

Supporting Goodyear welted

Goodyear welted remains a very traditional form of producing footwear where the basic construction has remained fundamentally unchanged for more than a hundred years. As a result, with various refinements, the machinery used has also remained essentially the same except as regards lasting and the introduction of forepart lasters in the early 1960s. These replaced the existing pullover and toe lasting machines with a single one that performed both tasks in one operation. They thus replaced two highly skilled operators with just one and offered cost savings without any loss of quality.

No further short cuts could be taken without sacrificing quality in one way or another and the welted construction was largely replaced by the cheaper cemented and direct injection moulded methods which offered substantial cost savings in an ever more competitive world market. They also required fewer highly skilled operators which were in any case becoming harder to attract and retain. By the Millennium, there were relatively few welted manufacturers left and those were all either at the top end of the footwear market or specialist producers for whom there was no practical alternative. As a consequence, there was little incentive to develop new machinery.

Existing welted machines were predominantly by USM in the U.S. or BUSM in the UK; built to extremely high standards they had very long working lives. However, welted production stabilised and, more recently, has begun to increase on the back of demand in developing

economies for high quality and traditionally made footwear. So, while there was no demand for new machines, there was however a niche market for reconditioned ones, a niche that has been filled by Roberto Petrozzi and his European Shoe Machinery Company based in Kettering, UK.

BACKGROUND

Roberto's father was a shoe machinery dealer and his son was fascinated by the complexity of shoe machinery from an early age as was his older brother Ezio. Their father unfortunately died at a relatively young age and Ezio took over the business. As he grew older, Roberto joined his brother where he learned more about the Goodyear welted process and how superior the old British United

machines were. Nevertheless, despite being extremely well engineered, they were beginning to wear out. With a significant number of footwear manufacturers still committed to the process, someone had to look after these machines and Roberto saw an opportunity.

"Initially we offered a simple service to help keep machines running. The trouble was these old machines were often in such a bad way, they would eventually need a complete overhaul. This meant sourcing components which were very hard to find. We managed to get hold of some original BUSM drawings so we could explain to engineers what we needed making. Stripping down these unbelievably complex machines was fraught with danger as one missed component, one



The EUHT heel and sole edge trimmer replaces two machines with one.

ALL CREDITS: ESM



There are no compromises in manufacturing standards of any ESM replacement parts.

bad setting or poorly made replacement part could end up causing more damage than when you started. We learned fast and became probably the world's most knowledgeable business in terms of Goodyear welted machines and how they worked."

However, it was soon discovered that the engineering tolerances of the parts suppliers were not up to the standard required and the company began to invest in its own CNC machines and precision engineers. Starting with the most complex needs first, equipment was added over the years until it became totally self-sufficient. Roberto says: "With such a passion for quality, we were really excited when we were able to engineer virtually every component possible to our own standards. This meant our customers could get the very best as our facilities meant we could strip and rebuild any BUSM machine. As our knowledge grew, we were able to learn what components from the original designs were the weakest, failed the most and why. This meant we were able to recreate the components with the weaknesses removed, making the machines better than the original. No other company did that. Even BUSM machines will naturally wear components but you can limit this with good manufacturing using the best materials."

FINE TOLERANCES

While this made each component more expensive to buy, it was nevertheless decided from the beginning not to compromise manufacturing standards. "If we create the best, our reputation is guaranteed. We know you can buy cheaper spares than ours, but they won't last as long. The tolerances by which they are made and the materials they are made from can create subtle increases to vibration in the machine and excess wear on something else. The end result of cheaper components is increased machinery failure and increased machinery downtime. Factor that in

and ESM spares become cost effective.

"We even go so far as to make our own bolts and screws. We also polish components using ceramics so the surfaces generate less friction in use. They look stunningly beautiful and then we go and hide them deep inside a machine where no one can see them. I know that sounds like unnecessary effort to go to but, for us, the quality of the end product is paramount. If you set out to deliver the best, you can't accept anything less can you? We have a saying, 'go beyond just tolerance'. It means don't stop at the stated limit, exceed it and improve it."

ESM in fact offers quite a range of services to welted manufacturers in terms of spares, rebuilt machinery and servicing packages. More exciting, however, are the upgrades and new machinery it produces based on its extensive knowledge and experience of BUSM machines. These comprise a suite of specially designed upgrades that improve operator comfort, significantly increase performance and provide a level of fine controls that offer further increased productivity. An important aspect of these upgrades is that operators still have machines with which they are totally familiar and do not need to go through a new learning curve.

It has also brought digital electronics into what was previously an analogue world in the form of induction



The EWS 4c HP welt sewer has less moving parts than the original USM model.

motors which offer incredibly high performance, which in outsole stitching enables up to 1200 stitches per minute yet stop instantly and then restart for just the odd stitch. R&D is a continual process and when a new improvement is conceived it is refined and tested until the company is confident it can be released. The most recent innovation has been the addition of the Sensornomic electronic footplate with an intuitive range of sensor control that is ergonomically proven to reduce operator fatigue and improve accuracy.

UPGRADES AND NEW MACHINES

In addition to upgrades, the last two years have seen the introduction of a range of brand new Goodyear welted machines covering virtually all making room operations plus one in finishing. Designed and built entirely in-house, these are said to offer marked improvements in productivity, reliability and longevity. There are currently 15, so customers therefore have a choice as to whether to go for a traditional machine with an upgrade or for a completely new one. Three ESM machines in particular are worth mentioning in more detail as they cover three key operations: welt sewing which is the foundation of the welted process, outsole stitching which is fundamental to the finished shoe's integrity and edge trimming on which the final presentation of the shoe depends.

The EWS 4c HP welt sewer is the result of a great deal of research and months of live testing which has resulted in a significantly reduced number of components compared to the original USM model. Needless to say, it has a number of sophisticated features including a high performance digital brushless motor, Omron touchscreen control offering 12 pre-programmable progressive speed options, waxpot temperature readings and, not least, digital control of the machine's welt cut-off feature for all-round welts.

Automatic welt butting was introduced by USM some 40 years ago. Traditionally, it had been done by stopping the seam before the two welt ends met, cutting them with a knife to create a vertical 'butted' joint and then

sewing over the top. This was slow and greatly reduced output. The new attachment makes a shallow scarf cut on both ends so that they overlapped and the seam is completed without stopping. It also led to the development of continuous welts which cut wastage and reduced material cost. It did however call for a highly skilled operator as everything was judged by eye. The EWS 4c's electro-pneumatic attachment uses a fully programmable feeler to control the cut-off and remove this difficulty.

This is certainly a well thought out machine which ESM says can improve output by up to 30% depending on the nature of the materials involved. A further plus is the greatly reduced vibration and noise levels compared to the old machines. Most traditional welted machines were extremely noisy and, as standards have risen, it has become increasingly difficult for manufacturers to meet them using sound absorbent hoods. All new or

upgraded ESM machines meet European standards mainly due to the fine tolerances referred to earlier which reduce the principal source of the problem, vibration.

The BHSS 10 HMI outsole stitcher is an extensively upgraded version of the BUSM No. 10 which has been in existence for just over 100 years. While it still uses the original main castings, these have been strengthened and stiffened by additional reinforcements. It also has a number of features that take it to a new level of performance compared to the old machine. The main one is the use of a Mitsubishi servo motor which can deliver up to 1200 stitches per minute, while at the same time being extremely smooth and quiet. It can also stop instantly and then rotate for exactly one, two, three or more stitches. A touchscreen controller is again used with a display of motor speed plus a Neetronic system to manage needle power so that the high 1200 stitch rate is achieved without



The BHSS 10 HMI outsole stitcher has outstanding levels of control.

creating excessive heat.

The machine also features a controlled work feed which has a positive effect in two ways. First, this ensures that the stitch length never varies once set by the operator to produce between 3-16 per inch. Second, there is no strain on the awl as it remains correctly aligned with the needle even at 1200 stitches per minute. This results in a regular depth of thread lock to provide a tight seam on all types of welted, veldtschoen and threadlasted footwear. A final plus is the optional Sensonomic footplate mentioned earlier, which reduces the pressure on the operator's lower back and legs associated with traditional foot pedal controls.

The old No. 10 is widely considered to be the best outsole stitcher ever built which is why it became the industry standard. It was, however, highly complex and to design a replacement from scratch would not be commercially viable. It was also an extremely well engineered machine which despite its age has provided a sound base for the new version. Manufacturers get the best of all things in a machine that is second nature to operators and yet is able to raise both output and quality in this key shoemaking operation.

The EUHT Heel & Sole Trimmer is a real production improvement as it combines edge and heel trimming with one simple operation by incorporating some clever technical features. The problem with combining these two operations has always been the sudden change in depth at each heel breast. The EUHT overcomes this through the use of sensors to constantly monitor cutting thickness and make appropriate adjustments whilst in operation. In addition, the tilting feed wheel can be instantly moved to create up to 15 degrees of taper for Cuban heels which makes the machine suitable for a wide range of footwear types.

A high speed motor is again used to provide electronically controlled cutter speeds of 9,000 -15,000 rpm for a fine edge surface on almost all materials. Where a lipped edge is called for—as in the case of most welted shoes where it will also be waxed and set—a light skim round on a conventional edge trimmer is sufficient. For all other types of

footwear, ESM says the initial cut edge has proved satisfactory. Trimming waste falls into a trough under the cutter unit and is immediately extracted. On its own, this would still leave some of the fine dust produced, so the machine also has an intelligent nebuliser that sprays a fine mist when cutting begins and then ceases when it stops.

LOOKING FORWARD

Starting out 20 years ago, ESM's early customers were top quality welted manufacturers in the UK, including Crockett & Jones, Church & Co. and Alfred Sargent. It now supplies welted footwear manufacturers all over the world. Roberto Petrozzi believes that Goodyear welted

footwear is here to stay. "We've supported the oldest businesses and helped the newest to start up too. Our commitment is to keep the businesses operating for years to come and our next venture is to establish a national training academy for Goodyear Welted machinery operators. Looking after apprenticeship development as well as experienced operators who are looking to develop their knowledge and stay up-to-date with machinery advances is important. This will help our customers and ESM protect the future skills of this wonderful industry." In the meantime, R&D continues and we can expect to see more new machines and upgrade options emerging in the future. 



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FOOTWEAR YOU MAKE,
MAKE SURE THE THREAD
IS GREEN.**

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