Guidance on design for longevity – underwear
Extending the lifespan and use of garments is one of the most significant ways of reducing the environmental impact of clothing.

**Product overview**
- Underwear includes bras, briefs, boxers, vests, slips, shapewear and thermals.
- Shapewear and bras are highly engineered products with many component parts, whereas briefs, slips and vests are simply constructed products with few parts.
- Good form, support, comfort and fit are pre-requisites when designing underwear.
- The daily use of underwear means that it must be able to withstand constant wearing and laundering.
- A balance is needed between style, colour, fit, comfort and how easy it is to launder when designing underwear.
- Opportunities for re-use are limited due to the personal nature of underwear.

**Top five solutions**
- Using more durable fabrics, trims and construction methods.
- Removing seams where possible, and recognising that comfort is crucially important for prolonged daily wear.
- Scheduling in time for multiple fittings during the design process to ensure that underwear fits well and supports where necessary.
- Providing expert advice on fit on product packaging and at point of sale.
- Designing underwear to be easy to launder.

*Extending the average life of clothes (2.2 years) by just three months of active use per item would lead to a 5-10% reduction in each of the carbon, water and waste footprints, and cut resource costs by £2bn.*
What limits lifetime?

Underwear is generally discarded when it no longer fits properly and so is uncomfortable.

- Discomfort and poor fit can be a problem from initial purchase onwards – particularly in the case of bras. This can lead to discard after relatively little use.
- Garments that rub or feel rough against the skin are likely to be worn less frequently or disposed of early.
- Underwear made from cotton or weft-knitted fabrics may shrink or become misshapen – again making the garments uncomfortable.
- Garments do not recover well from stretching. For example, if the waistband elastic in a pair of briefs becomes slack then consumers will throw them away, even though the fabric they are made from may still be serviceable.
- Though appearance is generally less of a reason for discard than discomfort, garments are often thrown away when fabrics fade or discoulour. White or light coloured underwear is particularly liable to this.

Around **30%** of clothing waste ends up in landfill.

The waste footprint for clothing is estimated at **1.2 million tonnes**, equivalent to **5%** of UK household waste.
Recommendations on fibre and fabrics

A range of fibre types are used for underwear including cotton, viscose, silk, polyester, polyamide and blends.

- Different fibres offer not only different aesthetic qualities but also different performance attributes. Some fibres and yarn types stretch better than others or are more resilient to washing.

- Fabric selection depends on expected end use. The fabric used in a sports bra, for instance, typically needs good stretch and recovery, excellent moisture management and a smooth handle.

- Micro-fibres and fabrics containing elastane can enhance comfort, fit and durability.

- Knitted fabrics may need to be relaxed to enable accurate sizing for spreading, cutting and sewing.

- Anti-static finishes may be of use when using man-made fibres that are prone to cling. It is important to check with fabric suppliers to ensure these finishes will not damage the fabric.

- If making underwear garments out of more than one fabric type, it is important to ensure that the fabric properties are well-matched.
Recommendations on design and manufacture

In designing underwear it is important to consider style, colour, fit, comfort and how easy it will be to launder – all of which encourage longevity.

- To ensure garments fit well, it may be worth allowing time for several fittings at different stages of the design and manufacture process, particularly for new styles of bras and foundation garments.
- Ensuring the best seam and stitch type is very important to ensure comfort and longevity. The margin of error on seam allowances is very small. It may be worth considering sewing trials with machines unthreaded to help with quality.
- Approaches that allow manufacture without seams (e.g. techniques such as seam free, laser, raw cut edges and moulded cups for bras) are beneficial.
- Frequency of wear can be increased by creating multi-way bras and underwear that can be worn as outerwear.
- Longevity can be increased by designing bras to accommodate an additional back hook and eye trim, which can be sold separately. This helps with increasing the comfort of the garment if the consumer’s size or shape fluctuates.
Recommendations on care and repair

Underwear generally requires relatively frequent laundering, so it is important to give customers the correct care advice. In general, this will involve hand or machine washing; ironing is not normally needed.

- Rigorous testing of pilot garments can help establish what the correct advice should be in terms of washing, drying and storage.
- Typical considerations include washing co-ordinating items (e.g. bras and briefs) together, using a lingerie wash bag for delicate items, washing deep colours together where appropriate and closing fastenings before washing in order to reduce the chance of these being caught on other garment parts.
- For silk garments, specialist detergents are generally recommended.
- Underwear garments that are constructed well are unlikely to need repair.
- It is unlikely that consumers will repair underwear unless the garment is a special occasion piece: there may be scope for an after-sales/repair service for such items.
- To minimise the risk of yellowing pre-sale, it is recommended to use BHT-free plastic bags for shipment and storage.
Re-use and discard

The intimate nature of underwear and the frequency of wear make it less likely to be re-used, so the focus should be on responsible disposal.

- Many consumers are relatively unaware of the possibility of recycling clothing, so may assume that items which cannot be re-used should be thrown away. Retailers can therefore help raise awareness of specialist recyclers.

- Garment design can affect the ease with which clothes are recycled. Using a single fabric facilitates recycling, but where multiple fabrics and components are used, there is scope for designers to make it easy to disassemble these, without compromising the robustness of the product.
This is one of a series of Guidance Notes for product development teams offering guidance on design for longevity.

For further information visit:

www.wrap.org.uk/clothing

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