ISSN: 0379-5462
Indian Pulp and Paper Technical Association

Qualitative and Quantitative Benefits of Installing Steam Profiler


Umesh Agarwal


Mukesh Tyagi


S K Brahma


Upendra Tyagi

ABSTRACT

Improvement in paper quality with reduced fiber and energy cost is one of the major challenges faced and is the driving force for sustainability in today's competitive environment.

Naini group is a leading agro based writing and printing paper manufacturing mill having two paper machines. Naini group is always on the quest for continuous improvement with technology up gradation.

To improve paper quality and productivity by increasing sheet dryness and moisture levels, Naini group initiated the process of installing steam profiler in PM #1.

Introduction

To remain sustainable in a highly competitive market, improved productivity coupled with reduced fiber and energy costs is a necessity. In today's customer driven market, improvement in paper quality is becoming the pre-requisite and need of the hour.

Keeping in mind all above factors Naini paper mills decided to install a state of art Steam Profiler in its writing and printing machine PM # 1.

Objective

1. Increase in productivity by improving sheet dryness
2. Increase in moisture level.
3. Reduction in steam consumption.
4. Improvement in product quality.

Increase in productivity

Production increase being the most obvious way to improve upon profitability of the organization. By installing the steam profiler, sheet dryness got increased. Thus the mill was able to increase its machine speed and then in turn increase overall production.

Increase in moisture levels

Fiber cost is one of the leading factors determining the profitability of the mill. By increasing moisture levels, the mill was able to save fiber and thus boosting its overall profitability.

Reduction in energy costs

Saving in steam consumption reduced the mill's energy cost and improve upon the productivity.

Improvement in paper quality

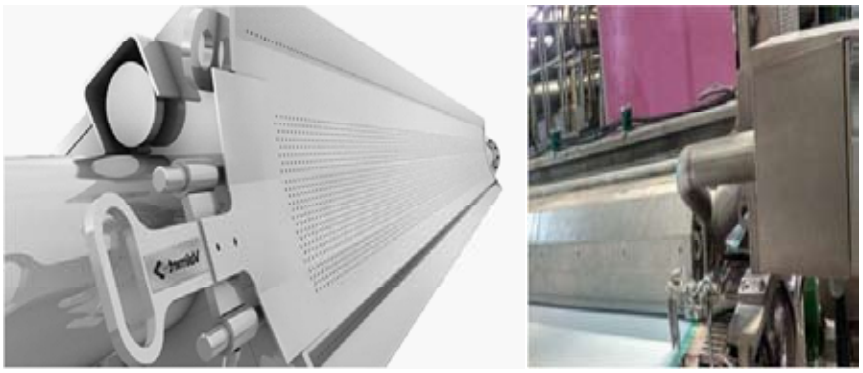
Today's market is increasingly being customer driven. Improving paper quality and satisfying customer needs is gaining importance.

Steam profiler

Steam profiler is a state of the art equipment having unique profiling accuracy combined with steam injecting technology. Its basic function is to reduce the cross direction moisture variation in paper. All the steam actuators are connected with scanner & control through DCS system. This also ensures good sheet quality.

Description

Steam supply has to be superheated with a minimum pressure of 3 bar. Steam flow rate is controlled by actuators/control valve inside the steam box. Pressure levels are being maintained between 20-60



kPa& are controlled by steam converting valve. Basic principle is that actuators are controlling steam flow at a constant steam pressure. Steam temperature is controlled in steam operating value by spraying condensate in steam.

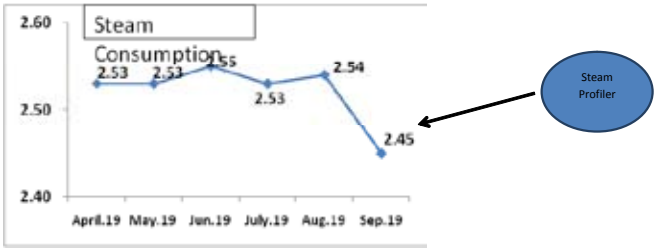
Recommended operating value

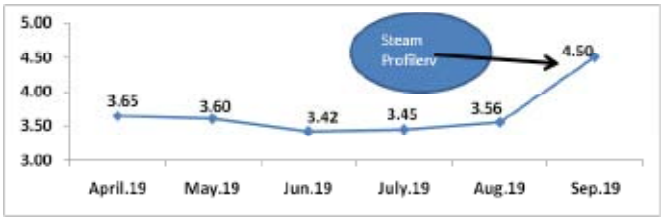
Steam Temperature: 110 to 125^{0}C

Steam Box Pressure: 20 to 60 kPa

1. Qualitative benefits

Project Target	Before	After
Dryness after Couch	17%	18%
Moisture at pope reel	3.60%	4.50%
Machine Runability		Improved
Moisture Two sigma	0.9 to 1.2 (@3.7 % moisture)	0.6 to 0.9 (@ 4.5 % moisture)
Steam consumption	2.45 MT/MT paper	2.35 MT/ MT paper
Smoothness (NSS grade)	198/230 ml/min	172/200 ml/min
Smoothness (SS grade)	195/225 ml/min	175/200 ml/min
Two sidedness	30-32 ml/min	25-27 ml/min
Product quality		Improved





2. Quantatitive Benifits

Naini Papers have achieved monthly cost saving of Rs. 17.6 lacs after installation of Steam Profiler.

Below mentioned chart illustrate the summary of cost saving achieved per month.

S.No.	Description	Saving Per Annum (Rs in lacs)
1	Steam	54
2	Fibre	105
3	Production due to speed increase	52.5
	Total Savings (Rs in Lacs)	211.5

3. ROI Calculation

Naini Papers have invested Rs. 2.0crores in installing the state of the art Steam Profiler. Considering the cost benefits achieved in a month, the investment cost will be paid within 11 months which is extremely encouraging.

Details of ROI calculation and saving are mentioned below.

Description	Unit	
Cost of steam Profiler	Rs in Lacs	200
Steam saving per Year @1000 Rs/MT	Rs in Lacs	54
Fibre cost Saving/annum through Moisture increase	Rs in Lacs	105
Cost benefits /annum due to production increase by speed increase	Rs in Lacs	52.5
Total savings / annum	Rs in Lacs	211.5
PAYBACK PERIOD		11 Months

Breakup Calculation For Cost Savings

1. Steam Saving

Description	Unit	
Steam Consumption (Before)	MT/MT paper	2.45
Steam Consumption (After)	MT/MT paper	2.35
Net Steam Saving	MT/MT paper	0.1
Cost of steam	Rs/MT steam	1000
Paper Production/month	MT	4500
Net steam savings /month	MT	450
Net cost Saving/month	Rs. In lacs	4.5
Net cost Saving/annum	**Rs. In lacs**	**54 lacs**

2. Fiber Saving

Description	Unit	
Moisture At Pope Reel(Before)	%	3.6
Moisture At Pope Reel(After)	%	4.5
Moisture increase	%	0.9
Production	MT	4200
Production (Per/Year)	MT	50000
Net Fibre Saving/ annum	MT	450
Cost of Fibre	Rs./MT	30000
Cost Savings/annum	Rs/ in lacs	135
Net fibre Cost Saving/annum (considering 350 MT pulp savings)	**Rs in lacs**	**105**

3. Production Saving

Description	Unit	
Speed before Steam profiler	mpm	670
Speed after Steam profiler	mpm	675
Production impact	MT/Day	1.1
Production (325 working days)	MT/year	357
Contribution /MT paper	Rs	15000
Cost Savings/annum	Rs in lacs	53.55
Net Cost Saving /annum (considering 350 MT production increase)	**Rs in lacs**	**52.5**

Conclusion

Continuous improvements with technology up gradation by maintaining focus on product development & reduction in costs is the key to staying competitive in a fiercely challenging scenario.