SUSTAINABILITY IN THE FOOTWEAR INDUSTRY

In 2014, the USA consumed 233 million pairs of footwear with imports representing 98.3% of the total volume. Researchers have estimated that footwear consumption will double every 20 years and this growth has made consumer product sustainability a key element of discussion for nearly a decade. The key stakeholders to drive the concept of sustainability are consumers, governments, NGOs, industry leaders, supply chain partners and society in general.

PRODUCT DESIGN

There are many aspects to sustainability including energy usage, water consumption, ability to recycle and social responsibility. Incorporating sustainability at the product design stage is arguably the single most critical element in the process.

Products which have been optimally designed for sustainability are those in which the overall material usage is drastically reduced. Examples can include the ability to reduce or totally eliminate the use of adhesives or even to eliminate complete components such as lining materials by creating smooth seamed uppers. Reducing or completely engineering components out of the product can lead to both material and cost savings. Design also can ensure that the individual components can be more easily separated at the ‘end of life’ stage i.e. when the consumer no longer has use for the product. Components which can be easily separated can significantly improve the potential to recycle the materials for future re-use. This is often improved by the elimination of adhesives or by the use of components which fit together or fit around one another simply but effectively.

MATERIALS USED IN CURRENT FOOTWEAR INDUSTRY

Once the design has been optimised, the selection of the component materials can significantly improve the sustainability profile. The core materials used in the footwear industry are leather, textiles, adhesives, synthetic rubber, PVC and polyurethane materials. Each of these materials may have its own sustainability issues and there is a need for alternative products. In some cases, these replacement products may lead to a reduction in product performance but often they also can lead to improvements.

Where possible, the selection of natural or bio-based products, renewable resources or recycled products is generally preferred. These products have different levels of sustainability but all reduce or avoid a reliance on petrochemicals. There are many examples of commercial products which can be exemplified by this approach but few appear to have been promoted in large volumes and are still mainly seen as niche products.
LEATHER
Whilst the hide raw material is a sustainable product, appropriate selection of tanning and processing chemicals can have a large influence on the overall profile. In addition to the use of natural tannages such as the use of vegetable extracts, the partial or full use of plant extract fatliquors and natural dyestuffs can lead to improved sustainability. In certain cases, leather may be completely replaced by sustainable textiles.

TEXTILES
There are a wide range of textiles and coated fabrics used as both uppers and lining materials many of which are petrochemical based and unsustainable. Alternative natural based textiles are available with examples including hemp, jute, silk, flax, cotton, bamboo, coconut, linen, wool and cashmere. In addition to these natural based alternatives, recycled polyester (for example from plastic bottles) has been used in both garments and footwear products. Recycled coffee grounds also have been used as a component in linings.

ADHESIVES
These play a vital role in footwear production for bonding the leather upper to the lining and sole. Different types of adhesives used in the footwear industry may be solvent based, radiation cured or hot melts and often carry environmental concerns. Where the use of the adhesive cannot be designed out of the product, water based adhesives are generally preferred.

POLYURETHANE FOAMS
These synthetic products are widely used to increase comfort and are widely used in many footwear types. Because of their chemical nature, the petrochemical based element of the raw ingredient (the ‘polyol’) has the capacity to be partially replaced with plant based products with a similar chemical profile. One of the more popular natural replacement products is based on a soybean extract which whilst not completely replacing the synthetic PU, it does allow a significant reduction in the overall use of fossil fuels.

SYNTHETIC RUBBERS
This petrochemical material is a popular choice as a sole material and is considered to have a poor environmental profile. The use of the more expensive natural rubber can improve both the product quality and sustainability profile with the additional option to use natural fillers such as rice husks. There are a number of shoe manufacturers who also use recycled car tyres as a replacement rubber sole by directly cutting from the disposed tyre.

SUMMARY
The footwear industry has explored a number of approaches to improve its sustainability profile but few have been widely adopted. The footwear design and material selection are just two aspects of sustainability but both are critical in moving the industry forward. There are many natural or recyclable alternatives available and many more that will undoubtedly be developed in the future.

Manufacturing sustainable footwear which meets the aesthetic and performance requirements of the customer continues to be a major challenge for the industry. Achieving this whilst maintaining financial competitiveness remains the sustainability goal.

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