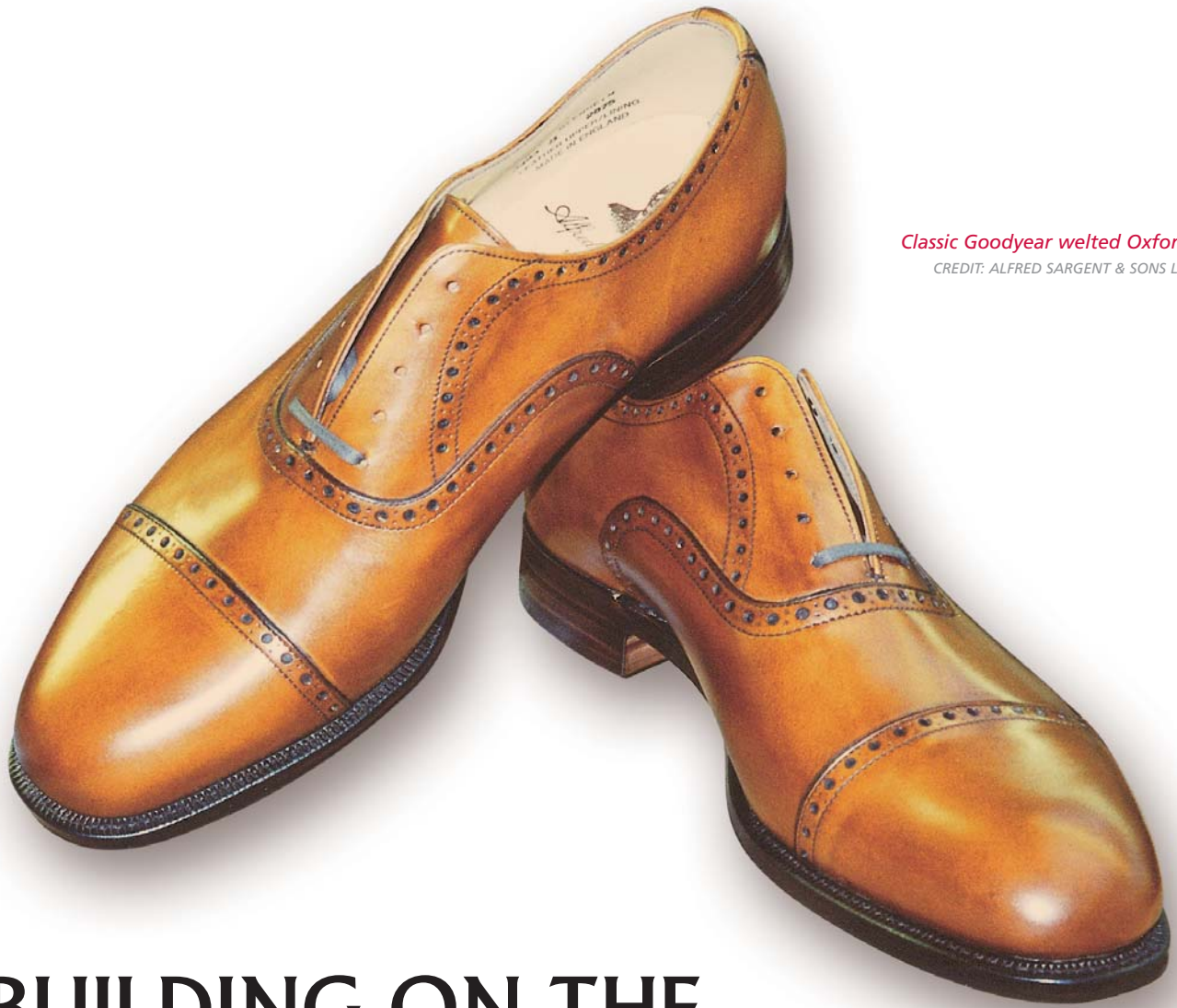




Classic Goodyear welted Oxford.

CREDIT: ALFRED SARGENT & SONS LTD

BUILDING ON THE RIGHT FOUNDATION

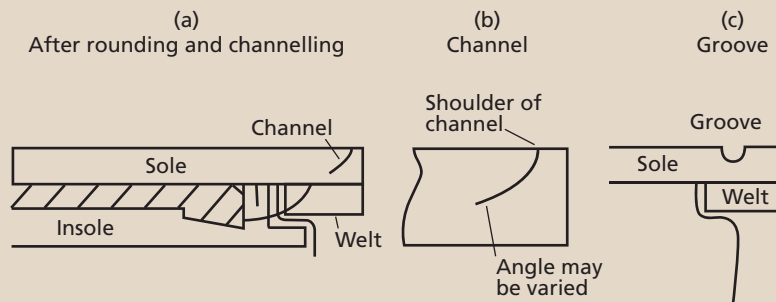
The Goodyear welted construction has undergone something of a renaissance in recent years. Up until the mid 20th century, it was the construction used to produce the vast majority of men's shoes worn in developed countries and exported to the rest of the world for those who could afford them. The emergence of simpler and lower-cost constructions such as direct vulcanising, stuck-on and direct injection moulding caused its rapid decline until it remained in use only for expensive shoes or specialist footwear. So it remained until relatively recently, with just a few traditional manufacturers supplying a limited but steady demand.

Then things changed as globalisation brought about accelerated industrialisation in developing countries and, with it, the emergence of a new middle class with money to spend on the better things in life. Among these were smart suits and good quality shoes for managers moving up the corporate ladder. Goodyear welted shoes had never lost their cachet of exclusivity and so demand for them suddenly increased beyond what traditional manufacturers in Europe

and America could supply and, in many cases, were prepared to supply. Rather than increase output, they preferred to increase quality and retain their own exclusivity in order to maximise existing production capabilities and profitability.

This created new opportunities for manufacturers in India and China to step into the breach. The former was already a major producer of cheap welted shoes by hand as shown by Somenath Ganguly's article on Agra's footwear industry in the March/April 2008 issue of *World Footwear*. Although Indian manufacturers knew how to make welted shoes, with the exception of one or two, they were not capable of the quality demanded in many world markets. So, Chinese shoe manufacturers were encouraged to move into Goodyear welted. Now, while they installed the right machinery and produced good uppers, they did not always buy the right quality components as they failed to realise that making good welted shoes is very different to making sports or fashion footwear for a mass market.

Figure 1 - Goodyear welted construction



machines plus their maintenance is sustainable. There have even been instances where manufacturers have actually begun to use a lower grade of insole board in the belief that the additional stitching will more than compensate. Stitching may also cause the rib to flatten and make lasting more difficult. In addition, if the adhesive bond is weak the rib will still shift during lasting, especially if the correct rib support plate is not used on the forepart lasting machine. A clear case of not just one but two steps backwards.

GETTING TO THE HEART OF IT

The heart of any welted shoe is its insole—get it right and all will be well, get it wrong and the problems will multiply. It must be strong enough to withstand the considerable shear loads exerted on it at lasting and, more particularly, welt sewing. If it is not, it will start to tear or delaminate so that the rib begins to move. Undetected, the shoe will soon come apart in wear and one of the chief selling points of a welted shoe is its strength and longevity.

Not unnaturally, Chinese shoe manufacturers like to buy Chinese-made materials and components; it's easier and usually cheaper. Unfortunately, many of these materials have technical and performance specifications that are not always up to the requirements of welted shoes. Insole boards are a good example, particularly in terms of 'rib peel strength' resulting from inadequate internal bond strength within the board itself. As a result, shoe manufacturers began to stitch round the welt rib to reinforce the bond to the insole as well as prevent delamination. While this worked to a great extent, it was only really economically viable while labour costs were minimal. However, shoes made this way lacked the three-dimensional stability during flexing and torsional wear that is found in a strong rib bonded to a proper board with a correctly activated good quality adhesive.

Labour rates in China are rapidly increasing so, leaving aside any technical considerations, it must be questioned whether the extra cost involved in adding anything up to ten workers, thread and the leasing or purchase of sewing

WHAT MAKES A GOOD RIB?

Bonding ribs to insoles with adhesive is foolproof if carried out correctly and using the right components. A good 25mm rib consists of a cotton polyester blended fabric with a water-based neoprene adhesive coating and a 1.0-1.5mm cellulose board core. The fabric should be capable of resisting a tearing load of 85-90kg which represents what can occur during side lasting and welt sewing. The rib will also have a 15mm wide 'foot' to provide a good bonding area to the insole.

The adhesive must withstand movement during lasting due to heat and pressure. It will normally re-activate at 150°F, so rib laying machines need to be set at 350-400°F to insure proper adhesion. Whilst pressure of some 27kg is applied to the rib, it is the temperature that is the key. As some machines such as Prime and Sampson are capable of 2,000 pairs per day, it can be seen why a high setting and regular checks are vital. The industry standard for rib to board pulls with a Scott Tester or similar is 38.5kg but pulls of 45-60kg are possible depending on the board used.

One further factor that also needs to be understood is the difference between this resistance to rib shear during welt sewing and the need for resistance to delamination or separation of the rib from the insole board in wear that is referred to as 'rib peel'. While it is possible to achieve good rib shear, unless the insole board is saturated correctly, its centre will be starved of binder or deficient in total wear strength leading to rib failure in wear.

Additional stitching should not be needed as the board used here is well-proven for bond strength.



CELLULOSE INSOLE BOARDS

All that remains is finding the right insole board. Texcon was the original inventor of cellulose insole board shortly after World War II, so it has enormous experience in the field. Bontex came a little later but, again, is a recognised producer of top quality cellulose insole boards. The United States had a huge footwear industry up until the late 1900s and was a major producer of welted shoes, so there was plenty of scope to perfect the right type of board for the



Applying a rib (the importance of this operation is not always appreciated by manufacturers new to the Goodyear welted construction)

CREDIT: CHURCH AND CO (FOOTWEAR) LTD

Goodyear process. With the bond between the rib and insole being so critical, boards were developed that used only virgin pulp with long fibres and had high binder content for maximum laminar strength in order to provide a sound base on which to bond the rib.

On a more general level, the good moisture absorption and breathability of cellulose boards, plus their clean surface appearance, means they can be used with only a heel sock so that foot comfort is maximised. Both companies have refined their products over the years and both have boards specifically tailored for the Goodyear welted process; Texon has T437 DSA and Bontex has materials from Bontex 244W, a material specifically designed for the welting process, through to 244G, a specially formulated water resistant product that also is suitable for Goodyear welted shoes, to the specially designed 37CEN product which not only meets the Central European standard of ISO 20344-20347 but also has excellent rib shear and rib peel strength..

T437 DSA provides a typical example of the level of performance that can be expected from boards produced by this level of supplier. The key indicator is that it is classified as being Grade 1, so it is abrasion resistant according to CEN 344, has water absorption of more than 35%, a recommended minimum thickness of 2.00 mm and is shear and peel tested in Texon's SATRA-accredited laboratory where it easily exceeds Grade 1 requirements in all respects. Like Bontex and other leading board producers, Texon takes great pains to ensure that its boards are always up to standard. Cuttings are taken from each production batch and tested. The

batch will only be cleared for shipment if all test parameters are met. Samples are also held back for two years for future reference. Each shipment carries a test certificate showing bale number, thickness, wet split tear strength, water absorption, flexing, wet abrasion and, most importantly, rib bond strength.

Bontex has experimented with various formulations over the years, with special emphasis on recycling and the use of post-consumer waste to minimise the escalating cost of raw materials. Although development continues in this direction, the vital blends of fibre and latex are especially critical to maintain, not only to ensure the level of rib shear strength indicated above but also the rib peel strength so that the rib stays firmly attached in wear. In order to achieve this, SATRA standards are used to measure not only the rib shear strength but also rib peel both dry and wet on a routine basis

as part of the quality control process.

Many millions of Goodyear welted shoes of all types have been and continue to be made around the world without additional stitching around the rib. They do not fail and there is less effort. The insole board, rib, adhesive and machinery suppliers have done all the hard work, so why add more when it is not necessary?

Shoes with stitched ribs may well look all right when they leave the factory but how long will they wear? As remarked earlier, welted shoes are expected to last longer (many of the best European shoes are treasured for years) so they are also something of an investment. Making them therefore requires a different mind-set to other constructions. 🍷



After wet web saturation created the foundation of the board, it is partially dried, the all-important latex binder added, followed by further drying and curing to produce the final board. CREDIT: BONTEx