



Desma Sole Processing Cell.
CREDIT: DESMA

New solutions to old problems

Klöckner Desma has long been regarded as an industry leader when it comes to PU injection moulding machines. It has now reached a similar position with regard to automation and robotics. Ever an innovator, the company has now taken a further step in its automated soling 'concept' by developing a robotic upper processing cell to run alongside its existing sole processing cell and so provide footwear manufacturers with the ultimate in automated soling solutions.

According to Desma, between 18 and 20 billion pairs of shoes are now produced globally each year with a substantial proportion made using the cemented or stuck-on process where a high level of manual labour is still involved. This includes sole and upper preparation and cementing as well as the actual attaching process itself. This is both time consuming and expensive. However, the construction remains extremely popular due to its flexibility as to the types of footwear and soling materials that can be accommodated.

As a result, manufacturers are asking for alternative solutions to these manually performed operations.

ADVANTAGES IN AUTOMATION

Automation in other areas of shoe manufacture has been shown to result in consistently high quality shoes at lower cost. As labour rates in Asia, and particularly in China, are growing exponentially year by year, there has been increasing pressure to find a way around the problem. Automation would



The Upper Processing Cell can be configured to either take the tools to the lasted upper (left) or the lasted upper to the tools (right).

CREDIT: DESMA

therefore again seem to be a logical solution to this on-going problem with stuck-on footwear. However, as in so many other aspects of shoemaking, applying it to this complex and vitally important area has not been easy, and Desma has been working on the problem for many years.

The company offers automation solutions for applying sole attaching adhesives to both sole units and lasted uppers under the brand name amir C, where amir stands for 'automated material flow with integrated robots'. The key elements involved are the sole processing cell, the upper processing cell and the upper processing line. These have been in limited use for some time now during which they have been refined to the point where they can be used on just about any type of boot or shoe employing the stuck-on process.

All shoe manufacturers dread an inadequate adhesion between upper and sole. Perfect adhesion is not only dependent on how well the adhesive is applied to the sole but also how thoroughly both the upper and sole have been prepared beforehand. Without properly treated surfaces, the adhesive will not be able to 'key' to them properly and the final bond less strong. As mentioned earlier, automation in other aspects of the shoemaking process has shown great improvements in quality and the two amir cells have now made it possible to drastically reduce the number of

such complaints received by offering far higher consistency in sole bonding that can be achieved manually.

UPPER PROCESSING CELL

World Footwear reported in detail on the Sole Processing Cell when it first appeared in the *January/February 2011* issue. Although it has since been refined, its basic operation remains the same in that a sole is fed in at one end and emerges at the other fully treated and ready for attaching. Not only is it fast, it is also extremely frugal and applies only the exact amount of adhesive required, no more and no less. As a result, considerable cost savings can also be made in terms of adhesive usage. The more recent upper processing cell operates in a similar manner whereby the operator need only introduce the lasted upper into the cell via a delivery station. All necessary manufacturing steps are then performed by a robot operating within the cell.

Most sole units are made with a slight side wall so that they are bonded to the upper in two dimensions. This provides a far stronger bond than if only the bottom surface of the lasted upper is treated. To achieve the necessary accuracy, the unit's side contour is normally drawn onto the lasted upper for the roughing and cementing to follow. Total consistency is extremely difficult to achieve manually. The robot, on the other

hand, is programmed to automatically rough both the bottom of the upper and the side contours, remove any residual dust and apply the adhesive with total accuracy every time.

The cell is available in a number of varieties, which are differentiated by the fact that either the lasted uppers are transported to the tools or the tools to the uppers. As with the sole processing cell, the upper processing cell can be operated either as an individual unit or as part of a larger production line. In addition, it is also possible to combine both cells. This is a huge rationalisation of a normally complex and demanding sequence of



TapePeel system is a clever approach to an old problem. CREDIT: TAPEPEEL

operations. If Desma's laser roughing system is also taken into account (*World Footwear May/June 2012*), this marks a further step in the remarkable revolution the footwear industry is experiencing in the 21st century as it strives to meet the global demand for more and ever better quality footwear at the lowest cost possible.

PROBLEMS WITH INSOLES

Where Desma has been solving shoemaking problems for almost 70 years, TapePeel Shoemachinery GmbH is a brand new company with a brand new product aimed at solving an age old problem.

From the earliest days of shoemaking, insoles have been attached to the last bottom prior to lasting with tacks or nails. It was fast, cheap and convenient; it also had downsides, as they had to be removed before the sole was attached. This left small holes in the insole that were visible inside the shoe, damaged last bottoms and often led to tacks being dropped on the floor from where they had a habit of transferring themselves to places where they were not wanted. Worst of all, one could be left in the finished shoe to the physical distress of the wearer and financial discomfort of the manufacturer.

There was no practical alternative until the advent of advanced adhesive products such as hot melt and double-sided tapes in the second half of the last century. Various ideas have been tried since then and, while they did work, there were still drawbacks. Hot melt could damage the surface of the insole and was difficult to remove from the last bottom. The pressure sensitive adhesive used on double-sided tapes could build 'in' bond strength during the shoemaking process and tear when the last was removed, again leaving residue on both last and insole. Nevertheless, a number of countries banned the use of tacks and staples, so manufacturers had to make the best of what was available. TapePeel may now have found a way round these problems.

A CLEVER IDEA

The system is again a form of double-sided tape but, this time, with a major difference. Unlike conventional double-sided which is applied flat, it is folded. The insole is still held flat to the

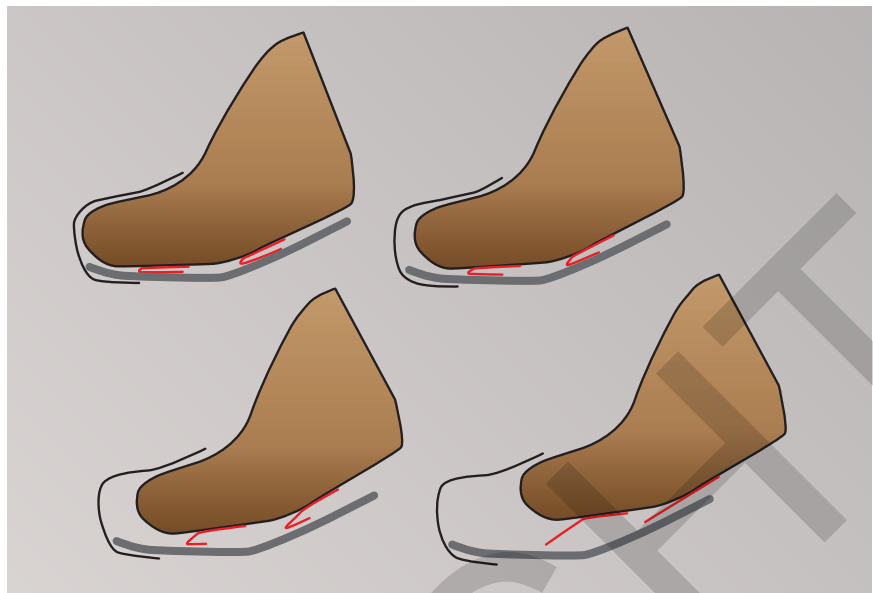


Figure 1 – The tape is folded and is peeled from the insole as the last is removed.



Figure 2 – Only two small areas of adhesive are in contact with the insole.



Figure 3 – The peeling action as the last is removed leaves the tape stuck to the last bottom from which it is easy to remove. CREDITS: TAPEPEEL

last bottom but when the last is removed from the shoe, instead of causing a sideways shearing action, it peels the tape away from the insole (Figure 1) after which it can be easily peeled off the last. There is claimed to be no damage to the surface of the insole and no residue left on the last. The adhesive used has been specially formulated for the purpose and is patent pending.

TapePeel is manufactured so that the side in contact with the insole has only two small areas of adhesive compared to a single large area on the one in contact with the last (Figure 2). This makes it easier to peel from the insole than from the last and ensures it is left on the latter rather than in the shoe (Figure 3). It also results in much less damage to the surface of the insole than is the case with hotmelt or conventional double-sided products. The company says that tests have shown the tape can be peeled from certain kinds of leather leaving it completely residue-free and without any other visible damage. This allows covered or pre-socked insoles to be used which would not be possible with existing insole attaching systems.

The application machine is controlled by an electronic eye which ensures that the tape is applied in the right place and that the fold faces the toe of the last. It then remains folded and flat on the last bottom while the insole is correctly positioned after which it will be held flat to the last bottom (Figure 4). For the best results, two pieces of tape should be used as this will hold the insole straight as well as making it secure. The adhesive system used is compatible with all types of lasts both with and without metal bottom plates. Each roll of tape contains 2,000 pieces.

This is a well thought out solution to an old problem and, while it appears to be simple one, the technology behind it is more complex. The key part is the dual peeling action: first from the insole and then from the last. This is made possible by the use of two areas of adhesion of unequal size and this, in turn, calls for some complex tape technology and manufacture to make it work. If it can live up to its promise, it will mean that there is one more problem shoe manufacturers will not have to worry about. 🌀



Figure 4 – Two pieces of tape hold the insole straight and flat to the last bottom.

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