



CREDIT: FAGUS

Lasts for correctly fitting children's shoes

Every responsible parent should be concerned about their children's feet and watching their first tentative steps can be a truly thrilling moment. It is also the beginning of a journey that will carry them on to full independent mobility. The average age at which children start to be able to walk with help is around 11–12 months. In the following twelve months they learn to walk sideways and backwards, and up and down stairs unaided. By the age of two they can walk rapidly, averaging about 170 steps per minute and their stance becomes narrower to reflect this increased speed. Such an amazing pace of development and progressive locomotion calls for supportive and functional footwear for

the proper development of their feet, a process that will continue to evolve until their late teens.

Accurate knowledge of the development of children's feet during the different stages of their development up to adulthood forms the basis for the perfect children's shoe and the last on which it is made. But how to determine what are and what are not the correct details on which to base a last's design and measurements? In a paper he presented at the 18th UITIC Congress in 2014, the late Petr Hlavacek of the Thomas Bata University at Zlín, made some pertinent observations based on extensive research he had carried out on the growth pattern of children's feet.

In the last decade of the 20th century, within a very short period of time, a shift had occurred in production from industrially advanced countries to those of the Far East. Prior to that, domestically produced footwear had predominated in retail shops and local last makers and shoe manufacturers had tended to work from anthropometric measurements of feet in the local child population.

Indeed, it had often been argued that the shoes produced as a consequence of this satisfied ethnic characteristics of the local population and so provided something of a guarantee for healthy footwear. Where the import of children's shoes had been controlled, their shape and quality could also be

controlled at a national level.

Attempts at unifying opinions and proposals for a common approach within the EU had so far failed in practice with the result that the selection of shape, dimensional proportionality and use of materials for children's footwear had been left to the will of manufacturers. Globalisation in footwear production had in fact led to an unfortunate deterioration of the conditions necessary for healthy children's footwear.

Another complication had been the violation of rules for traditional systems of labeling shoe sizes where the orientation numbering of footwear manufactured in other size systems had created chaos in the labelling of shoe sizes. In practice, this had made it all but impossible for parents to select and purchase footwear dimensionally and proportionally suitable for their children. Studies had shown as many as 60% of children were wearing dimensionally inappropriate footwear.

WMS KNOWLEDGE BASE

Nothing has happened in the past two and a half years that suggests the situation in general is any better today except perhaps in Germany. Germany has a well deserved reputation for producing extremely good children's shoes in terms of both quality and functionality. It owes much of this to the WMS quality seal of the Deutsches Schuhinstitut GmbH (German Shoe Institute) which is only granted to suitably qualified shoe manufacturers by the Federal Association of the German Footwear and Leather Goods Industry (HDSL). It therefore carries considerable weight and there are now over 800 WMS speciality shoe stores. During the more than 40 years of its existence, it has built up a formidable knowledge base that is continuously updated by scientific studies that monitor any ongoing changes in children's feet.

WMS prescribes standards that a good child's shoe has to fulfil. All manufacturers using the WMS label voluntarily undertake to meet these standards, as a consistently good fit cannot be guaranteed without a high standard of materials and workmanship. WMS manufacturers adhere to the statutory regulations for harmful substances and even voluntarily work below these. Any



The WMS foot measuring device ensures the best overall shoe fit is obtained.

CREDIT: HDS/L

manufacturer, trademark owner or importer who is able to satisfy the standards and guidelines of the WMS width measurement system can apply for the licence.

For quality assurance reasons, the licensee must also provide various documents testifying to its adherence to the WMS licence. The necessary certificates and documents are agreed with the PFI (Pirmasens Testing and Research Institute), in particular, a Certificate of Last Development and a Certificate of Fit Inspection.

Children's feet can have the same length but differing widths. The WMS foot measuring device enables a shoe size consisting of length and width, and taking into account the line of the ball of the foot and the big toe to little toe angle can be calculated. There are three widths; W (wide feet), M (medium width) and S (slender feet).

In addition, the system also allows for children's motor function, the missing suppleness when a little child starts to walk and the problems when slipping the foot into the shoe. The bones of growing children's feet are soft and thus easily deformable—especially with regard to length where the most rapid growth occurs particularly in the early years—so all these measurements are important when designing children's lasts.

EXPERIENCE KNOWLEDGE BASE

A second knowledge base as far as German shoe manufacturers are concerned is that of last maker Fagus-GreCon Greten GmbH & Co. KG, which has a very long history in the industry and is the only major lasts manufacturer left in Germany. Its founding father, Carl Benscheidt, was born in 1858 to a Westphalian farming family and as a young man wrote newspaper articles criticising the inadequate shapes of the lasts used for shoe production. This led to the establishment of his own last makers in Hanover, soon followed by his own shoe factory in the years prior to WWI. Needless to say, Fagus has acquired a great deal of knowledge since then in regard to feet and lasts of all types.

As sales Manager Haymo Bertram says, "We have a last know-how, especially for children's feet, of more than 100 years. Struggling for the perfect fit is a responsible task in the dialogue with the shoe manufacturer. For this end, it is important to have access to modern findings as well as to the experience that a last manufacturer has. This knowledge is necessary in order to give children's lasts the correct contour, to take into consideration the correct heel tip or the correct heel height for grading the size.

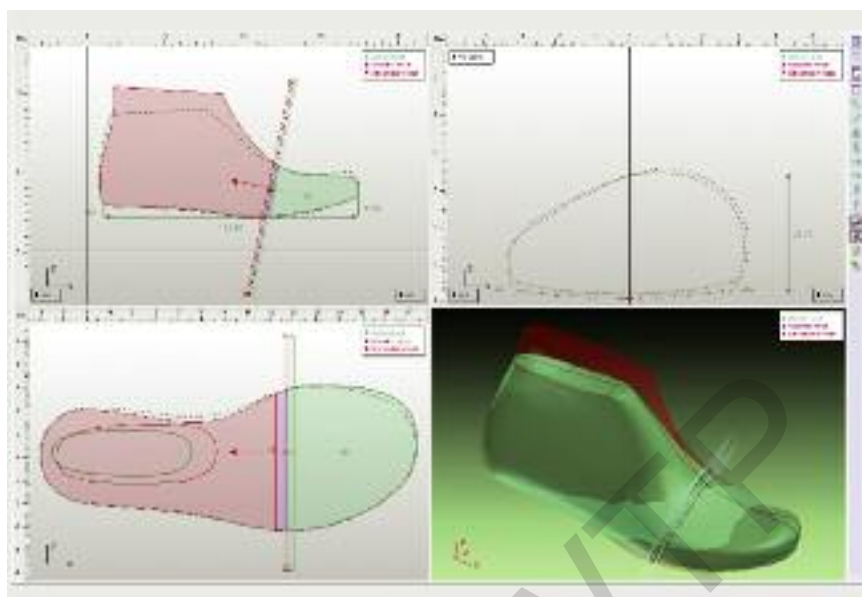
"In this case, again the WMS table provides for a guideline which illustrates the different stages of development up to the foot of an adult. Three different widths are covered and can be considered valid throughout the country. Thus, it is possible to develop a basic mould in which three variants are possible using different insoles. Another more costly possibility would be a width system with individual lasts and shoes. A third possibility for a perfect fit would be a scanning system which determines the optimal shoe for the scanned foot but this would then require full customisation in manufacture, which would be even more expensive."

POOLING KNOWLEDGE

Dialogue and cooperation have a profound influence on product development in the German children's shoe sector as regards perfect fit and foot health. Companies involved receive constant feedback on problems with fit and the success of development steps taken to improve things. Haymo Bertram goes on to say that "Having an ear to the market, participating in the design and asserting one's experience and knowledge is the quality that experienced actors in the industry have. Long-term cooperation helps Fagus to develop its own standards and in turn to positively influence the quality of children's shoes generally."

Although all this valuable information is readily at hand, it still needs to be converted into lasts that not only fully reflect, but, are also made to, the degree of accuracy demanded by modern shoe manufacturing techniques. To this end, Fagus uses both modern and traditional technologies. It creates the models for 90% of its lasts in CAD so that a basic file exists from which the final last and sole moulds can be directly machined to the very finest tolerances. For instance, where direct sole moulding is to be used, minimal tolerances of around 0.20 mm are required for both moulds and lasts to ensure no material is exuded during the injection stage and that the upper is not pinched off.

The company also employs skilled hand model makers who contribute experience and market knowledge to



Fagus creates 90% of its model lasts in CAD.

CREDIT: FAGUS

fine tune designs where needed. Shoe lasts are very complex objects and, even in today's digital world, there is still room for craftsmen who have a real 'feel' for what they produce. These hand craftsmen still shape model lasts using rasps and files in exactly the same way as their forefathers and their skills cannot be gained over night but call for several years of training. This was once possible at a footwear college but now the company trains both modellers and last makers itself.

WHOSE RESPONSIBILITY

All of this adds up to shoes that will protect the health of children's feet and ensure they grow up to a healthy adulthood as far as this aspect of their lives is concerned. It does however rely on feet being regularly measured and new shoes bought as required; this is where it often all goes wrong. Children's feet grow fast, as much as two or three sizes a year, beginning at about 12 months of age. The growth rate of young children's feet is however sporadic, with the most rapid period of growth occurring within the first 10 years. Shoe size should therefore ideally be checked as follows:

Age	Checked...
1–6 years	every 2 months
6–10 years	every 3 months
10–12 years	every 4 months
12–15 years	every 5 months

While totally desirable from the child's point of view, it does mean a considerable financial outlay for parents where top quality shoes are involved and, while there are a good number who will always buy the best shoes for their children regardless of price, there are many more who would also like to act in the same responsible way but who simply cannot afford them, particularly where there is more than one child involved. These parents are forced to turn to cheaper imported shoes—often from the Far East—made on lasts that are frequently designed with more of an eye to fashion than the child's health and from retail outlets or internet sites where no foot measuring is available.

Far too many of these children suffer from foot problems as a result, problems that will follow them throughout their lives causing them pain and their governments needless expense in treating problems that should have been prevented in the first place. If a last is designed correctly with due consideration given to all the physical requirements of children's feet at their corresponding ages of growth, the shoes subsequently made on them will not cause problems regardless of how much they cost.

If all children's shoe outlets could be made to offer a proper measuring service along the lines of Germany's WMS System and all last makers were encouraged to follow it, we would take a major step forward in children's foot health. 📍