TEXTILE INDUSTRY: BENEFICIARY OF ENVIRONMENTAL MANAGEMENT SYSTEM

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Abstract—In recent times, Environmental Management System has become the cynosure of all eyes. It is globally relevant in all types of industries. This paper deals with the procedure, tests and methods of keeping and managing the textile industry in an pollution free environment.

I. ENVIRONMENTAL MANAGEMENT SYSTEM

In the last two decades, organizations of all kinds are becoming increasingly concerned to achieve and demonstrate sound environmental performance by controlling the effect of their activities, products and services on environment taking into consideration their environmental policies and objectives. Many organizations have undertaken environmental reviews or audits to access their environmental performance. The emerging consensus is that when environmental management system become a part of management of any organization, only then an organization can survive in the long terms.

The Environmental Management System of an organization is one that should be designed to meet the following needs:

- Meet the regulatory and legislative requirements; improve the control of the environmental impact.
- Provide confidence to customers that the products from the organization are manufactured with the aim of reducing the negative impact on the environment.
- Suitably accommodate changing market trends and thereby gain competitive edge.
- Reduce cost associated with environmental liabilities and insurance.

International Standards have been developed in the last decade to help and equip organizations with an effective environmental management system, which can be integrated with other management requirements. Such a system is expected to assist organization to achieve environmental and economic goals. The International Organization for Standardization (ISO) has come out with a series of standards to enable organizations to establish environmental management system.

II. ESTABLISHING AN ENVIRONMENTAL MANAGEMENT SYSTEM FOR TEXTILE INDUSTRIES

A gradual move towards sustainable development is likely to push environmental management to the forefront of company activities. This has already taken place to a large extent in most developed nations. Newly industrialized countries are showing signs of jumping on the bandwagon by increasingly incorporating environmental safeguards into economic activities. The wide acceptance of ISO 14000 at the international level has also raised considerable alarm for developing countries as many international buyers of textile products have now included environmental components in the code of conduct to make their suppliers more accountable from an environmental perspective.

The concern of textile producers is that these demands might turn out to be another trade barrier, which would restrict access to international markets. Keeping in mind the changing global paradigm, and understanding that such changes affect the individual settings at national levels, SDPI (Sustainable Development Policy Institute) has launched a project that aims to develop a working manual to assist textile industries in developing an Environmental Management System (EMS) as per ISO 14001 requirements. The working manual will be designed in accordance with the existing production set up of these industries. It will facilitate the implementation of EMS without incurring substantial changes in the given set up of these companies. Because each organization is different, the guidelines will be specific enough to set up and implement an EMS but general enough to allow the flexibility for addressing unique characteristics of textile companies. The various sections of the manual will describe each element of the ISO 14001 standard and provide step-by-step procedures for typical textile processing industry. The manual will promote and assist capacity building efforts to ensure enforcement/compliance with environmental management systems and better define the resulting costs and benefits. It will also demonstrate environmental management systems implementation in local industrial units. The manual will also serve as a learning aid in visualizing ISO 14001 required documents and a tool to jump start development and implementation activities.

A. STANDARD TESTS, METHODS, AND DEFINITIONS

One of the greatest needs in improving pollution prevention industry wide is the ability to transfer the successes of one plant to another and from other industries to the textile industry. Transfers of pollution prevention ideas and cleaner technologies produce successful results and require minimal cost and effort. Standardization of tests, terminology, and reporting formats is a useful tool for
achieving successful transfer of information. Standardization also reduces potential disinformation and misunderstandings about processes and products. Some areas that should be standardized within a pollution prevention program, and if possible between pollution prevention programs. Which are:

- Audit protocols and reporting.
- Case history protocols and reporting.
- Aquatic toxicity testing and reporting.
- Quantifying treatability, offensiveness, and dispersability.

B. TERMINOLOGY RELATED TO BIODEGRADABILITY AND OTHER TERMS

Chemical and process alternative evaluation protocols. QC of incoming materials. Research reports that many international textile manufacturers are using the Austrian Textile Research Institute/ Mohensteiner Institute protocol for substances called OTN 100 (24). The tests are carried out by gas chromatography/mass spectrometry (GC/MS), and the products are certified as passing the OTN 100 test. One downfall of standardization is the negative impact it may have on creative thinking and innovation. If a pollution prevention audit or evaluation is reduced to an exercise in following a checklist or filling out a form, then the program runs the risk of becoming only a superficial activity with little importance to those involved. This is a serious matter and is the main reason why pollution prevention should be a grassroots, site-specific program, not a mandated, standardized paperwork exercise.

C. CONSUMER, INSTALLER, AND END-USER INFORMATION

Consumer demand for specific products (e.g., insect-resistant wool products) is the ultimate driving force behind textile manufacturing. Unfortunately, many, if not most, consumers are unaware of the pollution the textile plant generates in an effort to satisfy consumer demand.

In addition, consumers are often confused by “green” claims that are made in the absence of standard regulations and definitions (see “Standard Tests, Methods, and Definitions”). As a result, consumers may express preferences for products with certain attributes or qualities with little or no knowledge of the pollution generated to produce those products. Consumers need to be educated about textile manufacturing processes and the pollution resulting from these processes in order to make better-informed choices in the marketplace. Better-informed consumers can result in:

- Reduced demand for high-pollution products
- Improved life expectancy (durability) of textile products
- Less pollution from use, cleaning, and maintenance
- Better installation and use
- Enhanced post consumer recycling of textile products

Consumers, however, should not bear all responsibility for a market that demands high-pollution products. Although many textile manufacturers have initiated effective pollution prevention within individual process lines, few, if any, have applied a global approach that broadly integrates pollution prevention from fabric designer to consumer. Integration and coordination are the keys to maintaining pollution prevention all the way along the processing chain from raw material to yarn to fabric to textile product. Many of the difficulties of achieving global pollution prevention efforts have already been discussed.

The basic dilemma is that pollution prevention efforts undertaken at one stage of processing may only benefit downstream operations. Unless they are all part of an integrated operation, no mechanism exists for upstream operations to recoup the costs or reap the benefits of any pollution prevention initiatives they may undertake.

Further difficulties arise when textile materials are combined with other raw materials to produce final consumer products (e.g., furniture). Often, textile manufacturers do not know which materials will be combined or in what manner they will be combined after they leave the mill.

For example, in furniture upholstery, upholstery fabric can be combined with batting, fiberfill, open or closed cell foams, and stiffening inner liners. Problems arise when consumer product manufacturers lack good information about incompatible material combinations, especially those that could produce pollution such as indoor air emissions, sorption, and reemissions. This makes product design difficult for all involved. Accurate, clear consumer information on product use with respect to aftermarket treatments, cleaning solvents, use conditions, installation and maintenance, and recycling is also needed. High and low polluting products (in terms of manufacturing) need to be accurately identified to the customer. In addition, better information on material combinations is needed. In short, a clear need exists to provide better information on product use, installation, and material combinations to all involved, including textile producers, consumer products manufacturers, and customers. Marketing is a crucial link in this chain. Some industries (e.g., pharmaceuticals) do an excellent job of informing consumers, and the textile industry can learn from these industries. In addition, the textile industry needs to emulate other successful techniques such as better technical product bulletins and product specifications. Providing this information would also help avoid certain common quality problems such as color bleeding of knit shirts with contrasting collars.

D. SEGREGATION AND DIRECT REUSE

One cornerstone of good waste management is that individual waste streams must be separately captured, segregated, and stored to maximize the potential for recovery, recycle, and reuse. For example, in printing operations, Malone suggests that, when producing many special customer colors, excess material and overproduced material should be held in inventory until a suitable use is found. The stored excess can be used as a component in a new color mixture. New machinery is available with built-in features that facilitate recovering and reusing waste streams. One example that can be widely applied in textile processing is
the Scholl BLEACHSTAR. This machine has built-in facilities for waste stream segregation and capture. In addition, some facilities use multiple waste handling systems to segregate wastewater for more efficient reuse or treatment into:

- Non contact cooling water.
- Storm water from parking lot and roof drains.
- Cleanup water from machines, facility, and filter backwash.
- Process wastewater from preparation, dyeing, and finishing.

In the future, facilities and equipment will require even further segregation of wastewater. For example, highly colored or high salt content wastes can be better handled if separated from other waste streams. Reuse and treatment of these pollutants are expensive. Keeping these wastes separate from other wastes is essential to keeping the treated volume low.

E. IMPROVED PROCESS CONTROL

In the past, control systems in textile operations involved the automation of existing manual methods. In many cases, these methods have been enhanced with attractive graphic displays and other aesthetic improvements, but the underlying control protocol remains the same as with the manual methods. A new generation of innovative control systems is being developed that actually uses more capabilities of microprocessors. Some are hard automated systems, and others employ sophisticated fuzzy logic or neural network control strategies.

Some examples are:

- AUTOMATED MIXED KITCHEN
- Chemical dosing systems
- Direct dye bath monitoring and control systems
- Real-time sensors and advanced control strategies
- Real-time multi channel adaptive control systems
- Scheduling and management systems

F. CONTROL, AUTOMATION, SCHEDULING, AND MANAGEMENT SYSTEMS

Modern control systems typically control parameters such as:

- Air exhaust and moisture control from dryers
- Chemical feed or addition
- Cooling and heating
- Draining and filling
- Incident (tangle) alarm
- Pressure control, speed, flow, and temperature

These control systems follow a predetermined process routine and can be programmed with extreme accuracy. Pollution decreases with these systems because the improved control increases the likelihood of right-first time processing. This saves time, energy, and chemicals, and facilitates chemical handling within the operation.

G. REAL-TIME SENSORS AND ADVANCED CONTROL STRATEGIES

One innovation that has occurred at the front end of many control systems is the adoption of rapid, accurate, real time sensors. These enable the operator to monitor and evaluate important process parameters. In many systems, predictive models are embodied in the controls, which can make quick changes, adjusting operating variables to achieve the desired result. Some applications of these systems are:

- Dryer efficiency and air pollution improvement
- Direct dye bath monitoring and real-time control

In these applications, traditional control strategies are replaced with innovative strategies that adaptively adjust in real time to compensate for uncontrollable parameters. This allows a better chance of right-first-time results despite raw material and other variations.

H. POLLUTION PREVENTION THROUGH NEW EQUIPMENT

Equipment design, maintenance, and operation are essential elements of an effective pollution prevention program. During the last few years, certain new equipment concepts, as well as modifications to existing equipment, have appeared that directly contribute to the reduction of pollution from textile processing operations. Some of this equipment is mature and commercially proven, and are being readily adopted by textile mills as they replace older equipment. Other ideas are still unproven but show promise and deserve attention as attempts to bring them to a state of commercial usefulness progress.

III. CONCLUSION

Historical efforts have focused on 'end of pipe' technology to address textile environmental problems, the textile industry is recognizing the need to identify and implement waste minimization and resource recovery/reuse measures. Textile experts are working to identify manufacturing process concerns and explore operational alternatives. These alternatives include process modifications such as counter flow rinsing, cooling water recovery/reuse, chemical substitutions, dye substitutions, improved process control, wastewater heat recovery, and wastewater treatment/reuse.

These approaches have been successful in reducing the discharge of pollutants such as metals, salts, and waste heat. Advanced water treatment technologies including ozonation, membrane filtration, ion exchange, chemical coagulation, and distillation have been evaluated in laboratory and pilot scale trials to determine their suitability for dye bath reuse, water reuse, and caustic recovery.

Environmental, Health, and Safety issues confront the Textile Industry. The services required for the support of in-house operations and policies are necessary for the development of comprehensive environmental management programs and systems.

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REFERENCE


