



NCPC
 NATIONAL CLEANER PRODUCTION CENTRE
 — SOUTH AFRICA —



**RESOURCE EFFICIENCY AND CLEANER PRODUCTION
 BEST PRACTICE GUIDELINE
 FOR THE SOUTH AFRICAN CLOTHING INDUSTRY**



the dti
 Department:
 Trade and Industry
 REPUBLIC OF SOUTH AFRICA





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INTRODUCTION

The impact of clothing manufacturing

South Africans still spend up to 10% of their disposable income on buying clothes. The impact of clothing manufacturing is long term as the fabric waste is one of the highest contributors to landfilling. The Clothing, Textile, Footwear and Leather industry contributes only 1% to gross domestic product (GDP) (StatsSA, 2014), and it is one of the most labour-intensive segments of South Africa's manufacturing industry. However, over the past year (2015) new jobs have been created in the clothing industry with growth along the entire value chain.

The clothing and textile industry is known as the second most polluting industry in the world. The clothing industry has huge impacts throughout the entire life cycle, and this is because of the types of raw materials procured (fabric, thread, fasteners etc.) for the use and end of life of the garment. It is estimated that approximately 95% of landfilled textiles can be recycled, and based on RECP assessments conducted over the past ten years, it is evident that in South Africa an average of 20% is being wasted in the fabric-cutting process. South Africa has a fully operational textile and clothing manufacturing value chain; however, certain qualities of textiles are still being imported because of not being available or sourcing from cheaper suppliers.

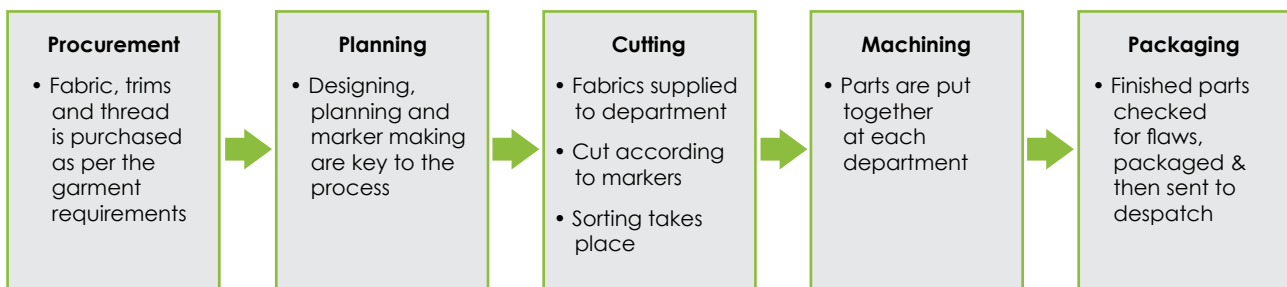
Purpose of this document

This document is intended to give a quick guide on implementing resource efficiency and cleaner production (RECP) best practice tips in the clothing industry.



1 PROCESS OVERVIEW AND RECP TIPS

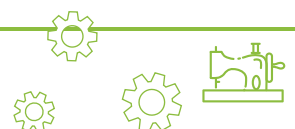
The diagram below provides an indication of the typical process steps in manufacturing clothing:



1.1 Procurement

The highest cost for any clothing manufacturer is fabrics. Depending on the style of garment, this could constitute up to 60% of overall cost, which is why it is crucial to focus on resource efficiency efforts and improve fabric use.

Fabric types, thread and accessories used in the manufacturing process have a huge effect on the overall life cycle impact of the clothing item that is produced. Therefore, it is important to identify the fabric with the lowest impact on the environment through adapting the following actions for each:



FABRIC

- Check the quality of the fabrics from suppliers (for shade and other flaws);
- Ensure that fabric widths are according to the specifications from suppliers;
- Practice width batching to ensure marker efficiency and rolls are used according to different widths;
- Ensure all claims regarding fabric irregularities are recorded, and addressed with the supplier or fabric supplier agent / representative; and
- It is suggested that all fabric measurement reports are captured directly into a computer spreadsheet for review and tracking.



THREAD

- Review and purchase thread quantity according to the costing of garments;
- Train key staff in sewing thread consumption for greater accuracy when purchasing sewing thread;
- Old stock can be used through rewinding, and re-dyed into darker colours if required; and
- Thread cones can also be recycled by suppliers.



PAPER

- Procure paper and plastic that can be reused and/or recycled;
- Check with suppliers if they have a take-back system for used material; and
- Check if the supplier will take back the inner cones.



1.2 Pattern making

Patterns are made according to the designer's requirements and in some instances samples are made. The planner completes the order sheets with the costed ratings included, as well as the number of garments to be produced for each type of fabric.

Actions to consider in this process include:

- Computing the marker process on software to minimise fabric waste;
- To avoid further wastage, ratings should be specific to each garment and not averaged;
- Creating samples are important to the overall efficiency of the garment and new technologies such as 3D printing can be considered for this process;
- To improve efficiencies, add in cut parts from another style in the markers;
- Individual markers should be made for different widths;
- Work studies are encouraged to get a proper understanding of how much time it takes to produce a garment. This will also affect the amount of resources used; and
- Reduce paper usage during marker making by checking that the fabric widths and lengths correspond to specifications provided by the planner.



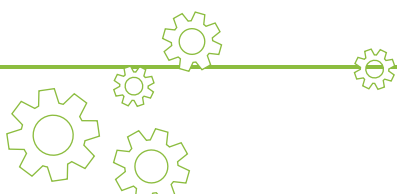
1.3 Cutting

The cutting process commences after the markers have been completed and finalised. Cutting includes laying up/spreading of the fabric by hand or using an automatic laying up machine. The most common automatic fabric cutting equipment used in South Africa are Gerber machines. These machines generally require layers of paper at the bottom and on top, as well as layers of plastic.



Actions to consider in this process include:

- Ensure the lay lengths are all within the required specifications and even at the ends;
- Ensure the end-cutters are properly squared to avoid skew cutting;
- Remove the bottom layer of paper for woven materials during the cutting process;
- Use weights in the manual laying-up process to ensure evenness at the ends of the fabric;
- A 'cut all' fabric policy can be used to ensure no remnants are left on the roll;
- Overlays as well as flaws should be identified or tagged throughout the fabric. Well-marked overlay plies can save on re-cutting;
- Redo markers if the fabric widths are too wide;
- Place markers on the edges instead of pinhole-to-pinhole as this can be worked into the allowance by the machinists;
- A daily vacuum and clean out of the cutting plane bristle bed with an industrial strength vacuum cleaner is good maintenance;
- Cut pieces should be sorted as soon as possible within close proximity to the cutting areas;
- Fabric waste offcuts should be separated at the point of cutting. Paper and plastic should then immediately be separated; and
- $(\text{Lay length extra}) \times (\text{average no. of plies}) \times (\text{lays for the day}) \times (\text{cost of fabric})$.



1.4 Machining

The bundled sorted cut panels are then moved to the sewing floor to be assembled.

Actions to consider in this process include:

- Replace older machines with newer ones as new energy-efficient motors use less energy during idle periods and are generally more efficient;
- Teach machinists basic machine settings and identify those factors that cause sewing thread breakages;
- Compressed air usage should be eliminated for machine cleaning and be replaced with blowers; and
- Try to use task lamps at machinery to avoid the use of overhead lighting.

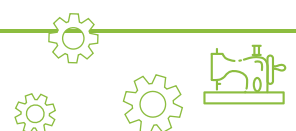


1.5 Finishing

Assembled garments are checked for quality prior to finishing (ironing, pressing) and packaged.

Actions to consider in this process include:

- All irons and heating elements should be switched off during tea and lunch breaks;
- The use of Tri Chloro Ethylene as a cleaning chemical should be eliminated and replaced with a less hazardous chemical; and
- Ensure proper training of those working on the equipment.



1.6 Packaging and distribution

Once the garments have been quality approved, it is ready for packaging and distribution.

Actions to consider in this process include:

- Avoid double packaging where possible; and
- Contact the customer if garments can be transported in returnable packaging.

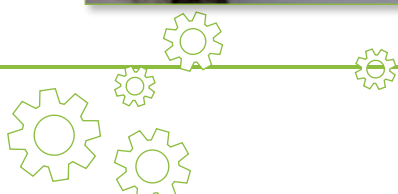


1.7 Utility usage

This focuses on the provision and reduction of water and energy throughout the garment manufacturing process.

Actions to consider in this process include:

- Metering and monitoring for all resource consumption areas are important;
- Set up key performance indicators to identify the cost of each contributing factor (e.g. electricity cost and consumption kWh per garment);
- Eliminate all usages of pneumatic machines where possible, such as drills and staple guns, and consider replacing with electrical alternatives;
- Compressed air leaks should be fixed immediately and regular leak tests done;
- Ensure that the compressor is operating at the lowest possible pressure;
- Proper insulation throughout the steam piping system is important;
- Low flow taps should be fitted in the water consuming areas;
- Install natural lighting where possible throughout the entire facility; and
- Installed lighting should be replaced with alternative and more energy efficient LED lighting.





2. INNOVATION WITHIN THE CLOTHING INDUSTRY

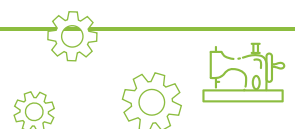
There are so many areas of improvement that can be made to move the clothing value chain towards sustainability, and these are discussed in the section that follows.



Figure 1: Adapted from Gap Inc. life cycle map of a garment

2.1 Design

- Consider designing for durability where garments will be more durable;
- Garments can be made flexible through the adaption into different types of functions;
- Offering a repair system for consumers can be a way of extending the life of the garment;
- Consider fabrics that require less washing and that may be coated or finished in a certain way; and
- Customisation, including individual fit and preference, is a key strategy for producing garments that the consumer wants to keep for a long time, but is generally considered an expensive luxury. Body scanning technologies are key in this new approach.



2.2 Fabric procurement

There are many types of fabrics (textiles) that can be used which have a lower impact on the environment:

- Recycled polyester;
- Lower impact or organic cotton;
- Bio-based synthetics (Sorono PTT – manufactured by DuPont);
- Man-made cellulose (e.g. Tencel, modal); and
- Natural fibres (hemp).

2.3 Garment use

- It's very important to communicate to customers the impact of washing on garment use;
- Encouraging customers to repair, adapt and pass on their clothing can reduce the environmental impact by increasing the life of the garments;
- Social media platforms exist for selling second-hand garments; and
- Clothing can also be given to charity.

2.4 End of life

- By diverting the clothing from landfill into systems such as reuse and recycle, the environmental impact is drastically reduced; and
- Concepts such as Cradle-to-Cradle and Circular Economy are encouraging companies to rethink their current business models and implement a closed-loop system.

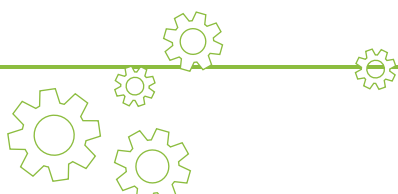


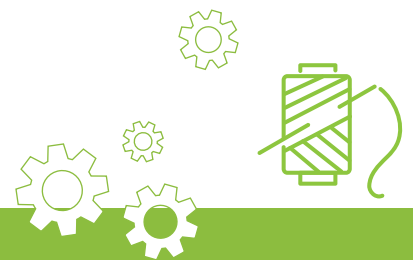
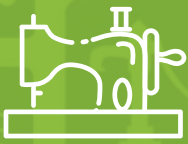
3 FURTHER READING

For further reading please visit the clothing knowledge hub developed by WRAP UK for sustainability innovative ideas. For more information you can visit the clothing knowledge hub regarding innovative ideas in the industry. <http://ckh.wrap.org.uk/>.

Also visit the NCPS-SA website for case studies. (www.ncpc.co.za)

Also visit the NCPC website for further case studies





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