

WORLD FOOTWEAR



The British Mk1 aircrew boot

Shoemaking to the very highest standards

Military aircraft cost tens of millions of dollars to build and aircrews hundreds of thousands to train. Every effort must therefore be made to ensure they can function efficiently in as much comfort as possible and survive in a hostile environment. As a result, a great deal of thought and practical testing is applied to clothing and footwear. A slight deficiency might be a nuisance in everyday wear but when flying a high performance aircraft it could prove to be disastrous.

The last used in the British Mk1 aircrew boot is the result of extensive surveys of the foot dimensions of male and female aircrew and provides the basis for a boot which offers comfort and support both for walking and when sitting in the cockpit. A major problem is the need to accommodate variations in the wearer's foot size. Depending on aircraft type and theatre of operation, aircrew may wear socks or, in addition, immersion or chemical resistant suits with bulky feet sections that must still fit inside the boot. This used to be overcome by issuing two pairs of boots of different sizes but is now resolved by use of a special removable insock. A further complication lies in the increasing number of female aircrew and so the total size range covers twelve full sizes, with four fitting options in the middle sizes.

Aircrew wear their boots constantly while on duty—whether flying or not—so they must be comfortable at all times. Two key requirements are breathability and water resistance. Haynes & Cann who have made aircrew boots since World War II, developed, with government approval, their own upper leather

specification for the Mk1 which is standard issue for the Royal Air Force. Water vapour permeability (SATRA PM47) is a minimum 5.0 mg per sq cm h, with water resistance (BS 3144/2) a minimum 120 minutes penetration time with a maximum 20% water absorption after abrasion and (SATRA PM34) a minimum 5000 flexes to initial penetration.

In addition, the leather also needs sufficient strength and heat resistance for the direct vulcanising process used in manufacturing the boot and to show the same suppleness as the calf leather originally used. Oils and free fatty acids must also be low to maximise sole bonding. Finding a leather to meet every requirement was not easy and some 20 tanners were tried before the basis for a suitable material was found in an existing soccer boot leather produced by Pittards. It was perfected and has been in use ever since.

The material is a 1.2 – 1.5mm, full grain side leather, dyed through and with a natural break. Hide selection is crucial as the boot has a galosh cut and the patterns are relatively large. Even so, average usage is around 4.5 sq ft per pair depending on size. The fact that the leather has to be processed in relatively small quantities to a special formula is a further test for the tanner. Clearly with such a premium placed on quality and performance, a close working relationship between tanner and shoemaker becomes essential.

A further interesting feature of this boot is the method used to waterproof the seams. Haynes & Cann states that the fewer barriers there are in a boot, the more comfortable it will be. A membrane—whatever its claimed performance may be—is a

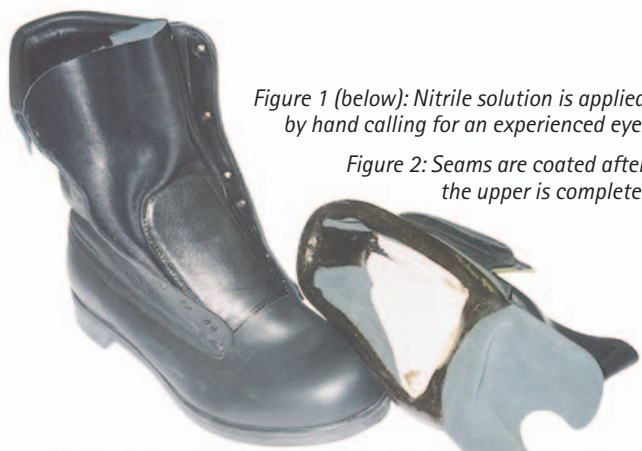


Figure 1 (below): Nitrile solution is applied by hand calling for an experienced eye.

Figure 2: Seams are coated after the upper is complete.



FOOTWEAR PROFILE

barrier which reduces the vapour permeability of the boot upper. Instead, they treat all seams with a nitrile solution to make them as water resistant as the leather itself and this has proven entirely satisfactory under regular use.

It is essential to ensure the nitrile solution penetrates the needle holes to seal them to the seam thread and between overlays and underlays. To achieve this, a diluted solution is first applied and allowed to dry (Figure 1). The seams are then examined and up to a further four coats of undiluted solution applied until all seams are considered to be fully sealed (Figure 2). This may vary from upper to upper and seam to seam. It therefore needs a skilled eye and considerable experience. The fact that the solution is applied by hand also makes it a time consuming and expensive process. But, in a product such as this, cost is secondary to performance.

The cut of the boot has hardly changed in 30 years except for enlarging the bellows tongue in order to allow easier foot entry with survival suits and a cuff around the top in which to trap the consequently longer lace ends. Insoles are still high quality leather and the boot is lined all through with natural chrome retan calf for maximum permeability but some heat resistance to the vulcanising process. The Mk1 boot is a perfect example of the steady and logical development of a proven concept, and calls for a very different approach to that of mainstream footwear manufacture. 

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