



Puma-sponsored sprinter Usain Bolt prefers a flexible shoe that does not have restrictions and has influenced the design of the Puma Faas collection.

 Karen Fuchs / Puma

FOOTWEAR TECHNOLOGY: LIGHTWEIGHT SHOES

Lightweight sports shoes have rocketed this year, accounting for nearly a third of sales in the running category in the US.



 Karen Fuchs / Puma

The speed of lightness

It's a law of physics that a larger mass takes more energy to accelerate than a smaller mass. To translate this into athletic footwear, the lighter the shoe, the faster you run – or so the big brands are saying. Take Puma's new Faas range of running shoes, for example (featured in the May/June 2011 issue of *WSA*).

Puma claims to have created "the best running shoe on the market" by taking a minimalist approach to the design and developing a lightweight and purely functional trainer. Faas shoes are numbered according to the amount of cushioning and structure they have, with 100 being the lightest and 1000 the heaviest. At 175 grams, the Faas 250 is no heavier than a Frisbee. According to Philipp Hahn, team head of running for international footwear at Puma, "Without using or adding any plastic materials to the footwear, we're ensuring that the shoe is flexing specifically in those areas where biomechanically it makes sense and it's enhancing the running feeling of this footwear."

There is not yet a standard weight at which a running shoe can be classed as 'lightweight', but it is generally agreed that anything less than 283.5 grams in a men's US size 9 fits the bill.

Lightweight running shoes are on average about 25% lighter than traditional running shoes. According to industry research organisation SportsOneSource, lightweight sports footwear accounted for 28% of the running category in the US in the second quarter of 2011 (it's worth noting that minimalist or barefoot styles, a subset of lightweight, accounted for 5% in the running category.)

Matt Powell, an analyst with SportsOneSource, said that the second quarter marked a turning point, as lightweight products began to "cannibalize" traditional running categories, such as cushioning and stability. Lightweight athletic shoes are expected to hit \$1.8 billion in sales this year (compared to \$1.1 billion in sales for athletic shoes' other trend, toning shoes).

Consumer demand

Lightweight shoes are not completely new to the market. Unlike barefoot or super-minimalist footwear, lightweight shoes offer some cushioning and support and are therefore a kind of midway point between heavier, traditional running shoes and barefoot shoes, such as Vibram's FiveFingers. Racing flats have long been used for track and field and many long



The adiZero Crazy Light, which adidas claim is the "lightest shoe in basketball".



distance runners use lightweight shoes for training purposes. But with advancements in foams and meshes, running shoes have been getting lighter and lighter – and it seems that consumers are responding positively.

"You're seeing a lot of innovation coming in and people are bringing a lot more to the table in lightweight shoes overall," SBU manager at New Balance, Katherine Petrecca, said. "But the minimal side of it is also very consumer-driven. So you're kind of seeing it from both sides. The consumer is reacting and has been over the last two years toward better-engineered, lightweight product from lots of people. It's opening up the spectrum as to what's acceptable in terms of performance footwear in the running category."

Last year it was estimated that Nike had a 75% share in lightweight running, mainly due to its Nike Free shoes. Since the first model debuted in 2005, Nike has led the lightweight running category while refining its offerings. The laces on the Nike Free are positioned asymmetrically, which relieves pressure on the top of the wearer's foot, and the grooves in the sole are deeper and wider, which forces the wearer to use their toes for stability. The latest in the Free line is the Nike Free Run +3, which weighs the same as its predecessor at 246.6 grams, but offers more support. The shoe retains Phylite midsole cushioning but modifies the sole flex groove pattern to better support the arch. It also improves durability, with a stronger toe box and reinforced hard rubber wear points on the heel and toe. The shoe's upper features a mesh construction that weighs less and offers ventilation to keep the foot cool.

year the German brand launched what it claimed was the "lightest shoe in basketball". The adiZero Crazy Light weighs 227.8 grams and is, according to adidas, more than 15% lighter than its nearest competitor.

Lawrence Norman, adidas vice president of Global Basketball, said: "No other basketball shoe compares to the new adiZero Crazy Light and it's a shoe that will revolutionise the game. The ultra lightweight design is built for players who want to be faster, jump higher and perform better on the court."

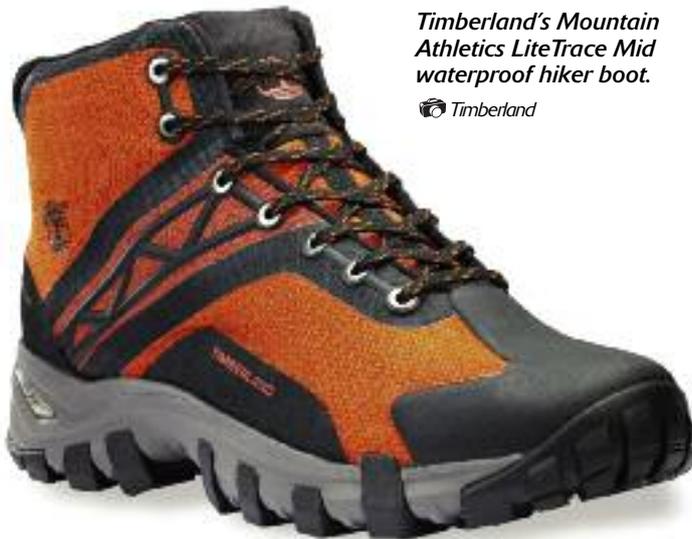
The adidas Innovation Team (aIT) and adidas Basketball Design developed the adiZero Crazy Light over a period of two years from the canvas of a bare foot. "We wanted to build the ultimate shoe for the ultimate basketball player, and research has clearly shown that a lighter shoe will provide better performance," said Griff Wilson, senior developer with the innovation team. "The key is to provide the support and cushioning of a traditional basketball shoe in a super lightweight construction."

Nike's lightweight Free 3.0 running shoe.



Lightweight basketball shoes

The presence of lightweight shoes is growing in a number of sports besides running – the adiZero Feather from adidas is a lightweight tennis training shoe, and in April last



Timberland's Mountain Athletics LiteTrace Mid waterproof hiker boot.

 Timberland

The adiZero Crazy Light features a 'Sprintweb exoskeleton' upper less than 1mm thick and seamlessly bonded to a nylon textile base to significantly reduce weight and provide increased support and strength. The web layout of the materials provides vertical and horizontal strength to give players optimum support for any cutting motion.

The 'Sprintframe' external heel counter and 'Torsion System' are bonded together to allow maximum weight reduction, energy return and motion control, according to adidas. Each lace eyelet is load bearing and has a corresponding web spar to support players during hard cuts. The upper is made with translucent nylon to further decrease weight.

Not just for running and jumping

It seems the push for lighter shoes is even expanding into the outdoor and trekking market, as outdoor footwear brand Timberland has now launched its own ultra-light multi-sport boot for men. Weighing 354 grams, the Timberland Mountain Athletics LiteTrace Mid isn't quite as light as a lightweight running shoe, but the brand claims it offers the "stability, traction, durability and waterproof protection of a hiking boot with the lightness of a sneaker".

"Our lightest design yet, the LiteTrace boot strikes a perfect balance between minimal and durable," said Brian Moore, vice president of men's footwear for Timberland. "Men no longer need to compromise; they can now get the protection, stability and waterproofing they need, in an extremely lightweight multi-sport shoe."

The LiteTrace boot's single-layer waterproof upper uses no-sew construction and minimal seam sealing for lightweight, breathable performance. By eliminating layers, the membrane is closer to the foot and the outside of the shoe, creating a breathable waterproof shell, according to Timberland. A Pebax foam heel insert further reduces weight in the shoe. Timberland is the first brand to use Pebax foam, and claims it is 20% lighter than EVA. The boot also features Green Rubber outsoles, made with 42% recycled rubber for traction and durability on the trails.

With more and more brands joining in the huge success of lightweight footwear, and the impressive sales figures to back it up, it seems a 'less is more' approach to footwear design is the direction shoes are heading in – and consumers seem only too happy to follow. 

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