SHARAD PROJECTS INDIA LIMITED

# CASE STUDY ON SHREYANS INDUSTRIES LIMITED:

## CANAL WATER TREATMENT


**ABSTRACT**

In India, there are 666 pulp and paper mills and out of them 632 units are agro-residue and recycled fiber based. Approximately 2/3$^{rd}$ of the raw materials comes from agro based material like wheat straw, rice straw, bagasse, sarkanda and waste paper etc.

Pulp and paper mills in India use a lot of water, and on an average, large-scale paper mills use 250–350 cubic meters of water per tonne of paper produced. However, water demand can range from 130–450 cubic meters per tonne. Pulp and paper mills use water in almost every part of the process, and the water becomes contaminated with various chemicals. The effluents from these mills are a significant environmental concern.

Also the waste water generation is high i.e. approximately 75–225 $m^3$ waste water/ton paper. The agro-residue based mills alone generate 150–200 $m^3$ effluent/ ton paper. Due to water scarcity and deterioration in water, the groundwater availability is decreasing. So we need efficient water management techniques.

Groundwater pumping has significant limitations, primarily due to its high costs. Companies incur an average expense of Rs. 26-28 per 1,000 litres of water. Consequently, Pulp and Paper Industries must explore alternative water sources.

Relying on canal water is also not advisable due to its high turbidity, suspended solids, and colloidal particles. These impurities can:

- Compromise equipment performance, leading to frequent breakdowns and downtime
- Interfere with the paper-making process, affecting product quality
- Result in economic losses
- Decrease heat transfer efficiency, increasing energy consumption

India's pulp and paper industry faces significant water management challenges. This case study showcases the successful implementation of Sharad Projects India Limited's (SPIL) canal water treatment technology at Shreyans Industries Limited, reducing water scarcity and environmental concerns.


**ABOUT SHARAD PROJECTS INDIA LIMITED (SPIL)**

SPIL is a community of closely-knit, diverse, and talented individuals operating under robust leadership. Established in 1994, SHARAD PROJECTS INDIA LIMITED (SPIL) is a multidisciplinary, professionally managed consultancy group providing global expertise in all aspects related to the Pulp and Paper Industry & Environmental Projects.

The company's forte lies in the design, manufacturing and erection of major projects, offering services, competitiveness, and the ability to manage multidisciplinary teams. The commitment to delivering customized services tailored to clients' needs and local conditions has fostered successful business relationships.

The company is managed by a team of Professionals & Technocrats with an idea to provide turn-key services to various Industries.

**INTRODUCTION OF SHREYANS INDUSTRIES LIMITED**

Shreyans industries limited, was incorporated in 1979. The company is located at Ahmedgarh (Distt. Sangrur) Punjab. Shreyans Industries limited manufactures writing and printing paper, the combined installed capacity of the plant is 94,000 MTPA.

Shreyans industries limited manufactures Writing & Printing Paper with a GSM range between 44 to 200 GSM and a brightness range of 75 to 90%. The paper is manufactured in the form of sheet and reel.

The product range of Shreyans Industries includes High Brightness paper, Cream Wove, Coloured paper, Duplicating Paper, Stamp Paper, Azure Laid Paper, Maplitho Paper, Super Printing Paper, Rail Ticket Paper, Super Calendered Paper, Surface Sized Printing Paper, Offset Paper, Postal Envelope Paper, Inland Letter Paper etc.

**PROBLEM**

Paper industry is a high water consuming industry. Government policies restricts/ prohibit the use of underground water for industrial use. If it is allowed, then the price of water is about INR 26/$m^3$. Thus extracting water from underground is very expensive and this price makes the paper industry financially non-viable so industry has to shift on raw canal water.

As we know that groundwater pumping has its own limitations therefore Shreyans industries limited uses canal water as their process water. But the main problem is high values of Turbidity (40-3000 NTU) and TSS (10-150 ppm) in canal water which makes it unsuitable for using it directly into the process. During the rainy season raw canal water contain high turbidity i.e. 3000 NTU which is needed to be reduced to the range of 10- 12 NTU. If it is not treated, then it may cause hindrance in the paper making process and may lead to many complications. It can affect the quality of the final paper product, causing spots, streaks, and unevenness etc.

**SOLUTION**

SPIL has made efforts to reduce groundwater usage by treating canal water to make it fit for process usage. SPIL embraces recycle to reduce philosophy to bring down the impact of Shreyans industries. SPIL has proposed and implemented full complement of engineering and consultancy services by treating canal water.

SPIL has implemented a multi-stage water treatment process to purify canal water:

**Stage 1: Pre-treatment**

A Rotary Screen removes large particles from the canal water, screening out unwanted debris.

**Stage 2: Macro Settling**

The screened water then flows into a Macro Settler, which captures remaining macro particles that escaped the rotary screen. This prevents sludge accumulation in the holding tank.

**Stage 3: Flocculation**

Chemicals such as lime and PAC/Alum are added to the Flocculation Tank to create flocs, increasing the density of suspended particles for efficient separation.

**Stage 4: Micro Plate Settling**

Four Micro Plate Settlers (MPS-150) further reduce Turbidity and Total Suspended Solids (TSS) in the canal water to desired levels, ensuring effective water treatment.

This sequential process enables SPIL to achieve optimal water quality for its operations.

MPS installed at Shreyans Industries Ltd.

**Micro Plate Settler (MPS)** is a solid liquid separation equipment which is highly efficient in removing all the left over particulate matters. It is designed and developed by SPIL and its concept is based on Hazen's law with latest lamella sedimentation & gravity technique for fast & efficient water clarification.

**Design & Features:**

- MPS is a unique equipment that is a custom design for each application and characteristics of fluid to be handled. It uses dual media with different working principles for water clarifications.
- Flocculation Chamber is used for flocs generations and suspension also keeps heavy solid from entering MPS Screw Pump
- MPS works on cross flow passage design for solid liquid separation.
- The plate media are inclined at specific angle required for different applications.

- Horizontal Fin Media have a unique design media in rack arrangement separates out fine suspended solids that passes through inclined plate media. This media works by creating steam line flow & utilizing the fluid boundary layer for solid liquid separation.
- MOC of the MPS is designed according to the fluid characteristics

**Advantages:**

- SPIL'S MPS works on 90-99% efficiency
- Low space requirement
- Low Hydraulic Retention times of only 30 min makes the unit very compact, lightweight with high specific clarification. Volumetrically less than 1/5th size of conventional Sedimentation Clarifier.
- Low Retention Time eliminates chances of septicity of the fiber/organic solids.
- Very low maintenance cost since there are no moving parts except flocculation Chamber Agitator.
- MPS is best substitute of Poly Disc Filter (PDF), Dissolved Air Floatation (DAF) & conventional clarifiers.
- Recovered water from ETP can be reused in the system hence reduced load on raw water source.
- Consumption of chemical/ polymer is either nil or negligible.
- Handles shock loads of flow without affecting effluent quality.
- Continuous operation without major down time.
- Individual plate sections can be easily removed.

**Why MPS over Conventional Clarifier?**

| S. No. | Micro Plate Settler | Conventional Clarifier |
|---|---|---|
| 1 | Low hydraulic retention time of only 30 minutes makes the unit very compact, lightweight with specific clarification. (Volumetrically less than 1/5th Size) | High Hydraulic retention time of more than 2.5 hours makes the system bulky. |
| 2 | Most modern clarification system with efficiency more than 85 – 90 % | Efficiency of sedimentation process is mostly not beyond 65% |
| 3 | Low retention time eliminates chances of septicity. | Effluent turns septic and thereby leads to foul smell due to high retention time. |
| 4 | Easy to clean, pre – fabricated design is shift able leading to fast erection in small area | Permanent huge Civil construction requires a large area. |
| 5 | Compact & requires only 65-80% of the area than conventional clarifier | Requires larger footprint area |

| | | |
|---|---|---|
| 6 | Thin blade separation cell protects the escape of micro-flocs and rising sludge in the treated water | Works by sedimentation alone, rising sludge is difficult to handle |
| 7 | Settled sludge is drained off by gravity | It requires sludge transfer pump. |
| 8 | Low power consumption, No internal moving parts requiring maintenance | Power required for the movement of internal mechanism and sludge transfer pump. |
| 9 | Low operating cost. No civil work required | Specialized long duration civil works involved |
| 10 | No gear boxes. No lubrication | Daily maintenance of drive system |
| 11 | Fully automated system with high working efficiency | No automation in conventional clarifier |

**Applications:**

- Canal Water/Underground Water
- Machine Back Water, Fiber Recovery
- Centri-cleaner Reject, Deinking Foam
- Black Liquor, Wet Washing
- Starch Recovery, Sulphate Removal
- Replacement of ETP Primary & Secondary Clarifiers.

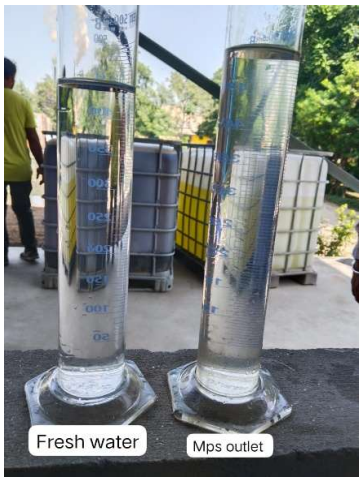
The recovered water can be reused in the process, significantly reducing the demand for freshwater and alleviating pressure on natural reservoirs. The readings are as follows.

| S. No. | Flow ($m^3$/hr) | Inlet turbidity (NTU) | Inlet TSS (mg/L) | Outlet turbidity (NTU) | Outlet TSS (mg/L) |
|---|---|---|---|---|---|
| **Min** | 100 | 40 | 12 | 2 | 4 |
| **Max** | 102 | 1500 | 150 | 9.8 | 9 |

**Table No. 1**



**Inlet to Rotary Screen and outlet from MPS is shown in the above images.**




For comparison purposes, a freshwater sample is displayed alongside the MPS outlet sample. As evident from the image, the MPS outlet water is remarkably clear, virtually indistinguishable from freshwater.

**Outlet from MPS is as per desirable parameters i.e. <10 ppm**

**CONCLUSION**

After analysing the readings, it has been concluded that

- The TSS removal efficiency is up to **94%.**
- The turbidity removal is up to **99.34%**
- Clarified Water is directly used in the process.
- Reducing maintenance cost and breakdowns.
- Energy savings are achieved through reduced heat energy loss.

This case study demonstrates SPIL's technology capabilities, establishing the company as a leading provider of innovative water treatment solutions. The commercial plant installation at Shreyans Industries Limited has yielded exceptional results, validating the technology's capabilities.

Hence SPIL'S MPS is a perfect solution to clarify water from various applications like Raw/ Canal Water Clarification, Paper Machine Backwater, Deinking Foam Water, Wet Washing System, Black Liquor Clarification, etc.

With over 100 companies trusting SPIL's innovative solutions, Sharad Projects India Limited has established itself as a leading technology provider in the field of pulp and paper industry and environmental projects.