

# Dyes & Chemicals

## DyStar Ecology Solutions: Key elements of sustainability in the textile supply chain

DyStar has always been committed to the highest standards of product safety and ecology and to the development of products and processes offering Best Available Technology with reduced environmental impact to textile processors. Through its econfidence® program described in outline in the first paper published in Pakistan Textile Journal in January 2010, this series by DyStar offers its expertise in dye chemistry, ecology, and application know-how available to our readers. In this second paper, some thoughts on what sustainability means in practice for the textile industry and how one can contribute through our global reach and local knowledge are shared with PTJ readers.

### Background

With the increasing consumption of manufacturing goods all over the world, product manufacturing systems have come under intense scrutiny with regard to their impact on the environment. The consumption of natural resources has increased dramatically in the last 40 years with little regard for the environmental degradation caused, particularly in the rapidly industrializing countries.

Problems such as global warming, due to increasing atmospheric Carbon Dioxide levels from the burning of fossil fuels, natural resource depletion, toxic waste disposal, and increasing air, water and soil pollution from both agriculture and industry are becoming issues of global importance requiring concerted international action to solve them.

In such a scenario, it becomes every individual's responsibility to proactively contribute and participate in the improvement of these problems. Every industrial sector and leading companies in each sector are also now being held to account for their impact on human health and the environment.

It is therefore imperative that the textile industry also address such issues within the supply chain. At every stage of textile production, vast amounts of energy, clean water and chemicals are used to process the textiles and apparel which consumers demand. In turn these processes generate air, water and soil pollution through often-untreated effluent disposal and waste generation which place a heavy burden on the environment.

This lack of awareness about the environmental impact of our industry is a major roadblock on the path to improved sustainability. With increased awareness and the right education of all actors in the supply chain, we can establish a more ethical, environmental and socially responsible industry.

The demand for sustainable clothing from "ethical" consumers, significant improvements in enforcement of environmental laws by regulatory authorities and better compliance by manufacturers clearly demonstrate a growing recognition of the importance of moving towards a more sustainable model for the textile and clothing industries. Hence it is important to drive the textile development

process towards sustainability and define a clear agenda for sustainable textile production, which can eliminate environmental hazards, improve process efficiency and reduce environmental pollution.

### What is Sustainability?

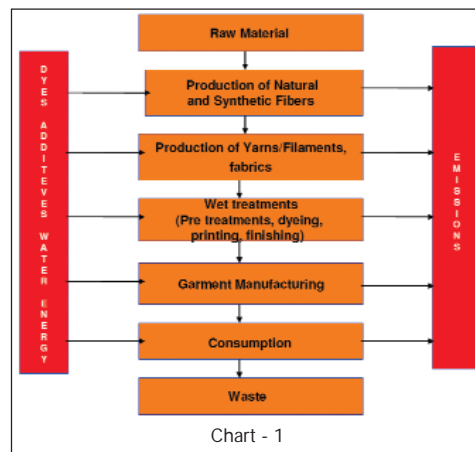
Sustain means "to maintain" or "to uphold" and with regard to industrial processes sustainability means establishing those principles and practices which can help to maintain the equilibrium of nature in other words to avoid causing irreversible damage to the earth's natural resources.

The simple example of caustic soda handling, recovery and reuse shows how a commonly used industrial chemical can be handled in a sustainable manner:

- ❖ **Economic:** minimize raw material costs by recovery and re-use.
- ❖ **Environmental:** Minimize the release of caustic into the waste stream thereby reducing effluent treatment requirements eg; acid for pH neutralization (additional economic benefit).
- ❖ **Social:** Install systems for safe handling and recovery of use caustic to minimize worker exposure to this corrosive chemical, and avoiding emission of highly alkaline discharge into public waters and sewer systems.

Moving to a greater degree of sustainability in our industrial processes and systems requires that we achieve a better balance between the social, economic and environmental aspects of textile production.

- ❖ A sustainable product is one that is manufactured in a way that respects the social elements of fair trade and human rights of the people involved in the whole of the manufacturing chain.
- ❖ A sustainable product is one that is manufactured in such a way that it has the lowest possible adverse effect on the environment e.g. by making the most efficient use of resources such as water and energy, and which goes extra mile to recover raw materials, e.g. by the recycling of as much water as possible or by recovering the heat from wastewater discharges.



- ❖ But equally important, a sustainable product is one which can compete effectively in the global marketplace against less sustainable products. i.e. which offers value benefits to the consumer, and where the economic returns from its success are fairly distributed back along the supply chain.

In order to achieve the above agenda, it is important to work at each and every aspect of textile production where natural resources, energy and chemicals are consumed and emissions to air, water and land arise. **Chart 1** outlines the typical stages of apparel production, use and disposal. Let us discuss the requirements of sustainability at various stages of textile supply chain:

### Sustainable design approach

Today various fashion brands and retailers are considering the options that are available to "green" the design of their product lines. If more ethical or sustainable clothing is to be achieved, it has to start from the design stage. The decisions made at the design phase greatly affect the later decisions that are open to be made by the rest of the supply chain. So, at design there is the greatest potential for changing the impact of the production process e.g. by using more sustainable textile fibers and specifying low impact dyes and chemicals. Such principles have been embraced by industry leaders such as Nike in sportswear and Patagonia in the outdoor equipment and clothing sector.

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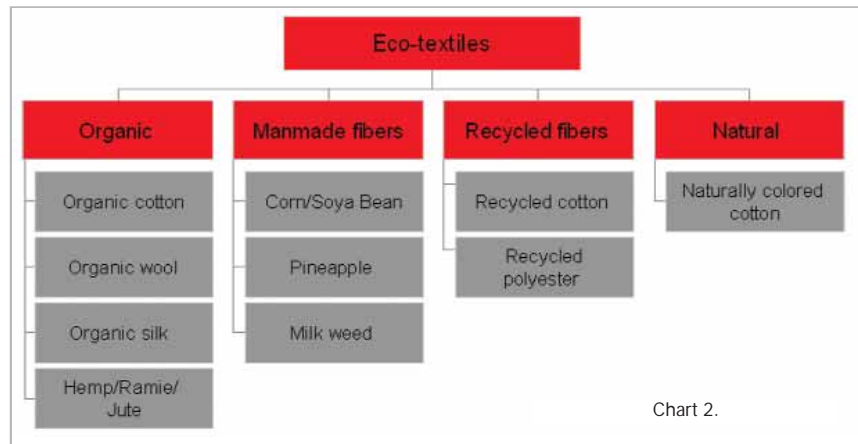
a) **Textile fibers:** In order to move to greater sustainability, companies and customers are searching for fabrics and apparel that are based on ecofriendly fibers. These fibers may be natural or synthetic but must have reduced environmental impact in their production and processing compared to conventional fibers. To some extent, we can also call them people friendly because of reductions in the use of pesticides and synthetic fertilizers in their production systems meaning they are less hazardous to farmers.

Some of these fibers have long been a part of our textiles and apparel industries but have never been given high importance in order to fully utilize their ecofriendly benefits and better textile properties. A few examples are: organic cotton, recycled cotton, naturally colored cotton, hemp, jute, ramie, organic silk, lyocell, recycled polyester, corn, soya bean and few more. **Chart 2** gives you an overview of these fibers and how we can classify them.

Recently, with the increase in consumer interest and the establishment of third-party certification systems a greater focus has been given by the textile industry to the production of sustainable fibers and new alternatives have been investigated, researched and evaluated by the textile industry for various uses in textiles: Tencel®, recycled polyester, recycled and organic cotton, and bamboo are some of the more successful examples. But whether the sustainable and eco friendly nature of the fiber is maintained through to the final end depends critically on how the fiber is subsequently processed.

## b) Dyes and chemicals

The next aspect of selecting "greener" raw materials should be the selection of



dyes and chemicals for textile processing. Designers of various brands push the first domino on a series of chemical decisions that reach around the globe. As a specifier, one can not be "arms length" from the chemical details of their supply chain. If you are a designer for textiles and catering to the brands needs, you are in effect a specifier for a complex chemical process.

**Chart 3** shows the various chemicals that may be used at each stage of processing. The careful selection of dyes and chemicals through accurate and reliable information provided by reputable suppliers enables processors to match their customers' Restricted Substances List (RSL) criteria. The best dye and chemical suppliers also help their customers in the wet processing industry to achieve better results in terms of sustainable textile production with more efficient resource use and reduced effluent loads whilst meeting the quality and technical performance demanded by the retailers and brands on behalf of their customers.

Processors often ask their dye and chemical suppliers for ecological safe dyes

with various terms used like Green dyes, Low impact dyes, organic dyes, eco dyes, natural dyes etc. Due to a lack of clear information and in the absence of an internationally agreed standard on the definition of eco friendly dyes, various myths and misinformation has grown up around dyestuffs. For instance it is not true that all azo dyes are carcinogen and in fact very few dyes are toxic.

DyStar has a long history of co-operation with various regulatory authorities for the chemical and ecological compliance of our products and has unrivaled experience in dyestuff manufacturing, product safety and ecology.

It is always advisable to look for reputable and experienced suppliers who are able to provide customers with accurate and reliable information on the compliance of their products with regulatory requirements such as the EU REACH regulation, retailer/brand RSLs, or independent ecolabel systems such as Oeko-Tex Standard 100 and the Global Organic Textile Standard (GOTS).

Chart 3	
Process	Chemicals
Spinning, weaving and knitting	Spinning oils, knitting oils, lubricants.
Sizing	Sizes (PVA, starches, polyacrylates, carboxymethylcellulose).
Desizing and scouring	Enzymes, alkalis, detergents, surfactants.
Bleaching, mercerizing	Bleaching agents (oxidants), alkalis, salts.
Dyeing and printing	Dyes, pigments, auxiliary chemicals, salts, alkalis, acids.
Finishing	Resins, softeners, fluorocarbon, flame retardants, anti-microbial.

Chart 4	
Parameter	Metrics
Energy	Energy consumption split by fuel source. Proportion of green energy used.
Water	Total water consumption; proportion recycled or re-used. Water use per ton production; split by process and machine.
Chemicals	Chemical Inventory with MSDS. Toxins identified for substitution.
Waste	Amount of solid waste disposal (tonnes). Waste disposal costs (\$) CO <sub>2</sub> , VOC, NO <sub>x</sub> , SO <sub>x</sub> emissions. Volume and characteristics of wastewater. Pollution charges.
Compliance	Records of inspections, tests Fines

### Sustainable textile processing

As we have already noted the textile industry is one of the most polluting industry sectors. A vast range and quantity of chemicals is used at every stage and the aftereffects in terms of wastewater treatment and air pollution are critical to manage. There is a strong need to establish more sustainable textile processing measures in the industry. The main objective of these measures should be to minimize and eliminate the most harmful inputs and the most polluting outputs and to reduce the level of chemical residues left on the textile. But it would be wrong to focus solely on the chemical inputs and ignore the consumption of energy and water which are the primary impacts of the textile processing industry. In summary a sustainable approach covers the following points:

- ❖ Minimum use of resources (water and energy with minimum chemical consumption).
- ❖ Minimum pollution load.
- ❖ Toxic chemicals eliminated from supply chain.
- ❖ Harmful chemical residues eliminated from final textile.

But in order to minimize the usage, it is important to measure the inputs and in order to eliminate the most harmful chemicals, it is important to know and understand what is being used. Uncontrolled or

unknown inputs lead to unmanaged use of resources and uncontrolled outputs. The measurement of the parameters shown below is essential to establish an understanding of the input-output balance of the textile processing operation. The measurement and control of these inputs and outputs can lead to improved resource productivity, eco-efficiency, cost efficiency, customer satisfaction and brand reputation.

Therefore, once the understanding about the basics of processes and chemicals involved with the supply chain is established and awareness about the inputs is there, then control over the output of the production process can be achieved.

### Color communication

Finally we should note another important element that is often overlooked in seeking to improve the sustainability of the textile and clothing supply chain and that is accurate and timely color communication. We will return to this subject later in the series but for now a few tips for improving color communication:

1. Communicate your color accurately using physical and/or digital color standards. Accurate communication of the color you require will reduce lab dip rejection rates and result in better right first time bulk dyeing.

2. Communicate electronically when feasible: avoid wasting time due to delayed communication
3. Do not set unachievable color standards- avoid wasting dye and chemicals in trying to achieve heavy depths or brilliant shades on certain fibers.

### Conclusion

Sustainable design, informed selection of dyes and chemicals, accurate color communication, and controlled coloration using Best Available Technology are key elements in raising the standard of sustainability in the textile supply chain. ♦

### Next Edition: Sustainable textile fibers and raw materials.

The next article on sustainable textile fibers and raw materials will be published in Pakistan Textile Journal in March 2010.

In this series of articles DyStar makes its excellent expertise in chemistry, ecology, and application know-how available to PTJ readers.

### BOOK REVIEW

## The Design Hotels™ Book Edition 2010 Yellow Pages never looked so good.....

Design Hotels™ announces the release of its annual publication The Design Hotels™ Book Edition 2010. Featuring a new vibrant yellow hard cover with silver foil embossing and a fold-out poster, the coffee table book showcases 170 member hotels with striking images and in-depth reviews. Focusing on design, along with the emotions and experiences it can create, The Design Hotels™ Book gives a first look at each member hotel's very individual promise.

A Preview of The Design Hotels™ Book Edition 2010 The 424-page publication focuses on the key message "Made by Originals" which captures the essence of what each hotel offers: experiences that can't be duplicated, made possible by people who have stories to tell. To illustrate this message, Design Hotels™ puts the spotlight on selected hoteliers and designers. These interesting characters are featured in up-close and personal profiles

which reveal the stories behind their hotels.

Originals presented include Daniele Kihlgren, a renegade hotelier who takes hospitality to new heights in his southern Italian properties Sextantio Albergo Diffuso and Sextantio Le Grotte della Civita. The first is a restoration of an abandoned medieval village in a national park in Abruzzo; the second consists of rooms found in the legendary caves of Matera, a UNESCO World Heritage Site. Another creative mind featured is design guru Sir Terence Conran, whose Boundary in East London exudes its owner's originality from the furniture to the artworks from his private collection. There is also Mark Edleson, CEO of the Asian Alila Hotels & Resorts.

As part of the group's philosophy, Alila properties are designed to be in contact with the local community. Alila's goal is to send guests home with spiritual and emo-

tional memories, not just souvenirs. The book's other focus is on the member hotels. The properties are grouped into three different categories – signature, off-beat and rare – to help navigate through the types of experiences guests can expect. With in-depth architectural and design reporting as well as detailed portraits of the hotels, guests are assured to find the right hotel for every occasion – whether that's maximum convenience on a business trip, or an out-of-the-ordinary holiday in an out-of-the-way resort.

### Where to Buy

The Design Hotels™ Book Edition 2010 is available to buy at [www.designhotels.com/shop](http://www.designhotels.com/shop), member hotels and selected book retailers worldwide. Retail price: EUR 44,00 | ISBN: 978-3-89955-283-6 | Hardcover, 424 pages, 32 x 23 cm. ♦