louis Garneau, Cannondale, and DMT are little



BG's specialised Pro Carbon road shoe.

Body Geometry (BG)

known outside of the sport of cycling. Other shoes have been developed in conjunction with pedal and cycle makers such as Look, Shimano and Time. Other specialised manufacturers of cycling shoes such as Diadora, Sidi, Northwave and Pearl Izumi have expanded to enjoy some popularity in other sports. One thing they all have in common is that they are constantly developing new concepts and improvements.

Italian style

Italian company Northwave specialises in shoes and clothing for cycling and snowboarding. The Northwave Revolution T is one of the company's top road shoes, with the distinctive feature that part of its sole is constructed from titanium for added stiffness and reduced weight. The Revolution T is a fairly complex piece of cycling footwear. The upper is constructed of three layers of "Aeromesh" – a soft and highly breathable material; the toe is made out of "Compact Mesh", which has a polyurethane web reinforcer heat sealed into it; and the heel is contoured moulded PU, which is stitched and glued to the sole and upper. The "TLS System Titanium" sole of the Revolution T is constructed from a combination of titanium and DuPont Zytel nylon for rigidity and light weight. The sole has a built-in sliding three/four-hole cleat adaptor that is suited for Look and Shimano SPD cleats.

Body Geometry makes a vast range of specialised road and MTB models for both the men's and women's cycling markets. Considered to be amongst the best road racing shoes in its category, BG offers micro adjusting M-lock replaceable buckles with two attachment positions for a custom fit; stiff injection moulded and fibreglass reinforced sole; a two density footbed for ergonomic comfort; MicroMatrix synthetic leather for a supple fit, which is durable, lightweight, and water resistant; and three-bolt and two-bolt cleat patterns to fit Shimano SPD, SPD R, SPD-SL, Look, Time and Speedplay. The approximate weight is 665g per pair (size 42).

Ultra rigid carbon fibre

The new 2006 top of the range Time shoes feature ultra rigid carbon fibre moulded soles for efficient pedalling with pressure relief comfort; closure and optimum foot holding via one carbon strap with an adjustable buckle and two Velcro straps in non-stretch fibre; and a comfortable lining and thermoformed removable insole. Synthetic uppers with lateral vents in the forefoot add a maximised mesh surface area for optimum ventilation, whilst a padded inner tongue helps to relieve pressure on the dorsal area of the foot. The three-hole sole fits the Time RX pedal range, Look pedals, Campagnolo Pro-fit pedals and Shimano SPD-SL. Speedplay and Time Impact/Time Equipe should be used along with the adapter supplied with their respective cleats.

A refreshing departure from "road-shoes with knobs on", Nike's Carnerso high-end MTB racing bike shoes are in the same class as more specialised models such as Sidi Dragons, Shimano Sh-M221's, Vittoria Ascents and Carnac Siroccos. Nike's Carnerso model has a carbon midsole under a lugged rubber outsole with threads for SPD cleats, a ratchet buckle closure plus two Velcro straps to attach the shoes to your feet and to provide quick 'on-the-roll' adjustability. The uppers are made of high-quality, tough coated leather with mesh panels with plenty of protection around the toes to ward off roots and rocks. For soggy race conditions there are a couple of extra threads under the toe for stud attachments to provide extra traction in the mud.

Shimano, which has been instrumental in developing shoes for mountain biking over the years, also makes a fine series of road shoes for the elite cyclist. The new SH-215 is 20% lighter than previous designs with increased rigidity coming from a super-light and stiff hollow moulded carbon fibre sole. The uppers of the SH-215 model have a sure-fitting buckle and strap system for stability and offer increased power transfer. Broad nylon ventilated mesh panels provide high abrasion wear with maximum breathability.

Shimano's new SH-215 road shoe is 20% lighter than previous designs.

Shimano

