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CREATING YOUR OWN LAST

The recently released updated version of Delcam CRISPIN's LastMaker software has opened up further possibilities for footwear manufacturers wishing to develop or modify lasts in-house, so it is perhaps a good time to take a look at what the program has to offer.

LastMaker began as FDS 3D Last, part of the MicroDynamics range of products that merged with CRISPIN in 1998 to form CRISPIN Dynamics as part of Texon UK. When CRISPIN Systems was formed in 2003, the product was not part of the core range due to CRISPIN partnering a third party vendor which had its own last modification software, mainly aimed at custom-made and orthopaedic footwear.

The partnership proved unsuccessful so CRISPIN decided to resurrect the last modification product under the name of LastMaker. It is now known as Delcam CRISPIN LastMaker 2010, following the acquisition of CRISPIN Systems in 2007 by Delcam Plc to create the Delcam CRISPIN Footwear group.

WHAT IS IT?

LastMaker 2010 simplifies the process of producing or modifying lasts, enabling models to be produced much faster than by hand and ensuring a faster turn-round time for both samples and bulk. Central to the system is having all last modifications based on accurate measurements of the foot taken either manually or with the use of scanning technology. Model size or graded last data can then be used for on-site machining or sent digitally to a last manufacturer. Scanned foot data imported as a template can also be used to modify existing conventional or fashion lasts for custom-made and orthopaedic lasts.

There is now only a handful of last manufacturers globally with the capacity to design new lasts and modify existing ones in order to produce new ranges. As a result, a growing number of footwear manufacturers would like to create and/or modify their own-design lasts for seasonal range changes, and these are the people at whom LastMaker 2010 is primarily aimed.

“...and it should be noted...”

Every person's foot has different shapes and sizes. If you think this contradictory, consider the following ways in which the foot becomes different in shape and size depending on circumstance:

- In a high heeled shoe compared to a low one
- In the morning to the evening
- When weight-bearing than at rest

- When walking, running or jumping
- In illness than in health
- Summer and winter

Producing lasts on which to make shoes that are able to encompass such variations is demanding in the extreme. It is no wonder that last making has always been one of the most skilled aspects of footwear manufacture.

Although still on a relatively small scale, there is also growing demand for custom-made lasts to produce custom-fit footwear. This too can be achieved by combining the system with 3D foot scanning and design, followed by a 2D manufacturing solution. It can also be extended to orthopaedic footwear where the correct shape and fit of the last is critical if the wearer's medical needs are to be met. The use of a digital solution throughout the process helps to ensure this accuracy and fit is always maintained.

GENERAL MODIFICATION

The process itself is essentially one of modifying an existing digital last into a new one. This existing last is located in the LastDatabase included in the program. It stores several last designs of various shapes, sizes and fittings electronically in XGEOM format that can be opened directly into LastMaker to provide the user with a starting point for creating a new shape. Last data can also be imported using IGES or STL formats. Points are selected on the surface of the last to establish the correct orientation and establish if it is a left or right foot. Pitch and roll can also be set prior to being saved.

Modification is achieved by the use of control planes automatically placed in relation to last size and standard last/foot measurement positions at the toe, joint, waist, instep and long and short heel. A further option will add the ankle position for creating boot lasts. These control planes allow modification to key areas of the last including standard last length (SLL), heel to ball, arch, ball joint, instep, heel, entrance axis, cone and toe (*Figure 1*). The adjustments themselves are made by entering specific measurement values into the dialogue box of each function or by interactive movement using the mouse and specifically placed arrows that, with the correct last view, allow the user to visually adjust the last.

SPECIFIC MODIFICATIONS

The editing of specific areas of the last is made using cross-sections placed according to user preference but always through the width of the last. Cross-sections can be

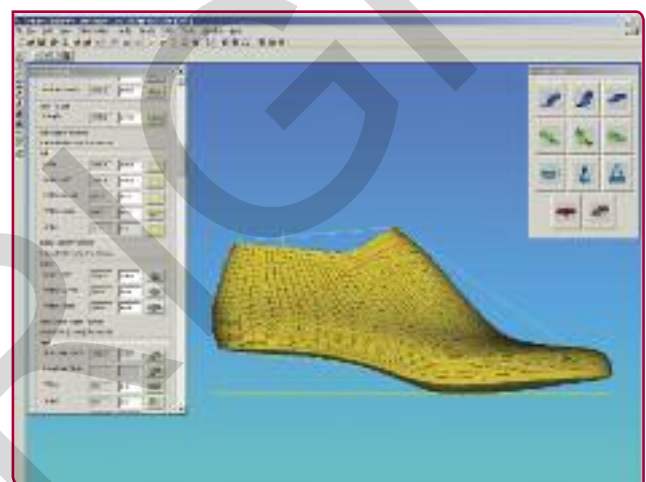


Figure 1 – Advanced editing of the starter last.

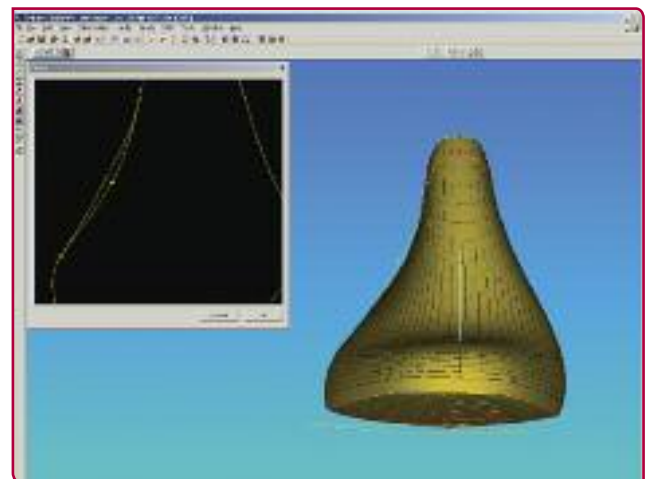


Figure 2 – Cross section editing.

positioned using a three point method (inside, outside and centre line) or a two point (inside and outside). The centre line is automatically selected at 90 degrees to the chosen points. Control planes at either the top or bottom parts of the section are edited using a 2D window, firstly using two blend points to establish the editing region, followed by a third point to edit the section line (*Figure 2*).

Additional options are available to select a cross-section and display the values for the inside and/or outside upper/bottom girth, width and for the circumference. Each of these can then be adjusted by entering a new value. Cross-sections and, if desired, control planes can be edited for position and angle (side or top) for more intricate modification of the last surface. Cross-sections can also be exported to produce 2D gauges for checking shape and accuracy when the last is machined.

The final shape of the last is determined by bringing together individual profile lines at the front cone, heel curve, inside and outside last bottom feather edge near to the shank area and tread point, the inside and outside of the cone top and the inside and outside feather edge at the toe. The completed file can again be used to produce 2D accuracy gauges.

A toe or forepart from one last can be cut and added to the backpart of another. The new toe section is placed in front of the backpart section and adjusted for position and angle (*Figure 3*). A blend between the two is generated automatically and then they are sealed together to produce a complete last with a completely new toe shape.

2D templates for the toe, back curve or last bottom can be produced in Delcam CRISPIN Engineer, then imported and used to reshape these areas of the last. Once the template is positioned, the shape of the template is transferred to the last and the new shape produced. Blending is again automatic.

And, finally, special boot lasts can be created from existing conventional or fashion lasts by defining the position of the ankle control plane between the cone and back curve lines of the last profile. Defining this plane produces the basic shape requirements for the boot last. The boot leg itself is produced by defining the number of sections required for the leg, each of which can have the same or different height values.

The profile of the boot last can be adjusted to make allowances for the calf, entrance shape and/or width and sides. The final leg shape then is transferred to the digital last to form a new boot last (*Figure 4*). Final adjustments can be made as required and there are options to define a boot leg cutting plane and location pins that will be used to re-attach the physical boot leg to the last. Both the last and the cut boot leg can once again be exported for machining.

ORTHOPAEDIC AND CUSTOM-MADE LASTS

An existing conventional last can be modified to produce a custom-fit last or basic orthopaedic last for conditions like diabetes or common foot problems such as Hallux Valgus, Hallux Rigidus and hammer toes. Imported data of a scanned foot is used as a template to help modify the last to the required shape (*Figure 5*). In more extreme cases an existing orthopaedic last can be used to produce a new orthopaedic one to meet the requirements necessary to help with the wearer's condition. It would obviously make

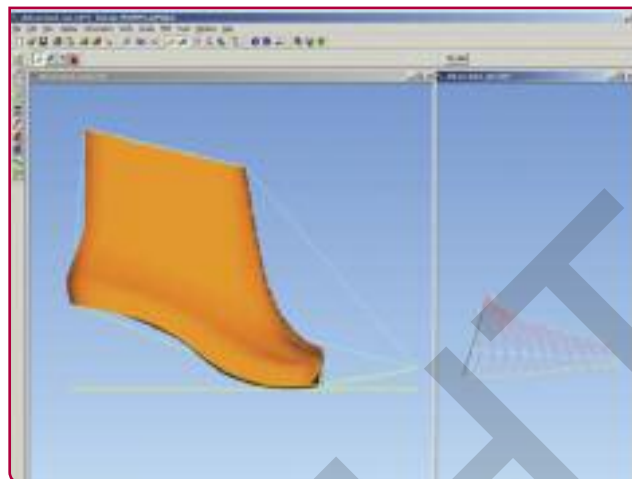


Figure 3 – Adding a new toe shape to an existing backpart.

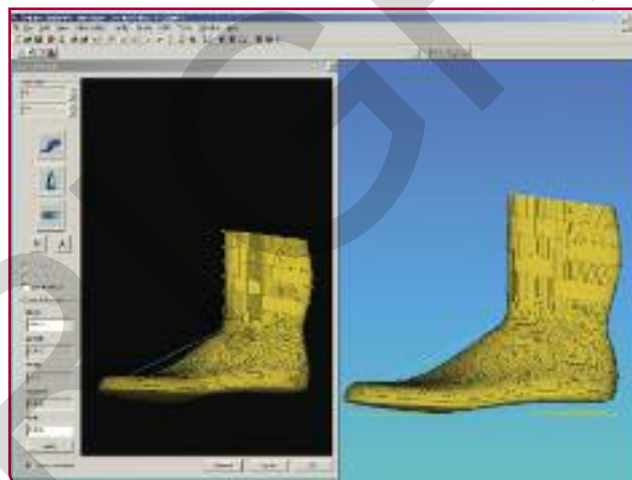


Figure 4 – Creating a boot last.

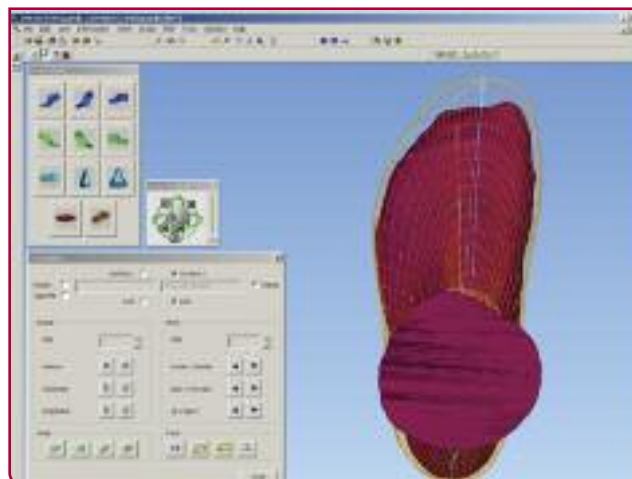


Figure 5 – Comparing foot and last.

sense to build a library of starter lasts that covered the majority of known foot conditions.

A custom or bespoke orthopaedic last can also have an insole block added to the bottom as a compensation for wearers with one leg slightly shorter than the other. In addition, a rocker sole shape can be built in around the ball joint area to aid walking. This takes the form of a tube that protrudes above the surface of the block that can be

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Before the advent of polypropylene, shoe lasts were invariably made from wood. A hard and dense grain was essential to allow accurate shaping and finishing, and to withstand the rough usage they were subjected to by traditional methods of footwear manufacture that involved tacks and rivets being repeatedly driven into the lasts and then removed.

A weak wood such as pine would be unsuitable as it would soon split. Beech and maple were the two favourites depending on availability, so Europe used the former and North America, the latter.

adjusted for position, angle and height. Its diameter can also be adjusted depending on how severe walking motion has been restricted by the block. An orthotic insole shape can be similarly produced based on the shape of the last bottom.

Another foot condition associated with orthopaedics is when the foot is bent inwards to form a ‘banana’ shape. One or both feet can also be twisted outwards as is the case in *Figure 6*, twisted outwards. This type of condition has always created problems as, depending on the severity of the twist, lasts often have to be created from scratch which is both expensive and time consuming. LastMaker is able to bend a last at both the forepart and/or the backpart sections to produce this type of shape. The areas of the last surface that have been bent are smoothed and blended automatically to avoid creasing. This is a good example of what the program has to offer.

Figure 6 – Feet can be badly twisted making it necessary to create new lasts from scratch.

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OUTPUTS

Needless to say, the completed new digital last file can be output for use in other Delcam CRISPIN programs either in-house or at an outside supplier for the production of upper and sole designs, machining of bulk lasts and sole moulds, or additional orthopaedic requirements such as orthoses, braces and cradles. ShoeDesign for instance, can use it as the basis for 3D upper designing or for appending an existing design on to the new shape. This is especially convenient and time saving where orthopaedic footwear is

concerned, as only minor adjustments are required to complete the design.

Delcam claims that the system is extremely user friendly and that operators can be brought up to speed in anything from five days for people with some knowledge of lasts, to two weeks or so for complete beginners. Taken

with its sister programs, LastMaker certainly offers a huge range of alternative combinations for developing the whole design and tooling process depending on what a factory would like to do for itself and how it wants to manage such a development.

Where it might also make a real impact is with orthopaedic footwear, where it would be possible for a branded producer of conventional footwear to offer a custom service based on regular styles that offered wearers the correct shoe for their medical condition while still reflecting its brand image. This

would have immediate appeal to style-conscious younger wearers with health or foot problems who nevertheless want to dress as much like their peers as possible provided, of course, that the price premium was not too great.

A complete package that also involved a last-milling capacity would obviously not be cheap, but the ability to transfer files at any time to anywhere in the world opens up the possibility of a variety of partnerships that would overcome this and create some new marketing opportunities. 🌐