

Björn Gustafsson:

Running Shoes 2.0

The interview with Prof. Gert-Peter Brüggemann (page 22) shows that cushioning systems in running shoes were superseded by “Natural Running”. This article clarifies what “Natural Running” is, what the heel lift has to do with it and what features are important for “Natural Runners”. Furthermore the article is completed by a test series of the current “minimal shoes” of different manufacturers from all over the world.



(photo: Saucony)

The year 2011 is the year of change and of a new awakening of the running shoe industry. The big, new idea, promoted under the term “Natural Running”, establishes itself. The manufacturers for the most part realized that the to date praised “gold standard” of rigid heel caps, average heel lift of 13 millimeters, rearfoot heights of up to 42 millimeters (!) and additional medial stabilizing elements is a one-way street in running shoe construction. This kind of shoe construction has led to a zero percentage reduction of overloading problems essential to running in the last 25 years.

At present many manufacturers are promoting “Natural Running”. Only in the October-edition of the German RUNNING-magazine the brands Puma, Scott and Newton placed full-page ads displaying their models as natural running shoes. When I asked if they would make the advertised shoes available for practical testing, many manufacturers declined. Thus we do not always get “Natural Running”, where marketing strategies proclaim it.

What is Natural Running?

But what is natural running at all? In the pure sense of the term you could say that it is about walking barefoot. Given that our modern surfaces may not transpose such locomotion, the emphasis is situated on the way of running, the running style. Instead of the usual initial contact, widened by 95 per cent with the latest shoes, that takes place far from the body’s center of gravity with a rather extended knee,

natural running consists of the following six points:

- An arm position with an elbow angle below ninety degrees.
- A good knee lift in the swing phase – the leg is led forward with a increased hip flexion.
- The initial contact is directly in front of the body’s center of gravity.
- The foot contacts the ground with the metatarsus or a flat heel landing.
- A knee flexion reduced by five to ten degrees in the support phase compared to the heel running.
- A severe hip extension in the propulsion phase, with a completely extended knee.

This running technique generally is regarded as being natural and requires shoe constructions with a lower heel lift and a flat construction of the midsole. The muscular system actively stabilizes the joints and prevents overloading problems. A positive side effect of this technique is a performance enhancement due to the negative braking effect during initial contact and a strong activation of the gluteal muscles act stronger whilst propelling, because there is less negative braking energy when landing and the lift off from the ground is stronger with the support of the gluteal muscles.

It is almost to impossible to implement this “natural” running technique with the conventional shoe constructions, due to the enormous rearfoot heights which consequently evoke a heel contact. These rearfoot heights then require additional stabilizing elements in the medial area of the midsole

in order to minimize the pronation movement caused by the instable lever – a vicious circle.

Thus shoe constructions for natural running should have the following five features:

- A flat sole height, getting the foot closer to the ground and additionally leading to a reduced cushioning. The shoe is therefore more direct and faster.
- A clearly reduced heel lift with a maximum height of 5 millimeters at the most. For that the lasts have to be constructed in a flat way (see picture Saucony Hattori).
- A flexible sole construction enabling the rolling over the forefoot and not over the toe-cap as it is provoked in conventional shoes with a high heel lift and a strong toe lifting.
- Due to the increased flexibility of the sole, the heel cap is not required, because the rearfoot stabilizes itself through the supinators (Mm. triceps surae, M. tibialis posterior, M. flexor hallucis longus und M. digitorum longus) of the lower ankle joint (see picture Nike FREE).
- A medial support is not necessary, because the sole is built flatter and it does not function as pronation – strengthening level beneath the foot.

Testing of Minimal Shoes

In the latest collection (fall/winter 2011) there is a completely new genre of running shoes, so called “minimal shoes” by the running scene. All of these minimal shoes forego medial stabilizing elements in the midsole.

The flatter construction allows however a good running style from supination to slight overpronation. About half of the manufacturers are currently offering such models, being used so far from experienced runners as alternative shoes. A fact that is bound to change within a very short time. I asked selected manufacturers showing coherent concepts for a pair of testing shoes, which I tested respectively for twelve kilometers.

My anthropometric data: weight 86 kilograms, height 189 centimeters, best time ten kilometers in 32 minutes 20 seconds, marathon 2 hours 51 minutes, runner for about 27 years, flat heel landing with strong pronation in lower ankle joint. At the age of 18 until 23 professional triathlete (junior world champion in 1989), constantly injured from running. Six years ago modification of running style to active running style with initial contact across the metatarsus/flat heel. Since then injury free.

Concerning the measuring data: the shoes were measured technically in the "currex" analysis lab on material properties and construction heights. Whilst measuring the rear- and forefoot height the standard insoles remained in the shoe, as well when measuring the cushioning. The entire information of the shoes for your daily work and for the competent customer counseling are deposited in the shoe data bank of the "motionquest" software.

Brooks PURE Connect PURE-line: the new hope

In the fall of 2011 the American manufacturer Brooks launched the new

PURE-line. The Connect is the most radical representative of this new line. With six millimeters it has the smallest heel lift of all models of the new PURE-line. The lasts show a significant toe lifting, causing it to appear very "fast" and it imparts a good feeling when putting it on for the first time.

Additionally there is the very responsive EVA-material, called MoGo by the Brookers. The impression while running the "Connect" seems to be at first a bit insecure when landing, as a result of the narrow sole. The toe lifting leads to a good propulsion due to the fact that the form of the shoe base reminds of earlier shoes with conventional heel lift in the metatarsus and is noticed after a certain distance clearly in the longitudinal arch.

All in all it is a good shoe and certainly a radical contemporary amongst the minimal shoes, that should be built upon a flat last, however.

Saucony Hattori A Specialist establishes itself in a Niche

The American manufacturer Saucony belongs to the top dogs in the development of the new minimal shoes, according to my opinion. Saucony will offer in most models completely reduced heel lifts of eight millimeters as of spring/summer 2012, the most radical implementation among all manufacturers so far. The "Hattori" is the tip of the iceberg for me. With zero millimeters heel to forefoot ratio and completely flat last, the Hattori looks like a flip flop with a bit of upper material.

First I did not dare to run the Hattori. When running however the

first impression was absolutely positive: the shoe is well attached to the foot and is hardly noticed as a shoe, light and absolutely fast. This shoe should be tested by every good runner – under two conditions: a good running style and a body weight of maximum ninety kilograms.

Adidas CC Ride No clear statement to the topic minimal

The "clima cool Ride" at first sight appears to be a one to one copy of the Nike "FREE". After all the German supplier took its time with this model series in order to study the concepts of the competition.

When trying it on for the first time, the Ride is well adjusted to the foot and shows its tight forefoot fit. Through the thin insole, the runner with a sensitive foot notices the groove structure of the midsole, also mainly because the EVA of the midsole is firmly foamed.

When running there is no surprise: The "CC Ride" is flat, fast and convinces with a good flexibility. The firm midsole offers little cushioning and thus requires a good running style. All in all a successful contribution to natural running by Adidas.

K-Swiss Blade light Run A successful entry in the running shoe industry

With the "Blade light Run" the Californian sports shoemaker announces his ambitions in the running shoe segment. The successful fitting however is tempered by a high heel lift of nine millimeters. Considering that the



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Adidas CC Ride



Asics Gel Excell 33



K-Swiss Blade Night Run



Brooks PURE Connect

“Blade light Run” is supposed to be the most radical shoe in the whole Blade family, I assume that the shoe appears to be a conventional cushioning shoe with the high heel to forefoot ratio. Therefore no surprise when running: the shoe tolerates the heavier heel runner as well as the ambitious metatarsal runner. However, no very clear statement towards natural running can be wrested from the shoe. Ultimately I consider the shoe as a good entry model and first of all a successful entry into the running market by K-Swiss.

Asics Gel Excel33
The giant does not bare its teeth

Heavily promoted the current market leader in the running section enters the market with the “33” series. Asics was however not able to provide a suitable testing shoe for me before the editorial deadline, which is why I can only describe the technical features of the shoe. The lady model, which was submitted to me, features an almost normal heel lift of ten millimeters and does not display any significant changes compared to conventional models apart from the new “propulsion plate” – a slightly modified metatarsal bridge that protrudes beneath the first and fifth ray – and the construction height reduced by two millimeters. Asics

wants to stay on the safe side with the 33-concept and does not want to leave the entry into the market of the minimal shoes completely to the competition. Altogether a very moderate and consumer oriented concept – you can run it, but you don't have to.

Nike Free 3.0 V3
A “must have” for every natural runner

Nike is the mother of natural running with its Free-series. About five years ago Nike was the first company to dare to offer shoes following a completely different paradigm: no heel cap, a ultra flexible sole in all directions (torsion, flexion and extension) and implied a completely new way of thinking. People that criticized the shoe as “unsellable” and “only suitable for runners without any malposition” at that time, are wearing the „Free” themselves today. In the meantime the “Free” established itself in some running shoe shops as extreme turnover item. I have worn and tested the “Free” myself from the beginning, but I was really thrilled by the updated version 3.0. Improved upper material and a noticeably changed sole construction have made the new 3.0 to the basic shoe number one. Those who want to try out the new running feeling cannot surpass the “Free 3.0”.



The insole of Connect clearly shows the pronounced built-up in the metatarsal area and the clear toe lifting.



New Balance Minimus Trail



Heel to forefoot ratio in direct comparison: (from the left) the “Mizuno” with a heel to forefoot ratio of 12 millimeters, with a reduced heel to forefoot ratio of 6 millimeters and the prototype of a running shoe for test runs without heel to forefoot ratio.



Nike FREE 3.0 V3

New Balance Minimus Trail Ying and Yang

The American sports shoemaker New Balance has a Minimus series with a heel lift of five millimeters. Whereas New Balance in the same season offers a shoe with one of the highest heel lifts of 15 millimeters, the American company shows with its Minimus series that they also can do things differently. I only had the "Minimus Trail" available for testing and unfortunately I could only run it on the street and on solid grounds. But here the shoe showed its



Saucony Hattori

potential for rough, mountainous grounds: the Vibram-sole is so non-skid that the imprint is real fun. The mid-sole of the model is however not cushioned at all and therefore only suitable for off-road trails. But here the concept is pure fun. Unfortunately I could not test the street version of the shoe, since it could not be delivered yet.

Björn Gustafsson is an expert on motion analysis, runner for about 27 years and 1989s world junior champion in triathlon.

Glossary

Cushioning: When running the moving force is partially transformed into heat, through the absorption of energy by the shoe sole. The bigger the EA value is, the more moving force is transferred into heat, the bigger is the cushioning of the shoe. Dimension: energy, work.

Backspringing: Code name as measure of the shoe sole's backspringing. The higher the value, the stronger is the backspringing, that means, the material's ability to regenerate into the initial position. Dimension: force.



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