

Cleaner Production Technology in Pulp and Paper Industry

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Abstract

Industrial development is an important constituent in our pursuits for economic growth, employment generation and better quality of life. On the other hand, industrial activities, without proper precautionary measures are known to cause pollution and associated problems. Hence it is necessary to comply with regulatory norms for prevention and control of pollution. Alongside, it is also imperative to go beyond compliance through adoption of cleaner technologies and improvement in environmental management practices. Cleaner technology based on high performance of products would go a long way to conserve and preserve natural resources and ensure their continued availability and quality of posterity. The approach of pulp and paper industry changed towards the cleaner production techniques used today by making some changes in the existing production process in the plant, especially to reduce the pollution levels at front-of-pipe stage and to meet the future environmental challenges. The current paper reveals the achievements of Cleaner Technology adopted by ITC Ltd. Paperboards and Specialty Papers Division Unit: Bhadrachalam.

INTRODUCTION

Global environment has been adversely affected because of rapidly rising activity towards prosperity of mankind. While the growth is essential, the care for the environment must not be neglected in the name of development and progress. Only environmentally sustainable growth adds for the overall socio-economic welfare. Sustainable development implies meeting the needs of the present while preserving the natural resources for the future generations. Our prosperity will be cursing us, if we fail to achieve a satisfactory level of harmony between the development and environment. It is imperative to take necessary steps to ensure that the environment protection remains at the top of our agenda. An effective environmental management approach involves progressive adoption of cleaner technology practices for protection of environment and identifying minimizing the risks posed to the environment and community.

The industrial atmosphere in Asia and the Pacific region is changing very fast and this has affected the society with improved economic conditions

on one hand, but adverse impact on environment on the other hand. The pulp and paper industry is also influenced equally with such developmental changes. Indian pulp and paper industry is also contributing to its development significantly and at the same time, all round efforts are being put by the industry to acquire Cleaner Production technologies to preserve the environment.

This paper highlights the outcome of the project and also looks at the available data base on the cleaner technology, which can be used by different mills for access to newer technology.

Cleaner technology

It is well known fact that the best way to reduce the environment impact of productive activity is through prevention. Such a notion is contained in the concept of Cleaner Technology, a term that implies a technological embodiment of a preventive approach to pollution control. By reducing waste at source, Cleaner Technologies would reduce pollution and pollution costs, through more efficient use of raw materials and the recycling of waste streams.

Changing production process to prevent or reduce waste is more cost effective than using end-of-pipe technology. The concept can be summarized

as follows.

Investigating causes of energy and resource loss, damage, pollution and concomitant risk and means of prevention.

Implementation of the actual tasks through the continued improvement of the organization performance.

Thus in contrast to the traditional view of pollution control technology (EOP), Cleaner technology is expected to achieve both environmental and economical goals.

Definition of Cleaner Technology

According to the European Community (Title VII, Environment Article 130r (3) and as explained by Mr. Eusebio Murillo Matilla, Commission of the European Communities, DG for Environment)

"Cleaner Technology refers to any technical measure taken in the various industries to reduce, or even eliminate at source the production of any nuisance, pollution or waste, and to help save raw materials, natural resources and energy."

As defined by the UN Economic Commission for Europe (UN ECE 1978)

"... Is the practical application of knowledge, methods and means so as, within the needs of man, to provide the most rational use of natural resources and energy and to protect the environment."

Followings are the advantages of cleaner technology.

- Decreased waste treatment and disposal cost.
- Cost saving from reduced raw material.
- Improved product quality and process control.
- Continued compliance with environmental

legislation.

- Increased competitiveness.
- Increased employee motivation.
- Improved customer/supplier relationship.

Users of cleaner technologies

The movement to curb the environmental pollution caused by the industry attacked the problem at different levels. However, industry still hesitates to convert their present production facilities to make use through cleaner technology. The recent survey shows that general pressures are not sufficient to provoke the decision to invest in a unit process that generates less pollution. The presence of events, which set off this reaction, has been observed and there are external and internal catalysts, which help to promote this reaction as. For example:

Need for adoption of cleaner technology

ITC Ltd. PSPD, Unit Bhadrachalam manufactures world class on-line coated Boards, in addition to other quality grades of printing and writing papers. It has been able to maintain its lead position in the market by continuous product and market development, product re-engineering, innovation, cost reduction and market segmentation.

In general, the status of the Cleaner production in the pulp and paper industry can be classified in the following two ways:

- Cleaner production management practices
- Cleaner production technologies

The challenges to the unit were to produce the required quality of bleached pulp at an international competitive cost and quality and at the same time to meet the future environmental demands for the society. Therefore, it had under taken a massive

EXTERNAL CATALYSTS	INTERNAL CATALYSTS
<p>New regulations</p> <p>The cost of taxes and penalties</p> <p>The intensity of neighborhood pressure</p> <p>Incidents or accidents which have occurred at other plants.</p>	<p>Level of quality of the finished products.</p> <p>Actual cost of the finished products</p> <p>The waste reduction cost</p> <p>Difficulty of getting rid of certain wastes</p> <p>Cost of raw materials</p> <p>Difficulty in supply of raw materials.</p> <p>Incident and accidents.</p>

"Cleaner Production Technology", which resulted in greater benefits in saving the over all operation of the plant and addressed the future environmental challenges.

The unit has taken up the following steps during the year 2002-03 as a part of implementation of Cleaner Technology.

- Twin roll Wire presses (Brown stock washing)
- Oxygen delignification
- DO, EOP, D1 bleaching sequence
- Falling film evaporator
- Energy efficient Soda Recovery Boiler
- Zero effluent discharge chlorine dioxide plant

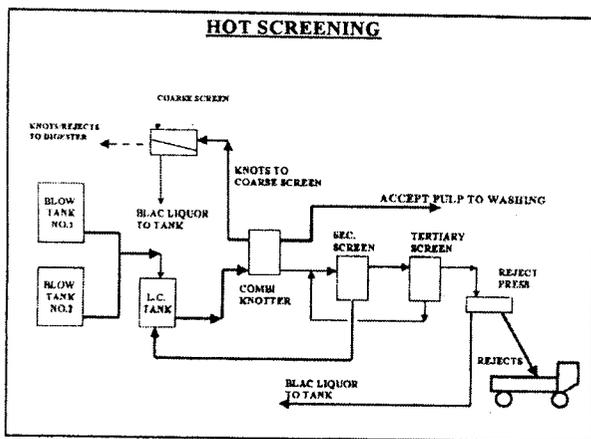


Fig- 1 (a) Hot Screening

Fig. 1 Schematic flow diagram of the state-of-the-art-Technology ECF fibre line

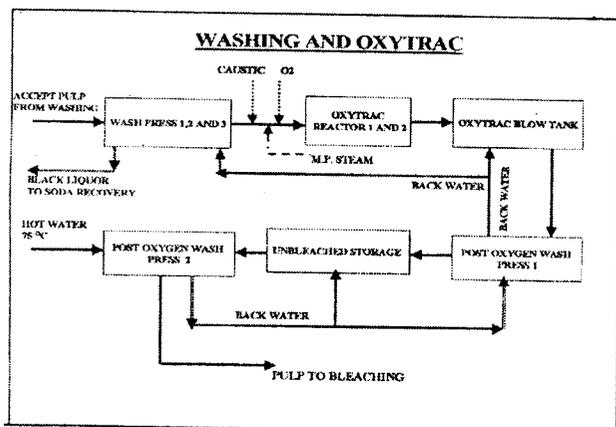


Fig. 2 (b) Washing and OxyTrac

Fig. 1

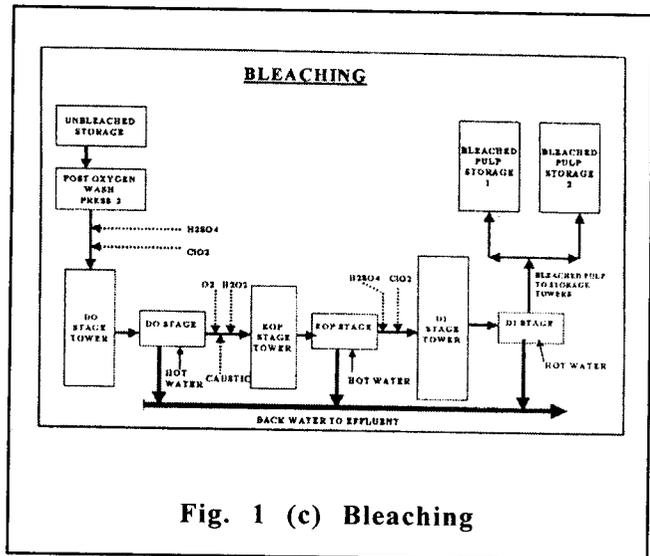


Fig. 1 (c) Bleaching

- Lime sludge re-burning kiln.

RESULTS AND DISCUSSION

After the stabilization of Cleaner Technology by adoption of ECF pulp bleaching and expansion of bleached pulp production from 200 TPD to 300 TPD section wise achievements of various environmental performance indicators product quality parameters and key operating index are shown in Table 1.

Reduction in overall pollution loads such as treated effluent discharge, COD, BOD, AOX are shown in Table 2.

A by-product Sodium sesique sulphate generated in the ClO_2 production process by R8 process is being used as a makeup chemical in soda recovery plant and due to this reduction in specific consumption of sodium sulphate reduced is shown in Fig. 2. Reduction of specific hydrogen peroxide and elemental chlorine consumption is also shown in Fig. 2.

Replacement of drum type washers in the pulp mill with Twine Roll Wire Presses in ECF fibre line for achieving better washing efficiency and high Consistency pulp and installation of medium consistency pumps resulted in the reduction of water consumption in pulp mills as shown in Fig. 3. Lime sludge reurning kiln helped in reducing the specific market burnt lime consumption as shown in Fig. 4.

Ministry of Environment and forests issued guidelines to the large pulp and paper industries to ensure compliance with the action points as

Table-I Sectionwise achievements of Cleaner Technology

Section	Particulars	Before	After
ECF Bleaching	AOX Kg/Tonne of bleached pulp	2.62	0.38
Oxygen delignification	Kappa No. entering to bleaching	21.5	12.5
Pulp Mill	Viscosity of Bleached pulp, cps	7.1	8.2
	Brightness of Bleached pulp, ISO	84.0+	88.0+
Falling film evaporator	Steam Economy	3.1	6.0
New Soda Recovery Boiler	Thermal efficiency, %	50	58
Soda Recovery Plant	Steam generation in Tonne per tonne of Black liquor solids fired	2.5	2.8
	Recovery Efficiency	94.9	97.1
Note		Before	

Table-2 Overall reduction in the pollution Load

Parameter	Unit	Before	After
Treatment effluent discharge	m ³ /tonne	81	75
COD	Kg/tonne	14.34	12.6
BOD	Kg/tonne	2.03	1.8
AOX	Kg/tonne	0.54	0.097

Charter on Corporate Responsibility for environmental Protection (CREP). The recently implemented cleaner technologies along with continuous efforts to protect the environment made the unit much ahead of compliance with most of the CREP action points, which are beyond the regulatory norms as on today. The compliance status of ITC Limited-PSPD against

the Charter on Corporate responsibility for environmental protection action points pertaining to large pulp and paper sector is shown in Table 3.

CONCLUSION

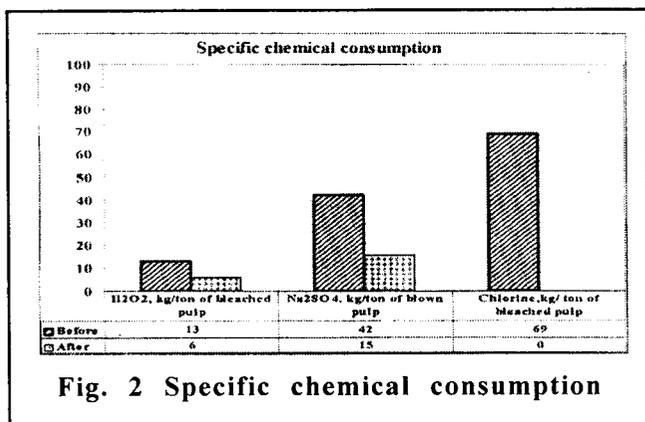


Fig. 2 Specific chemical consumption

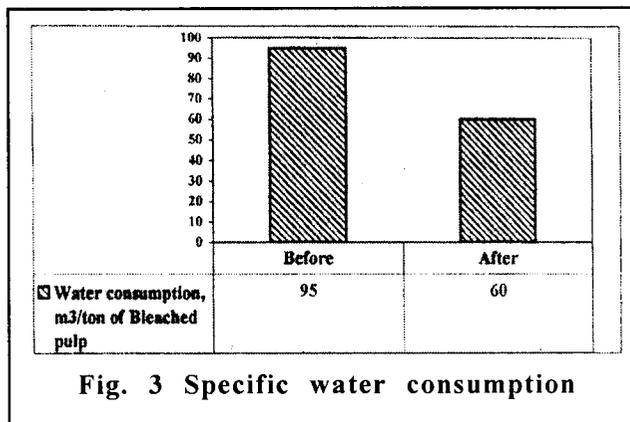


Fig. 3 Specific water consumption

Table-3 Compliance status of ITC Ltd- PSPD with CREP action points for large pulp and paper

Large Pulp and Paper	Implementation Schedule	ITC Ltd-PSPD Unit: Bhadrachalam
Discharge of AOX Kg/tonne of paper	AOX 1.5 Kg/tonne of paper within 2 years AOX 1.0 Kg/tonne of paper in 5 years	0.097 Kg/tonne
Installation of lime kiln	Within 4 years	Installed lime sludge re-burning kiln in November 2002
Wastewater discharge cum/tonne of paper	Less than 140 cum/tonne of paper within 2 years Less than 20 cum/tonne in 4 years for units installed before 1992 Less than 100 m ³ /tonne of paper per units installed after 1992	75m ³ /tonne
Utilization of treated effluent for irrigation	Utilization of treated effluent for irrigation wherever possible	Proposed irrigation project Cleared by APPCB and execution of project is under progress.

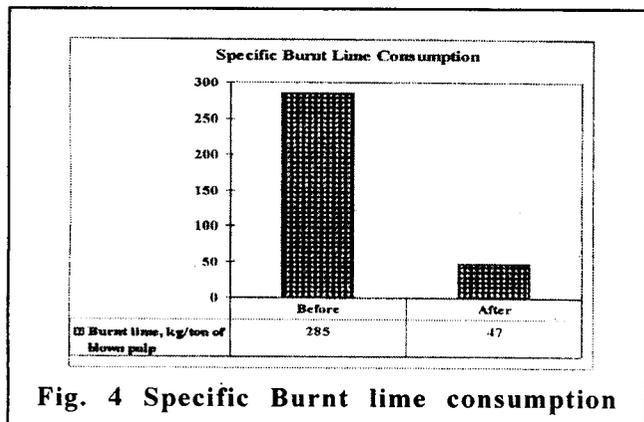


Fig. 4 Specific Burnt lime consumption

The effort towards Cleaner Technology at Bhadrachalam Unit met the challenges to harness the phenomenal ingenuity and creativity of the people to conceive and deliver product that require less material, energy intensive, toxicity. The benefits achieved from the implementation of Cleaner Production Management practices will encourage other mill management to employ the same. The efforts towards the implementation of cleaner production technology needs to be taken on continuous basis to explore appropriate

towards reducing pollution at the front-of-pipe.

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