

Best boot forward

One hundred years ago, military boots were often more of a hindrance than a help and formed a popular excuse for soldiers to exercise their love of grumbling about the army in general. One cannot really blame them because boots at that time were heavy and unyielding, requiring considerable 'breaking in' before they were in the least bit comfortable.

They were also not specifically designed for military use but were merely a version of the standard heavy men's working boot. That has changed out of all recognition during the past 50 years as military boots have gradually been developed into extremely sophisticated products often tailored to the specific needs of different sections

of the armed forces. American company Lalo Tactical is a good example of this modern approach.

Lalo produces technologically advanced military footwear that has been designed and developed in conjunction with US special forces, particularly the Navy Seals. Using years of formal testing and evaluation carried out with them, it prides itself on being able to produce the best tactical footwear available anywhere. It also strives to set a standard against which all other similar products are measured in terms of product design, content and authenticity, as well as customer service and social stewardship. In today's increasingly technically advanced footwear industry, this is quite a tall order, so just how does it go about

developing military boots that it says surpass all others?

The reasoning behind Lalo's range of tactical footwear is quite simple. The cost of training a special operations candidate up to the point at which they become fully operational was approximately \$1 million. The footwear they were issued with did not work as part of a fully integrated system which, in view of the total costs involved did not seem logical, so Lalo decided to change that by making it all compatible: boots that fit into combat swimming fins, VBSS (visit, board, search and seizure) ladders, and a system of footwear for use in physical training. Having footwear that was fully inter-related seemed a simple and common sense approach. To see what



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The Lalo Shadow has an outsole made from a blown rubber compound containing DuPont's Susterra to save weight and features a special tread for maximum traction on all types of surface.

this involves, we can take its Shadow Boot as a prime example.

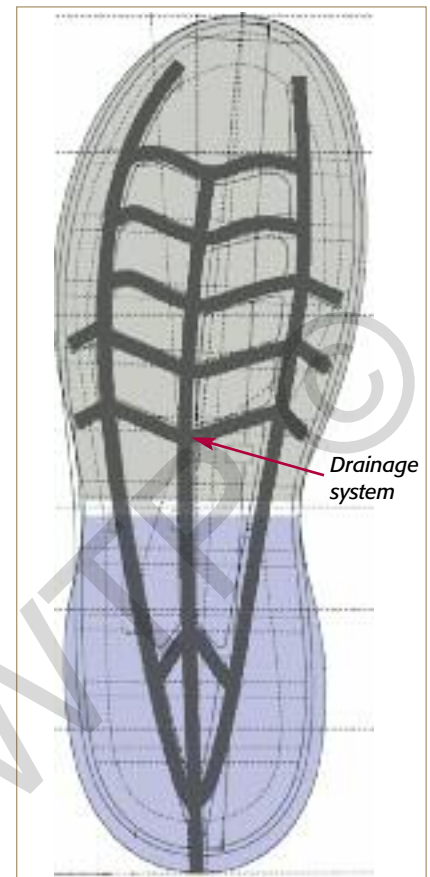
Like all the company's footwear, the key component in the Shadow is the sole as this plays a vital part in how well the wearer is able to function effectively in both seawater and on dry land. Overall weight is an important factor here and so blown rubber based on a proprietary compound from DuPont is used. This also contains Susterra to reduce weight while maintaining durability, increasing flexibility and aiding traction in all environments for the stealthy approach that is so essential for special operations operatives (see *World Footwear* March/April 2019 for more details on Susterra). To illustrate the importance of reducing weight, every 28 grams of unnecessary weight translates into 25 kg over one mile based on an average six foot stride length or 880 steps. The lighter the footwear, therefore, the less the fatigue created.

The design of the Shadow's outsole is quite complex as it has to satisfy a

range of different criteria. First, it has a longer tread depth than normal to provide traction over varying surfaces such as gravel, grass, etc., whether wet or dry, while still being able to shed debris effectively. The tread is also slightly thinner than is normal on a military boot to ensure it can be used in conjunction with a variety of combat fins in order to provide good 'swimmability'. It also features a rounded heel shape that replicates our natural heel shape and eliminates any jerky or slapping sensation at foot strike through the pronation phase of the gait cycle.

The overall profile of the sole is designed to roll the boot forward from foot strike through a smooth transition to toe off, thus making it as ergonomically efficient as possible. It also features an engineered footboard that creates a rocker effect and sufficient toe spring to make the wearer 20–35% more efficient depending upon the ruck load carried (rucking is a US military term for a forced march carrying a weighted back pack). The rolling motion this imparts helps negate an inefficient heel strike to toe off cycle and makes for a quiet, stealthy approach as well as promoting steadiness in the gait cycle when holding a firearm. Furthermore, the ramp angle (heel height to forefoot height) is set at an optimal 8mm drop.

The sole also features a number of other specialist features including a puncture resistant plate made from 70% recycled polypropylene with a



The Shadow's midsole uses two densities of EVA to provide the best possible combination of cushioning at foot strike and propulsion at toe off. The diagram also shows the layout of the integral passive drainage system.

composite additive. There is also a fin clip incorporated in the heel. This is designed to grab the heel strap of a swim fin and eliminate strap movement while swimming. The sole extends upwards over the heel and has a pocket



The sole's profile is designed to roll the boot forward to make it as ergonomically efficient as possible.



Water drains away via ports on each side of the sole and at the back of the heel.

moulded into it where a patch of IR glint tape can be applied. This is a special tape originally developed by 3M which is reflective in infra-red light and is used by the military for night operations so that anyone with an IR patch can be instantly recognised from behind as being friendly rather than hostile.

There has clearly been a great deal of research behind this sole design and Lalo spent some 18 months looking not only into the form of the outsole but more specifically how it functions, including the geometry, material science and how to resolve these factors for the maximum efficiency of the entire outsole unit. This in fact combines the blown rubber outsole with a patented dual zone compression moulding that uses proprietary EVA

compounds and which Lalo says offers benefits such as comfort while the wearer is stationary, rapid response to foot pressure and good performance while moving.

It achieves this by having the rear foot section of the midsole in a slightly softer EVA than the forefoot to allow for some cushioning at foot strike and then propulsion at toe off. EVA was chosen as it is a well proven and reliable material for midsole production that also combines reliability and performance which is what the Lalo Shadow is all about. Also incorporated into the unit is what Lalo describes as a 'passive drainage system'. This is part of both the outsole and the midsole. The former contains drainage ports and the latter has a cistern system that collects

and channels any water away from the boot. The outsole/midsole unit is both adhesive bonded and stitched to the lasted upper for maximum security.

If the sole is the key component, the upper is not far behind as it, too, must offer maximum performance in terms of comfort and reliability. The most important factor here is moisture control and so the boot's lining is made from ceramic bamboo fibre. This not only offers highly effective moisture management but is also anti-microbial, hydrophobic, quick drying, absorbent and also ensures that the boot will dry out rapidly. Bamboo fibre is also environmentally responsible as it comes from a highly renewable source where any raw material harvested is quickly replaced due to the plant's rapid rate of growth.

Foot comfort is further assisted by moulded KPU grills at the side of the boot which, while keeping debris out, act in a similar way to a car radiator to allow air to be exchanged with the outside and help to prevent skin breakdown. They also add further areas of grip for swim fins when these are used. KPU (two component polyurethane) is an extremely tough material that has exceptional wear, flexing and age resistance, and can be moulded into flat components, making it ideal for use on applications such as this. Lalo also uses it in the lacing system for the Shadow boot, as once laced, the boots stay secure over a long period of time due to friction. The boot will continue to function even if a lace breaks at an inopportune moment.

In a product such as the Lalo's Tactical boot, nothing can be left to chance as a wearer's life may depend on how well it functions under the most demanding of conditions, both physical and climatic. It is for this reason that so much research, product development and extensive testing in the field has gone into it. Needless to say, this does not result in a cheap boot but, then again, that is not the object. Compared to all the other costs involved in the training and equipping of a front line special forces operative it is of little consequence. On the other hand, if the wearer is unable to fulfil their full potential because their boots let them down, all has been wasted. That is why the Lalo Shadow is so technically advanced; it cannot afford to be otherwise. 



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