# Environmental management systems for the textile industry : A case study

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Increasing Environmental responsibilities on part of the management to comply with environment protection and pollution control legislations and escalating environmental compliance and remediation costs, has created a need for effective Environmental Management System (EMS). The focus of EMS is to conserve input resources and to protect the environment. This paper describes the ISO 14000 series as an effective tool for environment management systems applied to textile industries.

A case study based on actual implementation of ISO 14001 in an upcoming textile unit based in North India has been illustrated.

Keywords: Eco-labelling, Environmental management system, ISO 14001, Waste management

# 1 Introduction

Environmental accidents such as Bhopal, Valdez and Chernobyl and increasing concern over issues such as ozone depletion, global warming, resource exploitation and waste management have brought about a significant change throughout the industrial world to properly demonstrate the environmental responsibility. The implications have been realized and hence hazardous waste management chemical risk management and inter- boundary air and water pollution are given high priority in highly developed industrialized nations. They have implemented strict environmental legislation and regulations to address these issues. However, the developing nations like India have also initiated environmental strategies, regulations and programmes to deal with the problems associated with emerging industrialization and urbanization such as inadequate waste and sludge disposal system .British Standard BS 8800 has been in existence since 1996 for industrial safety. By far, the important standards for environmental most protection and safety are the EU eco-audit directive which is also abbreviated as EMAS (Eco Management and Audit Scheme) and international standard ISO 14001 (ref. 1).

The textile industry has attracted the attention of environmentalists world-wide because of its high resource consumption profile in terms of water, chemicals and energy and release of highly contaminated effluents at the end of wet processing, leading to intense water pollution apart from causing concern for air and noise pollution from other stages of textile production.

Indian textile industry has started adopting source reduction and waste treatment as approaches to specific environmental problems. Major impact has been brought about by buyer countries demanding ecofriendly textiles manufactured through clean technologies and processes and satisfying the specifications laid by various eco-labelling schemes. The regulatory pressures from Government through Pollution Control Boards to comply with discharge limits for water effluents and air emissions are still the major driving factor towards industries setting up effluent treatment plants (ETP) and adopting other pollution control measures.

It has been realized by countries world-wide that the Environmental Management System (EMS) is a cost-effective way for companies to manage their environmental responsibilities<sup>2</sup>. The companies use its EMS to establish its level of environmental commitment, develop plans, programmes and controls to meet these commitments and identify and correct the problems. ISO 14000 series of standards provides model for organizations to control their immediate and long term environmental impacts.

Indian textile industry after having positive experiences with ISO 9000 Quality Management Systems, is poised to adopt ISO 14000 standards to better manage environmental protection and safety. This paper discusses a case study on the implementation of ISO 14000 standards in a leading textile unit based in north India, one of the first few in

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this sector to adopt successfully EMS to handle their environmental problems.

# 2 What is ISO 14000?

# 2.1 History of Development

The ISO 14000 series emerged primarily as a result of the Uruguay round of the GATT negotiations and the Rio summit on the environment held in 1992. The International Organization for Standardization (ISO) formed a stategic advisory group on environment (SAGE) in 1991 to address the need for international environmental management standards which came out with a new series of ISO 14000 standards which are designed to cover:

- Environmental Management Systems (ISO 14001 - 14009)
- Environmental Auditing (ISO 14011 14019)
- Environmental Labelling (ISO 14020 14029)
- Environmental Performance Evaluation (ISO 14030 - 14039)
- Life Cycle Assessments (ISO 14040 14049)
- Environmental Aspects in Product Standards (ISO 14060 -14069)

# 2.2 Importance of ISO 14000 Standards

A set of international standards brings a worldwide focus to the environment, encouraging a cleaner, safer and healthier world. The existence of the standards allows organizations to focus on environmental efforts against internationally accepted criteria.

The fact that companies need environmental management certifications to compete in the global market-place reinforces the concept of international standards for environment management.

ISO 9000 quality registration has become necessary to do business in many areas of commerce. Similarly, the ISO 14000 management systems registration may become the primary requirement for doing business in many regions or industries world-wide.

#### 2.3 Who/What do the Standards Apply to?

The standards apply to all types and sizes of organization and are designed to encompass diverse geographical cultural and social conditions. The coverage of EMS can include the organization's products, services, activities, operations, facilities, transportation, etc.

## 2.4 Environmental Management System (EMS)

An EMS refers to structures, practices and control that an organization uses to manage its environmental

aspects and impacts and to achieve its performance objectives<sup>3</sup>. An effective EMS requires that the organization :

- establishes and communicates its environmental commitment and goals through its environmental policy,
- plans programs for controlling the environmental aspect and impact of its products, processes and activities,
- implements programs and control operations to achieve these goals,
- checks results and corrects problems,
- reviews and improves the performance of the systems.

Such a system can be represented by a continuing loop (Fig. 1).

# 2.5 Benefits of EMS (ISO 14000)

Receiving certification to ISO 14001 standards demonstrates that the organization has an EMS that conforms to these globally accepted standards and that it is continually improving its environmental performance. ISO 14001 standards, therefore, help organizations to:

- achieve market-place recognition through enhanced corporate image,
- · satisfy regulatory and legal requirements,
- minimize legal and financial risk,
- reduce operating cost,
- improve operational efficiency by better utilization of materials and resources, and
- improve staff morale and work environment.





# 2.6 ISO 14001: Conditions & Requirements

As with other ISO standards (such as ISO 9000 for quality management), the use of ISO 14000 Standards is entirely voluntary. ISO 14001 is the only specification standard within ISO 14000 series which is the basic foundation for ISO 14000 series and provides model for effective EMS. ISO 14001 standards commit for continual improvement and applicable legislation compliance with and does establish regulation and not absolute requirements for environmental performance. Companies become certified as complying with ISO 14001 by verifying, through third party audit, that they have an effective EMS in place that meets the standard requirements and that this system is being followed consistently.

# 3 Implementation of ISO 14001 in a Indian Textile Unit: A Case Study

Alps Industries Ltd, an unique integrated textile mill, is engaged in manufacturing and using natural dyes, conversion of fibres into yarns, fabrics, home furnishings and other allied textile products (madeups) under the same roof. This industry is 100% export oriented.

Alps Industries with its corporate office and plants located in Ghaziabad (U.P.) was awarded ISO 14001 certificate (1996 standard compliant) by KPMG Quality Registrars, Netherland. This project was undertaken through CII- USAID- ICICI - Project Grant. The CII's environment management division has been the environmental counsellor for this programme. Alps Industries is one of the first few textile industries in India who have voluntarily opted for ISO 14001 certification as an initiative to protect and preserve the environment from pollution that could arise out of its production process from site IV operation in Sahibabad (U.P.), India, The total plant have been divided into following activities departments:

- Administration (Management & Human Resource Development)
- Stores, Purchase, Sales & Marketing (Commercial)
- Engineering
- Spinning
- Weaving
- Dyeing (Process House)
- Dye Manufacturing

- R&D
- Quality Assurance
- Made-ups

ISO 14001 is a part of the overall management system which includes organizational, structural and planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the EMS on a continual basis.

The EMS starts from establishing commitment in the form of environment policy followed by plan-docheck-act cycle for total system improvement (Fig. 2). Implementation of ISO 14001 at Alps Industries started with the formation of a core group headed by the Chairman and Managing Director and twenty other representatives comprising President, Vicepresident, Deputy GM, Executives, Managers, etc from different departments /functions. Vice-president (Corporate HR& Legal) has been appointed management representative to serve as a link between the auditors and counsellors and represent the company as a whole.

#### 3.1 Environmental Policy

After assessing and developing a clear understanding of the significant environmental aspects of their products, services and activities and the impact they have on the environment, Alps Industries drafted their environmental policy. The main features of their policy are :

- Reviving and improving traditional manufacturing process of natural dyes and colouring process.
- Continually integrating and developing environmentally more acceptable products, such as naturally grown coloured cotton textiles.



Fig. 2 — Plan - do - check - act cycle

- Minimizing wastages and conserving resources such as water, energy, oils, chemicals, dyes and paper.
- Reducing water, air and noise pollution and land contamination.
- Compliance with relevant environment legislations and regulations.
- Keeping EMS alive through review of environmental objectives and targets.
- Maintaining cleaner working environment.

Environmental policy has been displayed and communicated so as to be understood by all the personnel of the mill who are affected as well as by their customers, clients and the public.

# 3.2 Listing of Activities, Aspects and Impacts

The implementation of EMS began with listing of all activities(including minor ones) which take place in the mill in its day to day work. Every operation / activity which has some impact on the environment was taken into consideration. The members of the core group made flow charts for their departments/ functions indicating inputs, intermediate products and outputs. These flow charts helped in listing of activities, aspects and impacts (as defined below) for each department.

### Activity

An activity is a process, operation, product or service, etc.

### Aspect

The aspect is the physical happening of the activity. Every activity can have more than one impact.

# Impact

The impact is the effect on environment due to the aspect generated when any activity takes place.

The environmental aspects are further sub- divided into three groups : normal operation (N), abnormal operation (A) and emergency operation (E).

The main impacts on the environment are: air pollution, water pollution, noise pollution, working environment, health hazard, land contamination, and resource depletion.

All the major and minor activities include an indepth analysis from the input stage to output stage of each and every operation within the organization whether in factory area, office premises or outside. The inputs included energy, water, lubricants, raw materials, intermediate products, final products and could include stationery, office equipments, etc.

The evaluation sheets which are important part of ISO 14001 documentation were prepared for each department, describing activities, aspects, impacts and their evaluation for significance of impacts in terms of scale, severity, probability and duration of impact. Each activity, depending on its impact, is further evaluated in terms of legal and regularity concern, interested party concern, resource saving concern and finally the significance of the impact on an arbitrary scale. A typical evaluation sheet for the process house of the mill is illustrated in Table 1.

An activity is an operation involving any or all the inputs as mentioned above in the process during manufacturing or office work. All the operations may cause wastage, spillage, gas generation, smell, etc. which may have an impact on the environment. Some of the salient features of the waste minimization, recycle and recovery schemes adopted by Alps Industries under implementation of ISO 14001 and resulting into significant cost benefits through reduction of operational costs are described below :

### 3.2.1 Processing Section

Reuse of exhausted dye liquor in indigo dyeing for about ten more cycles after suitable replenishment helped to reduce the consumption of costly indigo dye, resulting in significant cost benefit (Rs 2.00 per kg of dyed fibre), apart from reducing the load on ETP.

#### 3.2.2 Engineering Section

- Modifications of mangle motor and starter of stentor machine, main drive motor of starter of stentor machine and motor for cooling tower's cooling water line have significantly reduced the electrical energy inputs of these machines and estimated to give a net saving of Rs. 8.00 lakhs (approx.) per year. Better machine maintenance has reduced the noise pollution levels.
- Oil spillages have been minimised at all levels and oil is being collected and reused wherever possible.
- Painting of all iron pipings in the plant with an oil paint have minimised the chances of leakages and other wastages due to corrosion, wear and tear and need for frequent replacements.
- Fire extinguishers have been put in all the required points and are being regularly maintained and checked so as to face any emergency due to fire hazard.

-			Table 1 — Evaluation for s	significance of impact	s (Process House	e)			
Identification				Evaluation					
Activity	Aspect	Nature	Impact	Scale of impact (1)	Severity of impact (2)	Probability of impact (3)	Duration of impact (4)	Total score (1×2×3×4)	Resource saving concern
Fibre filling in bags	Fibrous dust liberation	N	Air pollution	1	1	4	4	16	300
			Resource depletion					_	2000
Transportation of fibre	Spillage	N	Resource depletion			-			
Loading of fibre in carrier	Fibrous dust liberation	N	Air pollution	2	3	4	3	72	
			Working environment	2	4	5	5	200	
	Excess use of raw water	N	Water pollution Resource depletion	1	3	4	3	36	10000
Dissolution of dyes & chemicals	Colour dust liberation	N	Air pollution Resource depletion	3	3	4	3	108	300
	Chemical fumes gen- eration	N	Air pollution	2	3	5	5	150	
Disposal of waste after dyeing	Spillage of dyes & chemical	N	Water pollution Resource depletion	3	3	4	3	108	_
	Chemical fume gen- eration	N	Air pollution	3	3	4	3	108	
Dyeing process*	Effluent generation	N	Water pollution	3	3	4	3	108	_
Hydroextraction of wet fibre & yarn	Effluent generation	Ν	Water pollution	3	3	4	3	108	
Drying of dyed fibre	Heat evolution	N	Air pollution	3	3	4	3	108	8000
	Fibrous dust liberation	N	Working environment Resource depletion	2	3	5	5	150	
	May cause fire	Е	Air pollution	5	5	4	4	400	_
			Resource depletion	5	5	4	4	400	
			Working environment	5	5	4	4	400	—
Storage & transportation of dyes & chemicals	Chemical fume libera- tion	N	Air pollution	3	1	4	2	24	-
	Colour dust liberation	Ν	Water pollution Air pollution	3	3	4	3	108	
	Spillage	Ν	Resource depletion Water pollution	3	1	4	2	24	500
Operation of all the ma- chines	Noise generation	Ν	Noise pollution	3	3	4	3	108	_
Yarn package winding & rewinding	Fibrous dust liberation	Ν	Air pollution	3	1	4	2	24	
Maintenance of all ma- chines	Spillage of oil & grease	Ν	Water pollution	3	3	4	3	108	
N - Normal Operation and	E — Emergency Operatio	n; "Stages	of legal and regulatory conc	em					

 The rain water which was flowing into ETP previously and thus increasing its load has been prevented to flow into ETP plant by proper drainage systems.

# 3.2.3 Spinning

The air pollution due to fluffs of cotton fibre suspended in the atmosphere in these sections has been minimised to premissible limits by spraying of water and maintaing proper humidification.Better ventilation and controlled atmosphere, i.e temperature and humidity inside the plant, has improved the working conditions for the workers.

#### 3.2.4 Segregation and Disposal of Waste

The waste dumping site had a major uplift after ISO 14001 implementation. The wastes of different categories, i.e. empty plastic containers of chemicals and oils, metallic wastes (rusted pipes, containers and broken parts of machinery) and wastes from spinning and weaving section, have been segregated and stored separately so that their further disposal is more systematic, rational and ensures minimal pollution through land contamination, etc. The selvedges and fabric wastes from the made-ups department is being reused to make more innovative designs by patchwork, etc.

Implementation of ISO 14001 has thus helped Alps Industries in maintaining better house keeping and work environment and achieve significant cost benefits through recycling, following better work practices and maintenance schedules. The process has not stopped here but is being continually improved through regular audits and an effective EMS system, supported and guided by deep commitment of top management towards preserving the environment and nature.

#### 4 Conclusion

Implementation of ISO 14001 (EMS system) at Alps Industries Ltd has been a success story. It has provided an effective framework for developing environmentally benign processes and products, improving environmental performance and ultimately reducing the costs of complying with its environmental responsibilities. It is anticipated that more and more textile units in the organised sector in India would opt for ISO14001 certification in the near of evergrowing environmental future times consciousness.

#### Acknowledgement

The author gratefully acknowledges the encouragement, support and cooperation extended by Mr K K Agarwal, Chairman and Managing Director, and Mr S Narasimhan, Vice-President, Corporate HR & Legal and Management Representative, of Alps Industries Ltd, through technical discussions and interaction during the author's visit to their plant.

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