



Sustainable footwear

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A product can be defined as sustainable if the production materials and processes used to make it do not adversely impact the potential for the same product to be manufactured in the future. In many cases the use of the term sustainable has been almost solely connected with environmental impacts and the use of material resources. However, it should be remembered that there are financial and social sustainability impacts as well.

In the footwear industry, a large part of the production is fashion footwear which is viewed as disposable. Therefore the impacts of sustainable production in the overall scheme of things are likely to be incremental only and, in many cases, closely linked to saving costs on materials, chemicals and energy. However, some niche markets, particularly those associated with outdoor activities, may find the development of sustainable lines

beneficial for marketing to a target purchasing group.

SUSTAINABILITY METRICS

In order for any organisation to set about reducing the impact of its products, it needs to determine a method of measuring them that is both credible yet simple enough to be fed into during production or pre-production.

In recent years some major sports footwear brands have taken steps to thoroughly examine their environmental credentials, particularly the sustainability of materials they use, and then ranking various materials by their environmental impact. These in-house tools were intended primarily to guide designers towards the use of more environmentally friendly materials in the design of their footwear. They are now being discussed and shared with other manufacturers in an attempt to draw up

a set of universal guidelines (in the form of an index) to help manufacturers rank a product's environmental impact.

These benchmarking tools are intended to enable brands to measure the environmental impacts of the product across the supply chain and throughout the products life cycle so that they can target improvement activity to negate the largest impacts. When field trials have shown these techniques to be robust, the possibility exists for the development of a customer-facing labelling scheme.

Schemes such as these are primarily intended to allow brands and footwear producers to measure the environmental impact of products, with the ultimate aim of seeking to improve or lessen that impact. They will also be of benefit to manufacturers who wish to evaluate or rank the performance of their factories and facilities, and to designers who will be able use guidelines to steer them in their choice

of more environmentally friendly materials, designs and processes when developing a new product. Sustainability indices take into account several criteria against which a product can be ranked; criteria and which can be used as a guide for manufacturers wishing to create products with better environmental credentials.

RESOURCE SUSTAINABILITY

Footwear uses a wide range of materials for the individual components needed to produce it and each material type will have its own sustainability characteristics. Two key constituents are leathers and textiles/plastics.

Leather from cattle, sheep, goats and pigs is considered a by-product of the meat industry and the raw material should be available as long as there is a market for meat products. The issue surrounding the rearing of animals which are then used for the production of meat and leather has centred on the land used for grazing these animals. Opposition to the use of cleared rainforest in South America has been part of an ongoing campaign which has led to the introduction of traceability standards within the leather supply chain. This became an issue for the leather and footwear industries as campaign groups identified them as more likely to be influenced by pressure from their customers rather than the meat industry which was the primary destination for the cattle produced in the region.

Once the raw skins reach the tannery the key sustainability issue is the use of water, a critical resource in many countries. This is especially true if the tannery is extracting or discharging water from a water course that is also a resource for other users, either for other processing, irrigation, drinking or even leisure. Extraction rates and discharge rates should be as close as possible and the discharged water should meet stringent levels in terms of pollutants, colour, pH and temperature. In addition to the pollutants that may be present in the water discharges from a tannery, solid waste must also be considered as this may be contaminated with a variety of possibly toxic chemicals and need to be disposed of responsibly to avoid the potential contamination of land and groundwaters.



A process of reverse osmosis and evaporation/condensation enables 95% of tannery effluent entering the Ranipet CETP plant in India to be returned for reuse. CREDIT: WTP



US company Faytex uses a variety of recycled or sustainable materials in its Drilex shoe linings including DuPont 'Sorona' which is made from fermented plant sugars. CREDIT: SHUTTERSTOCK/LILAC MOUNTAIN

The chemicals used for the tanning process should also be taken into account. Chromium salts are generated from chromium and chromium is extracted from ores found in the earth's surface. The state of the metal and its abundance in seams and specific minerals will determine how easy this is to mine and the cost and availability of chromium over time. Chrome is not however currently considered to be scarce.

Many of the same issues associated with the tanning process for leather apply to the processing of natural textiles, including the use of pesticides, fertilisers, process chemicals and the

extraction of water for processing. In addition, the amount of water used in the growing of cotton is also critical as the areas of the world where cotton is grown are those that can experience severe water shortages.

Synthetic textiles, like most synthetic polymeric materials, are derived from oils. Most of the oil used in this production comes from petroleum which is a non-renewable resource under pressure from transport, power generation and other industrial uses. The alternatives to petroleum-based oils are those that are derived from crops including rape seed oil, sunflower oil, palm oil and soya-based oils.

These are all renewable, as crops can be planted and harvested each season. They may not however always be considered sustainable as there is pressure on the land used to grow these oil generating crops which may also be required for growing food crops. Like petroleum, good arable land is a finite resource. The same argument applies to the use of crops for energy generation. This type of fuel is renewable but may not be the most efficient use of land in a specific region. The current high price of petroleum-based oil is an additional driver for organisations to move away from the polymers and fuels derived from this source.

MATERIAL EFFICIENCY

Products that claim to have sustainable credentials are often based on a simplified design and use components from an organic source (e.g. vegetable fibres, cork, unbleached cotton) or are made using recycled materials. A successful recycling process is the production of polyester textiles from waste plastic bottles and cups, as these items can easily be collected in a homogenous waste stream.

Recycled materials improve the sustainability profile of a product as the impacts associated with the production, extraction or growing of virgin materials need not be considered again. The key issue with any recycled material is to ensure the consistent supply of a quality feedstock. This can be difficult when relying on post-consumer waste, particularly for footwear materials which are difficult to recycle back into the same supply chain. The problem is less marked with production waste with many organisations already feeding their own waste back into the manufacturing process.

It is important to remember that even a material sourced in a sustainable manner can still be used wastefully and thereby unsustainably. This could be due to poor efficiency in cutting and material usage or a lack of quality control in the production line resulting in a significant number of rejects. The use of cutting programmes can help to reduce waste and the use of stitching protocols can improve the quality of shoe upper preparation thereby reducing the number of rejects.

Environmental quality systems can enhance existing quality management schemes by establishing policies and procedures for management of environmental impacts. The ISO14001 scheme includes elements of continuous improvements but just because an organisation is accredited to an environmental management scheme does not necessarily mean their products are inherently more sustainable.

MAKING A START

Improvements and quick ways to improve environmental impacts may include any or all of the following actions.

1) *Eliminate* the use of restricted substances in all stages of the product supply chain. This aspect of sustainability is one that is governed by legislation so, regardless of a company's stance on environmental issues, it is something that must be carefully managed. SATRA can assist companies with testing for the presence of restricted chemicals, advise them on practical alternatives and indicate the legislation to which they need to adhere. This includes ensuring that all suppliers and contractors supplying the company adhere to guidelines on the use of certain chemicals and carrying out routine check testing to confirm



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suppliers are actually following those guidelines. Also included in this would be measuring solvent usage (either the total volume used in a production facility or the amount used in an individual style of shoe) and introducing measures to reduce it.

2) *Select* and use environmentally friendly packaging and minimising the use of treatments such as wax coatings on cardboard that will reduce its recyclability.

3) *Design* footwear that is durable; footwear intended to have a long lifespan stays out of landfill longer than a less durable product. Many consider us to be living in an increasingly throw-away or disposable society. Long-lasting, well-made products ensure that fewer pieces of product per year need to be disposed of. SATRA can again advise on durability guidelines and how to improve the construction of footwear to maximise lifespan. However, this can only be seen as a positive sustainability attribute if the footwear makes use of its increased durability such as walking boots and industrial footwear. It's irrelevant for high fashion shoes as these will not be worn to the limit of their functional life.

4) *Reduce* the energy consumption of factories and facilities along the footwear supply chain. This includes ensuring that machines are optimised to perform their tasks appropriately and achieve maximum effectiveness with minimal energy usage. Examples include heat-setting machines which can be quite energy-hungry. There is also a range of other tools which can help companies optimise their in-factory processes. All reductions in energy usage equate to a cost saving, especially with increasing global energy prices. Reducing overall energy consumption is therefore beneficial on many levels.

5) *Introduce* or refine a practical end-of-life programme for a product. Consumers are now becoming accustomed to being able to return used electrical goods to the retailer or a dedicated recycling facility rather than disposing of them via a normal waste disposal system. Similar systems should evolve to handle other kinds of product. Some brands and retailers are introducing take-back schemes for the return of used products for either re-use or recycling. Designing shoes with



The environmental advantages to be gained by using recycled and sustainable materials can be reduced due to poor efficiency in cutting and material usage.

CREDIT: SATRA

ultimate recycling or re-use in mind is also becoming more feasible and lessens the potential environmental impact of a product. Although footwear is generally a complex multi-material, multi-component product, the fewer materials that can be used in its construction, the more likely it is to be recyclable. When it is not possible to make footwear recyclable, it should at least be designed to have less impact on mainstream waste disposal systems. This includes the use of biodegradable materials, compostable packaging and materials designed to break down rapidly in the anaerobic conditions of landfill. However, the inclusion of biodegradable materials in footwear must not be to the detriment of the functional life of the product.

6) *Avoid* the use of airfreight wherever and whenever possible. Air freight is considered by many to be one of the most environmentally unsound methods of transport and is certainly one of the most expensive. Many companies already keep a careful eye on the volume of goods that are air-freighted each year. Air freight is sometimes seen as a quick-fix solution to short deadlines and production problems that arise due to a planning shortfall. Better planning and more forward-thinking production strategies can all help to reduce the need for air freight.

END OF LIFE

Work is currently being carried out throughout the industry to tackle issues associated with the recycling of footwear such as the complexity of organising the collection and transportation of discarded footwear to treatment centres and how to effectively separate and isolate individual materials to produce a product that will have a commercial value, whether in footwear or any other application. Metal components in footwear (shanks, zips, eyelets and trims) pose a particular problem. Non-metallic materials may therefore have to be used in sustainable ranges of footwear to make end-of-life dismantling easier. While the recycling of materials alleviates pressure on waste products going to landfill sites, the economic case needs to be made before the volume of materials entering the recycling process can increase.

There are a number of initiatives within the footwear industry which lead towards the greater utilisation of sustainable materials and to footwear with eco-design features. However, until this becomes the normal behaviour of the main retailers and brands, it will remain a niche market appealing to a specific demographic customer base. ♻️