



your on-line toolbox for efficient textile production

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- e-learning: an on-line course providing background information on efficient textile production,
- e-efficiency: a management tool for identifying improvement options and increase a companies overall performance,
- e-solutions: a database containing descriptions of well over 200 efficiency measures.

This document is part of the e-learning tool.

Process analysis of textile manufacturing

Textile industry overview

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2.1. INTRODUCTION

Cleaner Production is an attractive approach to tackle environmental problems associated with industrial production and poor material efficiency. The cleaner production approach was successfully implemented in the textile sector. It shows that significant financial saving and environmental improvements can be made by relatively low-cost and straightforward interventions. This improves the quality of products and minimizes the cost of production, enabling the branch to compete in the global market. Moreover, Cleaner Production also improves the company's public image by highlighting the steps it has taken to protect the environment.

The main goal of this unit is to give an overview on the main processes involved in the textile manufacturing. For each process an extensive material and energy balance is provided as well as the impact of each in both environmental and human health terms. It also presents literature that will help on carrying out the cleaner production audit ([see e-efficiency](#)), especially in the identification and quantification of the company performance and in comparing this performance with industry averages.

2.2. TEXTILE INDUSTRY OVERVIEW

The textile industry is a significant contributor to many national economies, encompassing both small and large-scale operations worldwide. In terms of its output or production and employment, the textile industry is one of the largest industries in the world (1).

The textile manufacturing process is characterized by the high consumption of resources like water, fuel and a variety of chemicals in a long process sequence that generates a significant amount of waste. The common practices of low process efficiency result in substantial wastage of resources and a severe damage to the environment. The main environmental problems associated with textile industry are typically those associated with water body pollution caused by the discharge of untreated effluents. Other environmental issues of equal importance are air emission, notably Volatile Organic Compounds (VOC)'s and excessive noise or odor as well as workspace safety.

2.3. CATEGORIES OF TEXTILE MANUFACTURING BASED ON FIBER USED

Textile fibers are categorized into two principal groups; natural and manmade (Table 2.1). Natural fibers - cotton, wool, hemp, linen, jute, silk - are products of agriculture. Manmade fibers encompass both purely synthetic materials, e.g. nylon, polyester derived from petrochemicals, and regenerative cellulose materials, e.g. rayon and acetate, manufactured from wood fibers. Both types of manmade fibers are typically extruded into continuous filaments, which may then undergo treatment to impart texture to the fibers. The continuous filaments may be spun into yarn directly, or they may be cut into staple length and then spun in a process resembling that used for wool or cotton (2).

Table 2.1 Different fiber types (4).

Natural fibers		Animal origin	Raw wool Silk Hair
		Vegetable origin	Raw cotton Flax Jute
Manmade fibers	Natural polymers	Vegetable origin	Viscose, cupro, lyocell Cellulose acetate Cellulose triacetate
	Synthetic polymers	Petrochemical origin	Polyester Polyamide Polyacrylonitrile Polypropylene Elastane
	Mineral fibers		Asbestos Glass fiber Metal fiber