

Soling for low cost footwear



Sandals from Apin, Nigeria, with natural rubber soles and PVC straps

Traditionally, the fundamental demand for footwear was the basic need to protect the feet and its production was universal, either by individuals or local shoemakers. In cold countries, the moccasin—normally made from leather—was commonly used. In hotter places, the sandal was, and still is, the most widely used footwear.

Sandals were initially made of wood, straw, papyrus, palm fibre or leather, dependent on the local availability of suitable materials. However, within all societies it did not take long for style differentiation to take place, so people with increased wealth could move away from basic protection to more stylish footwear. This process has continued to the present day.

So what do we now mean by low cost footwear? One answer could be footwear that provides the basic protection function at a minimum cost. With the great shift of footwear production to low labour cost countries this no longer covers only the very lowest denominator made locally, but a broader range of footwear exported around the world.

The global market

Before it is possible to determine what sort of soling materials are used for this type of footwear and its impact on the overall soling market, it is necessary to look at the size of the global footwear market. There is always a high degree of uncertainty in the exact level of global production as it depends very much on how footwear is defined. Statisticians in some countries only include closed shoes and ignore the majority of sandal and non-closed footwear production. Others add just some sandal production dependent on type (fashion, trekking, outdoor, casual, beach, flip-flop, etc).

It is also necessary to look at the potential size of the grey/black economies that produce a hidden amount of footwear in many countries. These are mainly sold in local markets and are never measured by statisticians or taxed by governments. So, before we even look at the soling requirements of low cost footwear in all its forms, we must define the likely size of the market.

SATRA used official statistics to derive a production level of 14.39 billion pairs in 2004, whereas if sandals and other non-

closed production plus the grey/black markets were taken into account, then the total production in 2004 was about 17.93 billion pairs. These figures can be divided up by region and footwear type.

Looking at these figures we can see that even if we only consider the 'low quality' soling market, there are around 6.9 billion pairs produced that require low cost soling. If it is assumed that perhaps 50% of the 'standard quality' soling market also uses low cost soling, then the total market is around 9.3 billion pairs. We can therefore define the market of low cost footwear to be around 10 billion pairs, with up to 6 billion being sandals and the rest low cost casual, dress, sports, working boots and fashion.

Global footwear production split by soling quality & region

Region	Soling Quality (million pairs)				Total
	High	Medium	Standard	Low	
N America	70	109	54	78	310
S America	198	223	272	297	990
Asia	1,783	2,852	3,922	5,704	14,260
W Europe	225	263	150	113	750
E Europe	57	95	133	95	380
M East & Africa	124	186	310	620	1,240
Total	2,456	3,727	4,841	6,906	17,930

Choice of materials

There is no possibility of supplying this level of production using natural products such as straw, wood and felt or the traditional material for moccasins in colder climates, leather, which is too expensive. So, the low cost end has to be supplied by the same range of synthetic materials as used for the rest of the soling market. The key materials used for soling footwear are leather, natural rubber, vulcanised rubber (VR), PVC, thermoplastic rubber (TPR), polyurethane (PU), EVA, thermoplastic polyurethane (TPU) and polyolefin elastomer (POE). The range can be extended by combining them such as in VR/PU, PU/PU, VR/EVA, etc., and the ability to use VR, TPR, PU, EVA and

POE over a range of densities and types of formulations.

Therefore in order to produce low cost footwear it is necessary to take the cost out of the system and there are several ways to do this:

- Low density
- Recycled material
- Low labour costs
- Low cost machines
- Moulded footwear



Sandal production at Apin

Low density

Whilst natural rubber is still used for some low cost footwear by local artisan producers, it does not account for a major share of the market as it achieves a higher price in automotive tyres and as a blend in VR formulations for standard to high quality soling formulations. It is also not possible to reduce the density of natural rubber.

Solid VR was widely used for low cost footwear 40-50 years ago, as the other synthetics were not then available. It is used to a lesser extent now due to cost except for the use of blown VR (micro-rubber), where lower density overcomes the higher cost of basic raw materials. Micro-rubber became the pioneer in the use of lower density products but has been overtaken by newer materials.

EVA and POE can now be routinely produced in usable formulations at densities as low as 0.18 g/ml and used to make soft midsoles or harder outsoles. PU is routinely used down to 0.32 g/ml, again either as soft midsoles or very hard outsoles, while PVC can be moulded down to 0.35 g/ml for outsoles. On the other hand, TPR cannot be moulded much below 0.75 g/ml and so is not as cost effective on density as the others.

EVA and POE can both be moulded in sheet form, with sole units cut from the sheets, or else direct moulded in specialist injection machines. The former has a high reject level due to wastage, pushing the cost per pair up considerably, whilst the latter offers a highly attractive way of producing very low cost sole units.

Recycled material

The only true thermoplastic materials available to low cost sole producers are PVC and TPR and there is an enormous market for the blending of once, twice, thrice, etc., recycled material back into a smaller quantity of virgin compound in order to reduce the cost of the final compound. This provides a significant driver for the production of low cost soling in many countries, but it is not always sufficient to override the lower cost produced by a reduction in density for EVA, POE or PU.

Low labour costs

Whilst low labour costs also contribute to the production of low cost soling, due to the high efficiency of modern machinery, it is not necessarily a dominant factor and only comes into play when used in combination with low cost machinery and low cost raw materials.



Low cost machines

Another key factor is the use of highly efficient low cost machinery in combination with low density and low labour costs. This can clearly be seen by the rapid growth in EVA injection machines in India over the last 5-10 years. Mainly from Italy and Taiwan, they are used to produce soles for sandals (also referred to as chapals in India) and there are now many hundreds of them producing over 250 million pairs per year.

China also has a high level of EVA machines but, more critically, a huge number of locally made PU machines. These use simple tracks, fitted with manually closed moulds (moulds heated by IR heaters) with the PU poured manually using 3-4 simple mixing heads. They are very cheap to buy and, in combination with low labour costs and locally made PU systems, can produce sole units at extremely low cost.

Moulded footwear

The real breakthrough in low cost footwear has been the ability to mould a complete finished product using an efficient low cost machine and a low-density material. This is amply demonstrated by the production of finished sandals using EVA or complete 'jellie' sandals using solid PVC. It is now also possible to make pseudo-closed shoes using injection moulded EVA which need only an insock and laces.

None of these are used, or rarely, in the production of 'low cost footwear'.

It is apparent from this brief survey that the use of soling materials in this area is not significantly different from the high, medium or standard soling quality market. It is only the necessity to pay absolute attention to the need for the sole production to be 'just fit for purpose' with all extraneous costs trimmed out. As most soling materials tend to be over-engineered, this cost pressure on such a large percentage of the global footwear production is helping to keep the cost of all soling materials at a lower level than they would otherwise be. It will be interesting to see how effective this pressure is in the long-term with oil likely to remain at or above \$70 per barrel. 