

Section through a Goodyear welted shoe showing insole, welt, filler and sole.



Making a better welted shoe

In every area of shoemaking, quality and performance vary depending on the materials used and the general care with which the product is made. In the Goodyear welted process, however, there are some key operations that clearly demonstrate why so much skill and attention to detail is required in order to produce the best results.

Insole ribbing

The insole is the foundation of a welted shoe, as every subsequent operation depends on how well it has been prepared. The positioning of the rib in particular, directly affects both the strength of the shoe and its final appearance. Many people think that the rib is simply stuck around the edge of the insole at a set distance from the edge, but in fact this distance needs to change no less than five times. The rib must also start and stop at precise points previously marked on the insole to assist with accurate welt-sewing.

Although the settings vary with the thickness of upper materials and type of welt, a good average starting point is shown in *Figure 1*. The wider setting in the waist produces a better looking shoe (the lighter the shoe, the narrower the waist) and also prevents the sole stitching from spreading (fish-tailing) to the outer edge at the heel breast. The narrower setting at the joints makes the sole edge stand out further from the upper, which adds character when looking down on the finished shoe. The medium setting at the toe allows for the added thickness of the

Figure 1: Typical rib settings

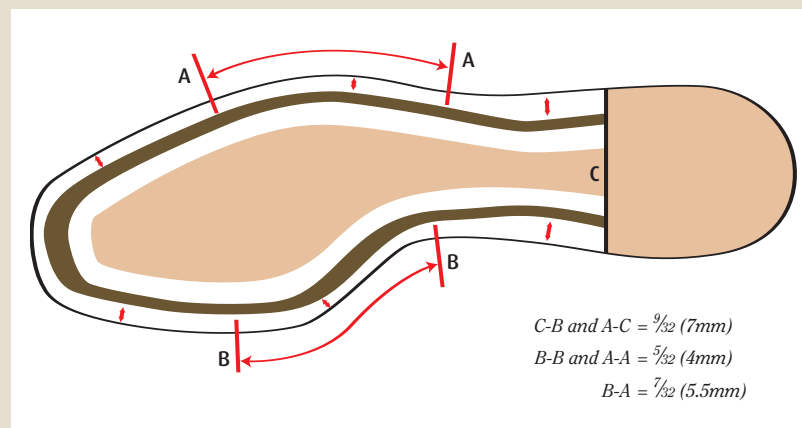


Figure 2: Applying the rib



toe puff.

Ribbing is a skilled operation, as the settings have to change gradually as the insole is guided through the machine. The operator must also perform four functions simultaneously. The right foot controls speed and the left the cut-off. The right hand controls the settings (red handle) while the left guides the insole. Insoles in most other constructions are thought of as just one component among many. In the Goodyear construction, they are critical (*Figure 2*).

The acknowledged machines for this operation are made by Prime Manufacturing Co. in the USA. Several versions have been produced over the years since the mechanisation of the welted construction began but, in many instances, the machines in use today are older than the operators. This situation applies to many specialised machines for the production of niche market footwear, where the volume does not warrant completely new machines and the build quality of existing equipment is so high that it continues to be serviceable, although Bima has recently introduced a new rib layer featuring an ergonomic design and improved safety features.

Lasting

The standard Goodyear rib is vertical, so it is essential that the conventional cement forepart lasting machine is equipped with a solid raised insole plate that fits snugly inside the rib. In this way the wiper blades compress the upper tightly against the supported rib rather than pushing it flat. Without it, welt-sewing becomes more difficult and less accurate, and extra stress is put on the rib to insole bond. Some companies supply separate models already equipped for welted work, but conventional models can often be converted through the addition of a raised insole plate plus changing the toe band and wiper plate settings (*Figure 3*).

Welt-sewing

Modern welt-sewing machines are very sophisticated but still depend on a great deal of operator skill. The shoe must be held so that the first and last stitches are placed relatively high on the rib where it ends at the heel breast in order to again prevent the 'fish-tailing' mentioned earlier. It is also important to go around the toe smoothly (*Figure 4*) and to make sure that the awl penetrates the upper and

Figure 3: Vertical rib centre block on a USM machine



Figure 4: Approaching the toe in welt-sewing



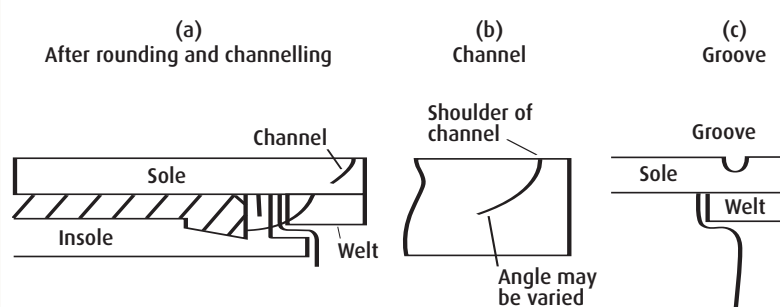
Figure 5: Engaging secondary edge guide at the joint



Figure 6: Sole stitching in a channel



Figure 7: Goodyear welted construction



The last few decades have seen a migration of Goodyear welted shoe production away from North America and Europe to countries where the cost of the additional labour involved is much lower and an increasing number of Asian factories are adding the construction to their production capacities. PVC welt is used on the majority of work boots whereas leather remains in demand for men's dress shoes and Western boots.

The USA and Mexico, however, still produce a good volume of men's dress shoes, work boots and Western style boots with factory output ranging from several thousand pairs per day to one or two pairs for the specialist Western boot makers.

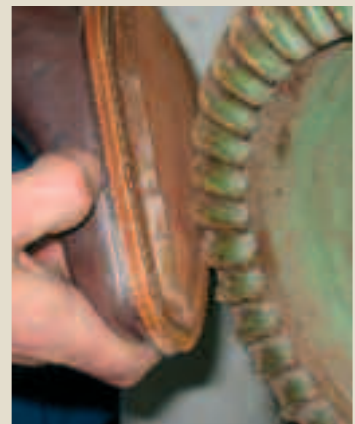
Asia produces all types with India leading in dress shoes and China in everything else. Goodyear welted work boots represent a huge category here with five to ten large factories dominating the scene with production capacities up to ten times the largest remaining US factories. All major brands have a presence in China and many have production spread between multiple factories in China, India and other countries in South East Asia.

The UK almost exclusively produces high grade men's dress shoes and is home to some of the best known names for Goodyear welted shoes. It would therefore appear that, in spite of the cost of all the operations involved, the Goodyear welt process still remains the chosen construction for the quality-minded consumer.

Figure 8: Opening the channel



Figure 9: Closing the channel



rib tight into the feather line at a consistent angle. Failure to do this results in 'grinning' where the welt thread can be seen at the feather edge—a sure sign of poor shoemaking. But even the best welt-sewer cannot produce good results without good welts. *World Footwear* profiled the Barbour Welting Co. in the November/December 2006 issue and this article clearly showed the care that needs to go into producing welts that will provide consistently high quality shoes. Recent developments in welt-sewing equipment include automatic lubrication and the use of variable speed motors to create less noise and vibration.

Rough-rounding

Many experts consider this to be the most skilled of all Goodyear operations, as it not only creates the final shape of the sole but also cuts either a channel or a

Figure 10: Levelling the sole



Figure 11: Nailing plate for stage 1 (right) and pressure plate for stage 2 (left)



groove that will receive the lockstitch seam joining it to the welt. Accuracy is therefore vital (*Figure 5*).

Shape is controlled by two guides. The basic 'crease' guide follows the welt seam and is only used in the waist. The foot pedal-controlled secondary guide is brought into play by the operator just before the joint and released just after on the other side. This guide follows the profile of the last immediately above the feather line, so that the outsole stitching does not run too close to the welt seam and therefore weaken it.

Sole stitching in a channel (*Figure 6*) was the traditional method, except on heavy shoes, as it left a clear sole and also helped to conceal any poor stitching. It has now all but disappeared due to the cost of the extra operations needed to open and close the channel. It is also more difficult

to cut accurately than a groove. (*Figure 7*) The key thing with either method is to ensure that the channels are sufficiently deep so that the bobbin thread of the outsole lies far enough below the grain surface of the sole but not too deep to weaken the seam. Setting the knife in either case is therefore critical. Correct mellowing of the sole is also important, especially for the channelled method, as it assists accuracy and the opening and closing of the channel lip.

Once again, many old machines remain in use. These were designed to provide powerful equipment to cut through heavy leather soles, often around 12mm ($\frac{1}{2}$ inch) in total thickness, and simultaneously cut the channel or groove. The noise produced by these has since become a concern, especially where several machines are in use together.

ESM from the UK now provides a rough-rounder where the motor runs only when a shoe is being processed. The machine is mounted in a lighted, sound-absorbent housing to reduce operator exposure to noise without impinging on functionality. This model also features automatic lubrication and a variable speed motor for reduced maintenance.

Equipment for turning the lip to facilitate stitching (*Figure 8*) and flattening it after stitching (*Figure 9*) is difficult to find and some companies have resorted to producing their own. The illustrations show original equipment, including a large brass wheel for initial closing of the channel prior to hammering to consolidate the bond.

Sole stitching

One might be forgiven for thinking that this was merely a case of following the channel or groove set by the rough-rounder. It is not. First the thread tension must be set correctly so that the bobbin thread (sole side) is locked to the top thread (welt side) one third of the way in from the grain surface of the sole. If it is any nearer the surface will wear too quickly, and if it is located where sole and welt join, it will create a loose seam.

The machine also has an adjustable guide called a 'scotch edge attachment' against which the edge of the sole is guided. Some manufacturers new to the process view this as an extra complication, but it is absolutely essential for welted shoes as it determines how far out the seam lies on the welt, again to prevent it running too close to the welt seam. If a welt fails in wear, this is the most common reason.

For sole stitching there is a little more choice in equipment. The latest development is from Falan and Fioretto, for use with exact cut soles where rough-rounding is not necessary. This features a cutter in front of the stitching head to cut the groove or slot and stitch in one operation.

Sole levelling

This operation compresses and consolidates the bottom of the shoe, adding all the contours of both forepart and waist. It seems simple but without it the shoe will lack its graceful line (*Figure 10*).

Heel attaching

So what is so special here? Well, there

Figure 12: Attaching the top piece



are two ways to nail on heels. The one most widely used is inside attaching where the nails are driven through the insole and sole into the heel after the last has been removed. This is fine when there are no further heavy operations. In Goodyear welted processes, however, there are still all the finishing operations to perform

including repeated manual gripping of the shoe, which, unless a last is in place, will spoil its appearance.

External attaching works in two stages on the same machine. In stage one, the base of the heel (adhesive-coated on both faces but without a top piece) is located on the sole and nails are driven through to

clench against the seat plate of the last (*Figure 11*). In stage two, the shoe is swung to a second station where the adhesive-coated top piece has been laid in a holder. The attached heel is pressed on to the top piece and the heel is now complete unless extra top piece slugging is thought necessary (*Figure 12*). This system has an additional advantage in that it does not need reinforcement of the insole to prevent distortion—an important consideration for the leather insoles used on the best-welted shoes.

Goodyear welted is a complex process when done to perfection, and a considerable number of skilled lasting, making and finishing operations are needed in order to produce a high quality pair of shoes. It is therefore little wonder that such products are expensive. But then again, they look beautiful and can have a very long life. 

*Images courtesy of
Church and Co. (Footwear) Ltd.*

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